

# INTERNATIONAL AVIATION & MILITARY GUIDE

Special analytical export project of Industrial Weekly

№08 (26) September, 2018

## **BRICS & AFRICA**

*Reliable solutions,  
prospects and progress*



.14

## **BEST WEAPONS**

*Russian holding creates  
innovative arms*



.20

## **MOTOR SICH JSC**

*Quality and reliability  
of aircraft engines*



.28

## **WORLD EXCLUSIVE**

*Unique system for rescue  
from any height*



.44

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## EDITORIAL



### The best partnership offers

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 secure people's safety, rivalry among sellers of weapons and defense systems increases in order to achieve such goals as increasing profits and market share. KADEX2018 presents in Kazakhstan the best weapons and innovations for global security, which are the undisputed world leaders on price and quality in their segments.

These exhibition and conference will show that it is not serious about how many weapons you have, but quality and possibilities of every single one of them is fact what leads to victory on the battlefield. 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 hitech products, solid aftersales service and proven reliability, Russia is honest and friendly partner for all countries, ready for mutual work.

Taking part in AAD2018 Russia continues the policy of open partnership with the BRICS-countries and with Africa, of course... Russia has a wide product line that meets all the needs of defense on this continent and ready propose the best technology and the best price offers.

Valeriy Stolnikov



## UNIQUE CAMOUFLAGE COATING

Ruselectronics and TSNIITOKHMASH have presented a unique camouflage coating for military vehicles and soldiers' equipment able to mimic the color of the environment at the Army 2018 forum. The company illustrated the possibilities of the material with a soldier's helmet made for the advanced, third generation equipment Ratnik. The specialized electrically-operated material covering the helmet prototype is able to change color depending on the camouflaged surface and environment. The material can display dynamic changes of color intensity and simulate complex images, for example, the motion of leaves in the wind. 'Existing types of camouflage do not change their masking properties depending on changes in the background. For example, soldiers will not be seen in a forest against greenery, but they will be visible against sand or snow. An innovative coating created by Ruselectronics provides unique opportunities for masking. We are demonstrating how it works using one element of equipment, i.e., a helmet. However, its application is much broader. It can be used in clothing, weapons, and military equipment,' said Industrial Director of the Armament Cluster of Rostec Sergey Abramov.

## T-500A AIRCRAFT

Rostec has presented T-500A aircraft with flotation landing gear for water deployment at the Hydroaviation-2018 exhibition. This modification can be used to carry out patrol and search and rescue operations in coastal areas, as well as for cargo delivery. With the flotation landing gear, the T-500A has significantly increased the area and geography of its use. No runways are required in order to operate the new modification of the lightweight all-composite aircraft which can be based on water aerodromes, river and sea ports. 'It is a modern multi-functional glider, which can be used for performing a wide range of tasks, such as search and rescue operations for detecting casualties and delivering rescue equipment and medications, delivering various cargoes from mail to urgent cargo, and patrolling coastal and remote areas. At the same time it's a universal aircraft – its flotation landing gear can be quickly replaced with wheel or ski gear if needed,' said Industrial Director of Rostec Sergey Abramov. The T-500A is a modification of the T-500 specialized aircraft for aerial chemical works. The project is implemented by ORPE Tekhnologiya named after A.G. Romashin (part of RT-Chemcomposite Holding Company of Rostec State Corporation) together with MVEN Company (Republic of Tatarstan).

## Re-equipping of the Be-200 amphibious aircraft

*Rostec's United Engine Corporation has presented the project to re-equip the Be-200 amphibious aircraft with the Russian-French SaM146 engine unit. The presentation took place at the ongoing Hydroaviation-2018 exhibition in the Russian city of Gelendzhik. The modernization will make it possible to introduce the aircraft on the European and American markets, and also to begin the validation of the aircraft in the transport and passenger configurations.*

The re-equipment project provides for modernization of SaM146 engine, including improvement of the software for the digital automatic control system. The next stage is the integration of the engine into the Be-200 aircraft and further certification of the re-equipped version.

The key advantages of the SaM146 engine unit are its simple and reliable construction, competitive price and life cycle cost. The engine meets high standards of environmental friendliness and fuel economy. The SaM146 engine unit has also passed international certification and complied with prospective ICAO requirements.

The implementation of this project will essentially make it possible to create a new aircraft based on the legendary Be-200, which is known to the world as a fire-fighting amphibious aircraft. The new engine opens up the possibility of the aircraft undergoing the certification and validation procedures necessary to enter the world market. I am sure that, thanks to improved technical characteristics and a well-deserved reputation, this plane will be in demand abroad,' said industrial director of the aviation cluster

at State Corporation Rostec Anatoly Serdyukov. The SaM146 is an integrated engine unit, including a turbofan engine and a nacelle with a reversing device. The SaM146 is produced by UEC-Saturn in an equal partnership with Safran Aircraft Engines to equip Sukhoi Superjet 100 passenger planes.



at State Corporation Rostec Anatoly Serdyukov.

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## Military Aviation Service Centre in India

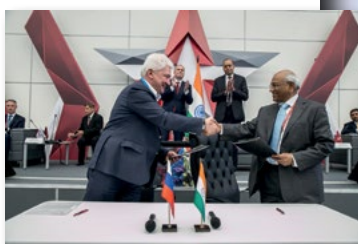
*The Radio-Electronic Technologies Concern (KRET), part of the Russian State Corporation Rostec, and the Indian company Space Era Materials and Processes have concluded an agreement on the participation of the Russian side in establishing a service centre for military aviation in India. A service facility with an area of 30,000 square meters is already under construction in Hyderabad. The agreement will allow the Russian side to participate in competitions held by the Indian government to provide after-sales service of military hardware supplied by Russia, and also to take part in creating a service center for Russian-made aircraft and helicopters.*

'KRET has been working with Space Era since 2015,' said KRET's first Deputy General Director Vladimir Zverev during the signing. 'The signed agreement will create an official centre in Hyderabad for the maintenance and repair of on-board electronic equipment and radar equipment installed in Russian-made aircraft. Currently the Indian side is building a facility with an area of about 30,000 square meters, including, among others, helipads. In light of the gained rights to carry out foreign trade activities, the task of KRET will be to organize the servicing of aviation equipment for the full range of products we produce. This work will be carried out in coordination with the Indian Air Force. We had to have this agreement to proceed to work with the Indian Defense Ministry' – Zverev added.

Under the agreement, KRET and Space Era will develop a joint work plan for the next five years, as well as build the necessary logistics and exchange of specialists and information to create the necessary material base for the project.

'India is one of our main partners in the region. Rostec is ready to provide advanced technology and contribute to the development of the nation's industry. We are confident that our joint projects will allow us to attract 'smart' capital to the economies of India and Russia and help Russian and Indian companies enter new markets,' Rostec's Director for International Cooperation and Regional Policy Viktor Kladov said.

Space Era develops, manufactures, stores, supplies, assembles, maintains, repairs and renovates parts, subsystems, components and equipment, including electronic warfare systems and equipment, which are used in the production of aircraft, radar installations and other electromechanical components, complexes and equipment in India. The Radio-Electronic Technologies Concern (KRET) is the largest Russian holding in the radio-electronic industry.



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### MODERNIZED NIGHT HUNTER HELICOPTER

Russian Helicopters (part of Rostec State Corporation) has presented a new version of the Mi-28NE attack helicopter at the International Military-Technical Forum ARMY-2018 which is being held from August 21 through August 26 in Kubinka in the Moscow Region. The attack helicopter can interact with drones and operate them remotely. The modernized Mi-28NE helicopter is presented at the static exposition of the forum. Improvements were primarily related to armaments. The 'Night Hunter' has the new Khrazantema-M anti-tank missile with a dual guidance system. Using this missile will increase the tank-type target engagement range to 10 km. The helicopter is also fitted with the modernized Ataka guided missiles with laser guidance. It can also use aerial bombs weighing up to 500 kg.

'Modernization involved engine power and blades, which improved aircraft performance in highland regions and in hot climates, increased the cruising speed of the machine and its capabilities in terms of advanced aerobatics. A larger tailplane improved the controllability of the helicopter. New armaments installed on the machine will increase its fire power, and the fact that the aircraft can be used in more fields will mean that it will be in greater demand on the market,' said Anatoly Serdyukov, Industrial Director, Aviation Cluster of Rostec State Corporation.

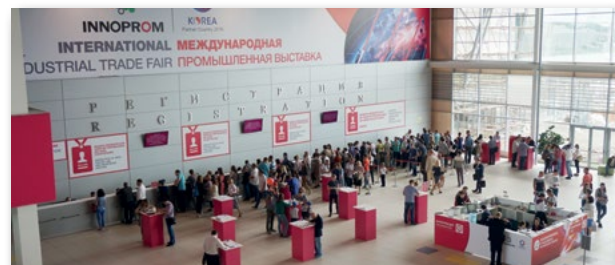
In addition, the new Mi-28NE helicopter can interact with drones and operate them remotely, as it has special means of communication.

'We are constantly improving military helicopters because the requirements of our customers change, and we always aim to meet them. Due to the experience of using Mi-28 machines during military operations we knew how to further develop this project. The modernization considerably increased the capabilities of Mi-28NE helicopters and offered us new prospects in terms of exports,' noted Andrey Boginsky, CEO of Russian Helicopters. The Mi-28N attack helicopter (the export version is Mi-28NE) is designed for fire support of forward ground troops, motorized infantry and tanks. The 'Night Hunter' helicopter has enhanced armor and greater combat survivability. It also has a complex of modern high-precision guided and unguided weapons. The advantages of the helicopter include resistance to battle damage due to the use of the most modern materials and design solutions. The blades of the Mi-28N main rotor are made of composite materials, which means that a flight can still be completed safely if they are hit by shells of 20 to 30 mm. The fuel system is designed in such a way that fuel can neither explode nor burn. The Mi-28N helicopter is one of the first Russian helicopters to be fitted with modern means of communication and digital avionics.

### 'City of the Future'

*The Rostec State Corporation presented a wide range of advanced developments for the 'city of the future' at the 9th international industrial fair, Innoprom 2018. The State Corporation's exhibition stand demonstrated technologically advanced samples of urban transport, digital systems of the 'smart' urban infrastructure, the newest solutions in the field of healthcare and medical equipment.*

At a 429 square metres' stand Rostec showcased its developments designed for transformation of the urban environment and creation of the 'smart' infrastructure in such fields as security, transport, housing and public utilities, healthcare, etc. It included smart traffic lights developed by the Shvabe holding company that can be automatically adjusted depending on the road traffic load. The Ruselectronics holding company presented electronic components for the Angara high-speed communication network for supercomputer computations, a new system for photo- and



video-recording of traffic violations, and a non-contact system for microprocessor-based synchronisation of switches and traffic lights for the subway.

The Mechanical Engineering Concern demonstrated an automated diagnostics and therapeutic sys-

tem for human life support to be used in intensive care units and during transportation of patients. The Shvabe holding company's developments also include the AND A15 automatic external defibrillator to be installed at airports, subway stations, shopping malls and stadiums.

### Avia Solutions Group

*In June 2018, the Zhukovsky international airport's passenger flow grew by 390% as compared to the similar period of the previous year and exceeded 100 thousand passengers per month for the first time ever. The airport complex is being developed by Ramport Aero, a joint venture of Rostec State Corporation and an international aviation holding Avia Solutions Group.*

While commenting upon this result, Tomas Vaisvila, CEO of Ramport Aero noted: 'One hundred thousand passengers is an important psychological landmark for us. To a large extent it means that we have reached a brand new level that allows us to state with assurance that the airport is being developed in the right direction. To some extent, the current growth was caused by an increasing passenger flow during the FIFA World Cup. Nevertheless, this result was expected even despite the football championship. To a greater degree it was caused by the extending route network and growing flight rate of the current regular flights. We have been steadily moving towards this goal, and our short-term plans are to consolidate and improve this result.'

The current year is quite successful for Zhukovsky – 472,877 passengers have been carried during the



first six month which is more than during the entire 2017. The growth of the passenger flow is ensured by the activity of partner airline carriers and the growing flight rate along the regular routes. The most popular are flights to Minsk, Tel Aviv and Simferopol. Significant progress has also been achieved in developing the flight services between Russia and China: today, Zhukovsky has regular flights to Guangzhou, Xian, Fuzhou, Haikou and Jinan.

The Zhukovsky Airport is still busy developing the international and domestic route network and attracting new airline carriers.

The Zhukovsky Airport that was opened in spring 2016 is located on the Ramenskoe Airfield 23 km from the capital and has the longest (5,500 m) runway in Europe that allows to operate passenger-carrying and cargo aircraft of any type. The Zhukovsky Airport supports airline operations with the airports of Tajikistan, Kyrgyzstan, Belarus, Turkey, Israel, China, Georgia and Italy. At the end of 2017, Zhukovsky won the Russia's Air Gate award in the 'International airport with a passenger flow of up to 0.5 million people' category.

## INTERNATIONAL DEFENCE EXHIBITION AND SEMINAR

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## UNIQUE NAVAL UNDERWATER WEAPONS AND SHIPS



JSC Rosoboronexport (part of the Rostec State Corporation), in conjunction with JSC Sea Underwater Weapons – Gidropribor Concern, has launched a program to promote naval materiel and special equipment to the external market.

'A wide range of missions carried out by the navies of maritime powers necessitates equipping them with various types of naval hardware and special equipment. The foreign navies include 225 Russian-built ships. Of them, more than 100 surface ships and submarines are the carriers of naval underwater weapons. Rosoboronexport is offering its partners unique solutions to equip and upgrade the armament of these ships,' said Alexander Mikheev, Director General of Rosoboronexport.

Naval underwater weapons are in service with the world's major navies. However, as few as 5 to 7 countries, including Russia, are capable of designing and manufacturing these weapons independently, due to the high complexity and cost of these efforts. A number of weapons produced by JSC Sea Underwater Weapons – Gidropribor Concern, offered by Rosoboronexport, are unrivalled in the world.

Foreign customers are offered a wide range of naval hardware and special equipment. Among them are torpedoes, mines, antimine and underwater anti-sabotage weapons, as well as means of ship's self-defense against underwater weapons. In the segment of torpedo weapons, the TE-2 universal electric remote-control homing torpedo is offered. It is designed to destroy submarines, surface ships and fixed targets. In addition, a number of newly developed torpedoes, including 533 mm torpedoes and 324 mm small torpedoes, are promising for promotion on the world market.

The MDM-1 and MDM-2 bottom mines are designed to create a mine threat and destroy surface ships and submarines in surface and submerged conditions when used in minefields. The Shelf naval shelf mine offered has no counterparts in the world. It can be placed from delivery aircraft, submarines, and surface ships. The Shelf mine has a hydroacoustic passive/active detection and targeting system protected from triggering when exposed to natural disturbances and influence sweeps that can detect any submarines and surface ships regardless of the level of their noise and speed. Its unique design makes it difficult for the target to use countermeasures and conduct an evasive action.

