# INTERNATIONAL MILITARY & NAVY GUIDE

Special analytical export project of the United Industrial Edition

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# Defense Technologies for Gulf States and Middle East

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# CONTENTS



## EDITORIAL

## The best offers for Middle East

**It has become already obvious and undeniable that security is becoming increasingly important among the various values of civilization. Today, for any state, the ability to reliably and securely protect the territory, residents and values is a priority.**

**Political situation in the world (conflicts, sanctions, threats of war and other) makes nations once again reconsider their defense possibilities. Threat of local conflicts to be evolved into global ones, failure of worldwide system of safety and nonending 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 technologies in order to safety, rivalry among sellers of weapons and defense systems increases in order to achieve such goals as increasing profits and market share. International defence exhibition & conference IDEX-2019 and Naval defence exhibition & conference NAVDEX-2019 presents in Aby Dhabi the best world (Russian also) weapons and innovations for global market, which are the undisputed world leaders on price and quality in their segments.**

**These exhibitions shows that it is not serious about how many weapons and planes you have, but quality and possibilities of every single one of them is fact what leads to victory on the battlefield and on the global market. Other significant 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 products, solid aftersales service and proven reliability, Russia is honest and friendly partner for all countries, ready for mutual work.**

**Taking part in this defence forum in Abu Dhabi Russia continues the policy of open partnership with Gulf states. Russia has a wide product line that meets all the needs of this region and ready propose the best technology and the best price offers.**

**Valeriy Stolnikov**

## EQUIPMENT TO THE TIANWAN NPP

The Roselectronics Holding of Rostec State Corporation installed the radiation-resistant television equipment to monitor nuclear fuel reloading at the Tianwan Nuclear Power Plant (China). The equipment was supplied as a part of construction of two new power units at the Nuclear Power Plant. It was the first export supply of equipment of such kind. Earlier Rostec has already supplied its solutions to the Tianwan NPP: automated workstations, industrial controllers and radiation control systems.

Special cameras may operate at a distance of 30 cm from the nuclear fuel assemblies at extremely high radiation levels (up to 1x107 rad/hour) and with a significant dose of total radiation accumulated over the entire period of operation (up to 2x108 rad). The plain equipment in similar conditions instantly gets out of order. The supplied systems consist of a television camera with a guiding device and an attachment fitting to be installed in the zone exposed to radiation, and the receiving equipment to be installed in the control room and not exposed to radiation.

The thermal imaging systems supplied to the Tianwan NPP were developed by the HVDC Power Research & Development Institute RASTR belonging to Roselectronics Holding and are a product of cooperation between several Roselectronics enterprises. Each system component is a unique technological solution contributing to the overall high quality and reliability of the equipment.

'China is our key partner in a wide variety of industries, including the nuclear energy sector', noted Viktor Kladov, the International Cooperation and Regional Policy Director at Rostec. 'Installation of the Russian systems at the strategic facility of the People's Republic of China is an indication of the highest level of relations between our countries and high confidence in the Russian equipment'.

China is one of the major trading partners of the enterprises of Roselectronics Holding. Side-by-side with the China Electronics Technology Corporation (CETC), the holding develops research and development cooperation in the field of radio electronics, including the joint development and production of multi-system high-precision navigation receivers (modules). In total, seven agreements have been signed between Rostec and Chinese state corporations covering various areas of cooperation in the field of civilian and dual-purpose technologies.

## Rostec Expands Cooperation With Latin America

***United Engine Corporation (UEC, part of Rostec) is expanding its cooperation with the largest gas transmission company in Argentina–Transportadora de Gas del Sur S.A. (TGS). The plans include new deliveries of NK industrial gas turbine engines manufactured by JSC Kuznetsov (part of UEC), and also the transfer of technologies for semi knocked-down (SKD) repair of TGS engines.***

In June this year, Rostec's holding company supplied the NK-14ST gas turbine engine to Argentina. Installation and commissioning works have been completed and the engine has successfully been put into operation. Four NK-12ST engines and three NK-14ST engines are being operated successfully in the country as part of the gas pumping units of the state-owned company TGS at the Belisle and Indio Rico compressor stations. Under the new contract signed between UEC and TGS in June, the delivery of another NK-14ST is expected in 2019.

The Corporation's holding is also implementing a contract for the overhaul of two NK-14ST gas turbine engines operated by the Argentine company, as well as an agreement for the supply of spare parts to support the operation of TGS engines. In addition, the companies are exploring the possibility of concluding new agreements for the supply of both spare parts, as well as new engines.

'Rostec is particularly focused on not only expanding the range of supplies in the region, but also developing after-sales service for its products. We are not offering our partners a single, standalone product, but a full range of related services,' said Viktor Kladov, Rostec's Director for International Cooperation and Regional Policy. 'Latin America is a promising region for the Corporation. Rostec is ready to offer its partners solutions that are competitive both in terms of price and quality, with the subsequent transfer of technologies.'

Another promising area of cooperation between UEC and TGS is localizing individual projects for the overhaul of gas turbine engines at the production facilities of the Argentine company, with the prospect of concluding a technology transfer contract. Technology transfer is an issue that is discussed at the regular meetings held by the two parties.

TGS is the largest producer and supplier of natural gas in Argentina. The company operates the longest pipeline system in the country and the whole of Latin America. Thanks to three trunk pipelines–Neuba I, Neuba II, and San Martín–the company transports 60% of all the natural gas consumed in Argentina and delivers it to distributors and industrial enterprises.

Rostec continues to implement its Development Strategy, the main goals of which are to increase revenue by an average of 17% in ruble terms until 2025, to improve operational efficiency and enter global markets. Latin America is one of the key regions for Rostec. Alongside its Latin American partners, the Corporation is developing projects in the field of engine building, machine manufacturing and helicopter engineering.

## Center for Russian aircraft in Peru

***The maintenance and repair center for Russian-made helicopters Helicentro Peru has been launched in Lima at the facilities of the Peruvian Air Force Maintenance Service – SEMAN. Built in partnership with Russian Helicopters (part of Rostec State Corporation), the center will provide maintenance for Mi-type aircraft.***

The official opening ceremony was attended by CEO of Russian Helicopters Andrey Boginsky and Chief Commander of the Peruvian Air Force Rodolfo García Esquerre.

The facility will be used by Helicentro Peru to repair Mi-17 civil helicopters operated in the region, and by Russian Helicopters to overhaul Mi-17 aircraft of the Peruvian Air Force.

'The establishment of the maintenance and repair center for Russian helicopters in Peru is of strategic importance – it will enable to provide the full range of work without taking out fuselages from the country. Although the center has just started its operation, it has already orders until 2023 – nearly 40 helicopters have been planned for repair during the next five years. In addition, the advantageous geographical location of Peru and the enterprise's production capacity would enable to accept orders from other countries of the region,' noted Andrey Boginsky, CEO of Russian Helicopters.

'Peru is the major importer of Russian-made aircraft in Latin America. This country is currently operating over 100 Russian helicopters,'

said Viktor Kladov, Rostec's Director for International Cooperation and Regional Policy. 'We continue to create a unified system for managing the life cycle of our helicopters in Peru. The opening of the aircraft maintenance center is significantly enhancing our positions in Latin America that is a top-priority region for Rostec.'

## ZENIT & LEICA

Krasnogorsky Zavod, manufacturer of the Russian brand Zenit, in cooperation with Leica Camera AG, German manufacturer of premium cameras and optics, designed a new digital rangefinder camera Zenit M with a new generation lens. The Shvabe Holding, part of Rostec, has presented this product on its exhibition stand at Photokina 2018, the largest international trade fair for the photographic and imaging industries held in Cologne. One of the participants of this Russian-German project is Krasnogorsky Zavod (KMZ Zenit), one of the Russian leading designers of photographic equipment, is part of the Shvabe Holding. The Zenit M camera is technically based on the Leica M Type 240 platform, but has been modified both in terms of hardware and software.

## COMPONENTS FOR THE INDIA SPACE CENTRE

The Ruselectronics holding company, which is part of Russian State Corporation Rostec, has supplied ferrite components to the Space Applications Centre of the Government of India. These materials will be used in super-high-frequency devices for space satellites.

Ferrite Domen Scientific Research Institute (part of the Ruselectronics holding) has delivered microwave ferrites for the space industry to the customer. They can be used under conditions of solar radiation and other interference to precisely control wave oscillations, switch energy flows from one direction to another, and partially or fully absorb the power flow. These characteristics mean that microwave ferrites can be used as components in space microwave equipment.

'India is continuing to actively increase its pace of space exploration and is spending more than $1.2 billion per year in this field. The country is already ranked fifth among the space powers and intends to strengthen this position. The first supply of ferrites for Indian civilian satellites allows us to open a new area of cooperation and gain a foothold in this fast-growing market. Thanks to the expansion of cooperation with India, in 2018, we already expect to quadruple the share of exports of ferrite products compared to last year,' says Rostec's Executive Director, Oleg Yevtushenko. Ferrite Domen Scientific Research Institute manufactures around 40% of all ferrite products in Russia. The Space Applications Centre of the Government of India produces civilian satellites, which are used for telephone communications, radio broadcasting and satellite Internet. In addition, the organization develops optical and microwave sensors for satellites, and software for signal and image processing.

## Rosoboronexport Helps Make Africa Safe

***Rosoboronexport, part of the Rostec State Corporation, attended the Shield Africa 2019 International Security and Defense Exhibition which was held from 22 to 24 January 2019 at the Police Academy in Abidjan, Côte d'Ivoire.***

'Shield Africa 2019 was the first exhibition event for Rosoboronexport in the new year. This is symbolic because 2019 should be the Year of Africa for Russia's system of military-technical cooperation, in which several important projects with the countries of the continent will be implemented. We have been fruitfully working with the largest associations in sub-Saharan Africa, such as the Southern African Development Community (SADC) and G5 Sahel. Rosoboronexport helps its partners and looks forward to increased cooperation in countering terrorism, organized crime, piracy and providing security,' said Rosoboronexport's Director General Alexander Mikheev.

The Company was conducting an extensive business program in the framework of Shield Africa 2019, during which it presented to its existing and potential foreign customers its capabilities for supplying a wide range of weapons and military equipment for counter-terrorism and special police operations.


Ground and air vehicles for moving and delivering special-purpose units and their equipment are most in demand in African countries. In particular, the BTR-80A, BTR-82A armored personnel carriers, infantry fighting vehicles, Tigr family of armored wheeled vehicles, as well as the Mi-35M transport/attack helicopter and the Mi-17-type military transport helicopters.

According to the organizers, this year's exhibition focused on border security and critical infrastructure protection. In this area, Rosoboronexport was ready to present a wide range of surveillance and monitoring assets, including unmanned aerial vehicles and radars.

In addition, Russian small arms, close combat weapons, special-purpose weapons and equipment, non-lethal weapons and special technical devices are of great interest in the African countries.

'We are well aware of the needs of our partners and friends and appreciate their desire to make Africa a safe territory. I'm sure that Russian-made battle-tested products are fully consistent with these goals,' added Alexander Mikheev.

## Mi-172 to Equatorial Guinea

***As part of the contract with the government of Equatorial Guinea, Russian Helicopters holding company (part of Rostec State Corporation) produced and transferred to the customer two Mi-172 helicopters manufactured at Kazan Helicopters (KVZ). The vehicles have already been sent to Central Africa.***

One of the helicopters produced under the contract was delivered in the Salon VIP modification. The vehicle is designed for transportation of up to 12 passengers in greater comfort. The custom-made interior is equipped with all the necessary up-to-date hardware and uses high-quality materials. The second Mi-172 has been transferred in the passenger modification. It can transport up to 26 people in comfortable conditions.

'Equatorial Guinea is a long-time partner of Russian Helicopters. In 2006, we also delivered two Mi-172 helicopters in Salon VIP and Passenger modifications to the country. I would like to note that Russian helicopters are popular in Africa due to their advantages: reliability, easy operation, good price/quality ratio. Therefore, I am sure that this contract will not be the last one,' said the CEO of the Russian Helicopters holding company, Andrey Boginsky.

The Mi-172 is one of the Mi-17 pattern helicopters that is certified for passenger transportation and has established itself as a reliable vehicle with a high level of safety. The Mi-172 is a classical single-rotor helicopter with an antitorque rotor and a twin-engine power unit. The improved performance of the helicopter meets special requirements for passenger transportation. In addition to the passenger and VIP modifications, there are also transport, medical and evacuation, search and rescue, military and firefighting models of this vehicle. Specific features of the Mi-172 include the large power reserve of the power unit, excellent altitude characteristics, a spacious cockpit, various options of avionics, and autonomous preparation for flights and maintenance.

The Mi-8/17 pattern helicopters are designed for operation in any climatic conditions as they can be used in a wide temperature range (from -50°C to +50°C). Today, there are a total of 400 Mi-8/17 helicopters in countries on the African continent.

## COOPERATION WITH SOUTHERN AFRICA

Rosoboronexport took part in the Southern African Development Community (SADC) Day celebrations. 'Rosoboronexport regards the Southern African Development Community as a promising partner. It is one of the largest and most influential subregional organizations whose activities are aimed at comprehensively promoting the development of its member countries. The Community's goals and objectives largely comply with our strategy on the African continent. We are working closely with member countries of the Community in strengthening infrastructural and state security, combating terrorism and organized crime, preparing and equipping peacekeeping missions under the auspices of the Community. We are pleased to have such a strong and reliable partner in Africa,' said Rosoboronexport's Director General Alexander Mikheev.

Today, Rosoboronexport notes an upward trend in the arms market in the sub-Saharan African countries, which is due to a number of objective factors. Among them are the fight against the spread of international terrorism and Islamic radicalism, the continuing threat of maritime piracy. In addition, different units from countries in the region are actively involved in peacekeeping operations.

The Company uses a comprehensive approach to cooperation with the countries of the region, offering its partners the delivery of final products, as well as the necessary logistics support throughout their life cycle, training and the establishment of facilities for the repair and maintenance of products.

## RUSSIAN LADA IN GLOBAL MARKET

LADA continues to strengthen its positions on foreign markets. It was sold 27398 cars and SKDs in 9 months of 2018 that is by 65% more vs the same period of last year. Along with that it was opened 2 new directions and 9 dealerships. Since the early year LADA cars started to be sold in two new countries – Tunisia (Tunisia) and Chile (Santiago, Punta Arenas). LADA occupies the second position in Belarus by sales results for 9 months of 2018. The brand's dealership has been actively developed here: since the early year 6 new dealerships were opened in Minsk, Gomel, Mogilev, Pinsk, Vitebsk, and Grodno, fully meeting the new standards of design and service. For 9 months of 2018, 3 new LADA dealerships were opened in Uzbekistan – in Tashkent, Dzhizak and Bukhara. By results of 9 months LADA has again occupied the first position by sales in the Republic of Kazakhstan with a market share of 22,9%. And its growth took 5.2% points vs the same period of last year.

# Naval materiel for the external market

***Alexander Mikheev, Director General of Rosoboronexport (part of the Rostec State Corporation), and Renat Mistakhov, Director General of the Ak Bars Shipbuilding Corporation, signed a cooperation agreement and a joint action program to promote naval materiel in the external market in 2019–2023.***

'The agreement will undoubtedly strengthen Rosoboronexport's positions on proposals for naval forces. We are closely monitoring trends in the world weapons market, we are leading some of its directions, and we ourselves are making the rules of the game that competitors have to follow. The documents signed will make it possible to manufacture products that meet the needs of foreign customers as much as possible, and also provide technology transfer – a highly demanded service today – with our very responsive and reliable protection of the results of intellectual activity of the Russian developers and manufacturers,' said Alexander Mikheev.

The purpose of signing the documents is to organize effective interaction between the companies in developing, manufacturing and promoting Ak Bars Shipbuilding Corporation's military, special, civil and dual-use products and services in external markets.

'I am very pleased to consolidate cooperation with the leading exporter of Russian weapons. We see Rosoboronexport as a reliable partner with many years of experience in external economic activities. I'm sure that our joint efforts will help the Corporation meet its primary strategic goal of increasing the revenues from the current level of 38.5 billion rubles to 100 billion rubles by 2025. In addition, I wish to note the social value of the agreement for Tatarstan: today the Corporation unites 10 enterprises and organizations that employ about 10,000 people. The portfolio of foreign orders for our products supports the modernization of production, permanent employment and growth in incomes,' said Renat Mistakhov.

Under the agreement signed, Rosoboronexport will consider Ak Bars as a possible participant in various military and technical cooperation projects with foreign countries, including in the course of its international naval market research. As is known, Rosoboronexport has been appointed the organizer of the joint Russian displays at international defense exhibitions abroad. In this role, the Company stands ready to provide organizational and information support to the Ak Bars Corporation.

'Rosoboronexport is proud to present Ak Bars products at international exhibitions. Navy representatives from the Company's partner countries pay great attention to the Gepard-class frigates, our bestsellers supplied to a number of countries. This year we have added new Ak Bars products to our catalog, namely the Sarsar and Karakurt-E class missile ships, which have generated enormous interest abroad, including through the battle-proven Kalibr cruise missile systems integrated into them,' added Alexander Mikheev.

# Cooperation with Southern Africa

***Rosoboronexport JSC (part of the Rostec State Corporation) took part in the Southern African Development Community (SADC) Day celebrations.***

'Rosoboronexport regards the Southern African Development Community as a promising partner. It is one of the largest and most influential subregional organizations whose activities are aimed at comprehensively promoting the development of its member countries. The Community's goals and objectives largely comply with our strategy on the African continent. We are working closely with member countries of the Community in strengthening infrastructural and state security, combating terrorism and organized crime, preparing and equipping peacekeeping missions under the auspices of the Community. We are pleased to have such a strong and reliable partner in Africa,' said Rosoboronexport's Director General Alexander Mikheev.

SADC was formed in 1980. Today it comprises 16 member countries, including South Africa, Angola, Tanzania, Mozambique, Zambia, Zimbabwe, Botswana, which are striving to establish a single financial, legal, and trade and economic space. Rosoboronexport actively holds meetings with SADC at various levels to discuss possible cooperation projects.

Today, Rosoboronexport notes an upward trend in the arms market in the sub-Saharan African countries, which is due to a number of objective factors. Among them are the fight against the spread of international terrorism and Islamic radicalism, the continuing threat of maritime piracy. In addition, different units from countries in the region are actively involved in peacekeeping operations.

The Company uses a comprehensive approach to cooperation with the countries of the region, offering its partners the delivery of final products, as well as the necessary logistics support throughout their life cycle, training and the establishment of facilities for the repair and maintenance of products. In addition, the possibility of organizing licensed production of Russian weapons and military equipment on their territory is being discussed with some countries.

## TEST COMPLEX FOR PD-35

**United Engine Corporation (UEC), a part of Rostec, will build a test complex for the prospective PD-35 aircraft engine, which is proposed to be used in the Russian-Chinese CR929 aircraft. The testing facilities will be created at JSC 'UEC-PERM ENGINE'. There will be about 40,000 square meters of production, administration and accommodation, and engineering areas with state-of-the-art equipment on the premises of the out-of-town test facility in Russia's Perm Krai. The cost of the project is about $300 million, the first test stands will be built in 2021.**

'The most important objectives during the implementation of the prospective PD-35 project include exhaustive tests of both separate subassemblies and full-size engines. To achieve this, we are creating infrastructure that meets the latest requirements. We have already started preparing designs for facilities. I would like to remind that PD-35 is one of the most significant developments in Russian aviation. I am convinced that the joint project on creating the engine for the prospective Russian-Chinese CR929 aircraft, based on the PD-35, will combine the best technological and managerial competencies of the two countries and will become an example of successful international partnership in the sphere of high technology', said Victor Kladov, Director for International Cooperation and Regional Policy Department of Rostec.

UEC started the development of the PD-35 engine in the summer of 2016. The bypass turbofan engine is expected to have increased thrust (up to 35 tonnes) and to be installed in prospective wide-body aircraft.

The PD-35 project widely uses the scientific and technical reserve obtained during the development of the newest Russian PD-14 engine for the prospective MS-21-300 aircraft.

Currently, the design of the PD-35 engine has been determined, cooperation between industry enterprises has been established, and issues related to breakthrough technologies for project implementation have been identified. This allows creating a competitive engine of the late 2020s. A family of high thrust engines may be created on the PD-35 base.

On September 20, 2017, during Aviation Expo China 2017 held in Beijing, UEC signed a cooperation memorandum with the Chinese company AECC Commercial Aircraft Engine Co., Ltd. (AECC CAE) on the development of a gas turbine engine for the prospective CR929 Russian-Chinese long range wide-body aircraft (LRWBA).

Rostec continues to implement a large-scale program on developing its Aviation Cluster in accordance with the approved strategy stipulating the main goals such as increasing ruble revenue by an average of 17% until 2025, increasing the share of civilian products in the revenue to 50%, improving operational efficiency and getting into global markets.

## Cooperation in Southeast Asia

***The Russia-Singapore Business Council (RSBC) and the Singapore Manufacturing Federation (SMF), representing the interests of the country's manufacturing companies, have signed a cooperation agreement. The parties have agreed to expand the multilateral cooperation between companies of the two states, primarily Rostec's enterprises, in high technology areas that are most relevant for the Singaporean partners.***

The agreement has been signed by Deputy Chairman – Executive Director of the Russia-Singapore Business Council Sergey Pronin and President of the Singapore Manufacturing Federation, candidate to the Parliament of Singapore Douglas Foo. The document also provides for establishing joint certification centers to promote Russian manufacturers' products in Southeast Asia.

'I firmly believe that this agreement will boost expansion and intensification of the cooperation between Rostec's enterprises and companies of the Southeast Asian countries,' stressed Rostec Deputy CEO, RSBC Chairman Nikolay Volobuev. 'Singapore is a leading financial center in rapidly developing Southeast Asia. Therefore, by strengthening our presence, we are laying the foundation for long-term collaboration between our enterprises and companies of all states in the region.'

The official ceremony of signing the agreement took place within the Exhibition of Russian Technologies being held in Singapore on November 12–29. The exposition is organized at the facilities of the Center for Foreign Promotion of Russian High Technology Companies and Presentation of Investment Projects located in TechPlace II – a largest industrial park of the country.


Within the event, the parties have also signed a trilateral agreement between the executive body of the Business Council – RS Trade House, Singaporean company Progression Engineering (S) Pte Ltd and Autonomous Nonprofit Organization 'Far East Investment and Export Agency'. The partners have agreed to jointly promote high-tech companies and investment projects of the Far East in Southeast Asia. Promotion will be supported by the Center for Foreign Promotion established by the RSBC with the support of the Rostec State Corporation and RSTrade – international electronic information and service B2B Platform.

Rostec continues implementing the large-scale program for promoting the State Corporation's high tech products abroad in accordance with the approved Strategy that includes 17% average annual rouble revenue growth, increase in the share of civilian products in revenue up to 50%, improvement of operating efficiency and entry into international markets.

## Engine Components for MC-21

***United Engine Corporation (UEC) and the All-Russian Institute of Light Alloys (VILS), both forming part of Rostec, will prolong the life of the PD-14 engine by using a new heat-resistant granulated alloy.***

The new alloy has been used for making high pressure compressor discs and a turbine for the PD-14 engine created for the first Russian short and medium-haul MC-21 aircraft. According to current estimates, its implementation, along with other innovative technical solutions, will increase the life of these components of domestic engines for civil aviation from 5 to 30 thousand flight cycles.


'PD-14 is the result of the broad cooperation work of our enterprises. The innovative solutions applied in it, including new alloys, allowed to create a truly modern, powerful and highly resourced aviation engine. The first flight of the prototype MC-21 with PD-14 is scheduled for the second quarter of 2019. Deliveries of PD-14 for MC-21 will begin in 2021', said Anatoliy Serdyukov, Industrial Director of Rostec's Aviation Cluster.

In 2019 the All-Russian Institute of Light Alloys (VILS) will conduct additional research in the interests of UEC, which will allow more extensive use of this technology for engines of civil aircraft. The research includes development of new alloys and products for a new generation of PD-35 engines based on these alloys.

## SERVICE CENTER IN EGYPT

Russian Helicopters Holding Company (part of Rostec State Corporation) is completing the creation of maintenance, repair and overhaul (MRO) center for Mi-8/17 helicopters based at the facilities of Helwan Factory for Developed Industries (HFDI) in Helwan (Egypt). The Holding Company is to certify the MRO center in Egypt in 2019.

During the first stage, the center will be carrying out maintenance and overhaul of Mi-8T and Mi-17-1V helicopters operated by EAF. Future plans include mastering of a Mi-17V-5 type.

Within 2015-2018 the Holding Company fitted HFDI with the required equipment and conducted personnel training at the Aviation Training Center of Novosibirsk Aircraft Repair Plant. Moreover, basing on the audit results of the MRO center Mil Moscow Helicopter Plant has already issued a statement on the center's readiness to perform helicopter overhaul.