## For Eurasia Largest Telescope

*Shvabe Holding affiliated to Rostec State Corporation, has completed installation of a mirror on the Large Altazimuth Telescope (BTA) in the Special Astrophysical Observatory belonging to the Russian Academy of Sciences in Karachay-Cherkessia. Operation of the telescope with the new astronomy-dedicated optics will commence this autumn. The observation distance will increase by 1.5 times. The 6-meters diameter mirror installed by Rostec experts is a key component of BTA.*

'Our technologies allow us to build a mirror with a weight of up to several dozens of tons and carry out its nanometric machining. The combination of the large size of the mirror and the unique light-reflecting optical properties will allow Russian scientists to work with the one of the most advanced telescopes in the world in the nearest decades to come. The new optics will augment the observation distance by 1.5 times, so the research horizon will be significantly increased,' commented Oleg Evtushenko, Rostec State Corporation Executive Director.

The telescope's history began with the production of two mirrors in 1970s. The first one was used during the first four years of work, and then it was replaced with an improved one. For more than 40 years of operation the surface quality materially deteriorated, and it was decided to deliver the first mirror to Lytkarino Optical Glass Factory for an upgrade. Today, adjusted in accordance with the new weight, it has been successfully installed on BTA, A regular surface shape evaluation has been carried out. The Russian Academy of Sciences has already received the first test images. The next task is to improve the mirror surface



and further adjustment to complete the preparatory stage. The upgrade procedures will guarantee 40-50 years of further telescope's uninterrupted operation,' said Alexey Patrikeev, Shvabe CEO. Until 1993, BTA was the world's largest telescope. Today, it is the largest telescope in Eurasia.

## Mi-35M and Mi-35P at ARMY 2018

*At the International Military-Technical Forum ARMY 2018 Russian Helicopters has presented modernized Mi-35M and Mi-35P attack helicopters for the first time.*

Guests and participants of the forum will be able to see the machines at the static exposition of the forum. The helicopters have avionics which have undergone a considerable upgrade, and new military equipment.

'The multi-purpose Mi-24 military-transport helicopter (Mi-35 is its version for export) is the first Russian helicopter designed especially for military operations. Its design is so good that now it is one of the most sought-after machines on the international market, and it has proved its high performance during military operations many times. We expect that the demand for new versions of the helicopter with increased combat capability will be high in many countries,' said Anatoly Serdyukov, Industrial Director, Aviation Cluster of Rostec State Corporation.

The modernized Mi-35P helicopter has the OPS-24N-1L observation-sight system with a third

generation matrix long wavelength thermal imager, a TV camera and a laser rangefinder. The new digital flight simulator based on the PKV-8 automatic flight control system will increase the helicopter's steadiness, and automate piloting to assist a pilot. In addition, a modernized sight and computing system will increase the accuracy of target engagement.

The new Mi-35M helicopter has much more options in terms of equipment. The helicopter can be further upgraded for using Igla-S air-to-air guided missiles and the President-S onboard defense system with a laser station for suppression of infra-red homing heads of man-portable air-defense system missiles. Additional equipment may include VOR/ILS systems and a radio rangefinder for measuring the distance between a helicopter and ground-based beacons.

'The Mi-24/35 helicopters are among the machines most frequently used in military operations

all over the world. They have been used during more than 30 wars and military conflicts. With such wide experience, we have managed to perfect this platform, and now we are consistently equipping it with state-of-the-art armaments and avionics. Serial production of the upgraded machines will commence when all the modifications have been tested,' said Andrey Boginsky, CEO, Russian Helicopters.

The Mi-35 military-transport helicopter is designed for destroying armored fighting vehicles and providing fire support for ground troops. It is equipped with modern high-precision weapons and can perform combat missions at any time of day and in all weather conditions. The most important features of the Mi-35 helicopter include its ability to carry personnel with armaments and transport up to three wounded persons from the battlefield, as well as cargo inside the cabin or on an external sling.



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## HOUSE OF FRIENDSHIP

Before the Tank Biathlon finals, Minister of Defence General of the Army Sergei Shoigu visited the House of Friendship at the Alabino training ground showcasing national expositions about history and culture of the participating countries. Sergei Shoigu played some music instruments of Myanmar, Uganda and Jordan. He was also treated with Chinese tea, Kyrgyz mineral water and oriental sweets. An Uzbek foldable wooden bookholder, Syrian folk craftwork items and copperware attracted Sergei Shoigu at most. Participants of the Games made national expositions about their culture and history at the House on the opening day of the Games. Concerts of national ensembles, lectures, expositions and other events took place in the House of Friendship on a daily basis.

## FIRST VISIT TO ERA TECHNOPOLEIS

Specialists from more than 40 leading industry enterprises, scientific and educational organisations visited the Era military innovative technopolis to learn about its capabilities. They saw options for housing joint laboratories for researches in the interests of the Defence Ministry. During the meeting, the Main Department of the Research Activities and Technological Support of Advanced Technologies (innovative research) of the Defence Ministry with the Office of Advanced Research and Special Projects held a working meeting to discuss main vectors of scientific research, relations with enterprises and organizations, as well as logistical base. The Era shall start functioning in September 2018 to house 18 specialized laboratories at the first stage equipped with over 800 pieces of experimental and test hardware.

## EUROSATORY-2018

The international Land and Air-Land Defence and Security Exhibition EUROSATORY is one of the world's largest exhibitions of land and air defence weaponry. It has been held biennially under the patronage of the Ministry of Defence of France since 1992. The year of 2018 marked the 12th time Russia has participated in EUROSATORY. FSMTC of Russia has decreed that responsibility for the organization of the Russia's joint display at the exhibition should be vested in Rosoboronexport. The exhibition's main focus is the land and air defence weaponry, as well as communications assets, computer technologies, simulators and logistics support. It has also placed special emphasis on the upgraded versions of current military equipment. Manufacturers of dual-purpose, crisis management, humanitarian aid, peacekeeping, security and counterterrorist products have enjoyed an increasingly broader representation at the exhibition in recent years.

## Run Tests in Mountainous Areas

*Helicopters of Russia specialists have started the trials of Mi-171A2 and Ansat helicopters. Mi-171A2 will perform a series of flights in the Astrakhan region, and their results will be used to prove this model's operability at ambient temperatures up to +50°C.*

The next step will be trials in Nalchik: onboard equipment will be tested in mountainous terrain. Meanwhile Ansat will be tested on Elbrus. Trial results are supposed to confirm the helicopter's operability in mountainous areas at altitudes up to 2,500 meters.

'As the Holding plans to certify Ansat and Mi-171A2 in a number of countries, at the moment it is important for us to check and document the maximum capacity of these helicopters,' said Andrey Boginsky, CEO of Helicopters of Russia.

He also noted that the results of helicopter trials will be used in presentations for potential customers. In particular, they will be demonstrated at Airshow China, an international aerospace salon to be held in Zhuhai in November 2018.



The multifunctional helicopter Mi-171A2 is the result of an in-depth overhaul of the Mi-8/17 family. More than 80 modifications were introduced to the Mi-171A2 design. The helicopter is equipped with VK-2500PS-03 engines (civilian version of engines installed on Mi-28 combat

helicopters) with a digital control system. Ansat is a light twin-engine multifunctional helicopter. According to the certificate, the helicopter design allows for its quick transformation into both cargo and passenger versions with the transportation capacity up to seven persons.

## Product Range for SSJ-100 and MC-21

*Technodinamika (a Rostec State Corporation affiliate) extends the product range for SSJ-100 and MC-21 advanced Russian aircraft. The statement was made by Igor Nasenkov, the Holding CEO, during the new production line opening ceremony.*

Science-cum-Production company Respirator, affiliated to Technodinamika Holding, is developing smart units and fire protection systems designed for SSJ-100 aircraft. Besides, affiliated to the holding UAP Gidravlika Publ.Corp is carrying out R&D aimed at components production for MC-21 aircraft. It has already worked out relevant detailed and engineering designs, as well as the working design documentation for fire resistant flexible piping with a protective coating and for hydraulic filter modules.

Nowadays, company specialists are busy preparing for the production of prototypes to be subjected to preliminary and interdepartmental trials. According to the holding company's media relations service, commercial supplies of components are expected



to start in 2019. Most likely, the holding company will become a supplier of the fire suppression system not only for SSJ-100, but for MC-21, too.

Acting in conformity to the MC-21-dedicated programme, Technodinamika Holding has already

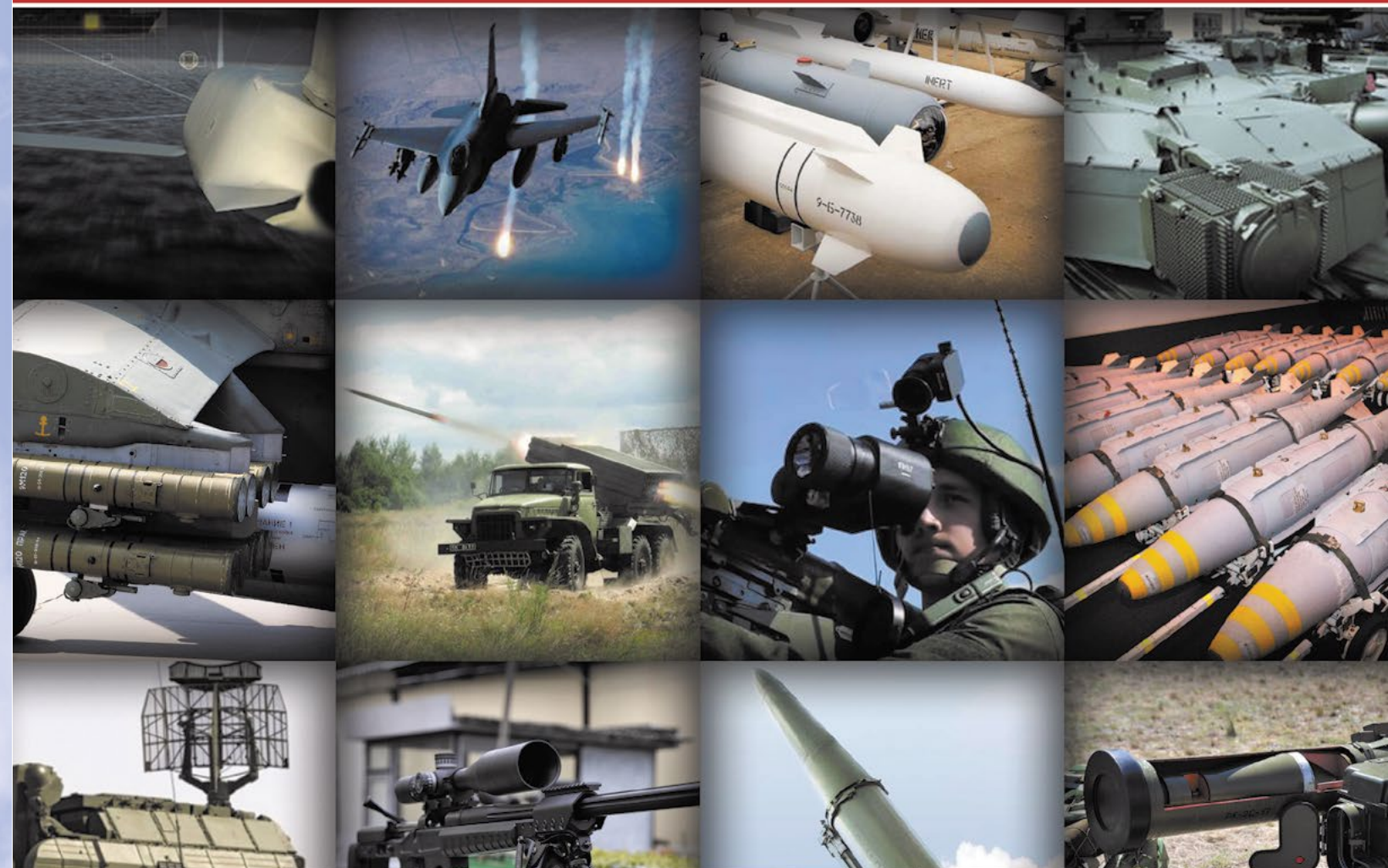
been chosen as the supplier of electrically-driven devices for the aircraft's fuselage cargo doors and certain parts for the advanced PD-14 engine, as well as equipment for installing and dismantling batteries found in the fuselage section.

## HIGH-PRECISION WEAPONS IN RUSSIA AND IN THE WORLD

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The volume of each room – from 120 p.



## CITY OF THE FUTURE

The Rostec State Corporation presented a wide range of advanced developments for the 'city of the future' at the 9th international industrial fair, INNOPROM 2018. The State Corporation's exhibition stand demonstrated technologically advanced samples of urban transport, digital systems of the 'smart' urban infrastructure, the newest solutions in the field of healthcare and medical equipment. Rostec showcased its developments designed for transformation of the urban environment and creation of the 'smart' infrastructure in such fields as security, transport, housing and public utilities, healthcare, etc. It also include smart traffic lights developed by the Shvabe holding company that can be automatically adjusted depending on the road traffic load. The Ruselectronics holding company presented electronic components for the Angara high-speed communication network for supercomputer computations, a new system for photo- and video-recording of traffic violations.

## RUSSIAN DELEGATION IN THE USA

In the United States of America, on the Day of Military Glory of Russia – Victory at Cape Gangut – the Russian Defence Ministry delegation joined by Russian representatives of the U.S.–Russia Joint Commission on POW/MIAs laid wreaths to graves of seamen of the Imperial Russian Navy in the USA. Sailors Nikolay Pavlov and Timothy Cheparinov, members of the crews of the cruiser Varyag and the battleship Retvizan, were buried in the cemetery Glenwood Memorial Gardens, near Philadelphia, where these ships were built by the order of the Russian government. The graves are dated 1900 and 1901. In late May 2018, memorial stones were installed at the graves. These are the first memorials erected by the Russian Federation for its servicemen on the Atlantic coast line of the USA.

## SYSTEM NAMED CHANCE

Rostec premiered a unique design for people evacuation from high-rise buildings – an individual special-purpose parachute system called Chance. The novel solution was unveiled at the Kirzhach airfield when opening a new production complex of the Scientific Research Institute of Parachute Construction, part of Technodinamika Holding affiliated to the State Corporation. Unlike conventional parachute systems, Chance makes it possible to land a person from extremely low altitudes – as low as 30 meters (the height of a nine-storey building) and higher. Its structure includes an anchor line used to close side valves and pull canopies, three parachutes maintaining a specified landing speed, as well as a pack with harness. At the same time, the parachute opens at a required height by itself, and no special training is required for its operation.