'One of the key objectives of JSC 'Russian Helicopters' is to organize a system of after-sales support providing first-class service throughout the complete life cycle of Russian-made rotorcraft. The holding intends to continue expanding its global network of authorized service centers. Over the past three years, in cooperation with our partners from HFDI we have performed a tremendous job establishing the MRO center for Russian-made rotorcraft at the factory's facilities. The Egyptian side is already in process of performing a pilot Mi-8T and Mi-17-1V overhaul upon the results of which we plan to proceed with certification of the center', announced Igor Chechikov, Deputy Director General for After-Sales Support of JSC 'Russian Helicopters'.

'Egypt is a long-standing and strategically important partner for Rostec. We cooperate in a wide range of areas. At the same time, helicopter industry and after-sales service of equipment are one of the key areas of our cooperation,' said Viktor Kladov, Director for international cooperation and regional policy at Rostec. 'Certification of the helicopter service center in Egypt opens up new opportunities for expanding cooperation with local partners.'

Mi-8/17 helicopters developed by Mil Moscow Helicopter Plant (part of Russian Helicopters Holding Company) are world-famous. Reliable and low-maintenance, they remain in constant demand. They are capable of medevac and humanitarian missions, cargo and passenger transportation (including VIPs). Military-transport Mi-8/17 helicopters are designed to transport service personnel and to carry cargo inside the cabin and on the external sling. These rotorcraft are employed for patrol or search-and-rescue operations and can also carry armament. Not once have they been used for combat operations in flashpoint conflicts as well as for anti-drug operations and missions against illegal armed groups.

## Expanding Cooperation with Southeast Asian Countries

***Russian State Corporation Rostec and the Singapore Manufacturing Federation (SMF) have signed an agreement aimed at promoting Russian high-tech products in Southeast Asia. The document, which has been developed with the active participation of the Russia-Singapore Business Council (RSBC), will enable more than 3000 SMF member companies and more than 700 Rostec enterprises to expand opportunities for cooperation and joint production.***

The contract manufacturing market of the EAEU and the ASEAN is approaching 4.5 billion US dollars in terms of volume, with a development trend that is exceeding the production growth rate. Southeast Asia is one of Rostec's most important partners with which the State Corporation intends to expand foreign economic relations.

'The signed agreement on cooperation opens up new horizons for mutually beneficial bilateral technology transfer, and also the exchange of industrial, engineering and research competencies. I am confident that, in conjunction with other tools and formats for cooperation and promotion, Rostec's agreement with the SMF will lead to qualitative changes in the positions of our enterprises, both in Singapore and in Southeast Asia as a whole,' said Nikolay Volobuev, Chairman of RSBC and Deputy CEO of Rostec.

The agreement, among other things, includes the use of RSBC infrastructure, such as the Singapore-based Centre for Foreign Promotion of Russian High-Tech Companies and the Presentation of Investment Projects established at the initiative of the Council and with the support of Rostec.

'Today, the SMF is an advanced federation serving the industrial community through the introduction of digital data processing, innovative productivity, business transformation and internationalization in order to increase the competitiveness of its member companies. Recently, we have begun to actively develop contacts with major partners in the former Soviet Union. The Russian market is undoubtedly of particular interest to Singaporean partners, and Rostec State Corporation is the largest industrial association of Russian enterprises. I am confident that the signed agreement will lay a solid foundation for expanding and strengthening cooperation between SMF members and Rostec enterprises,' said Douglas Foo, President of the Singapore Manufacturing Federation.


Rostec continues to implement a large-scale program for promoting high-tech products of its enterprises abroad in accordance with its approved Strategy-2025, the main goals of which are to increase the share of civilian products in the revenue to 50%,improve operational efficiency and enterfast-growing global markets.

## Rosaviatsiya said 'Yes'

***Federal Air Transport Agency (Rosaviatsiya) certified the increase in take-off/landing altitude of Ansat helicopter to 3,500 m. Major change approval is issued on the basis of trials conducted in summer 2018 at Mount Elbrus. The document allows Ansat to operate in high-altitude conditions.***

Before that the helicopter take-off and landing altitude was limited to 1,000 m, restricting its use in elevated areas. During certification tests Ansat successfully completed a series of take-offs and landings at altitudes up to 3,500 m, including simulation of one engine failure and autorotation mode, thus confirming its capability to operate in high-altitude conditions.

'The major change approval for increase of take-off and landing altitude of Ansat gives us new opportunities to bring in new customers from countries with such complex terrain. For example, during the South Asian Heli Tour conducted in late 2018 we saw interest from potential helicopter operators in Vietnam, Thailand, Cambodia and Malaysia. We received approximately 30 requests for delivery of Ansat helicopters, and improvement of flight performance will benefit our subsequent customer negotiations', noted Andrey Boginskiy, Director General of Russian Helicopters Holding Company.

'Ansat is one of the main strategic projects for the Corporation. Successful flight tests at the altitude of over 1000 meters have proven reliability and the highest standards of equipment efficiency,' said Industrial Director of Rostec's Aviation cluster Anatoly Serdyukov. 'We plan to continue to upgrade and improve Ansat's performance'.

Ansat is a light twin-engine utility helicopter serially produced at Kazan Helicopters. As per the type certificate, the helicopter design makes it possible to carry out quick conversion from cargo to passenger version capable to transport up to seven people. In May 2015 a major change approval was obtained for EMS version of the helicopter. Ansat is certified for operation in ambient air temperatures from minus 45°C to plus 50°C. In July 2018 a major change approval was obtained for extension of service life of Ansat assemblies.

## AVIATION REVENUE TO REACH $15 BILLION

The inclusion of the United Aircraft Corporation (UAC) will enable Rostec's aviation cluster to increase its revenue to 1 trillion rubles ($15 billion), and make the State Corporation join the ranks of the world's leading aircraft manufacturers, says the Director of Rostec's aviation cluster, Anatoliy Serdyukov.

Russia's President, Vladimir Putin, signed a decree on the transfer of a 92.31% stake in UAC to Rostec on October 24. According to the signed decree, the process of merging the aircraft corporation with Rostec structures will take a year and a half. The inclusion of UAC in the State Corporation's control loop will mean that the entire aircraft production chain can be combined into one, which will strengthen production cooperation between aircraft manufacturers and parts suppliers.

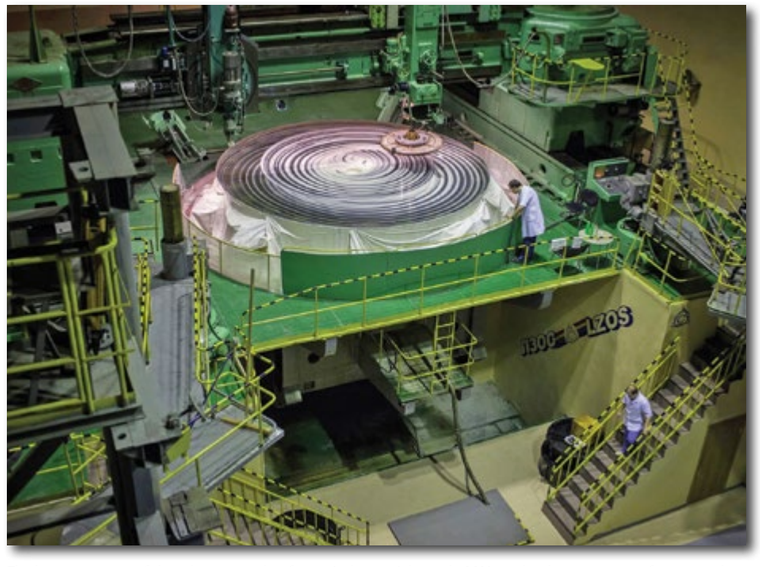
'For Rostec, integration with the UAC is a landmark moment. The share of the aviation cluster in the State Corporation's overall revenue will be approximately 50% – around 1 trillion rubles. This means that the aircraft manufacturing unit will become the most powerful one in the State Corporation, and Rostec will be at the same level with the world's leading aircraft manufacturers,' said the Director of Rostec's aviation cluster, Anatoliy Serdyukov.

The total revenue of Rostec's aviation cluster in 2016 was 534.7 billion rubles; for UAC it was 417 billion rubles. In line with the development strategy of the aviation cluster, it is planned to increase this indicator by an average of 14% per year in ruble terms until 2025. The new structure with a larger turnover will be more attractive to investors. Rostec's other priority projects will include the creation of MS-21 medium-range aircraft – it is expected that about 55 billion rubles will be invested in this by 2025.

Rostec continues to implement a large-scale program for the development of the aviation cluster in accordance with the approved Strategy, the main objectives of which are to develop civilian production, improve operational efficiency, and gain access to global markets until 2025.

## Cooperation with India in Space Sector

***Rostec has supplied a secondary mirror for the telescope of the Indian Mount Abu InfraRed Observatory (MIRO). The mirror was produced at Lytkarino Optical Glass Factory (LZOS), one of the plants of a high-tech Holding Shvabe, at the request of the Belgian manufacturer of the telescope. The manufacturing process lasted a year and a half.***




The key component of the telescope is made of astrositall. The production process comprises several stages, including milling, asphericization, computer-controlled polishing, as well as automated finishing. The mirror was certified and accepted by the customer in early November. To transport it to India, the LZOS specialists also created a special container, a cargo handling device and auxiliary equipment.

'Every suchlike mirror has its own characteristics. The distinctive features of the mirror for the Indian telescope are its special shape and surface quality. With every new contract, mathematical processing of monitoring results used for this purpose is improving and becoming more complex, as astronomers want to obtain an increasingly high-quality image and minimize scattering from the mirror,' said Alexey Patrikeev, CEO of Shvabe.

LZOS, an enterprise controlled by Rostec, is a top producer of optical glass, sitall, large astronomical mirrors and space lenses in Russia. Its share on the Russian and global market for optical materials totals 98% and 7% respectively.

'India is our traditional and long-standing partner, and we confidently expect to expand and enhance our cooperation, including in the space sector. New Delhi continues to scale up space exploration, the country's spending in this area exceeds USD 1.2 billion per year. Today, India ranks fifth among space nations and intends to strengthen its position. In turn, Rostec is ready to offer products and technologies that our Indian customers need,' said Victor Kladov, Director for International Cooperation and Regional Policy at Rostec.

Rostec continues to implement its ambitious program to develop and promote radio-electronic products in accordance with the approved 2025 Strategy, whose main objectives are to enhance the operational efficiency, increase the share of civilian products in revenue to 50% and enter fast-growing global markets.

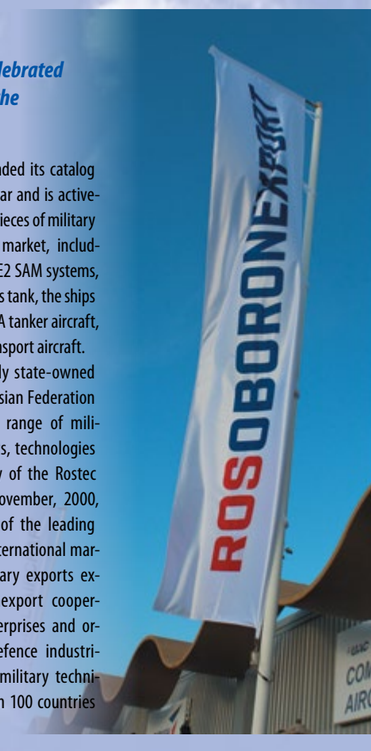
Rostec is a Russian State Corporation established in 2007 with the purpose of facilitating the development, manufacture and export of high-tech industrial products for both civil and military purposes. It incorporates over 700 entities that currently form 11 holdings operating in the military-industrial complex and 4 holdings active in civil industries, as well as over 80 directly supervised organizations. Rostec's portfolio includes such well-known brands as AVTOVAZ, KAMAZ, Kalashnikov Concern, Russian Helicopters, VSMPO-AVISMA, Uralvagonzavod, and others. Rostec companies are located in 60 regions of the Russian Federation and supply products to the markets of over 100 countries. In 2017, Rostec's consolidated revenue reached RUR 1.589 trillion, its consolidated net profit was RUR 121 billion, and EBITDA – RUR 305 billion. According to Rostec's Development Strategy, the mission of the Corporation is to ensure Russia's technological advantage on highly competitive international markets. One of Rostec's key goals is to implement new technological way of living and to promote digitalization of Russia's economy.





## 18th anniversary of Rosoboronexport

***On November 4, 2018, Rosoboronexport, which is part of the Rostec State Corporation, celebrated the 18th anniversary of its founding. The Company was established in 2000 by decree of the President of the Russian Federation.***




'For 18 years, Rosoboronexport has become a world leader in the supply of weapons and military equipment and reached record levels. Today, Russia assuredly ranks second in the world in terms of the scope of military-technical cooperation. The Company's order book stands well above $50 billion, while the total value of deliveries has exceeded $150 billion over the years. We continuously improve and offer foreign customers more and more new models of military equipment, often the best in the world in performance and competitive in terms of price and quality. More than 200 Rosoboronexport employees have been awarded state and departmental awards for their great contribution to the development of military-technical cooperation with foreign countries,' said Rostec's Director General Sergey Chemezov.