## NtechLab Face Recognition System

*The FindFace Security solution created by NtechLab and implemented by Rostec in several cities during the FIFA World Cup made it possible to detain more than 180 persons included in the database of offenders. Some of them were on the federal wanted list. In the capital, the system introduction project was implemented in conjunction with the Department of Information Technology of Moscow. The system introduced in all regions of the Russian Federation will significantly improve the safety of citizens and reduce the crime rate.*

About 500 cameras monitoring the city, metro, stadiums and fan zones as well as mobile biometric complexes for the mass events were connected to the face recognition system in several regions just for the World Cup period. Even within such a short timeframe, the system has shown its high efficiency. It could not be deceived by any tricks. For instance, one of the fans who was banned from sports events by the court decision tried to penetrate the fan zone five times using his glasses, hood and finally the cap for masking, but it did not help! Another striking example is a theft of the sponsor's trophy (one to be awarded to the best player of each match) from the fan zone. Video cameras were used to restore the events: it was possible to identify the persons involved and find their profiles in social media. Thanks to the face recognition system, one of the thieves was located in the fan zone the next day, and the trophy was returned,' said Sergey Chemezov, CEO of Rostec State Corporation.

In 2018, Rostec State Corporation signed a deal for the acquisition of a minority stake in NtechLab, the Russian developer of a unique face



detection algorithm based on artificial neural networks and machine learning. NDF became the third party to the deal.

As for now, the NtechLab algorithm is considered the fastest and most accurate face recognition technology in the world. This is proved by numerous victories in the international competitions held by the US Intelligence Advanced Research Projects Activity, US National Institute of Standards and Technology, as well as Ohio and Washington State Universities.



The algorithm recognizes faces with an accuracy up to 99%. Finding a specific person among 1 billion people takes less than half a second. The NtechLab algorithm can also determine the emotional state, sex and age of a person.

The technology can be used in monitoring and security systems operating on the streets, in yards, house entrances, public spaces, offices, metro, stadiums and other facilities.

The high efficiency of the algorithm was confirmed during the 2018 FIFA World Cup: FindFace Security helped to detain over 180 offenders, some of which were on the federal wanted list.

Rostec was responsible for the implementation and operation of a wide range of digital solutions in the field of security and civil IT services during the 2018 World Cup. In particular, it ensured the smooth operation of the information and telecommunications infrastructure in 30 Russian cities. This infrastructure provided 2.8 million phone calls for fans, 262 TB of Internet data transmitted and Ultra HD game broadcasts for 220 countries during the World Cup.

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## KUZNETSOV ENGINES

Serially-built RD-107A/RD-108A engines by Kuznetsov PJSC, Samara-based enterprise of the United Engine Corporation, were used to perform the seventh launch of the Soyuz-type space launch vehicle this year. The Soyuz-2.1a medium-lift space launch vehicle with the Progress MS-09 Cargo Spacecraft was launched at 12:51 Moscow time on 10 July from the launching site No. 31 of the Baikonur Cosmodrome. Launch of RD-107A/RD-108A rocket engines installed on the first and second stages was conducted normally.

As expected, the cargo spacecraft will approach the station and the Pirs docking compartment of the Russian segment of the International Space Station in the automatic mode under control of the ISS Russian segment's Chief Operational Crew located in MCC, and Russian cosmonauts Oleg Artemyev and Sergey Prokopyev. This will be the second cargo spacecraft to be placed into orbit by serially-built Kuznetsov engines this year. In total, this year saw seven launches of Soyuz-type space launch vehicles with RD-107A/RD-108A engines from four cosmodromes – Baikonur, Vostochny, Plesetsk and Guiana Space Centre. The spacecraft will deliver to ISS about 2.5 tons of various cargoes, including fuel, compressed gases, water, scientific equipment and components.

## SELF-LOADING RIFLE TG1

Kalashnikov Concern, affiliated to Rostec State Corporation, launched a new smooth-bore self-loading shotgun TG1. The weapon is meant for training and live practicing, law enforcement and personal property protection. The product can be purchased under a usual license for smooth-bore weapons, making an online order on the official website of the concern or through a proprietary network of brand-zones.

The 12 m gun is constructed on the basis of the popular MR-155 model and features a modern gas venting system, chrome plated chamber and bore. The 12/70 and 12/76 caliber cartridges are fed out from a detachable box magazine, the design provides an automatic shutter delay. The handle with a pistol grip and fore-end are made of impact-resistant plastic. The rifle is furnished with a Picatinny rail, on which a detachable carrying handle with a fully integrated iron sight is mounted. The length of the gun is 1040 mm, while the of barrel length is 510 mm. The weight of the weapon with an empty magazine does not exceed 3.5 kg. the of the magazine case capacity is 5 cartridges.

## Support from the Russian Foreign Ministry

*At the conference of Russian ambassadors and permanent representatives which took place on the premises of the Russian Foreign Ministry, the Director General of JSC Rosoboronexport (part of the Rostec State Corporation) Alexander Mikheev said about military-technical cooperation and about help from Russian diplomats.*

The conference was attended by representatives of the Russian Presidential Executive Office and the Government, the heads of the two houses of the Federal Assembly (Parliament), ministries and agencies involved in the implementation of Russia's foreign policy, subordinate and voluntary organizations of the Ministry of Foreign Affairs, as well as veteran diplomats.

'Today, Rosoboronexport carries out military-technical cooperation with more than 100 foreign countries, and the role of the Russian Foreign Ministry in establishing and strengthening our relations with partners cannot be overestimated. Thanks largely to support from diplomats, we have made a breakthrough to the markets in Latin America and the Middle East in the past decade, and now we are successfully returning to sub-Saharan Africa,' said Alexander Mikheev, Director General of Rosoboronexport.

Rosoboronexport is working closely with dedicated units of the Russian Foreign Ministry in the implementation of Russia's state policy in the field of military-technical cooperation in virtually all re-

gions of the world. In addition, Russian diplomats provide support to Rosoboronexport employees at more than 50 Rostec's representative offices abroad. Russia's ambassadors are involved in the promotion of military products in regional markets, marketing efforts and assist in fulfilling contracts with foreign customers.

The official status of exclusive state-controlled special exporter provides Rosoboronexport with unique opportunities to expand long-term mutually beneficial cooperation with foreign partners, strengthen Russia's leading positions in the world arms market. Rosoboronexport always receives the necessary diplomatic support from the Russian Foreign Ministry in implementing large-scale projects aimed to enhance the defense capabilities of partner countries. This contributes to creating a climate of cooperation and good neighbourly relations with other countries.

'In a dynamic and changing industrial and political landscape, our joint task set by the nation's leadership is to enhance the impact of economic diplomacy efforts, actually help domestic businesses promote advanced



Russian developments abroad, and bring high-tech products to regional and global markets. I am sure that together we are able to accomplish it,' added Alexander Mikheev.

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.

## Engineering Machines to Vietnam

*ChTZ-URALTRAC, a member of Uralvagonzavod Group of Rostec State Corporation, and a Vietnamese company NGA PHAT have signed a B10M.0100E bulldozer supply contract. The tractor manufacturer's dealer has won the state tender for supply of the bulldozer designed for repair and recovery of roads in mountainous villages of South Vietnam.*

Tu Hong Hung, CEO of NGA PHAT, explained that local budgets do not allow the territories to independently procure the machinery, so the government helps the highland regions and covers a portion of the infrastructure investments, including the purchase of B10M.0100E. The Vietnamese party shall consider buying two more bulldozers of the same type should the operating experience of

the Chelyabinsk-manufactured earth mover be successful.

The machine will be assembled, tested, painted and prepared for dispatch to the customer as early as this August. The vehicle will be delivered non-assembled to Vietnam in a 40' shipping container. The dealer possesses the required production facilities and qualified mechanical engineers to independently assemble the bulldoz-



er on-site. It will then transfer the machine for operation and carry out its after-sales service and maintenance.

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# RUSSIA, AFRICA, BRICS

In Johannesburg (South Africa) there was the 10th summit BRICS, where the leaders of Brazil, Russia, India, China and South Africa were to consider the current situation and prospects for cooperation within BRICS in various areas, the development of BRICS and priorities of the strategic partnership. They will also discuss important current issues on the global and regional agenda, including problems of joint counteraction to modern challenges and threats. The summit programme included a meeting between the BRICS leaders and invited leaders of African and other countries. Vladimir Putin was held a number of bilateral talks with the heads of state and government participating in the summit.

**S**ummit participants discussed steps to further improve the BRICS format, promote political, security and trade cooperation, and coordinate efforts regarding regional problems, including the developments in Syria and the Middle East in general, a settlement on the Korean Peninsula and the Iranian nuclear programme.

Vladimir Putin attended a meeting of BRICS leaders with delegation heads from invited African states and chairs of international associations. Those invited included the leaders of African countries, namely, Angola, Botswana, Ethiopia, Gabon, Lesotho, Madagascar, Mauritius,

Malawi, Mozambique, Namibia, Rwanda, Senegal, the Seychelles, Tanzania, Togo, Uganda, Zambia and Zimbabwe. The meeting was also attended by the heads of Argentina (the current chair of the G20), Turkey (the current chair of the Organisation of Islamic Cooperation) and Jamaica (the current chair of the Caribbean Community).

At the summit President of Russia Vladimir Putin said: 'The advantage of BRICS as a format is that it is free of all the red tape you find in many other associations like this. As President of Brazil, Michel Temer said today, BRICS is an organic association of countries that have many things in common:

they have many shared interests and common approaches to addressing challenges that are relevant to all of humanity, including Russia.

In fact, there is no formal leader within BRICS. All decisions are taken by consensus with full respect for the interests of all the participants in this organisation. This is one of its key advantages. Today, we also mentioned the fact that many countries are showing an interest in what BRICS is doing.

BRICS Plus and an outreach format have already been created to this effect. For now, we agreed to rely on these formats for expanding our reach and drawing into our orbit

countries that share the underlying principles and values of BRICS.

So far, we have no plans to expand BRICS membership, since the existing formats have proven effective. As for our discussions and the issues we intend to address, these are issues relevant for a vast majority of countries and economies around the world. The sky is the limit for us. The same applies to politics and security.

These are the subjects we discussed and on which we have adopted decisions or coordinated positions. You may see, regarding the non-deployment of weapons in space, it boils down to security and the arms race, or rather the prevention of an arms race in this particular case.

We also talked about fighting terrorism, but is this not a vital task facing many countries? In this context, we spoke about Syria, of course, and my colleagues welcomed our idea of encouraging a more active contribution to humanitarian aid to the Syrian people, which is an absolutely natural desire.

The fourth issue we discussed concerned the industrial revolution. This is happening in Russia and the other leading and emerging economies. Why did our colleagues support our proposal on strengthening our cooperation in the humanitarian area, as well as in culture, cinema and sport? Because this is what brings us closer together and creates a natural basis for interaction between people.

The Prime Minister of India said it was a very good idea because we can organise sporting events like a mini-Olympics for the BRICS countries, a sports mini-festival that could include national sports, which are not generally known in other countries but could be interesting for our countries.

This is a natural way to bring millions of people, or even hundreds of millions or billions of people closer together, considering that the BRICS countries account for nearly half of the world's population.

Africa is one of the world's most rapidly developing regions. According to the UN, the population of this continent will reach 2.5 billion by 2050. The level of urbanisation in Africa is increasing as well: the proportion of the population living in

urban areas is expected to reach 60 percent by 2050.

The domestic African market and consumer demand are expanding. BRICS and the African states have similar development goals in many respects. In 2015, the BRICS summit in Russia adopted the large-scale BRICS Strategy for Economic Partnership.

We need to think about involving our African partners and friends in the work of each of the areas we identified then: the economy, finance, and food security.

Russia has always given priority to the development of relations with African countries, based on long-standing traditions of friendship and mutual assistance. We have recently held a number of high-level contacts, including with many of the leaders present in this room.

Russia's trade with African states grew by more than 25 percent in 2017. Food supplies increased by 38 percent, metals – by 30, machinery and equipment – by 24 percent.

Russian businesses are interested in working with African partners in a variety of areas, including industry, agriculture, healthcare, communications, geology and mining. I will give just a few examples of Russian companies' interaction with countries represented at this forum.

I would like to note in particular that Russia plans to increase its assistance to the development of the national energy sector in African states. We are implementing promising oil and gas projects with a number of countries, such as Angola, Mozambique, and Gabon.

In the nuclear power industry, where Russia is a technological leader, we offer our African partners the creation of an entire industry on a turnkey basis. Agreements on cooperation in the field of atoms for peace have been signed with a number of countries in the region, while in some of them the work has acquired a practical dimension. All these projects will be of strategic importance for Africa, where, according to different estimates, as many as 600 million people still live without electricity.

A considerable part of Russian initiatives provides for localising industrial businesses in Africa, including,



among other things, the construction of plants manufacturing component parts and assembly works.

The implementation of these joint projects will serve to strengthen the industrial potential, support local businesses and create new and well-paid jobs. On the whole, this will lead to an improvement in living standards and a solution of social problems in African states.

Russia has a vested interest in intensifying interaction with African regional and sub-regional organisations, primarily with the African Union as well as the Southern African Development Community.

The amount of Russian assistance to Africa exceeded one billion dollars in 2017. Russian contributions to the World Food Programme fund are constantly growing. Russia is the fifth biggest contributor to the UNIDO Industrial Development Fund.

Considerable funds are remitted to the World Health Organisation for the fight against non-infectious diseases on the African continent. Our work to combat the Ebola virus has proved highly efficient.

Russia has for years trained national professional personnel for countries of the continent. Currently, thousands of Africans are being educated in Russia. We will continue to build up cooperation in this sphere.

In conclusion, I would like to inform you that we are studying the idea of holding a Russia-Africa summit with the participation of heads of African states. This could be preceded by relevant meetings of prominent business people, experts, and public figures; I intend to discuss this with representatives of African countries.'

/IA&MG/





# RUSSIAN DEFENSE INNOVATIONS

## *Rosoboronexport Advances Cooperation with Sub-Saharan African Countries*

Rosoboronexport, a member of the Rostec Corporation, is to set up a joint Russian exposition at AFRICA AEROSPACE & DEFENCE 2018, an international conference and exhibition of military equipment for all services is to take place at Waterkloof Centurion AFB in Pretoria, South Africa, on September 19-23.

**A**FRICA AEROSPACE & DEFENCE is the most important marketing event, gathering representatives from the most part of Sub-Saharan Africa. Rosoboronexport consider these states as strategic and long-standing partners. Just over the past two years we signed 20-plus contracts with them. Our estimates suggest that the regional market of military equipment will demonstrate stable growth,' says Rosoboronexport's Director General Alexander Mikheev.

The positive dynamic of the arms market in Sub-Saharan Africa is attributed to several factors. These include international terrorism, Islamic radicalism, and still persisting threat of

pirates at sea. Besides, Sub-Saharan countries contribute troops to peace-keeping missions conducted under auspices of the UN and African Union.

Rosoboronexport's display at AFRICA AEROSPACE & DEFENCE 2018 has been arranged with due account of needs of security agencies in Africa. The booth houses 280-plus pieces of military equipment, developed and manufactured by Russian defense enterprises.

Russian export to the region makes emphasis on aviation equipment. Company's specialists believe that the most promising export future faces the Su-30 family of multirole fighters, MiG-29M/M2 multirole tactical fighter, and Yak-130 combat-trainer. African partners also get their

attention piqued by the Mi-171Sh military transport helicopter, Mi-35 gunship with troop-caring capacity, and ANSAT.

Rosoboronexport also expects foreign delegates to show a keen interest in Russia's Army equipment, namely the BTR-80A/82A armored personnel carrier and Tigr special-purpose police vehicle. Of all air defense assets supplied to Africa, particularly popular in the region are the Pantsir-S1 gun and missile AD system, as well as Verba and Igla-S MANPADS. Navies will see patrol boats of various types.

Security agencies in the Sub-Saharan African countries pay special attention to various security solutions in an attempt to not only miti-

gate the results of illegal actions, but also prevent them at all. To this end the visitors of the exhibition will be able to see small arms, equipment and gear for special-purpose units, as well as assets for protection of borders and critical installations.

Rosoboronexport is facing a rich business program on the sidelines of the event. The company is open to discussions of a variety of aspects of military and technical cooperation with Sub-Saharan African countries.

'Rosoboronexport already takes advantage of a comprehensive approach to cooperation with countries of the region. We offer our partners not only end products, but also the required aftersales support throughout the life cycle, training of specialists, and establishment of maintenance facilities. Moreover, we are in negotiations with some countries to set up licensed production of Russian military equipment in their territories,' adds Alexander Mikheev.

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



The first Soviet state intermediary agency for military-technical cooperation with foreign countries was created on 8th May 1953 after the USSR Council of Ministers had decided on forming the General Engineering Department within the then Ministry of Domestic and Foreign Trade. Other special foreign trade bodies were created later on to provide for further expansion of military-technical cooperation activities. In the late 1990s there were two federal state unitary enterprises in Russia acting as state arms exporters Rosvoorouzhenie State Corporation and Promexport.

In November 2000 the two enterprises were merged into a single one – Rosoboronexport Federal State Unitary Enterprise, the sole state intermediary for export/import of defence products, by the Presidential Decree No. 1834 dated 4th November 2000 aimed at restructuring the system of military and technical cooperation of the Russian Federation with foreign states, and improving its performance. Since September the 1st, 2014 Rosoboronexport has been operating as a joint stock company.

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





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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

**Russian export to the region makes emphasis on aviation equipment. Company's specialists believe that the most promising export future faces the Su-30 family of multirole fighters, MiG-29M/M2 multirole tactical fighter, and Yak-130 combat-trainer. African partners also get their attention piqued by the Mi-171Sh military transport helicopter, Mi-35 gunship with troop-caring capacity, and ANSAT.**



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.

/IA&MG/



# HIGH-PRECISION WEAPONS

*The Russian Holding creates the best innovative weapons for Africa and other regions*

Products of the High-Precision Weapons Holding (part of Rostec Corporation) are well known all over the world, including in the African countries. Russian brands like 'Pantsir-S1', 'Kapustnik-B', 'Metis-M1', 'Bur', 'Kornet-E/EM' and others made by High-Precision Weapons Holding are determining technological and combat future of high-precision systems all over the world. This Russian holding is the primary designer and manufacturer of Russian high precision weapons is engaged in producing the world's best types of high precision weapons. Professionals and guests of the AFRICA AEROSPACE & DEFENCE 2018 may fully see it in the exhibition.

**R**ussian High-Precision Weapons holding (was founded in 2009) being mostly world leaders in their production and technology segments. 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 Shipunov KBP Instrument Design Bureau, Tula Arms Plant, Tulatochmash, Nudelman Precision Engineering Design Bureau, Kovrov Electromechanical Plant,

V.A. Degtyaryov Plant, All-Russian Scientific Research Institute Signal, and others. Most of them are national and international leaders in their segments.

Holding is the world largest science and technology complex engaged in developing and creating high-precision weapon systems for combat tactical zones. The company being a member of Rostec Corporation, the world largest engineering corporation, is among the leading designers of state-of-the-art weapons in the world.

The weight of the holding company and its products in terms of strengthening defensive power of Russian army and delivery of the newest weapons to world markets can hardly be overestimated. There is a fast growing number of high precision systems and importance of tasks performed with them in the biggest armies of the world. Thus, over the recent five years Russian Armed Forces have had increasing purchase volumes. Export volumes of the latest weapons are also increasing. According to Alexander

Denisov, Director General of High-Precision Weapons, JSC 'in view of defense and industrial sector mission we are considering well-timed and full fulfillment of purchase obligations as a priority task.'

According to military experts among the calling cards of the company is first of all the above-mentioned 'Pantsir-S1' air defense gun and missile system made by Tula instrument design bureau (KBP), ship-based 'Palma' air defense artillery system armed with 'Sosna-R' missiles, 'Kapustnik-B' fire control system, 'Kornet-E/EM', 'Metis-M1' antitank missile systems, 'Krasnopol', 'Arkan' guided missile systems and others. The majority of weapons being exported by High-Precision Weapons is second to none in the world in terms of performance and efficiency.

An average annual increase of the company's export deliveries is 25-40% that is certainly a world record in the sector of high precision weapons. Middle East, Africa, Arabian Gulf countries and India are among the most stable importers of the company-made products. Recently there has been also increasing export activity in the markets of Southeast Asia, Latin America, Central and South Africa. Besides, according to military experts there is every reason to believe that by 2020 export delivery volume of High-Precision Weapons Holding may have been increased twice. It is clearly seen at nearly every international armament exhibition where the holding company takes part, its products (both at displays and open sites) are leading objects of regard for experts and ordinary visitors. This is also because everybody wants to take a closer look at famous 'Pantsir-S1' or 'Kornet-E/EM' and meet the people who create the most efficient and advanced weapons in the world.

High-Precision Weapons Holding plays an increasingly important role on the world arms market. The 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.

Such a success can be explained by 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 groundswell 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 weight of the holding company and its products in terms of strengthening defensive power of Russian army and delivery of the newest weapons to world markets

can hardly be overestimated. There is a fast growing number of high precision systems and importance of tasks performed with them in the biggest armies of the world. Thus, over the recent five years Russian Armed Forces have had increasing purchase volumes.

An average annual increase of the company's export deliveries is 25-40% that is certainly a world record in the sector of high precision weapons. Middle East, North Africa, Persian Gulf countries and India are among the most stable importers of the company-made products. Recently there has been also increasing export activity in the markets of Southeast Asia, Latin America, Central and South Africa. Besides, according to military experts there is every reason to believe that by 2020 export delivery volume of High-Precision Weapons Holding may







have been increased twice. It is clearly seen at nearly every international armament exhibition where the holding company takes part, its products (both at displays and open sites) are leading objects of regard for experts and ordinary visitors.

It is no coincidence that currently 'Pantsir-S1' is among the top 10 rated ground weapons in the world. Escalation of tensions, military operations in unstable regions, all this only adds the Russian air defense system a fair-minded attractiveness to strengthen defensive power of many countries. Besides, its geographical application is extending. Military exercises and tests show that 'Pantsir-S1' can be properly used both in sand storm and severe conditions of polar night. In addition to that, being equipped with many heavy weapons 'Pantsir-S1' remains highly maneuverable, all-terrain, easy-to-use. Besides, it is capable of steady killing the wide range of targets including low-flying air ones.

It goes without saying that when you talk about Tula KBP you should anyway mention its famous 'Pantsir-S1' air defense gun and missile system designed to defend military, administrative and industrial assets and districts against airplanes, helicopters, cruise missiles and high precision weapons, smart air bombs and remotely-controlled vehicles as well as to augment air defense forces when repelling air strikes and kill light-armored vehicles. Today 'Pantsir-S1' is possibly the most famous and popular weapon not only

in its class but among all other defensive means generally.

One of the newest defensive sensation from High-Precision Weapons Holding was the presentation of anti-aircraft artillery weapon system 'Pantsir-ME' in Saint-Petersburg in 2017. The creation of new innovative defense complex confirms the fact that Russian High Precision Weapons Holding is one of the world leaders in creating modern weapons. There was an absolute sensation in the world of military innovation. The system provides the ultimate protection against modern air threats, including small-size unmanned aerial vehicles. The naval missile and anti-aircraft artillery weapon system 'Pantsir-ME' provides the ultimate protection against modern air threats, including low-flying and small-size unmanned aerial vehicles.



Among absolute masterpieces acknowledged by experts is 'Kornet-EM' long-range antitank missile system, which in term of versatility, efficiency and reliability is considered to be a unique product of today. This multipurpose 24-hour high precision system is designed to engage ground and air targets. It is capable of killing both modern and advanced tanks including those equipped with reactive armor. As a matter of fact 'Kornet-E/EM' is a versatile defensive and offensive mean which can be also used during local conflicts with fast moving battles. In addition to engaging any tanks 'Kornet-E/EM' can easily fight any light-armored equipment, ensure crossing fortifications, provide protection against air weapons (UFV, helicopters and so on) at a distance of up to 10km.

'Kornet-E/EM' features the modern 'fire and forget' principle, where targets are killed almost automatically to reduce psychophysical load, skill requirements and preparation time. 'Kornet-EM' is also popular for its mobility and easy-to-use capability. It is manufactured in two versions, they are tripod-mounted hand-held version (to augment antitank defense of attacking and defending ground troops and field artillery) and version mounted on small vehicles (car, APC, IFV and others).

'Kornet-E/EM' multipurpose missile system provides for engagement of modern and future tanks, various fortifications (pillboxes, bunkers) and low-velocity aerial targets (helicopters, assault aircrafts and UAVs) in day&night and adverse weather con-

ditions under enemy ECM and optical jamming at ranges up to 8-10 km.

The 'Kornet-E/EM' system comprises: combat vehicle with two automatic launchers and operator's panel with a display; battery commander's reconnaissance and control vehicle, equipped with combined surveillance system including TV, IR and radar reconnaissance aids, navigation, communication and data exchange systems, automated control suite and weapon system ('Kornet-E/EM' ATGM and PKTM machine-gun), guided missile with HE warhead with impact and proximity fuses and firing range of up to 10 km; an antitank guided missile with a maximum firing range of 8000 m and shaped charge warhead armour penetration of 1100-1300 mm which enables the 'Kornet-E/EM' system to engage modern and future tanks bearing in mind the tendency to growth of their armour protection.

Such performance specifications endow 'Kornet-E/EM' with the highest target handling capability among similar existing and future systems – min. 3-4 targets per minute at ranges up to 5 km. Thus, in case the weapon systems are positioned at a stand-off range from enemy tanks (more than 4 km) a single 'Kornet-E/EM' battery of 9 combat vehicles is able to repulse an attack (i.e. destroy min. 50% of targets) of enemy tank (M1A2 class) battalion (58 tanks). Actually, such mission may be accomplished by two battery salvos, destroying 32-34 tanks, i.e. 55-60% of the battalion. The time required to accomplish the mission will not exceed 1 minute, allowing to avoid casualties, since the enemy tanks will not be able to reach their effective firing distance.

UAV on a reconnaissance mission lets enemy well in advance disclose defence, give accurate target designation for firing over-the-horizon munitions, record and transmit information on army relocations both during operations near the line of contact with enemy and in the rear. This results in significant increase in casualties and possible failures of combat mission performance. From the point of view of engagement, UAVs are difficult targets due to low altitude of flight. Moreover, in case of mass application they are a teaser for the air defence

assets, causing high consumption of expensive surface-to-air missiles.

The well-known 'Krasnopol' artillery guided projectile (AGP) developed by KBP Instrument Design Bureau (Tula, Russia) is in service with the Russian Army and with armies of several other countries. 'Krasnopol' showed itself very well at demonstration tests, battle exercises and local conflicts when fired from both the 152 mm artillery systems (D-20, 2S3, 2S3M, 2S19) and foreign-made 155 mm artil-

lery systems (including obscured and low-contrast targets – firing points, engineering constructions, concealed vehicles and equipment).

This fact is also confirmed by foreign specialists. As reported by US sources, 75% of combat operations in Iraq involved guided ammunition firing against targets with low thermal signature. As noticed by the US specialists 'The use of 'fire-and-forget' ammunition in this situation is complicated and expensive.'



**Holding is the world largest science and technology complex engaged in developing and creating high-precision weapon systems for combat tactical zones. The company being a member of Rostec Corporation, the world largest engineering corporation.**

lery systems (M109 family, G5, G6 and Bofors).

Both Russian-made (1D20, 1D22, LTsD-3M developed by Polyus, Moscow) and foreign-made (DHY307 made by CILAS, France) laser designators/rangefinders are used for the 'Krasnopol' system.

Despite of the fact that a number of countries have been conducting intensive research work aimed at development of self-contained mm-waveband and IR-wave band seekers, the artillery ammunition load should comprise highly precise ammunition with semi-active laser homing head because main task of conventional artillery is to engage observed targets,

Therefore, in foreseeable future the systems with semi-active laser homing will be in demand, as judging by the experience gained during the recent years nature of probable armed conflicts has changed and artillery missions, in particular, are accomplished not by means of a massive attack but means of engagement of selected targets, including urban warfare operations in presence of civilians. Accomplishment of such missions requires participation of a human being in selection of a target.

The field experience of the 'Krasnopol' system, new demands made by the future operational tactics for artillery guided weapons with



laser semi-active homing became the reason to produce a new generation high precision artillery system, which is characterized by the following improvement directions:

- Extension of firing range;
- enhancement of AGP lethality providing for total engagement of strongly fortified targets;
- increase of relative frequency of combat use under conditions of wind, cloudiness, night;
- use of automated FCS;
- simplification of AGP handling in terms of fire preparation and loading;



**According to military experts there is every reason to believe that by 2020 export delivery volume of High-Precision Weapons Holding may have been increased twice. It is clearly seen at nearly every international armament exhibition where the holding company takes part, its products are leading objects of regard for experts and ordinary visitors.**

With the said purpose KBP developed the 'Krasnopol-M2' system that provides the following advantages over the standard 'Krasnopol' system: the firing range of the new system is significantly extended; new projectile lethality is almost two times higher than that of a standard 'Krasnopol' projectile and provides unconditional kill of future tanks and strongly fortified fire positions; does not require mating of two sections unlike in the 'Krasnopol-M2' projec-

tile; provides flexible cyclogram of onboard systems activation on the trajectory to ensure optimal guidance trajectories; the 'Krasnopol-M2' FCS provides automated fire control and input of the projectile flight time cyclogram into projectile; FCS ensures day-and-night combat application and automated calculation of the system's firing settings.