In 2018, the Company was actively engaged in efforts to promote and exhibit their products. Rosoboronexport took part in 16 international exhibitions and forums, and 6 are yet to come before the end of the year. The Eurasian Air Show in Antalya, Turkey, the International Far Eastern Maritime Show in Vladivostok and ADAS 2018 in the Philippines were debut exhibitions for the Company. Rosoboronexport is expected to participate in yet another new exhibition, EDEX 2018 in Egypt, to be held late this year.

'Despite unprecedented competition, Rosoboronexport continues to strengthen its position in the global market. Just recently, we signed the biggest-ever contract in company history to supply India with the S-400 Triumph anti-aircraft missile systems. In 2018, we delivered weapons and military equipment to more than 40 countries of the world. At the same time, over 1,100 contract documents worth about $19 billion were signed, almost a quarter more in the whole last year. That statistics suggest that the quality of Russian weapons and their proven performance are a determining factor for our partners,' said Rosoboronexport's Director General Alexander Mikheev.

Rosoboronexport has expanded its catalog of military products over the year and is actively promoting a number of new pieces of military hardware on the world arms market, including the Buk-M3 Viking and Tor-E2 SAM systems, the Sprut-SDM1 light amphibious tank, the ships Karakurt and Sarsar, Il-78MK-90A tanker aircraft, and Il-76MD-90A(E) military transport aircraft.

Rosoboronexport is the only state-owned arms trade company in the Russian Federation authorized to export the full range of military and dual-purpose products, technologies and services. It is a subsidiary of the Rostec Corporation. Founded on 4 November, 2000, now Rosoboronexport is one of the leading world arms exporters to the international market. Its share in Russia's military exports exceeds 85 percent. Rosoboronexport cooperates with more than 700 enterprises and organizations in the Russian defence industrial complex. Russia maintains military technical cooperation with more than 100 countries around the world.


# RUSSIAN INNOVATIONS AT THE IDEX-2019

## *Rosoboronexport presents best and newest weapons and equipment for defence and counter-terrorism*

**Rosoboronexport, part of the Rostec State Corporation, is the organizer of Russia's exhibit display at the International defence exhibition & conference IDEX 2019. Rosoboronexport is showcasing a wide range of capabilities to provide security and counter-terrorism and organized crime. Russian enterprises are developing and producing unique means and solutions for detecting and neutralizing both small groups of extremists and fighting numerous highly organized terrorist groups. Most of them have been successfully tested under real battle conditions and appreciated by specialists during the operation in Syria.**





*Dear friends!*

*On behalf of Rosoboronexport, I welcome and congratulate you on the opening of the 14th International Defense Exhibition and Conference (IDEX) 2019.*

*IDEX has a long history. It has been held since 1993 and is now rightly considered one of the most representative international exhibitions of weapons and security technology. Russia has always been its active participant.*

*Over 1,000 companies from all over the world are showcasing their products at IDEX. Rosoboronexport is proud to organize a joint display of products from Russia's major developers and manufacturers of high-tech weapons and military equipment.*

*Interest in our exhibits from Russia's permanent partners and potential customers is growing here every year. I am sure that IDEX-2019 will traditionally open new horizons in the Middle Eastern region, which is so essential to the Company from a marketing point of view.*

*In Abu Dhabi, Rosoboronexport is showcasing some of the most in-demand products in the world for all services of the armed forces. We unveil new products from our export catalog here every time – this year will not be an exception.*

*Along with the new products that offer significant export potential, Russian companies have traditionally brought to the exhibition their best selling items in the world arms market: airplanes and helicopters, air defense systems, tanks, ships. All of them have been tested in real combat conditions. Visitors to Russia's exhibit display will see full-scale hardware here as well.*

*We are closely monitoring the trends in the international arms market, including in the Middle East. At IDEX-2019, along with displaying the best Russian weapons, we are ready to tell our partners about the diversity of forms of mutually beneficial cooperation.*

*Alexander Mikheev,*
*Director General of Rosoboronexport*

Rosoboronexport is ready to showcase the most advanced security equipment to foreign customers. The exhibits include military and service small arms, weapons and special technical means, specialty equipment, special-purpose weapons and gear, non-lethal weapons, border and critical facility surveillance equipment, law enforcement gear. At the exhibition in Abu Dhabi there are a lot of Russian novelties, among which it is necessary to first of all name the grand world premier.

At the Russian exposition Rosoboronexport and High-Precision Weapons Holding arrange the first demonstration within a foreign defence show of the Pantsir-ME shipborne air-defence missile and artillery system developed and produced by the KBP named after Academician A.Shipunov (part of the High-Precision Weapons Holding).

'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 countering practically all the possible aerial kill assets has been developed in Russia, and it will be represented at one of the largest world defence exhibitions in Abu Dhabi. 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


**Rosoboronexport is the only state-owned arms trade company in the Russian Federation authorized to export the full range of military and dual-purpose products, technologies and services. It is a subsidiary of the Rostec Corporation. Founded on 4 November, 2000, now Rosoboronexport is one of the leading world arms exporters to the international market. Its share in Russia's military exports exceeds 85 percent. Rosoboronexport cooperates with more than 700 enterprises and organizations in the Russian defence industrial complex. Russia maintains military technical cooperation with more than 100 countries around the world.**

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 countertypes in the world market in the segment of ship-borne 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, 'Demonstration of a full-scale specimen at the IDEX exhibition is a perfect opportunity to present this new state-of-the-art Russian weapon to our partners from the Middle East and Northern Africa – the strategic region of Rostec's presence.'

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.

At the IDEX-2019 Rosoboronexport has launched a global marketing campaign to promote the AK200 series legendary Kalashnikov assault rifles manufactured by the Kalashnikov Concern.

'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, which will make their international debut at IDEX 2019,' said Rosoboronexport Director General Alexander Mikheev. 'In Abu Dhabi, Rosoboronexport will 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 in the Middle East and around the world.'

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. In the framework of IDEX 2019, we have scheduled a series of negotiations where, among other things, we will discuss the new AK series,' commented Vladimir Dmitriev, Director General of Kalashnikov Concern.

'At IDEX 2019, Russia will showcase cutting-edge weapons and military equipment for countries in the Middle East region, which is of particular interest to Russian industry. The AK200 series assault rifles will be a key novelty that visitors to IDEX 2019 will see. 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 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.

Also Russian exposition presents to foreign customers many interesting things, among them Kornet-E/EM and Metis-M1 ATGM systems, Kalashnikov AK-101, AK-102, AK-103 and AK-104 assault rifles, Kalashnikov Pecheneg machinegun, rocket flamethrower Shmel-M, Varna jet flamethrower, Bur compact grenade launcher system, the AGS-30 and AGS-17 automatic grenade launchers.

In addition, representatives of partner countries show considerable interest in the ground and air vehicles for transporting anti-terrorist units and their equipment. In particular, the BTR-80A, BTR-82A armored personnel carriers, the BMP-3M infantry fighting vehicle, the Tiger family of armored motor vehicles, as well as the Mi-35M transport /attack helicopter and the Mi-17-type military transport helicopters.

Rosoboronexport has in its arsenal exhibiting a number of means for timely detecting and locating terrorist threats, in particular, the Orlan-10E and Takhion UAV systems, electronic devices and the Repellent electronic warfare system designed to counter small unmanned aerial vehicles.

And many, many others...

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 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 customer 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.***

MAIN TOPIC



***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.***

**Core areas of activities of Rosoboronexport**

**• Export / import of all types of conventional weapons, military and dual-use equipment and services.**

**• Organization of licensed production of armaments and military equipment abroad, joint R&D efforts with foreign partners.**

**• Maintenance and repair of earlier supplied weaponry and military equipment.**

**• Modernization of Russian-made weapons and military equipment.**

**• Training foreign specialists in Russia and customer countries in the operation and maintenance of supplied military equipment.**

**• Technical assistance in the construction of military infrastructure facilities: defense plants, airfields, depots, ranges, training centers.**


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 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.

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.

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 customer 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 marketing 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. /IM&NG/

# ADJUTANT OF HIS EXCELLENCY

**Victory in the modern combat situation is achieved through combination of the following components: use of hi-tech weapon models, consistently high level of professional knowledge and practical skills of the specialists operating these weapons, and precision and operational flexibility of decision-making in the multi-tiered command system.**

The proportion of state-of-the-art weapons is growing year over year, in line with the Russian Government's current armament update program aimed at providing the Armed Forces with the most recent models of weaponry and defense equipment. The new weapons are more technologically sophisticated, have extended circle of applications and improved time of response to emerging threats. To keep up, the combat crews operating the weaponry models need to acquire deep knowledge at the stage of familiarization with their functions and rules of their combat application, and to maintain the achieved high level of practical training.

'Train hard, fight easy,' wrote Aleksandr Vasilyevich Suvorov, the great Russian military commander. In practical terms, this old saying is still valid. It is especially relevant, when it comes to the modern situation with the troops' combat preparation, where, along with the training of each individual crew, it is increasingly important to organize the comprehensive multi-tier system for troops management.

Therefore, to achieve maximum practical competence of military units engaged in drill and combat missions, the training conditions must very closely approximate the real battle situation. In particular, for preparation of an air defense crew, it is necessary first to bring the practical skills of each crew member to full automatism using simulators, and second, to design and offer sophisticated (combination) target layouts for training and combat with comprehensive use of various types of targets, providing their maximum resemblance to the existing and future air assault weapons of a potential enemy.

Currently, the target fleet mostly consists of target missiles Saman-M and Strela-10M, with a small amount of Pensne target missiles and remaining Soviet targets Peniye, Kaban, and Strizh. These are all expendable, unreliable, and maneuver-restricted remakes of anti-aircraft guided missiles for obsolete air defense missile systems. Apart from poor reliability of the targets, there are substantial issues related to retrofit and maintenance of the target systems (launch units) whose current working lifespan exceeds 30-35 years.

In the coming years, the number of targets remade from old missiles will be naturally going down. With emergence of new models of short-, medium and long-range air defense systems in military service, the demand for state-of-the-art reusable targets will be annually growing. Another important consideration is that testing of the AM&SE models, primarily of the most recent and future-oriented types, requires not simply airborne targets, but the targets which could very convincingly simulate modern air assault weapons, especially smart weapons (SW). These targets should have high maneuverability and flight speed, minimum radar cross section (RCS), the capability to form sophisticated target groups, etc.

In 2015, the administration of Izhevsk Electromechanical Plant Kupol, JSC, with the approval from Almaz – Antey Air and Space Defence Corporation, JSC, analyzed the above-mentioned considerations and made a decision to carry out a proactive research and development project aimed at creation of an omni-purpose target training complex (OTTC) capable of generating a sophisticated target layout using various simulators of state-of-the-art air assault weapons for a wide spectrum of existing and future-oriented air-defense systems. The product was indexed 9Ф6021 (9F6021), while the project was codenamed Adjutant, which fully reflects the purpose of this system as the main 'aide de camp' for commanders of all ranks in the matters of drilling and training the combat crews, running all types of tests for batch and prototype air-defense systems, and carrying out actual firing with sophisticated target layouts.

'From the first days of the project, the OTTC structural design was discussed with the specialists of the Ministry of Defence of the Russian Federation responsible for education and combat training of air defense artillery units. This discussion resulted in an original concept of the system which had to comply with most of the wide range of requirements to modern training and simulation facilities and helped avoid loss of time and effort in the period of design of the OTTC component parts. The design documentation was promptly prepared, and the pilot samples of airborne targets and the whole system were manufactured,' told Andrey Rusakov, the OTTC chief designer.

'For today, the OTTC 9F6021 comprises a mobile ground control station with operator workstations, three types of airborne targets, outside-mounted air situation display systems, communication systems, and the life sustenance means for the personnel. A logistics module has been developed for accommodation and transportation of equipment for launch, maintenance and refueling of the targets. All airborne targets are reusable. The launch is performed using a mechanical thrower without powder boosters or compressed air, and the touchdown is parachuted.

The first type of airborne targets was developed on the basis of a classical layout airplane type UFV with a thrust propeller and is mainly intended for the initial training of the crews of air defense systems. These targets can only reach a maximum speed of 120 kph but have considerable duration of flight – more than four hours.



The target can be equipped with a pair of remote activation tracers.

The second target type is also made on the basis of an airplane type UFV, but comprises a turbojet engine ensuring a higher speed of up to 100 m/s.

The third target type is intended for imitation of cruise missiles and gliding smart bombs at speeds up to 150-200 m/s. The target was updated, equipped with a turbojet engine, and is now capable of effecting all types of combat spatial maneuvers characteristic of UFV and cruise missiles, including preprogrammed automatic mode.