The rocket-assisted grenade launchers earned a reputation of convenient, efficient and popular close

range engagement asset. Further, the introduction of various types of warheads has considerably broadened their application range. Their high combat power (comparable to that of artillery projectiles), as well as small dimensions and low weight, allowing employment as shoulder-weapon, turns them into one of the main infantry fire support means in a wide range of missions.

The experience of law enforcement and counter-terrorist operations shows that in most cases such missions take place in urban areas or separate buildings. This eliminates the possibility or hampers the employment of combat vehicles for engagement lightly-armoured vehicles and low-vulnerable targets concealed in shelters or terrain and unreachable for the small-arms. Under such circumstances the weapon should be extremely light-weight (to allow higher ammunition carrying capacity), highly maneuverable (small dimensions) and accurate, as well as possess long firing range and powerful warhead.

KBP Instrument Design Bureau have been over a long time involved in the researches aimed to extend the firing range and enhance accuracy of grenade-launching (flame-thrower) 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 PDM-A), adopted for service with Russian Army in late 2003, which proved the efficiency of the solutions implemented by KBP into

the new method of grenade-launcher (flame-thrower) rounds propulsion.

Further, based on the design of RPO PDM-A, KBP developed a small-size grenade-launcher system (SGLS) 'BUR'. The wide range of missions and specific requirements of a number of defence and law enforcement agencies, for which this multifunctional weapon was intended, determined a need for system approach to its development.

The launcher features a metal plate with a dove-tail side-rail for mounting the sights which are zeroed with a particular launcher. The grip incorporates a miniature generator providing an electric pulse required for launch. The grenade-launcher rounds comprise a launch container, motor and grenade itself. The container and motor are uniform for all types of rounds, whereas only a grenade payload varies. However, the warhead is designed in such a way that the payload variation does not affect the exterior ballistics, allowing employment of optical sights for firing all types of grenades.

The governmental testing of 'BUR' SGLS is successfully completed. The small-size grenade-launching system is intended for: engagement of manpower in urban environment, inside buildings, fortifications, as well as exposed on various terrain (including mountainous areas); inactivation of soft-skinned and lightly-armoured vehicles. The system allows firing from limited space rooms. The system ensures reliable firing within the whole operational temperature range: from minus 40°C to plus 60°C and in adverse conditions.

While developing the SGLS the designers managed to create a highly accurate rocket assisted grenade launcher allowing effective engagement of wide range of targets depending on the mission scenario at ranges up to 650 m. To guarantee high accuracy of firing a 'reactive-active' grenade propulsion principle was introduced, since standard methods, e.g. increase of the booster motor power or employment of sustainer motor running during the flight, lead to increased size and weight of the weapon or higher dispersion respectively.

The 'reactive-active' propulsion principle implies jet thrust acceleration of the grenade placed in a barrel fixed to the jet engine and simultaneous active acceleration in the moving barrel due to gas bleeding from the engine chamber. Further, the barrel and engine stop, inducing additional acceleration to the grenade.

Thus, the energy induced to the grenade is increased (doubled) and accordingly grows the muzzle velocity compared to that of the conventional design grenade launchers with similar container length. However, high grouping of shots is maintained.

The efficiency rate was practically proved in the course of the system testing at KBP and by subcontractors.

Creation of highly efficient and at the same time easy in operation grenade launching system allows engagement of most targets in close-range battle, as well as flexible

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



response to the changing combat environment due to employment of various warheads. The system may become a demanded light weapon for various services of defence and law enforcement agencies.

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

been used by Russian Army and National Guard units.

The above-shown products are examples of the highest level and quality of weapons made by High-Precision Weapons company. So far High-Precision Weapons is certainly among the key designers of high precision arms worldwide. More details of its products can be learnt at the largest international military exhibition in Africa – AFRICA AEROSPACE & DEFENCE 2018 and at the other arms shows permanently attended by the Russian holding.

/IA&MG/







# 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 military-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: dimensions (length, width, height), mm weight with a missile, kg	1380x312x353 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: length with unfolded stock length with folded stock width with unfolded stock without sights width with folded stock without sights	878 615 60 80
Firing range, m: with an open optic sight with a night sight	Up to 400 Up to 300
Bullet muzzle velocity, mps	Up to 295
Shooting mode	Single and automatic
Magazine capacity, cartridges	20
Working temperature rate, °C	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 width without sights height without sights	894 60 160
Sighting range, m: with an open optic sight with a night sight	Up to 400 Up to 300
Bullet muzzle velocity, mps	282 - 292
Shooting mode	Single and automatic
Magazine capacity, cartridges	10
Working temperature rate, °C	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 guaranteed 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 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. 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: length with unfolded stock length with folded stock width height with a 10 cartridges magazine height with a 20 cartridges magazine	640 396 45 160 218
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) 3 (20-round magazines)
Working temperature rate, °C	From -50 to +50

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Vyacheslav A. Boguslayev, President of Motor Sich JSC

# MOTOR SICH AT AAD-2018

**MOTOR SICH JSC is a company specialized in the development, manufacture and post-sale support of the gas-turbine aeroengines, industrial gas-turbine drives, as well as gas-turbine power generating sets with these drives. Currently, the Company actively develops the helicopter industry in Ukraine. Quality and reliability of the Company's aeroengines is confirmed by years-long service in more than 100 countries all over the world. 37 of them are on the African continent.**

At present, designers of IVCHENKO-PROGRESS State Enterprise and MOTOR SICH JSC develop the D-436-148FM engine for the An-178 transport aircraft with load-carrying capacity from 16 to 18 tons. It is intended to replace the An-12 veteran transport aircraft that is well-known in Africa.

The D-436-148FM engine is a new version of the D-436-148 engine with the takeoff thrust increased up to 7900 kgf and the contingency power thrust of 8790 kgf due to application of more efficient engine units.

In order to increase efficiency, reduce emission and noise levels, the Company has developed the D-18T series 3M engine for the An-124-100 aircraft which is one of the biggest ramp-type transport aircraft in the world. The engine design is unified as much as possible with the basic D-18T series 3 engine.

MOTOR SICH cooperates with IVCHENKO-PROGRESS in the development of the AI-222 family of engines and manufactures them in series. These engines may provide maximum thrust from 2500 to 3000 kgf, and up to 5000 kgf with the afterburner installed.

The AI-222K-25 version of the engine (without afterburner) and the AI-322F version of the engine (with afterburner) are intended for the L-15A twin-engine subsonic basic and advanced training aircraft and for the L-15B supersonic training aircraft produced by Hongdu Aviation Industrial (Group) Corporation (HAIC), China.

The AI-322F engine was the first afterburning engine which was designed and manufactured in Ukraine.

To improve helicopter performance in high-mountainous regions of countries with hot climate, MOTOR SICH JSC has developed the TV3-117VMA-SBM1V engine with the total service life of 12000 hours/12000 cycles and the first overhaul period of 5000 hours/5000 cycles.

In order to increase the customer appeal and competitiveness of these helicopters, MOTOR SICH has developed the TV3-117VMA-SBM1V-02K version of the TV3-117VMA-SBM1V engine, which power specifications are adapted to this helicopter. The Company has got Type Certificate of the IAC Aviation Register for this engine.

The first overhaul period of the TV3-117VMA-SBM1V-02K engine in conditions of flight cycles with transportation of cargoes on the external load sling system is 3320 hours/3320 cycles without the need of in-service replacement of the engine hot section parts, which is 4 times longer than overhaul period of the hot section of the TV3-117VMA (VMA series 02) engines currently operating in the Ka-32 helicopters under the same service conditions.

The TV3-117VMA-SBM1V series 1 version with electronic-digital ACS is developed for new rotary-wing projects. New automated control system will improve performance of engines and helicopters.

The TV3-117VMA-SBM1V series 4 and 4E engines (with air or electrical

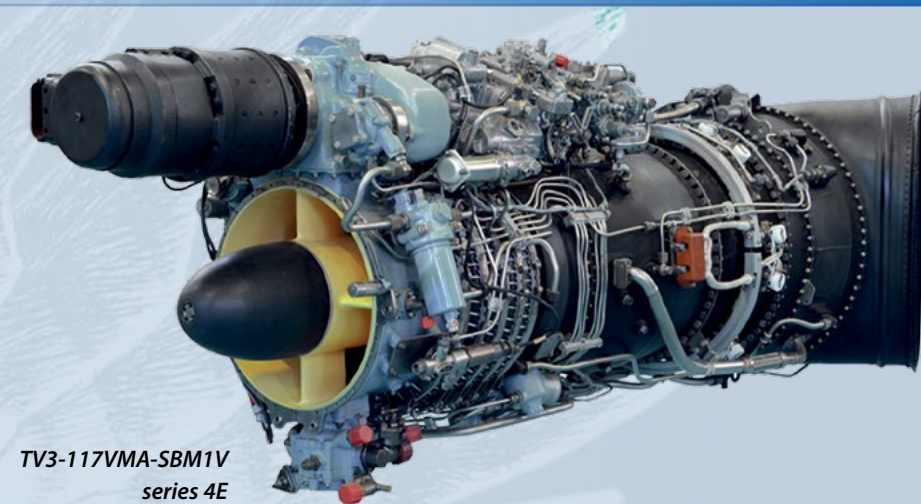
starting systems) are versions of the TV3-117VMA-SBM1V engine. They are intended for re-engining of the Mi-8T helicopters in order to improve their performance.

The TV3-117VMA-SBM1V series 3 engine was designed for the Mi-8MSB1-V helicopter (and other similar helicopters). Its power ratings and service conditions correspond to those of the basic TV3-117VMA-SBM1V engine. Its distinctive feature is electrical starting system.

The TV3-117VMA-SBM1V series 5 engine is a new project. This engine is developed in cooperation with IVCHENKO-PROGRESS. The engine has takeoff power of 2800 h.p. and 2.5-minute OEI power of 3750 h.p. It has higher power due to the changed design. Two versions are planned: turboshaft engine for helicopters with takeoff weight from 15 to 16 tons (e.g. for the Mi-38 helicopter), and turboprop engine (TV3-117VMA-SBM2) for the An-140T class of transport aircraft.

MOTOR SICH is working on development, manufacture, and overhaul of helicopter gearboxes. The company has mastered overhaul of the VR-8A, VR-14, and VR-24 main gearboxes for helicopters of the Mi-8, Mi-17 and Mi-24 family. MOTOR SICH and IVCHENKO-PROGRESS are developing the VR-17MS main gearbox, which is a new version of the VR-14 gearbox for the Mi-17 helicopters with take-off weight increased up to 14 tons.

These achievements allow MOTOR SICH to overhaul the Mi-8,



TV3-117VMA-SBM1V  
series 4E

Mi-17 and Mi-24 helicopters, re-engine them and upgrade their onboard systems.

Today, small aircrafts are in keen demand all over the world. Therefore, MOTOR SICH takes an active part in activities of IVCHENKO-PROGRESS on the development of the AI-450 small-sized turboshaft and turboprop family engine.

On April 15, 2015, the AI-450M version of the engine with take-off power of 400 h.p., 430 h.p. or 465 h.p. depending on the ACS settings has successfully passed life and certification tests. The Company has got Type Certificate of the IAC Aviation Register for this engine.

This engine is intended for re-engining of the Mi-2 helicopters, which are equipped with the obsolete GTD-350 engines.

There also conducted works on the AI-450C and AI-450C-2 turboprop

versions of the engines with takeoff power from 450 to 495 and from 630 to 750 h.p. correspondingly. They are intended for general purpose aircraft and trainer aircraft, including aerobatic ones (the AI-450CP and the AI-450CP-2 versions of the engines). In 2016, the AI-450C engine has passed flight tests as part of the DA50-JP7 seven-seater aircraft produced by the world-known Austrian DIAMOND AI company. In June 2017, MOTOR SICH has got Type Certificate for the AI-450C family of engines (AI-450CM, AI-450CD).

DIAMOND develops the DART-450 trainer aircraft powered by the AI-450CP engine. This airplane was officially demonstrated at the Farnborough-2016 air show for the first time and has sparked great interest of experts. The AI-450C-2 and the AI-450CP-2 engines are intended for general purpose aircraft, regional passenger aircraft and trainer aircraft,

Mi-8MSB





including a new version of the DART-450 aircraft.

MOTOR SICH develops the MS-500V turboshaft engines of new generation. These engines will have take-off power from 600 to 1100 h.p. They are intended for different helicopters with take-off weight from 3.5 to 6 tons.

The MS-500V engine with take-off power of 630 h.p. (in May 2014) and the MS-500V-01 engine with take-off power of 810 h.p. (in April 2016) have got Type Certificates of the IAC Aviation Register.

MOTOR SICH develops the MS-500V-02 version of the engine with take-off power of 1050 h.p. and the MS-500V-03 version of the engine with take-off power of 950 h.p. (with forward and rear power offtake shaft correspondingly).

Now, the Company develops the MS-500V-S family of turboprop engines with take-off power from 950 to 1050 h.p. These engines are intended for general purpose, trainer and passenger aircraft.

Nowadays, MOTOR SICH rapidly develops own Helicopter Program. The Company has created Experimental Design Bureau comprising more than 300 specialists. This Bureau is certified as the Design Organization by the State Aviation Administration of Ukraine.

MOTOR SICH helicopter production facilities include modern machining and assembly workshops, paint removal and application section, Flight-Test Complex, Simulator Complex for crews training in all types of helicopters produced by the Company.

Flight-Test Complex has a multi-purpose test bench intended for optimization and ground testing of airframe components and helicopter systems.

MOTOR SICH has established its own science and technology base for designing, manufacture, testing and certification of the helicopters.

The Mi-8MSB medium multipurpose helicopter with maximum take-off weight of 12,500 kg is the first implemented project under MOTOR SICH Helicopter Program. The helicopter is equipped with a powerplant consisting of two TV3-117VMA-

SBM1V Series 4E gas-turbine engines with electrical starting.

The Mi-8MSB helicopter has already proved itself as an optimal solution for high-mountain regions. Outstanding altitude performance of the TV3-117VMA-SBM1V series 4E engines allows the Operator to use helicopter bases at the altitude of up to 4200 meters.

The Mi-8MSB helicopter powered by the TV3-117VMA-SBM1V series 4E engines has set several world records. Among them is an absolute record of level flight altitude in E1 class - 9150 metres, that is 300 m higher than Mount Everest.

The Mi-8MSB helicopter is distinguished from similar helicopters by simplicity of maintenance, repairability and reliability. The helicopter design makes it possible to install a wide range of specialized equipment for various missions. The helicopter is equipped with advanced navigational complex complying with EASA and ICAO requirements.