The fourth type is represented by airborne targets imitating helicopter type UFVs. The target is intended for dynamic and functional simulation of a combat helicopter, including hovering and 'bouncing', at distances up to 10 km away from the launch site.

Presently the preliminary tests of the OTTC prototype are successfully completed. The official tests of the system are scheduled for the end of the current year. Based on the results, the decision will be made concerning the time to launch the batch production and supply the Armed Forces of the Russian Federation with the first samples of this unique product that can substantially improve the training quality for the crews of state-of-the-art air defense systems.' /IM&NG/


# BRAHMOS: India's ultimate force multiplier

**As India reinforces its military might in the highly contested regional and global landscapes of 21st century, the emergence of a unique, state-of-the-art precision strike weapon has not only fortified the country's defence & security apparatus manifold, but also revolutionised modern battlespace in a significant way.**

BRAHMOS – world's most formidable tactical missile combining the deadly features of 'speed, precision, firepower, range, stealth and versatility' – has become the ultimate 'force multiplier' of Indian Armed Forces.

Since its conception in 1998 to its maiden successful test firing in 2001 and continuous evolutions thereafter, BRAHMOS has maintained its lead as the world's fastest and best cruise missile system to date.

Cruising at a very high speed of three times the speed of sound, the 3-ton heavy missile carries a conventional payload of up to 300-kg and is capable of completely obliterating an enemy target just in the wink of an eye. The terrain-hugging, fire-&-forget, quick-reaction missile having stealth features uses a high-low trajectory throughout its supersonic flight, thus evading an air defence system of the enemy, however powerful it maybe.

'The formidable BRAHMOS has strengthened the security apparatus of India manifold. The missile is one of the best weapon systems in India's military arsenal. It is the backbone of our Army's Artillery. In the Navy, it is the 'prime strike weapon' onboard all frontline warships. The Indian Air Force has deployed land-attack BRAHMOS,' says Dr. Sudhir K Mishra, CEO & MD of BrahMos Aerospace, the India-Russia JV entity which has been designing, developing, producing and marketing the powerful BRAHMOS Weapon Systems.

On 22nd November 2017, the Defence JV programme achieved an unparalleled feat when BrahMos Aerospace successfully conducted the maiden test firing of the advanced air-to-ground version of





***Owing to its highly successful track record, BRAHMOS has also generated a lot of interest in the worldwide arms market with many countries across continents expressing strong desire to acquire the supersonic cruise missile for their military. Accordingly, India and Russia have agreed in principle to export the weapon to selected friendly nations.***

BRAHMOS from the IAF's frontline Sukhoi-30MKI air combat platform against a sea-based target.

With that milestone mission, India became the first and only country in the world with the exclusive capability to launch a supersonic cruise missile from land, sea, sub-sea and air.

The air-launched BRAHMOS project was fraught with numerous challenges as it involved the integration of a very powerful, high-speed missile onboard a heavy, long-range air superiority fighter platform. The Russian-origin Sukhoi-30 combat aircraft underwent structural modifications to carry the BRAHMOS-A whose weight was also reduced by 500-kg in order to fit it onto the heavy strike fighter. The missile also featured other design refinements, including redesigned fins and nose cap, for aerodynamic stability in the early stages of its flight from the supersonic air platform.

The highly intricate mission, fully backed by the Governments of India and Russia and the scientific experts of both sides, once again brought together all major defence sector entities, including DRDO, NPOM, Sukhoi and HAL, to synergise all their resources and successfully realise the BRAHMOS air-launched cruise missile (ALCM) programme.

Today, BRAHMOS ALCM has emerged as an unparalleled precision strike weapon in terms of range, lethality and effectiveness among worldwide conventional airborne weapons. Already deployed as a powerful ground-based and sea-based weapon by the Indian Armed Forces, the formidable BRAHMOS in its advanced airborne configuration would give an unprecedented fillip to the Indian Air Force's air combat capability.

The universal BRAHMOS holds the potentiality to influence the entire spectrum of warfare in modern times. By deploying BRAHMOS on land, in sea/coast and from air, India would be able to launch coordinated attacks against enemy installations and positions, thus completing decimating them within no time.

Owing to its highly successful track record, BRAHMOS has also generated a lot of interest in the worldwide arms market with many countries across continents expressing strong desire to acquire the supersonic cruise missile for their military. Accordingly, India and Russia have agreed in principle to export the weapon to selected friendly nations. /IM&NG/

MAIN PHOTO

# 'PANTSIR-S1'

## AIR DEFENSE MISSILE-GUN SYSTEM

The system is designed for air defense of small military and administrative-industrial objects and areas against aircrafts, helicopters, cruise missiles and high-precision weapons, guided air bombs and unmanned aerial vehicles as well as for reinforcement of AD groups during repulse of massive air strikes and ensuring of engagement of lightly-armored targets.

# FROM MASTERPIECE TO MASTERPIECE

## *High-Precision Weapons Holding creates technics of absolute effectivity and accuracy*

**The role of high-precision weapons is growing reasonably worldwide. Among the largest manufacturers of the most advanced weapons of such kind is Russian High-Precision Weapons Holding (part of Rostec Corporation). The company is well-known all around the world thanks to its high effective products which outperform foreign counterparts and successfully serve in armies of all world continents. The weapons made by this Russian Holding are also known in Gulf states among other countries. In February of this year, the High-Precision Weapons Holding was celebrated the 10th anniversary of its work on the global market. All these years, the company's products enjoy consistently high demand in the global market for weapons and military equipment.**

High-Precision Weapons Holding is the Russian largest developer and manufacturer of the most modern and innovative high-precision weapons. The importance and potential of the Russian holding increase worldwide as well: On a scale of the top 100 weapons manufacturers in the world, the Stockholm International Peace Research Institute (SIPRI) rates the High-Precision Weapons Holding from Russia at 39.

It is evident that the demand for high-precision weapons only increases around the world. They do not miss. They are mobile, fast, maintenance-friendly, reliable, and the most modern. The newest technological solutions are used. 20 years ago, the proportion of high-precision weapons used in local conflicts amounted to up to 7%. In recent years, this share has increased by up to 90-95%. The most designs of the 'High-Precision Weapons Holding' are the best in the world and determine the technological vectors of development in their segments.

Every year High-Precision Weapons Holding is increasing deliveries both to the Armed Forces of the Russian Federation and to the foreign market. According to an SIPRI expert, 'the Russian companies ride the ground-swell of boosts in military spending and arms export. Eleven companies from the top 100 list are Russian ones. Their income has increased by a total of 48.4%'. It also can be noted that the 'High-Precision Weapons Holding' belongs to the top 10 world's defensive rankings by an overall production and supply increase rate.

The High-Precision Weapons Holding was founded in 2009. The holding consists of a number of largest leading defense enterprises that are well known on the world arms market. It is sufficient only to mention such brands as KBP named after Academician A.Shipunov, Tula Arms Plant (Tulsky Oruzheiny Zavod), Tulatochmash, Nudelman Precision Engineering Design Bureau, Kurganmashzavod, Kovrov Electromechanical Plant, V.A. Degtyaryov Plant, VNII Signal and others. Most of them are national and international leaders in their segments.

The products of the holding's companies are well known on all continents and much sought after on international arms markets. Interest in the products of the 'High-Precision Weapons Holding' grows due to the objective situation.

The exports of the holding are based on warfare systems well known on the international mar-

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BEST TECHNOLOGIES

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Holding is to strengthen the defense capability of Russia and to supply the Russian Army with the most modern and the most reliable high-precision weapons. Within the scope of the contract, the holding regularly transmits to the Russian Ministry of Defense the corresponding quantity of planned weapons. Due to the holding, the Russian Army is armed with the best weapons in the world. At the same time, it is important that the holding itself also supplies the same weapon to the world market, where it enjoys consistent success.

ket such as Pantsir-S1, Kornet-E/EM, Konkurs, Metis-M1, Igla-S', Arkan, Verba, Shmel, Kapustnik, and others as well as on training systems, armored vehicles upgrade, and so on.

The holding's products are well known and much sought after on the markets in the Middle East, the Gulf, Northern Africa, Latin America, India, Central and Southern Africa. The holding is constantly expanding the geography of its exports. This is due to product line extension, development of new models and upgrade of products in demand as well as well thought-out service policy.

The holding invests much into the development of promising designs of weapons and military equipment, enhances and augments its development and production potential, and invests in the development of models of tomorrow.

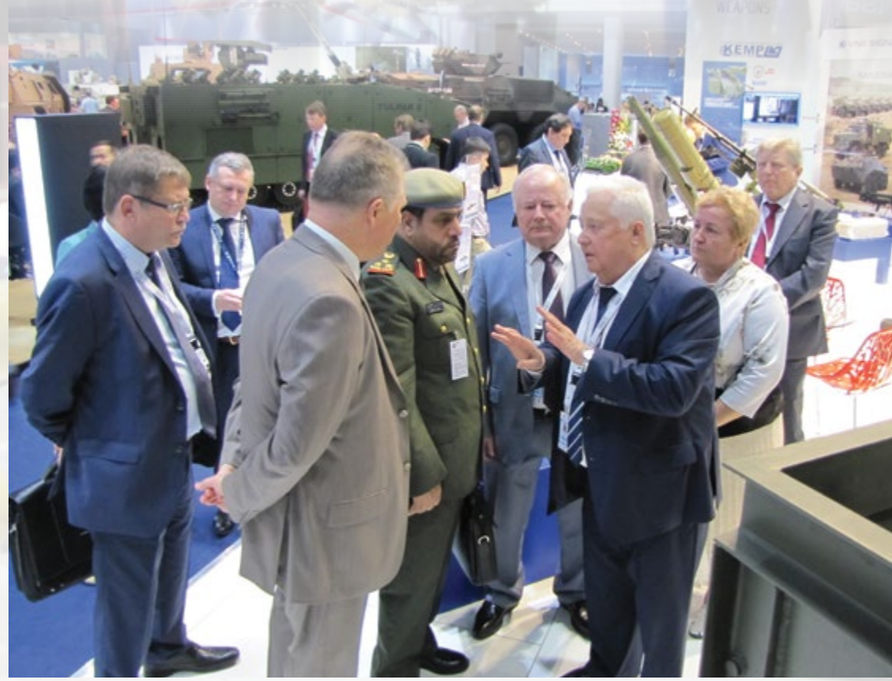
There is no doubt that the main task of the High-Precision Weapons


Middle East states are always been and remains the most important strategic partner of the High-Precision Weapons Holding. The participation of the holding's enterprises in IDEX-2019 is an important stage of friendly and mutually beneficial cooperation in defence area.

In this regard, the Holding presents at the exhibition in the city of Abu Dhabi almost the entire line of its traditional and newest products, highly in demand throughout the world.

Among the samples of products of the High-Precision Complexes presented at IDEX-2019, for example, unique complex Kornet-E/EM, weapon system developed by KBP named after Academician A. Shipunov' in the early XXI century remains to be one of the mostly demanded anti-tank missile systems in the world military market. Due to availability of a shaped-charge warhead primarily designed to engage heavy armour contributed by a thermobaric high explosive warhead of blast effect Kornet-E/EM ATGW has become an effective defence and attack weapon capable to destroy a wide range of targets on the modern battlefield. Open media read that the Kornet-E system, including self-propelled home-made versions, is being used intensively and effectively in the Middle East against all and any military armaments, equipment and manpower.

One of the biggest defense masterpiece from the Holding – man-portable air-defense system (MANPADS) Verba. It is weapons of the new generation, is a unique and second-to-none design. Verba has been developed by the Konstruktorskoye byuro mashynostroyeniya (RPC KBM). The Verba MANPADS was unveiled at the Army-2015 International Military-Technical Forum in Kubinka (Moscow region, Russia). Due to its performance and capabilities, this MANPADS is superior to all comparable foreign counterparts in use. The man-portable air-defense system is intended to be fired by one person. Verba is a further development of the well-known Igla-S system. Even though the new MANPADS looks similar to its predecessors, this is a fundamentally different weapon with new performance. Verba can successfully engage not only traditional air targets – aircrafts and helicopters – but also targets with low thermal radiation, such as cruise missiles and drones.



Also a famous development is complex Khrizantema-S (RPC KBM) – the Best All-Weather Antitank Missile System, which can change the tactics of armored warfare: a small group of combat vehicles anti-tank systems have the power to change the outcome of the battle. Only three cars are able to conduct actions against 14 tanks and damage a minimum of 60 percent of the equipment. This missile system can also fight with low-speed air targets, helicopters and aircraft. Russian Khrizantema-S is the most powerful anti-tank missile system of distant action that the world has ever known. Khrizantema-S is designed to provide a very important combat mission. Destruction of fielded and future main battle tanks, including those protected with explosive reactive armour (ERA), small-displacement surface vessels, low-flying aerial targets, fortifications, manpower under cover and in the open in the day- and night-time, under easy and difficult weather conditions, in the presence of dust and smoke.

Great interest is shown in the world and to small arms, created by the enterprises of the Holding. An example of such a development can serve BUR small-size system – the rocket-assisted grenade, which launcher earned a reputation of convenient, efficient and popular close range engagement asset. BUR was made by KBP named after Academician A.Shipunov, that have been over a long time involved in the searches aimed to extend the firing range and enhance accuracy of grenade-launching (flamethrower) system rounds, as well as increase the payload relative to the total weight of the weapon. The R&D resulted in rocket-assisted infantry flame-thrower of increased range and power with thermobaric warhead (RPO PDMA), adopted for service with Russian Army in late 2003. Further, based on the design of RPO PDM-A, KBP developed a small-size grenade-launcher system 'BUR'.

Another defense masterpiece by High-Precision Weapons is 30mm antipersonnel automatic grenade launcher AGS-30 dedicated to kill manpower and vehicles both on open terrain and in trenches, rooms, behind natural and artificial obstacles. The grenade launcher kit includes three ammunition boxes and 18 belts with 10 links each. Loaded rounds are placed in paper cartridges and put in sealed metal boxes 48 pieces each. Rate of fire is 400 shots per minute.

AGS-30 is equipped with mechanical and optical sights. According to customer's choice the launcher may be fitted with day-and-night sighting system. It can also use radar sight to monitor situation and conduct aiming fire in zero optical visibility conditions.

This grenade launcher has a number of advantages which ensure its uniqueness in close combat. Small size and its mount design features ensure quick firing position change, capability of shooting from windows and unprepared positions. Thanks to wide limits of traverse one can quickly switch fire upon a sudden target. In travel position mount and grenade launcher can be densely folded and carried on back slings. AGS-30 has been used by Russian Army and National Guard units.







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Pantsir-ME takes a very special meaning represents in the holding's exposition at the IDEX-2019. 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 that give them significant advantage these systems posses 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 fold higher that 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). 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.

Use of the target tracking radar with the phased-antenna array and the SAM with 20 km range within the Pantsir-ME system fighting module ensure simultaneous engagement of 4 targets as well as killing new types of upgraded anti-ship missiles and small-size surface targets.

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 worldwide.

***In the exhibition of the Holding on IDEX-2019 there are still a lot of real weapons and military-technical masterpieces, which will have no analogue in the world and will not be soon.*** /IM&NG/


# TULSKY ORUZHEINY ZAVOD

## PJSC Tulsky Oruzheiny Zavod

**Tula became the armory capital of Russia when the first state arms plant was founded there. For almost all military state enterprises Tulsky Oruzheiny Zavod had become the rational grain which set in motion the national militaty-industrial complex and foremost to Tula defense industry.**

Founded by a decree of Peter the Great of February 15, 1712 Tulsky Oruzheiny Zavod counts a lot of monumental moments in its rich biography.

Russian Army won more than one great victory thanks to the weapon produced by Tula skilled gunsmiths. The legendary Maxim gun, Nagant Revolver, 3-line Mosin rifle were manufactured here, in plant shops. Here and today the richest master traditions of the past and raise new craftsmen for the glory of Russia.

The plant went through a great and glorious path for more than three centuries. Being a part of NPO High Precision Weapons for successful development Tulsky Oruzheiny Zavod has manufacturing base fitted with high-tech equipment, professional stuff focused on solving specialized tactical and strategic tasks, effective management team.


As in the past nowadays plant workers allot most of the manufacturing time to military products. By the Defense Procurement and Acquisition the enterprise produces two new articles: Modernized 9-mm Special Assault Rifle ASM and Modernized 9-mm Special Sniper Rifle VSSM. They are designed for special units of the Ministry of Defense of the Russian Federation, and also for other force structures of Russia perform special combat missions.

Output of Anti-tank guided missile Konkurs-M is increasing, manufacturing of modernized Anti-tank guided missile Kornet is mastered. Within the federal program Ratnik the order for production of small arms is executed (including Special Sniper Rifle).

Now PJSC Tulsky Oruzheiny Zavod stands in line with leading defense enterprises and continue the glorious traditions of the first Russian arms plant. Especially important that enterprise does not only keep the brand but directs to the future, having clear plans for continued development confidence in the future.

## Anti-Tank Guided Missile 9M113M of the 'Konkurs-M' System

***The guided missile is a part of the antitank missile complex 'Konkurs-M' 9K111M4 which is intended to engage modern vehicles equipped with the mounted reactive armor, fortified fire emplacements, both moving or stationary surface and afloat targets, low flying helicopters at any time and weather conditions.***
***The 9M113M missile is launched from a portable launching unit 9P135M-1.***
***Main technical characteristics of the guided missile are indicated in the table.***

| | |
|---|---|
| Missile caliber, mm | 135 |
| Firing range, m | 75 – 4000 |
| Warhead type | Tandem cumulative |
| Average homogeneous armour equipped and unequipped with an active armour penetration with frequency not less 0,5, mm | 750 |
| Length of container with a missile, mm | 282 – 292 |
| Package 9M113M.00.00.090 for a missile:<br>dimensions (length, width, height), mm<br>weight with a missile, kg | <br>1380x312x353<br>49,4 |

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# TULSKY ORUZHEINY ZAVOD

## 9 mm Special Assault Rifle AS

*The 9mm assault rifle AS (index 6P30) is an automatic firearm, its automatic operation is based on the work of the energy of powder gases, which leak out of the barrel bore to the gas chamber, barrel bore locking is provided with the bolt turning round its longitudinal axis at 6 locking lugs.*

*The assault rifle AS is designed to use a special 9-mm cartridge (SP6). It is intended for a noiseless and flameless shooting at a distance of 400 m. The assault rifle is intended to engage the enemy manpower protected with fragmentation bulletproof vests and the non-armored vehicles.*
*The design features of the assault rifle AS are:*
- *high characteristics in the accuracy of fire and closely-grouped fire are achieved due to an original design of the assault rifle barrel;*
- *high hitting is guaranteed due to the subsonic velocity of a bullet (noiseless shooting is possible);*
- *a silencer is an assault rifle integral part, its design provides a no replacement usage during the assault rifle service life;*
- *a folding metal buttstock and quick detachable silencer make it possible to reduce assault rifle dimensions;*
- *mounting seats for optical and night sights;*
- *absolute safe handling is guaranteed with safeties.*

*The main type of assault rifle shooting is automatic. A cartridge feeding is provided out of a detachable double-column sector magazine with the cartridges located in a chess-board order. The magazines are interchangeable.*

*Cartridges types used for the assault rifle AS shooting:*
- *SP6 – 9-mm armor-piercing cartridge;*
- *SP5 – 9-mm sniper cartridge.*

| | |
|---|---|
| Caliber, mm | 9 |
| Weight of assault rifle with an empty magazine and without sights, kg | 2,5 |
| Assault rifle dimensions, mm:<br>length with unfolded stock<br>length with folded stock<br>width with unfolded stock without sights<br>width with folded stock without sights | <br>878<br>615<br>60<br>80 |
| Firing range, m: with an open optic sight<br>with a night sight | Up to 400<br>Up to 300 |
| Bullet muzzle velocity, mps | Up to 295 |
| Shooting mode | Single and automatic |
| Magazine capacity, cartridges | 20 |
| Working temperature rate, ºC | From -50 to +50 |

## 9 mm Special Sniper Rifle VSS

| | |
|---|---|
| Caliber, mm | 9 |
| Rifle weight with an empty magazine and without a sight, kg | 2,6 |
| Rifle dimensions, mm: length<br>width without sights<br>height without sights | 894<br>60<br>160 |
| Sighting range, m: with an open optic sight<br>with a night sight | Up to 400<br>Up to 300 |
| Bullet muzzle velocity, mps | 282 – 292 |
| Shooting mode | Single and automatic |
| Magazine capacity, cartridges | 10 |
| Working temperature rate, ºC | From -50 to +50 |

*The 9 mm Special sniper rifle VSS (index 6P29-1) is an automatic firearm, its automatic operation is based on the work of the energy of powder gases which leak out of the barrel bore to the gas chamber, barrel bore locking is provided with the bolt turning round its longitudinal axis at 6 locking lugs.*

*The rifle VSS is designed to shoot a special 9-mm sniper cartridge (SP5) and is intended for a noiseless shooting at a distance of 400 m.*
*The design features of the VSS rifle are:*
- *high characteristics in the accuracy of fire and closely-grouped fire are achieved due to an original design of the assault rifle barrel;*
- *high hitting is guarantied due to the subsonic velocity of a bullet (noiseless shooting is possible);*
- *a silencer is a rifle's integral part, it assures noiseless and flameless shooting, the silencer's design provides a no replacement usage during the rifle life service;*
- *a quick assembling into three parts (stock, silencer and body) makes it comfortable to carry the rifle secretly (in a special bag or case);*
- *absolute harmless handling is guarantied with safeties.*

*The main type of assault rifle shooting is automatic.*
*A cartridge feeding is provided out of a detachable double-column sector magazine with the cartridges located in a chess-board order.*
*The magazines are interchangeable.*
*The rifle is equipped with a sniper optical sight.*

*A common night sight is possible to use.*
*Cartridges types used for the rifle VSS shooting:*
- *SP5 – 9-mm sniper cartridge;*
- *SP6 – 9-mm armor-piercing cartridge.*

## 9 mm Small-Size Assault Rifle AM

*The 9mm small-size assault rifle AM (index SR3) is an automatic firearm, its automatic operation is based on the work of the energy of powder gases, which leak out of the barrel bore to the gas chamber, barrel bore locking is provided with the bolt turning round its longitudinal axis at 6 locking lugs.*
*The assault rifle AM is designed to shoot a special 9-mm cartridge (SP6) and is intended to engage the enemy manpower wearing fragmentation bulletproof vests as well as the non – armored vehicles at a distance of 200 m.*
*The design features of the assault rifle are:*
- *a magazine quick 'ejection' mechanism;*
- *a metal folding buttstock reduces the overall dimensions during carrying and allows to deliver aimed fire with a folded or non-folded stock;*
- *secret carrying is allowed due to the absence of projections on the assault rifle surface;*
- *assault rifle dimensions are the same as a submachine gun but the firing range and hitting effect of the assault rifle are considerably better;*
- *the safety presence assures a safe treatment of the assault rifle.*

*A cartridge feeding is provided out of a detachable double-column sector magazine with the cartridges located in a chess-board order. The magazines are interchangeable.*
*Cartridges types used for the assault rifle AM shooting:*
- *SP6 – 9-mm armor-piercing cartridge;*
- *SP5 – 9-mm sniper cartridge.*

| | |
|---|---|
| Caliber, mm | 9 |
| Weight of assault rifle with an empty 10-round magazine, kg | 2,1 |
| Assault rifle dimensions, mm:<br>length with unfolded stock<br>length with folded stock<br>width<br>height with a 10 cartridges magazine<br>height with a 20 cartridges magazine | <br>640<br>396<br>45<br>160<br>218 |
| Firing range, m | 200 |
| Bullet muzzle velocity, mps | 295 |
| Shooting mode | Single and automatic |
| Rate of fire, rpm | 840 |
| Magazine capacity, cartridges | 20, 10 |
| Quantity of magazines, pcs | 2 (10-round magazines)<br>3 (20-round magazines) |
| Working temperature rate, ºC | From -50 to +50 |

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# EDEX-2018: GOOD START

## *International Defense and Security Industry Exhibition in Cairo*

**International Defense and Security Industry Exhibition EDEX-2018, which was hosted in Cairo, Egypt, showed very good results, especially considering that it was a debut. Organized by the Egyptian Ministry of Defense and Military Production, EDEX was attracted more than 10,000 visitors interested in the field of armaments and defense industries. Furthermore, as a minimum 10 Defense Ministries from the United Arab Emirates, Oman, Sudan, France, Greece, Cyprus, South Sudan, Cameroon, Somalia and South Korea were attending the exhibition. Egyptian President Abdel Fatah al-Sisi was the first person and main guest of the exhibition.**


Egypt's first tri-service defence exhibition EDEX-2018 was organized under the patronage of His Excellency, president Abdel Fattah El-Sisi, the president of Arab Republic of Egypt, the supreme commander of the Egyptian Armed Forces. The EDEX exhibition tries play role of the main global platform in North Africa for showcasing the latest military products and the latest technology of the defense industry in the world. First edition has good result: the exhibition hosted 373 international companies from 41 countries, including 13 Russian companies. Additionally, seven main military departments of government from the United States, China, Russia, France, Germany, Italy and UAE were participated in the exhibition. As for the Egyptian pavilion, Egyptian military products, including arms and equipment jointly manufactured by the Armed Forces, the National Organization for Military Production (NOMP), and the Arab Organization for Industrialization (AOI) were included in the exhibition.