Development and manufacture of the light helicopters is one of the main lines of MOTOR SICH Helicopter Program. The Mi-2 helicopter powered by the AI-450M-B engines has become the first certified light helicopter that was developed by MOTOR SICH JSC. Main design change involves re-engining of the helicopter with modern AI-450M-B engines developed by IVCHENKO-PROGRESS SE and manufactured by MOTOR SICH.

The Mi-2 multipurpose helicopter powered by the AI-450M-B engines differs from other light helicopters by a spacious passenger compartment and twin-engine powerplant. As compared with the Mi-2 helicopter, power of each engine is increased from 400 to 430 h.p.

This helicopter has the following advantages as compared to the Mi-2 helicopter: hourly fuel consumption is reduced by 30 %; flight range with additional external tanks is increased by 40 %; service ceiling is increased from 4 to 5 km.

Due to the changed shape of cowlings, the helicopter has received a renovated, more dynamic external view. The cowlings are made of advanced composite materials in

order to reduce the structural weight. The design of structural frame, engine fuel, oil and cooling systems is changed.

The instrument panel is supplemented with digital indicators of the engine parameters. 'Glass cockpit' onboard equipment may be installed as an option.

One of the key advantages of the upgraded helicopter is its altitude performance, which opens its way for export to the mountainous countries. On April 18, 2016, the Mi-2 helicopter powered by the AI-450M-B engines has set a new record of reaching seven thousand meter altitude.

Another advantage of the helicopter: it may be stored without hangar. Almost all similar helicopters do not have such feature.

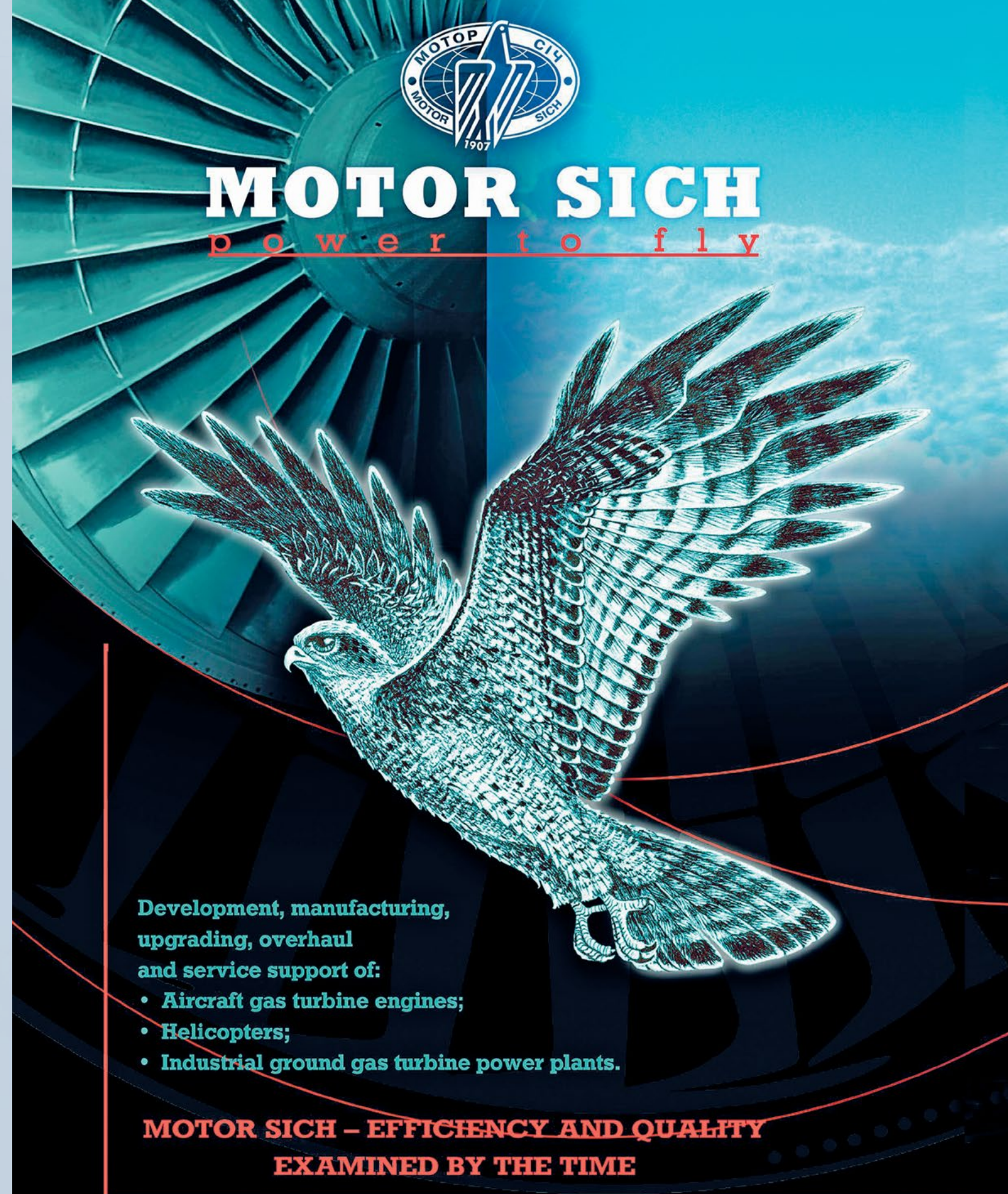
In spite of the fact that the Mi-2 helicopter powered by the AI-450M-B engines belongs to the light helicopters, its transport capabilities are rather high. 8 passengers may seat in the helicopter cabin (excluding the pilot). Thus, seating capacity of the Mi-2 exceeds capacity of more expensive similar foreign helicopters.

MOTOR SICH works at expansion of commercial capabilities of the helicopter owing to integration of new mission equipment. For example, a new original external sling system is designed in order to increase the helicopter load-carrying capacity.

New flexible U-shaped fuel tank is designed to ensure passage of the external sling. Another advantage of new design of the external sling system is location of lock at the helicopter center of gravity. At present, the Company's tests of the new external sling system are complete. They confirm the possibility to increase the load-carrying capacity by 25% (from 800 to 1000 kg).

In addition to increased flight range due to more efficient engines, this parameter may be enhanced due to installation of the external fuel tanks of higher capacity. Capacity of each external fuel tank is 300 liters.

The dual-control helicopter version may be used for training of the future pilots. The helicopter has one more advantage for training purposes: its design is similar to that of heavier helicopters of the Mi-8 type.



**MOTOR SICH**  
power to fly

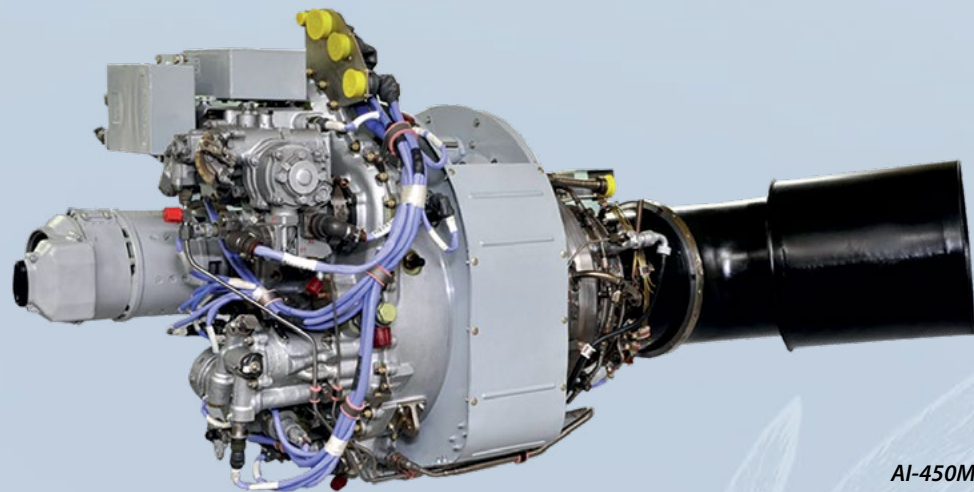
**Development, manufacturing, upgrading, overhaul and service support of:**

- Aircraft gas turbine engines;
- Helicopters;
- Industrial ground gas turbine power plants.

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EXAMINED BY THE TIME**

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AI-450M

The Mi-2 helicopters successfully participate in the helicopter sports championships. Impressive flight characteristics of these helicopters are well-known. Re-engining significantly improves capabilities of the helicopter as a participant of aviation competitions.

For treatment of agricultural fields, the helicopter may be equipped with spraying or fertilization system featuring two composite tanks having total volume of up to 1200 liters.

The Mi-2 helicopter powered by the AI-450M-B engines may be equipped with equipment for medical air evacuation. Rescue variant may be equipped with a searchlight, a winch for fast lifting of 2 persons, and other mission equipment.

The MSB-2 helicopter is a light multipurpose helicopter partially unified with the Mi-2 helicopter powered by the AI-450M-B engines. This model of helicopter has more powerful AI-450M-P engines (465 shp each) and new transmission based on the VR-442 main gearbox. Full-size mockup of the helicopter was demonstrated at several specialized air shows and exhibitions.

Due to its design features, the helicopter fits ideally for carriage of passengers, search-and-rescue operations and medical evacuation. As compared with the Mi-2, the MSB-2 helicopter has the following additional advantages: fuel flow rate is reduced by 30 %; cargo compart-

ment space is expanded by 1 m<sup>3</sup>; automatically-driven cargo-and-passenger compartment door; large area of the flight compartment windows.

At present, the first MSB-2 helicopter, which is manufactured at MOTOR SICH, undergoes the cycle of ground and flight tests.

Current activity of MOTOR SICH fully meets the criteria of global economy. The corporate strategy is aimed at increase of the production output and marketing of its products, development and commercializing of the advanced products, expansion of the sales markets.

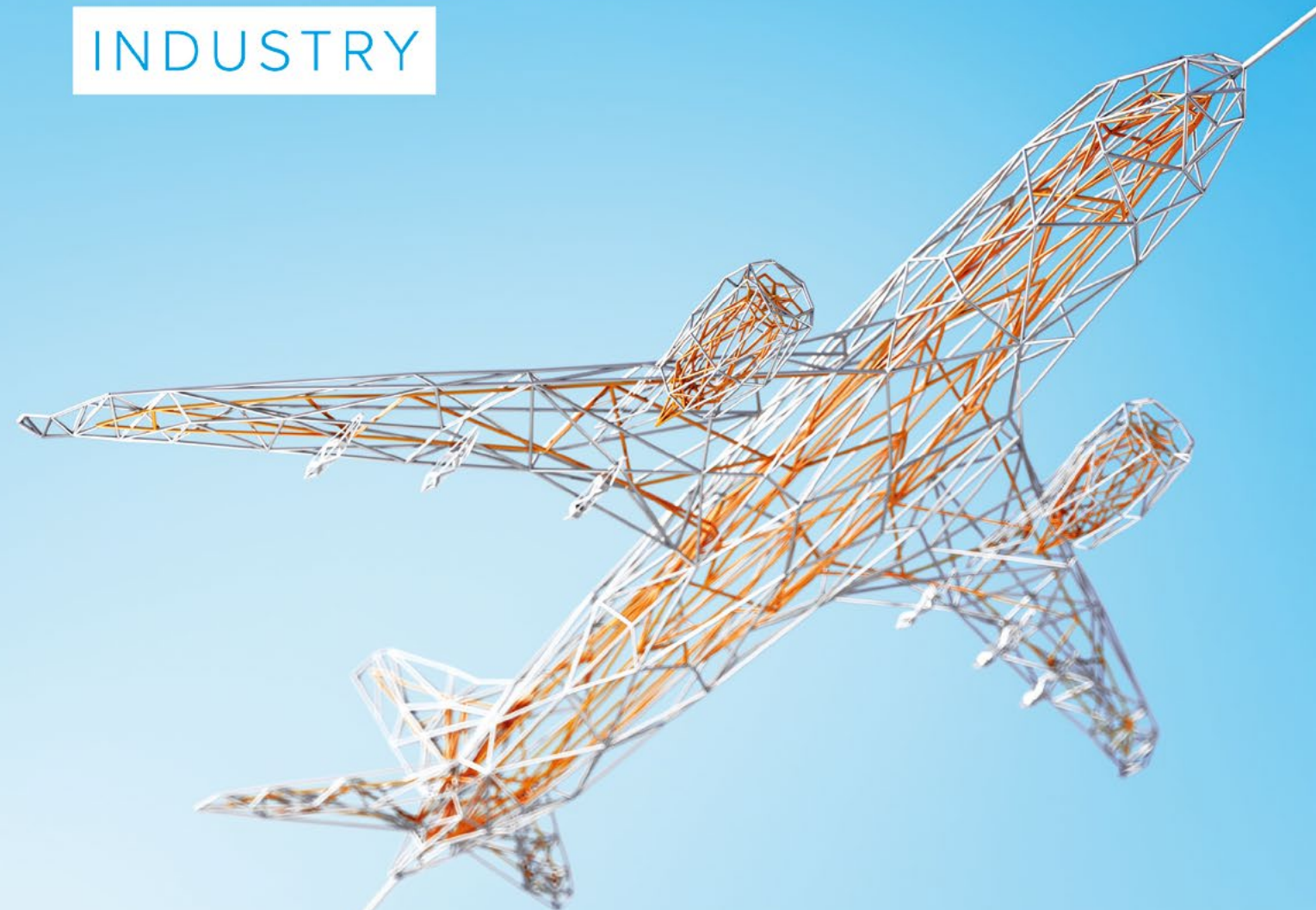


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Mi-2 powered by AI-450M-B engines



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# India, Russia aim for new breakthroughs in BRAHMOS missile programme

The world-class BRAHMOS supersonic cruise missile system, produced by BrahMos Aerospace, has expanded the realm of India-Russia strategic partnership and elevated bilateral defence ties to a higher level. The joint venture (JV) military programme involving two scientific institutions of eminence – India's DRDO and Russia's NPOM – has produced a powerful tactical weapon with no parallels in the world. The project, which started in 1998 with an initial investment of \$250 million having a 50.5% Indian share and 49.5% Russian share, today has become the most successful Defence JV programme in the world.

**A**s a new-age precision strike missile with land, sea/sub-sea and air deployability and operability, the formidable BRAHMOS has redefined and influenced warfare tactics and strategies in the 21st century. Initially developed in anti-ship configuration, BRAHMOS has evolved over the years to establish its impeccable land-attack

capability. Presently, it is the only weapon system which can be fired in land-to-land, land-to-sea, sea-to-land, sea-to-sea, sub-sea-to-land and air-to-sea configurations. No other country in the world has been able to develop such a highly versatile, multi-role modern weapon for its military.

Flying at a top speed of Mach 2.8 and carrying a powerful warhead of up to 300 kg, the two-stage BRAHMOS

has been designed to annihilate high-value land and sea-based enemy targets with impeccable accuracy, high speed and deadly firepower.