**Oleg Golubev,**
**Assistant Director General, Director of Information Analysis Center of Izhevsk Electromechanical Plant Kupol JSC (IEMZ Kupol):**

'At the EDEX-2018 in Egypt, member of the Almaz-Antey Air and Space Defence Corporation IEMZ Kupol showcased an extensive product range of the famous TOR air defence missile system, as well as the Adjutant Universal Target Training System. The Adjutant UTTS was demonstrated at an overseas exhibition for the first time and attracted considerable attention of foreign delegations. Thus, the international premiere of Adjutant can be termed successful, and we expect the same degree of success from promotion of the system in the international armament and military equipment market.

In general, the exhibition was very fruitful for us. Meetings have been held with the representatives of the Egyptian Air Defence Command and the officials of the armies of other countries. We had substantive negotiations concerning possible supply of our equipment to foreign customers. Specialists from the countries presented at EDEX-2018 have expressed practical interest in purchasing our systems, including our newest Adjutant UTTS.

This interest is driven by high quality of our products and trusted reputation of IEMZ Kupol built through hard work of the entire plant's team. The past year has been very eventful for our factory. In scope of the State Defence Order, we have manufactured and handed over three battalions of our equipment to the Army. Inter alia, the Army received the first battalion of our 'Arctic' TOR systems – Tor-M2DT air defence missile system. All deliveries have been completed on time; a portion of the delivered equipment has been handed over to the Army ahead of schedule at the request of the Ministry of Defence.

As regards further prospects of our company, it is of note that during the past year we have developed IEMZ Kupol 2027 Development Strategy Concept. The concept features an action plan for further improvement and development of our specialized equipment.'



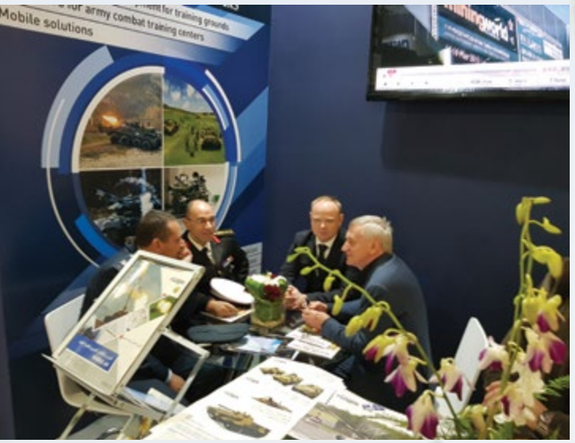
'EDEX is the first large-scale defense exhibition in North Africa. Rosoboronexport sees enormous potential in the exhibition for cooperation. We will be exhibiting here most of new Russian-made export products that are now actively gaining positions in the global arms market. I am sure they will arouse a lot of interest among representatives of the armed forces of Egypt, North African and the Middle East countries, as well as guests from other regions of the world,' said Alexander Mikheev, Director General of Rosoboronexport.

Rosoboronexport, a member of the Rostec Corporation, set up a joint Russian exposition at EDEX-2018 and was featuring products for all services of the armed forces from 11 major Russian defense manufacturers. In Egypt Company showed over 300 pieces of Russian weaponry.

Rosoboronexport was presented advanced products, including the BT-3F armored personnel carrier, Karakurt-E and Sarsar class missile ships, 76.2-mm AK-176MA-01automatic naval gun system, as well as the Orion-E aerial reconnaissance system based on medium-altitude long-endurance UAVs. Also russian military products, including the Yak-130 trainer (combat trainer) aircraft, Su-35multipurpose super-maneuverable fighter, MiG-29M/M2 multirole front-line fighter, Mi-17, Mi-26, Mi-28NE, Mi-35, and Ansat helicopters were on display at Rosoboronexport's stand.

A full-size Russian Ka-52 Alligator scout/attack helicopter was demonstrated at the exhibition. Earlier, in October 2018, the president of Egypt Abdel Fattah El-Sisi saw the Ka-52 Alligator helicopter and assessed its capabilities during the visit to the Egyptian air force base.

'Africa has one of the world's largest fleets of Russian helicopters, and their number increases steadily. Taking into account the importance of the holding company's machines for the region, we are actively strengthening cooperation both in terms of supplying new helicopters and organizing quick service which is convenient for customers,' said


Igor Chechikov, Russian Helicopters' Deputy CEO for Aftersales Service.

'In 2018 Russia and Egypt celebrated the 75th anniversary of establishing diplomatic relations. The military and technical partnership of the countries has also lasted for a long time. Egypt became the first Arab country to purchase weapons from the USSR, and it has been one of the key customers buying Russian military equipment and weapons in this region for many years. Today we continue to develop our relations in many industries. Russia's participation in events like EDEX-2018 provides us with new opportunities for cooperation,' said Victor Kladov, Director for International Cooperation and Regional Policy Department of Rostec.

The Ka-52K helicopter continues the product line of 'marine' helicopters developed by the Kamov Design Bureau. It is intended for patrolling, providing fire support for troop landings, solving tasks of anti-airborne defense along the front line and at tactical depth, at any time and in any weather conditions. Modern onboard equipment ensures navigation of a helicopter when there are no landmarks in the sea.

Ka-52K differs from the basic model due to its shorter folding wing that was modernized to place heavy weapons, and to the blade folding mechanism; this will allow it to be placed in the hold compactly. The smaller size of Ka-52 shipborne helicopters makes it possible to increase the maximum number of helicopters which may be placed on a ship. An armored cockpit and the use of a catapult system that is unique to the world helicopter industry provide the pilots with the maximum level of safety that cannot be provided by any foreign helicopter of this class.

Foreign customers were 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. 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.

Among Russian masterpiece were also prezented in Cairo the S-400 Triumph air defense missile systems, Tor-M2E and Buk-M2E SAM systems, Pantsir-S1self-propelled anti-aircraft gun/missile system, as well as the Igla-S and Verba MANPADS may be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**Director for International Cooperation and Regional Policy Department of Rostec:**

'In 2018 Russia and Egypt celebrated the 75th anniversary of establishing diplomatic relations. The military and technical partnership of the countries has also lasted for a long time. Egypt became the first Arab country to purchase weapons from the USSR, and it has been one of the key customers buying Russian military equipment and weapons in this region for many years. Today we continue to develop our relations in many industries. Russia's participation in events like EDEX-2018 provides us with new opportunities for cooperation.'





of interest to representatives from air defense forces. The T-90MS main battle tank, BMP-3 infantry fighting vehicle, BMPT Terminator tank support combat vehicle, BTR-82A armored personnel carrier, Khrizantema-S and Kornet-E ATGM systems, as well as small arms and close combat weapons may draw attention of army delegations from partner countries. These weapon systems have been successfully tested under real combat conditions and are best suited for combating terrorism in different climatic conditions.

Note that Rosoboronexport actively advances cooperation with Egypt and Africa's states. Russian company 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 customer 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.

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 marketing and customers' settlement methods.

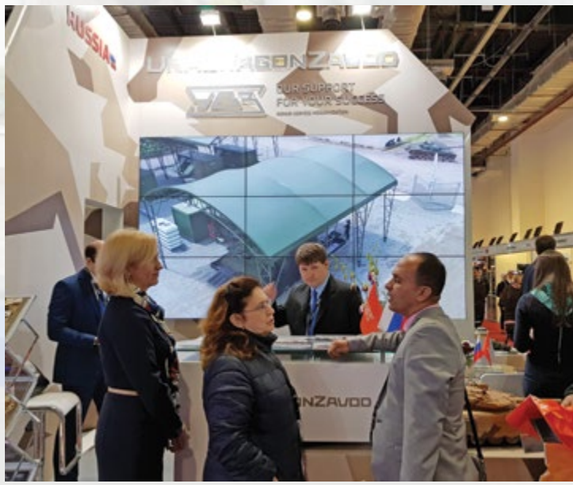
With over 1.3 million military personnel, as the largest military power in Africa and one of the leading forces worldwide, Egypt is the ideal setting for a large-scale event for the sector. In addition, Egypt has historically maintained continuous investment in the latest weaponry as a defence strategy and has strengthened national production lines across a range of military complexes.


**Artem Muranov,**
**First Deputy Director for Civilian Products, Military and Technical Cooperation and Marketing at Scientific Research Institute of Applied Chemistry:**

'At Cairo exhibition we presented our product line of non-lethal action equipment intended for use by law enforcement bodies, including our new developments. We already have a vast experience in cooperation with this region. In particular, we shipped trial batches of Osa pistols and ammunition supplies there. We hope that after the trial use, the Egyptian police will make a decision in favor of further orders.

Our non-lethal action equipment designed on the basis of Osa pistol is undoubtedly among the world's best. Its range has a number of essential advantages in terms of versatility, ergonomics, and cost, leaving behind the competitor counterparts. Despite the tough conditions in the global market of non-lethal action systems, we confidently hold the ground. For instance, our Osa pistols are purchased by the US police, law enforcement structures of South America, South-East Asia, Middle East, etc. We expect that the existing combination of advantages will help us expand the shipments, e.g. to African countries.

Another essential advantage of our products is that the Scientific Research Institute of Applied Chemistry is the parent developer and manufacturer. We fully supervise the whole chain of production and shipments and thereby ensure the required level of technology, quality, and service.




**Valeriy Grebenshchikov,**
**Director of Minotor-Service unitary enterprise, Republic of Belarus:**

'Minotor-Service enterprise operating in the defence economy sector of the Republic of Belarus since 1991 is involved in the development, manufacturing, and maintenance of land and amphibious tфcracked combat vehicles designed for the with ground forces and Marine Corps units. Currently, the enterprise is focused on design of new and modernization of the existing military equipment in service with the armed forces worldwide, as well as repair and aftersales service of armored vehicles' tracked chassis.

At EDEX-2018 Expo we exhibited our wheeled and tracked light armored vehicles (including amphibious ones) with various mounting options of armaments, equipment, electronic warfare systems, command equipment, and communication controls. At Cairo exhibition our exposition was in high demand with the audience, and we hope that by following up the preliminary agreements concluded there, we can expand the scope of deliveries of our products into this region.

The requirement in our products in this region is evident, as we have already shipped over 500 vehicles to Egypt. We hope the cooperation will be progressing, seeing that our vehicles fully meet the local needs. The preference of our products by this country has high chances to endure, supported by the fact that the quality of our vehicles and their high performance are well-known, along with their special features such as the ability to float. Another competitive advantage of ours is, effectively, our realistic, fair prices.'

The Egyptian armed forces signed several arms contracts with international companies during the International Exhibition for Defense and Military Industries, EDEX 2018. Some of them were quite significant. For example – a Memorandum of Understanding (MoU) was signed to establish a joint company between a French naval defense company, Naval Group, and an Egyptian Marine Industries and Services Organization (MIASO) to provide maintenance and technical support for all French naval units operating in the Egyptian army. There was signed an agreement to purchase drones from China's National Aero-Technology Import and Export Corporation (CATIC). Another agreement was signed with Italy's Leonardo company to supply advanced radars for the Egyptian air defense forces.

Among the agreements, there was one signed with the Portuguese EID, part of the UK-based independent technology group Cohort, to supply an internal communication system, and another deal with the Bulgarian company, Samel-90, to supply and develop electronic jamming stations in Egypt. Commander of Egyptian air forces, Mohamed Abbas, signed an agreement with French Dassault Aviation to provide technical support and spare parts for Rafale jet fighters recently purchased by Egypt, to ensure their technical validation.

Among russian projects in Egypt we can say for example about the creation of maintenance, repair and overhaul (MRO) center for Mi-8/17 helicopters based at the facilities of Helwan Factory for Developed Industries (HFDI). Russian Helicopters Holding Company is to certify the MRO center in Egypt in 2019.

During the first stage, the center will be carrying out maintenance and overhaul of Mi-8T and Mi-17-1V helicopters operated by EAF. Future plans include mastering of a Mi-17V-5 type. Within 2015-2018 the Holding Company fitted HFDI with the required equipment and conducted personnel training at the Aviation Training Center of Novosibirsk Aircraft Repair Plant. Moreover, basing on the audit results of the MRO center Mil Moscow Helicopter Plant has already issued a statement on the center's readiness to perform helicopter overhaul.

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'One of the key objectives of JSC 'Russian Helicopters' is to organize a system of after-sales support providing first-class service throughout the complete life cycle of Russian-made rotorcraft. The holding intends to continue expanding its global network of authorized service centers. Over the past three years, in cooperation with our partners from HFDI we have performed a tremendous job establishing the MRO center for Russian-made rotorcraft at the factory's facilities. The Egyptian side is already in process of performing a pilot Mi-8T and Mi-17-1V overhaul upon the results of which we plan to proceed with certification of the center', announced Igor Chechikov, Deputy Director General for After-Sales Support of JSC 'Russian Helicopters'.

'Egypt is a long-standing and strategically important partner for Rostec. We cooperate in a wide range of areas. At the same time, helicopter industry and after-sales service of equipment are one of the key areas of our cooperation,' said Viktor Kladov, Director for international cooperation and regional policy at Rostec. 'Certification of the helicopter service center in Egypt opens up new opportunities for expanding cooperation with local partners.'

**Pavel Vasilyev,**
**Chief Specialist, Business Development Department INFRATECH:**

'INFRATECH is one of the leading high-tech enterprises in Russia specializing in the design and manufacture of optical instruments and laser systems. For more than 25 years, the company has been successfully implementing sights, monoculars, night and thermal imaging nozzles, infrared illuminators and other devices for technical equipment of state power structures, hunters and athletes. The main products of INFRATECH are precision instruments for shooting marks, first of all – thermal sights and thermal imaging attachments for small arms. The company has a complete production cycle from design, engineering to product assembly. Our devices are characterized by high tactical and technical characteristics, efficiency of use and ease of use. We are already exporting our products, and the presentation at an exhibition in Egypt is another step in our international program.

The product line is very wide, there are also new-generation models that differ for the better from their counterparts from other manufacturers. Initially, the products are designed for special units of the security forces, taking into account all the requirements, wishes and specifications. At the same time, the duration of work, our devices are far superior analogues.'

Among our devices there are unique models. For example, the scope of the marine application, which retains its combat serviceability after immersion in salt water for two hours to a depth of 30 m.

Among our promising developments is a very light, compact multifunctional automatic thermal sight, which is optimal for solving operational problems: for example, in buildings where lightness, maneuverability and speed of reaction are of great importance.'

Mi-8/17 helicopters developed by Mil Moscow Helicopter Plant (part of Russian Helicopters Holding Company) are world-famous. Reliable and low-maintenance, they remain in constant demand. They are capable of medevac and humanitarian missions, cargo and passenger transportation (including VIPs). Military-transport Mi-8/17 helicopters are designed to transport service personnel and to carry cargo inside the cabin and on the external sling. These rotorcraft are employed for patrol or search-and-rescue operations and can also carry armament. Not once have they been used for combat operations in flashpoint conflicts as well as for anti-drug operations and missions against illegal armed groups. /IM&NG/


# RUSSIAN WEAPONS at BIAS 2018

**Rosoboronexport had set up a joint Russian exposition at Bahrain International Airshow 2018 (BIAS), a fifth iteration of an international exhibition took place at Sakhir AFB in the Kingdom of Bahrain on November.**

'Rosoboronexport deems Bahrain International Airshow as a perfect opportunity to bring Russia's most advanced systems and equipment to the attention of the Gulf states and let them know their unique features. Lots of the exhibited air force and air defense platforms are either second to none in the world or at least unmatched by their foreign counterparts in key characteristics,' says Director General Alexander Mikheev of Rosoboronexport.

Gulf states are particularly interested in AD systems of various range, aircraft, helicopters and drones. Numbering 250-plus pieces of military equipment, Rosoboronexport's booth had numerous combat proven systems, which confirmed their characteristics in Syria.

The Su-35 multirole supermaneuverable fighter, MiG-29M/M2 multirole tactical fighter and Yak-130 combat-trainer had everything there was to gather crowds at the event. Rosoboronexport also had on display the IL-78MD-90A tanker plane and IL-76MD-90A(E) transport, both being recent additions to its portfolio.

BIAS's guests and participants were witness outstanding airmanship of the aces of the renowned Russian Knights aerobatic display team demonstrating unsurpassed capabilities of Russian aviation equipment on Su-30SM fighters. Wherever they go, Russian Knights pull standing ovations.

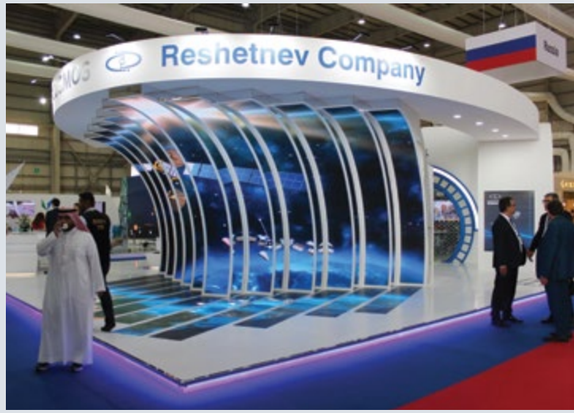
In the RW aircraft segment, the interest of foreign Customers is traditionally piqued by the Mi-28NE attack helicopter, Ka-52 reconnaissance and attack helicopter, Mi-35M gunship with transport carrying capacity, and Ka-226T light multi-purpose helicopter. Other platforms coming to Bahrein's event are the Ansat light multi-purpose and Mi-26T2 heavy transport helicopters, both are very much popular.

For partners the company was make available at its booth information on Russian UAVs to include Takhion and Orlan-10E small short-range drones and Orion-E long endurance reconnaissance platform.

Expectations are also high in the AD sector. Rosoboronexport believes that a rather bright export future faces the S-400 Triumph SAM system, Tor M2E and Buk-M2E SAM systems, Pantsir-S1 gun-missile system, and Verba MANPADS. Besides, the company made some room in its booth for a variety of EW systems, including the Repellent EW system complete with small drones.

'Lack of stability in the international situation prompts the growth of arms trade worldwide. This has also gone a long way in stoking the Gulf states' interest in getting the most advanced and effective military equipment. Under the circumstances, everything labeled Made in Russia enjoys a keen demand, for Russian equipment has been proven in complex combat and climatic environs at sea, in the air, and on the land. And the trend is on the rise. Recently Rosoboronexport's backlog breached the record $50 bln barrier. Contributing to the achievement are contracts signed with Arab nations,' notes Alexander Mikheev. /IM&NG/






# CONTRACT WITH INDIA FOR S-400

**On October 5, 2018, in Delhi Rosoboronexport (part of the Rostec State Corporation) signed a contract to supply India with the S-400 Triumph long-range air defense missile systems (ADMS).**

'The S-400 supply agreement with India is a new landmark in the history of military-technical cooperation between our countries. The deal demonstrates the highest level of trust and understanding between India and Russia. I am sure that this agreement will also be a new impulse for strengthening and deepening our cooperation in civil industry.' said the Head of Rostec State Corporation Sergey Chemezov.

The main advantage of the S-400 lies in its versatility. The system is able to engage both all types of aerodynamic targets and ballistic missiles, up to intermediate-range ballistic missiles. The Triumph is far superior to its foreign counterparts in maximum engagement range and minimum engagement altitude, emplacement/displacement time, as well as in a number of other key characteristics.

'The contract for the supply of S-400 Triumph air defense missile systems to India is the biggest for the entire period of military-technical cooperation between Russia and India and the largest in history of Rosoboronexport. Today we begin to execute it' said the Head of Rosoboronexport Alexander Mikheev.

Regular meetings between the leaders of Russia and India give strong impetus to the development of relations between the countries and play an important role in expanding and strengthening military-technical cooperation, which has been underway since 1960. Since then, exports of Russian military products to India have exceeded $65 billion.

'Rosoboronexport is prepared to cooperate with India in any areas. At the moment, a number of other major contracts for the supply of Russian weapons to India are in the final stages of preparation and we hope they will be signed soon,' Alexander Mikheev said. /IM&NG/

***'The contract for the supply of S-400 Triumph air defense missile systems to India is the biggest for the entire period of military-technical cooperation between Russia and India and the largest in history of Rosoboronexport. Today we begin to execute it.'***

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

### 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. Aassembled – 900x450x300 mm
    b. In Descent mode – 6,500x2,700mm *(without conopy)*

**Actual Landing Impact Loads:**

***Acceleration directions:***

'chest-to-back' – up to 8÷10 g

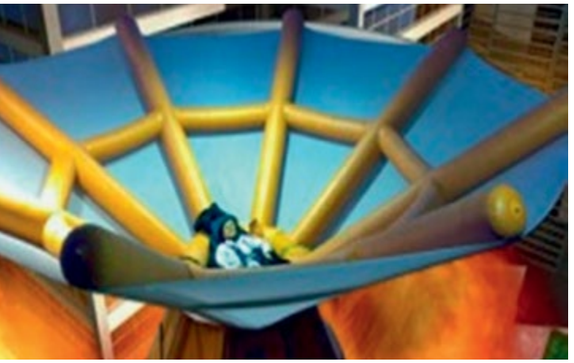
'side-to-side', 'head-to-pelvis' – up to ± 6 g

***Acceleration Exposition Time*** – less than 0.5 s

***Acceleration Growth Velocity*** – less than 500 1/s

***User's age*** – 18÷70 years

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 necessary 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; sky-scraper'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.

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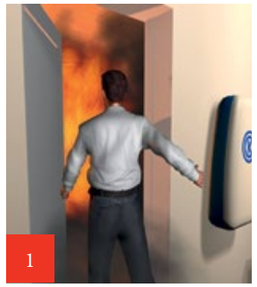


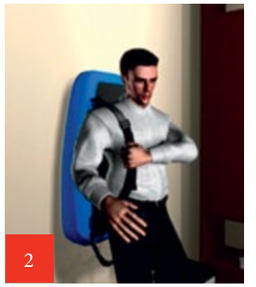


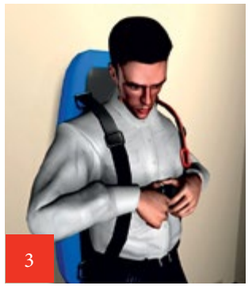


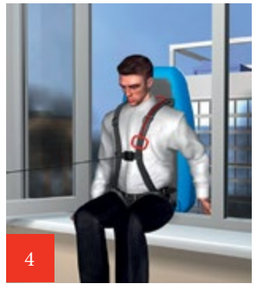


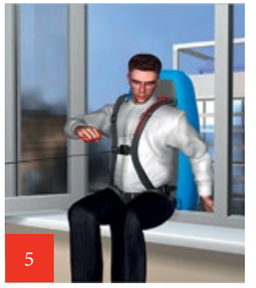



## There are following innovations in the proposed SPARS® technology:

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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## INTERNATIONAL AEROSPACE, MILITARY, NAVY AND TECHNOLOGY GUIDES IN 2019

### In 2019

| ISSUE | RELEASE DATES | ADDITIONAL DISTRIBUTION |
|---|---|---|
| 'RA&MG' №01 (32) | February 12th | **IDEX 2019 / NAVDEX 2019** (17-21.02.2019, UAE, Abu Dhabi) |
| 'RA&MG' №02 (33) | February 15th | **AERO INDIA 2019** (20-24.02.2019, India, Bangalore) |
| 'RA&MG' №03 (34) | March 24th | **LIMA 2019** (26-30.03.2019, Malaysia, Langkawi) |
| 'RA&MG' №04 (35) | April 01th | **LAAD 2019** (02-05.04.2019, Brazil, Rio de Janeiro) |
| 'RA&MG' №05 (36) | April 01th | **IDEF 2019** (30.04-03.05.2019, Turkey, Istanbul) |
| 'RA&MG' №06 (37) | May 12th | **IMDEX ASIA 2019** (14-16.05.2019, Singapore) |
| 'RA&MG' №07 (38) | May 14th | **SITDEF 2019** (16-19.05.2019, Peru, Lima) |
| 'RA&MG' №08 (39) | June 16th | **Paris Air Show 2019 Le Bourget** (17-23.06.2019, France, Paris) |
| 'RA&MG' №09 (40) | June 24th | **ARMY 2019** (25-30.06.2019, Russia, Moscow) |
| 'RA&MG' №10 (41) | June 25th | **IMDS-2019** (26-30.06.2019, Russia, Saint Petersburg) |
| 'RA&MG' №11 (42) | August 27th | **MAKS-2019** (27.08-01.09.2019, Russia, Moscow) |
| 'RA&MG' №12 (43) | September 16th | **AVIATION EXPO CHINA 2019** (18-20.09.2019, China, Beijing) |
| 'RA&MG' №13 (44) | October 01th | **INMEX SMM India 2019** (03-05.10.2019, India, Mumbai) |
| 'RA&MG' №14 (45) | October 13th | **SEOUL ADEX 2019** (15-20.10.2019, Korea, Seoul) |
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