While the Russian scientists and engineers contributed in developing the critical propulsion system, including the ramjet engine and booster for the missile along with the warhead, the Indian scientists and technology experts played an equally important

role by designing and developing the fire control system, electronic system, guidance system, avionics and materials for airframe among other components for the missile. In the initial phase, NPOM provided its facilities to test all the technologies needed to develop and configure the new weapon system.

Today, the Indian Navy has deployed the powerful BRAHMOS on all frontline surface warships while the Indian Army is the only land force in the world which has operationalised the land-attack variant of the tactical missile.

A major technological breakthrough in the BRAHMOS project came on 22nd November 2017 when BrahMos Aerospace for the first time successfully test fired the advanced air-to-surface variant of the missile from the Indian Air Force's Sukhoi-30MKI combat aircraft against a sea target. It became a world record feat for India which showed the country's exclusive capability to launch a supersonic cruise missile from land, sea, sub-sea and air.

The air-launched BRAHMOS project faced many 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, backed by the Russian and Indian Governments 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 ALCM programme.

Today, the BRAHMOS air-launched cruise missile (ALCM) has become an unparalleled precision strike weapon in terms of range, lethality, and effectiveness among world-wide conventional airborne weapons. It has given an unprecedented fillip to the Indian Air Force's air combat capability.

As India and Russia now intend to export BRAHMOS in the international market, it is the advanced BRAHMOS-A which has gained maximum attention. Russia's Irkutsk Aviation Plant in particular, has been keen on modifying and integrating the airborne missile on the Sukhoi-30 fighter platforms operational in all the friendly countries of India and Russia.

Moreover, with the Russian military presently equipping itself with a large number of modern land, sea and air platforms, the prospects for BRAHMOS getting inducted into the Russian Armed Forces in near future has certainly brightened.

India, with the necessary support and backing from Russia, has also started indigenising the BRAHMOS Weapon System. 'Of course, given that the Indian economy and Indian infrastructure and technology have improved over the last many decades, what we are now focusing on along with Russian partners is to manufacture and produce more in India using technology that is available in Russia to upgrade our equipment, to manufacture new equipment and to build upon the successes of the past,' says Dr. Sudhir K Mishra, CEO & MD of BrahMos Aerospace.

Consequently, BrahMos Aerospace has successfully tested land-attack BRAHMOS with an indigenous seeker and has also carried out 'life extension technology' tests successfully in recent past with indigenous components.

Additionally, India and Russia have also initiated work on more advanced variants of BRAHMOS,



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including the BRAHMOS-NG (next-generation) and a hypersonic BRAHMOS-II (K), paving the way for the 'world's best and fastest cruise missile project' to continue retaining its legacy position of 'market leader' well into the distant future. /IA&MG/







# RUSSIAN NAVY DAY

*Vladimir Putin and Sergey Shoigu marked the main military holiday of summer*

In the last Sunday of July in Russia, traditionally celebrated the Navy Day. This holiday has always been a special celebration of Russian honor, pride and military power of the navy. This year the holiday was especially powerful. An official reception to mark Russia's Navy Day was held at the Admiralty in St Petersburg – Navy capital of Russia. Also in this city there was the Main Naval Parade, and the Supreme Commander-in-Chief Vladimir Putin reviewed it on the Neva River.

**D**uring official reception Vladimir Putin said: 'The profession of a navy man in our country has always been an honourable one that personified courage, valour and dedication. Such respect is well-deserved: everyone knows that the naval profession is a difficult and important work. It means service in the most difficult and rough environments, often involving long separations from the family and loved ones. But for a navy man, the noble goal of serving the Fatherland has always been a top priority.'

The high combat readiness and effectiveness of the naval forces is a major component of ensuring the country's military capability and its security, as well as the security of its citizens. And, of course, we will continue to implement measures aimed at strengthening and developing the Navy and better equipping its fleet.

This year, the Navy has already received four surface vessels, one anti-terror boat, and three support ships. Overall, in 2018 the Navy will receive 26 new ships, cutters and vessels, including four ships with the Kalibr missile system.

Rearmament and modernisation is making good progress largely due to the workers of our shipbuilding industry and their professionalism and responsible attitude. The Navy infrastructure, including ship base infrastructure, has also been developing to meet the latest requirements.

The Navy has always been among the first to master scientific, technical, engineering and design achievements. Meeting the Navy's current and prospective needs should further stimulate the development and introduction of advanced and innovative technologies and serve as one of the drivers for the technological breakthrough. And this, as experience shows, will be inevitably followed by the flow of breakthrough knowledge into the civilian sector.

I am confident that every person who serves in the Navy knows that they have the entire great history of the Russian Navy behind them, all the outstanding achievements of our predecessors and the valour of our respected veterans. I hope the current generation of navy men will honourably continue this great history.



*The Navy has always been among the first to master scientific, technical, engineering and design achievements. Meeting the Navy's current and prospective needs should further stimulate the development and introduction of advanced and innovative technologies and serve as one of the drivers for the technological breakthrough. And this, as experience shows, will be inevitably followed by the flow of breakthrough knowledge into the civilian sector.*







***Honour and valour, being true to one's duty and oath have always been and will remain the underpinnings of the spectacular victories won by our Navy. For more than three centuries now, the Russian fleet has enabled Russia to affirm its status as a great naval power, capable of standing up for its national interests and protecting its shores.***

The Main Naval Parade that took place on the Neva River this year, united more than four thousand Navy personnel from the Baltic, Northern and Black Sea fleets and the Caspian Flotilla, as well as more than 40 ships and motor boats of various kinds, along with a Navy aviation group all took part in the parade.

Before the main part of the parade, the President sailed round the combat ships, which were lined up for the parade in the inner harbor of Kronstadt, and welcomed their crews. The President also visited the Peter and Paul Fortress and the Cathedral of Saints Peter and Paul.

At the Main Naval Parade Vladimir Putin said: 'I congratulate all those who guard the maritime boundaries of our Motherland, take part in long-distance expeditions, and all those who have dedicated their lives to the surface and submarine forces, naval

aviation, coastal defence troops, and who are committed to serving to the glory of the Russian Navy.

Honour and valour, being true to one's duty and oath have always

been and will remain the underpinnings of the spectacular victories won by our Navy. For more than three centuries now, the Russian fleet has enabled Russia to affirm its status as a great naval power, capable of standing up for its national interests and protecting its shores.

The fleet's history is personified by the courage, valour and spirit of its sailors and officers. Their devotion to the Fatherland served as a guiding light for bold pioneers, and inspired ship builders to reach new heights by developing engineering marvels. These glorious traditions cannot fail to inspire current generations.



The celebration of Navy Day emphasises the power of the sacred maritime brotherhood that unites all Navy bases and units of the Baltic, Northern, Pacific, Black Sea fleets and the Caspian Flotilla.

The Russian Navy has been successful in ensuring our national defence capability, and continues to make a substantial contribution to the fight against international terrorism, while also playing a vital role in guaranteeing strategic parity. Every day dozens of ships and submarines ensure the defence of Russia's interests in any part of the World Ocean.

We have every right to be proud of our Navy, our Naval forces, their high-class combat readiness, strategic, tactical and operational capabilities, as well as the power and beauty of the Russian fleet.

Our people have always admired the sailors of our Navy, since only the brave and resilient can shoulder maritime service, and understand the value of military readiness, strict discipline, unity and chivalry. Together with having the latest knowledge and impeccable skills in mastering the latest advances in military hardware, these qualities enable our Navy to deliver on even the most complex missions! /IA&MG/





# MEETING ON SPACE SECTOR DEVELOPMENT



In Novo-Ogaryovo (Moscow Region) Vladimir Putin held a business meeting on space sector development. The meeting participants discussed the implementation of the programmes to develop the space sector and measures to ensure its stable growth. The meeting was attended by First Deputy Prime Minister – Finance Minister Anton Siluanov, Deputy Prime Minister Yuri Borisov, Presidential Aide Andrei Belousov, Deputy Commander-in-Chief of the Aerospace Forces and Commander of the Russian Space Forces Alexander Golovko, and General Director of the Roscosmos State Corporation for Space Activities Dmitry Rogozin.

President of Russia Vladimir Putin marked: 'As you know, a few weeks ago we met with the new leadership of Roscosmos corporation. Today we will continue analysing the situation in the space sector. This sector is of strategic importance for the country. Its steady and progressive development is essential for building up Russia's defence capability and national security, for enhancing the country's scientific potential and for creating innovative commercial technology.'

Space exploration and making use of the opportunities it offers to serve the interests of the economy and social sphere are major areas for Russia's technological breakthrough. Today I suggest discussing the implementation of the programmes for the development of the rocket and space industry and additional measures to ensure its stable and balanced growth.

Instructions were issued to the Government and Roscosmos in this connection, primarily to increase the orbital group, create a super heavy-lift launch vehicle, implement a manned flight programme and complete the construction of the Vostochny Space Launch Centre. I hope to hear reports on the implementation of these instructions today.

It should be noted that Russia has the necessary design, engineering and technical capabilities to success-

fully implement all of these projects, as well as the experience of designing complex space equipment and unique space exploration competences.

At the same time, our space industry must consistently improve the quality of its products and works, which should come at globally competitive prices. This is the key condition for increasing the industry's commercial potential to ensure its successful operation on the global market, where competition, or even rivalry, continues to increase.

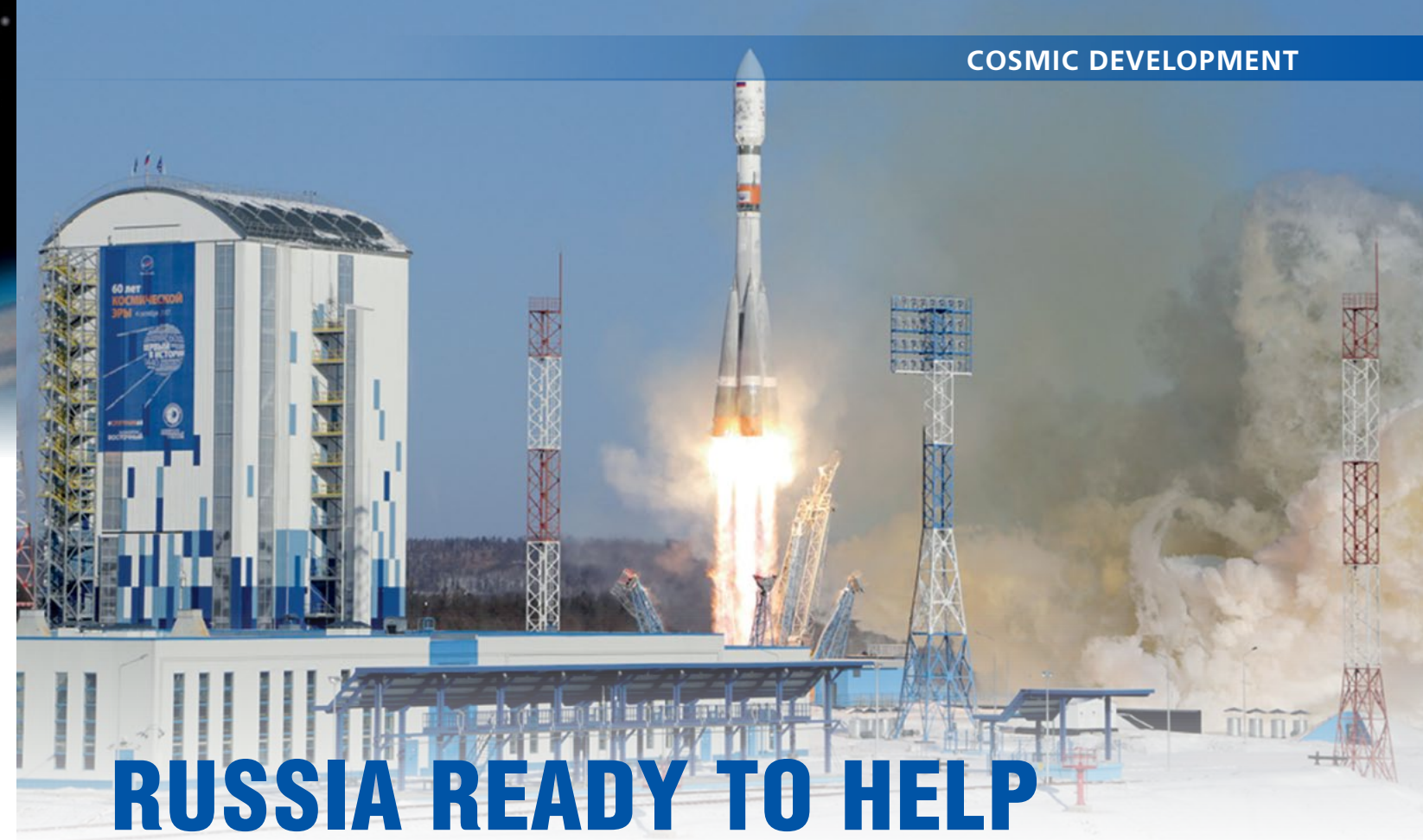
We must create conditions for fruitful and coordinated work of all space industry companies and their personnel, including designers, engineers and workers. We must also enhance the financial stability of these companies and provide additional social guarantees and incentives for improving the professional skills of their personnel and for attracting young talented professionals.'

After President speech General Director of the Roscosmos State Corporation for Space Activities Dmitry Rogozin said: 'Based on your instructions, starting from January 1, 2017, we introduced a new procedure requiring all vehicles produced in Russia or supplied to Russia to be equipped with ERA-GLONASS units. This has already saved hundreds of lives. We are even ahead of European practice here. We propose to introduce a similar practice when Russian airlines buy or lease for-

eign-made aircraft and even more so, aircraft made in Russia. They should all be equipped the same way – and we propose making it a legal requirement – with GLONASS or GLONASS-GPS modules in some cases. This will enable more accurate navigation for the crews. We have airports equipped with this system, but the planes, which are still mostly foreign-made, do not have these units. I would ask you to support my proposal. I have prepared a report and will submit it to you today.

And the second question. I would like to show you an album today after the meeting. Since April 2014, we have been photographing the Crimean Bridge, while it was being built. From the first step on each autoshot path, 240 paths in all, were shot monthly by our satellite-based remote sensing devices. Now we have a group of 10 satellites; in a few years, there will be 23. This is also a very important area for the commercialisation of space activities. At present we can remotely monitor how objects change, observe changes in the landscape, changes in the natural environment, illegal logging and many other things.

Before the end of this month we will be presenting the latest capabilities of Roscosmos and its orbital group to the federal districts and the regional governors. These new capabilities need to be commercialised and promptly introduced into the national economy.'



Rostec is ready to expand its cooperation with Turkey in creating and developing the republic's space agency. Earlier, the Turkish satellite Turksat-4A was launched in cooperation with Rosoboronexport (part of Rostec).

Rostec is actively developing the space industry and introducing advanced technologies in various areas of space exploration. The engines manufactured by UEC put Soyuz carrier rockets into orbit. Technodinamika produces life support systems for pilots and astronauts, including the Orlan-MKS space suit and the latest 'space' parachute system. Optical devices designed by Shvabe sense the earth's surface from satellites and are also used in the largest observatories in the world. RT-Chemcomposite creates unique composite materials that can withstand ultra-high temperatures and heavy loads.

'Rostec and its Turkish partners have had a mutually beneficial relationship in various industries for a long time. We certainly welcome our partners' intent to develop the space industry,' said Viktor Kladoy, Director for International Cooperation and Regional Policy Department of the State Corporation. 'Rostec has a wide range of competences and

extensive expertise in developing the space industry, and we are ready to expand and strengthen cooperation in this sphere.'

In addition, through Rosoboronexport and in the interests of foreign customers, Russian aerospace industry enterprises create and launch spacecraft for various purposes, make ground control complexes, complexes for receiving and processing data from satellites, and provide foreign partners with maps created based on space images. Specialists from partner countries learn how to carry out thematic processing and analysis of data obtained by remote sensing of Earth, with support from Rosoboronexport.

Rosoboronexport may suggest unique comprehensive projects to partners, as in the case when the first Malaysian astronaut Sheikh Muszaphar Shukor was sent to the ISS as part of an offset agreement to the contract for supplying Su-30MKM fighters.

Overall, Rosoboronexport has assisted in putting over 30 space-

craft from 14 countries into relevant orbits, including in the interests of the UK, Germany, Italy, China, Norway, Sweden, and the European Space Agency.

/IA&MG/







# SPLAV: NEW POSSIBILITIES OF MRLSS

**R**ussian JSC 'SPLAV SPA' is the leading Russian enterprise in development and organization of production of the Multiple Launcher Rocket Systems (MRLS) for the Army, Navy, and Air Force.

Over its history from the time of its foundation in 1945, such outstanding systems as GRAD, URAGAN, SMERCH for the Army, GRAD-M, UDAV-1M, OGON', DAMBA, RPK-8 for the Navy have been developed at

JSC 'SPLAV SPA', dozens of unique techniques for the rocket projectiles, the artillery shell cases of calibers from 24 to 152 mm made of various materials have been elaborated. Nowadays our engineering developments and production techniques in the field of the rocket artillery and shell cases production are known worldwide.

The distinctive feature of the Russian MRLSs development is striving of their designers to constantly

enhance the rocket artillery combat capabilities through development of the new types of the rocket projectiles fitted with different-purpose warheads, as well as upgrade of the launch vehicles for the army-accepted systems.

Specialists of the enterprise have developed modernization programs for the GRAD and SMERCH systems which ensured execution of the fire missions on destruction of the enemy over a distance of, correspondingly, 40 and 120 km, enhancement of capabilities of fire engagement against the typical targets, computerization of the fire preparation and delivery, upgrade of the launch vehicles.

JSC 'SPLAV SPA', being the world leader in delivery of ammunition for the Russian-produced MRLSs, conducts active operations in the field of military and technical cooperation through Rosoboronexport, the Russian State Intermediary.

Nowadays JSC 'SPLAV SPA' offers at the international defense market upgraded GRAD and SMERCH MRLSs, including different-purpose

warheads rocket projectiles with the range of fire of, correspondingly, 40 and 120 km, as well as the new generation of the 80mm unguided aircraft rocket armament, C-80FP HE-Fragmentation penetrating warhead unguided aircraft rocket projectile and a small-type high energy solid rocket propellant motor.

Presently the following systems are being offered for export:

GRAD MRLS:

1. 122mm Rocket Projectiles (RPs):

- 9M521 RP with increased power warhead;
- 9M522 HE-fragmentation separable warhead RP;
- 9M218 shaped-charge fragmentation submunitions RP.

2. 2B17-1 Launch Vehicle (LV) is equipped with automated laying fire and control system (ALFCS).

Besides, the algorithm has been elaborated in order to upgrade GRAD and GRAD-1 MRLSs standard RPs by increasing the range of fire up to 40 km.

SMERCH MRLS:

1. 300mm RPs:

- 9M525 fragmentations submunitions warhead RP;
- 9M528 HE-fragmentation separable warhead RP;
- 9M529 fuel-air explosive warhead RP;
- 9M531 shaped-charge fragmentation submunitions warhead RP;
- 9M533 sensor-fuzed fragmentation submunitions warhead RP.

2. 9A52-2 LV (on MAZ chassis), 9A52-2T LV (on Tatra chassis) 9A52-4 LV (lightweight six-round launcher mounted on elongated KAMAZ chassis) equipped with ALFCS.

3. 9T234-2, 9T234-2T, 9T234-4 Transporter-Loaders.

4. 9F819 Arsenal Equipment.

5. 9F827 Training Aids.

6. 9F840 Training Set.

7. MP32M1 Unified Command and Staff Vehicle.

8. 1B44 Radio Direction-Finding and Meteorological Complex.

Upgrade of GRAD and SMERCH LVs ensured the new capabilities of these systems:

- Fire delivery from the unsurveyed in the topographical respect firing position thanks to the autonomous calculation of the LV ramp longitudi-

nal axis azimuth and plotting of the own coordinates;

- Cutting time from the moment of taking up of the temporary firing position to the moment of commencing fire by a factor of three;

- The LV ramp laying operable from the cab and without usage of the aiming points;

- Visual presentation on the computer screen of a graphical information for the LV ramp laying, the ground map with indication of the LV position, destination point, and route of advance;

- Increase in the LV survivability thanks to cutting time in the firing position;

- Increase of the operator-layer comfortability, especially in the adverse weather conditions and at night;

- Increase of the LV self-sustainment thanks to imparting to it of the navigation and topographical survey functions, which ensures shoot-and-scoot tactics, autonomous movement to the assembly point after firing, compensation of errors due to the human factor;

- reduction in the crew number up to 2 persons (GRAD MRLS), and up to 3 persons (SMERCH MRLS).

Beginning from 2003, the enterprise has been granted the right to independently carry out foreign trade activities with respect to the products for military purposes to the extent concerning delivery of spare parts, aggregates, assemblies, devices, completing units, special, training, and auxiliary equipment, technical documentation for the earlier deliv-



ered products for military purposes, carrying out of works on technical inspection, repair (including modernization subject to carrying out of R&D works), and other works ensuring complex service maintenance of the earlier delivered products for military purposes, as well as training of the foreign specialists in carrying out of the above works. /IA&MG/

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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](http://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

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

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

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

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

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

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

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

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

case of emergencies than traditional evacuation methods are impossible.

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

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

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

absorbing systems entered into force in 2013.

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

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

New SPARS® escape solution provides the following advantages:

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

## The SPARS® General Specifications

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

## Actual Landing Impact Loads:

### Acceleration directions:

'chest-to-back' – up to 8÷10 g

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

Acceleration Exposition Time – less than 0.5 s

Acceleration Growth Velocity – less than 500 1/s

User's age – 18÷70 years

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

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







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

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

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

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

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

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

essary intellectually property rights protected.

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

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

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

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

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

For a strategic industrial Partner sought who would be interested to

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

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

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

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

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

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

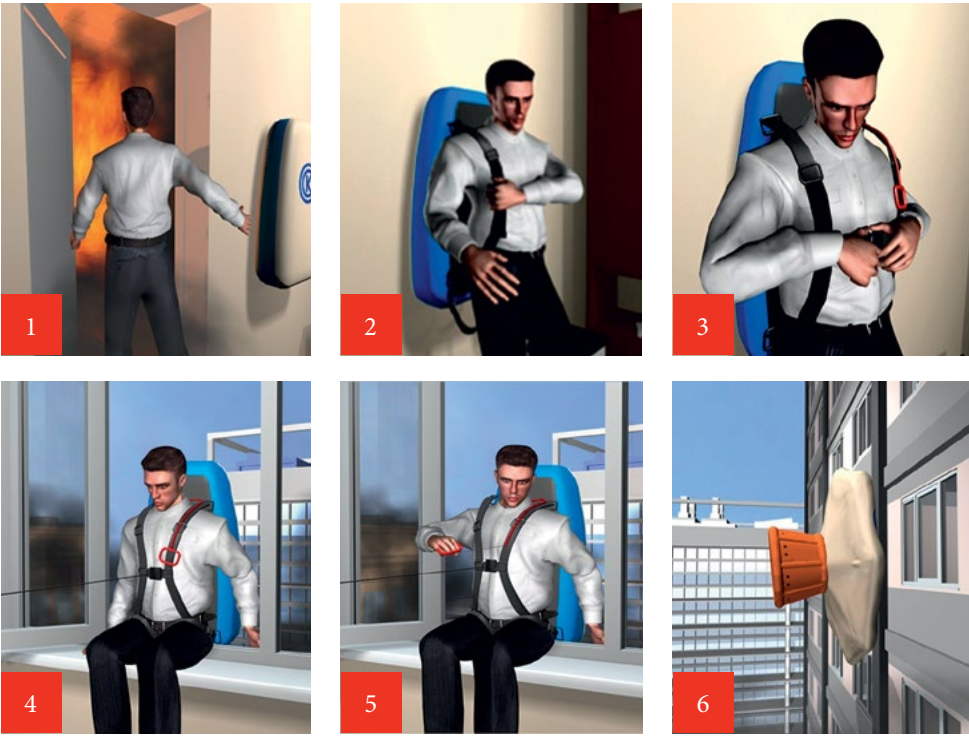


### There are following innovations in the proposed SPARS® technology:

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 2018-2019

In 2018

ISSUE	RELEASE DATES	ADDITIONAL DISTRIBUTION
'RA&MG'№08 (26)	September 17th	<b>Africa Aerospace and Defence 2018</b> (19-23.09.2018, South Africa, Pretoria)
'RA&MG'№09 (27)	September 24th	<b>ADEX 2018</b> (26-29.09.2018, Azerbaijan, Baku)
'RA&MG'№10 (28)	November 05th	<b>Airshow China 2018</b> (06-11.11.2018, Zhuhai, China)
'RA&MG'№11 (29)	November 07th	<b>INDO DEFENCE 2018</b> (07-10.11.2018, Indonesia, Jakarta)
'RA&MG'№12 (30)	November 26th	<b>IDEAS 2018</b> (27-30.11.2018, Pakistan, Karachi)
'RA&MG'№13 (31)	December 01th	<b>EDEX 2018</b> (03-05.12.2018, Egypt, Cairo)

In 2019

ISSUE	RELEASE DATES	ADDITIONAL DISTRIBUTION
'RA&MG'№01 (32)	February 12th	<b>AERO INDIA 2019</b> (14-18.02.2019, India, Bangalore)
'RA&MG'№02 (33)	February 15th	<b>IDEX 2019 / NAVDEX 2019</b> (17-21.02.2019, UAE, Abu Dhabi)
'RA&MG'№03 (34)	March 24th	<b>LIMA 2019</b> (26-30.03.2019, Malaysia, Langkawi)
'RA&MG'№04 (35)	April 01th	<b>LAAD 2019</b> (02-05.04.2019, Brazil, Rio de Janeiro)
'RA&MG'№05 (36)	May 12th	<b>IMDEX ASIA 2019</b> (14-16.05.2019, Singapore)
'RA&MG'№06 (37)	May 14th	<b>SITDEF 2019</b> (16-19.05.2019, Peru, Lima)
'RA&MG'№07 (38)	June 16th	<b>Paris Air Show 2019 Le Bourget</b> (17-23.06.2019, France, Paris)
'RA&MG'№08 (39)	June 24th	<b>IMDS-2019</b> (26-30.06.2019, Russia, Saint Petersburg)
'RA&MG'№09 (40)	July 20th	<b>MAKS-2019</b> (23-28.07.2019, Russia, Moscow)
'RA&MG'№10 (41)	September 16th	<b>AVIATION EXPO CHINA 2019</b> (18-20.09.2019, China, Beijing)
'RA&MG'№11 (42)	October 01th	<b>INMEX SMM India 2019</b> (03-05.10.2019, India, Mumbai)
'RA&MG'№12 (43)	October 13th	<b>SEOUL ADEX 2019</b> (15-20.10.2019, Korea, Seoul)
'RA&MG'№13 (44)	October 28th	<b>BIDEC 2019</b> (28-30.10.2019, Bahrain, Manama)
'RA&MG'№14 (45)	November 02th	<b>Defense &amp; Security 2019</b> (04-07.11.2019, Thailand, Bangkok)
'RA&MG'№15 (46)	November 16th	<b>Dubai Airshow 2019</b> (17-21.11.2019, UAE, Dubai)
'RA&MG'№16 (47)	December	<b>Gulf Defense &amp; Aerospace 2019</b> (December, 2019, Kuwait, Al Kuwait)

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Международный военно-технический форум

# ARMY 2019

№ 01, 20 августа 2019 года

ОФИЦИАЛЬНОЕ ЕЖЕДНЕВНОЕ ИЗДАНИЕ ФОРУМА

OFFICIAL SHOW-DAILY  
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## Главный форум

Инновационный союз ОПК России и Вооруженных сил РФ



«С 20 по 25 августа Министерство обороны Российской Федерации проводит Международный военно-технический форум «АРМИЯ-2019». Это третье по счету масштабное мероприятие, в котором примут участие крупные отечественные и зарубежные предприятия оборонно-промышленного комплекса, ведущие конструкторские бюро и научно-исследовательские институты.

Основные мероприятия Форума пройдут в Конгрессно-выставочном центре «Патриот». Общая площадь экспозиции в павильонах и на открытых площадках превысит 300 тыс. кв. м. Динамические показы ходовых, летных и огневых возможностей вооружения, военной и специальной техники состоятся на аэродроме Кубинка, полигоне Алабино, а также в военных округах и на Северном флоте.

Научно-деловая программа пройдет в формате пленарных заседаний, конференций, круглых столов и брифингов, что позволит обсудить актуальные вопросы обороны и безопасности, дальнейшие направления совершенствования способов производства продукции военного назначения.

Тысячи посетителей смогут ознакомиться с последними достижениями в области высоких технологий и перспективными разработками, которые реализуются в военной сфере.

Сегодня Форум можно считать одной из ведущих мировых выставочных площадок в области вооружения, военной и специальной техники. Уверен, что Москва на «АРМИЯ-2019» будет играть центральную роль.

## International military-technical forum 'ARMY-2019'

August 20-25, 2019

The Patriot Congress and Exhibition Centre with the Military and Patriotic Park of Recreation and Leisure of the Armed Forces of the Russian Federation

Official information analytical edition of the forum – newspaper show-daily 'ARMY-2019'

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