

# RUSSIAN AVIATION & MILITARY GUIDE

Special analytical export project of the United Industrial Publishing

№ 01 (62), March 2022

**ROSOBORONEXPORT**  
*Russian exposition  
at WDS-2022 in Riyadh*



**TOP FIVE**  
*New Russian export  
products of 2021*



**TOR-M2KM**  
*Absolute protection  
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## TOR-TYPE SURFACE-TO-AIR MISSILE SYSTEMS

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№ 1 (62), March 2022

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## EDITORIAL



### The best defense innovations for the global market

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

Political situation in the world (conflicts, sanctions, threats of war and other) makes nations once again reconsider their defense possibilities. Threat of local conflicts to be evolved into global ones, failure of worldwide system of safety and nonending crisis – all of this leads to an unstable and dangerous situation.

One can predict raise of defense means market in times like this. But together with developing of defense technologies in order to safety, rivalry among sellers of weapons and defense systems increases in order to achieve such goals as increasing profits and market share.

The first international exhibition and forum World Defense Show (WDS-2022), a fully integrated exhibition, covers a broad range of product segments; end systems, sub-systems and components aligned to global and domestic interoperable defense requirements. It presents in Saudi Arabia the best Russian weapons and innovations for global market, which are the undisputed world leaders on price and quality in their segments.

WDS-2022 shows that it is not serious about how many weapons and planes you have, but quality and possibilities of every single one of them is fact what leads to victory on the battlefield and on the global market. Other significant factor is technological independence from seller – modern technologies make it possible to shut down any device from any place of the globe if you have appropriate access. With hi-tech products, solid aftersales service and proven reliability, Russia is honest and friendly partner for all countries, which are ready for mutual work.

Taking part in WDS-2022 Russia continues the policy of open partnership with the Gulf's states and other countries. Russia has a wide product line that meets all the needs of this region and ready propose the best technology and the best price offers.

**Valeriy Stolnikov**



TESTING IN YAKUTIA

The MC-21-300 prototype aircraft manufactured by Irkut Corporation (a member of Rostec's United Aircraft Corporation) flew from Zhukovsky (Moscow Region) to Yakutsk for testing under sub-zero outside temperatures. A group of specialists from Irkut Corporation and Yakovlev Design Bureau, headed by Andrei Boginsky, Irkut CEO, came to Yakutsk to organize and perform trials of the MC-21-300.



'Today's flight is the first one to combine two factors: the distance to the destination point from Zhukovsky and the proof of serviceability of all aircraft systems for a comfortable long flight with many passengers onboard. The number of transported specialists exceeded 70 people. They will perform testing to expand the aircraft's ability to operate under outdoor temperatures below minus 30 degrees Celsius. This is a follow-up to the hard work that was carried out last year and resulted in obtaining a type certificate for the MC-21-300. We will have to run a series of tests to expand the certificate and hand over its first mass-produced airplanes to the Rossiya airlines for operation by the end of this year,' said Andrei Boginsky, Director General of PJSC Irkut Corporation. Daniil Brenerman, Managing Director of the Yakovlev Design Bureau, reported that the MC-21-300 flight from Zhukovsky to Yakutsk proceeded without any problems. 'It will take approximately three weeks to conduct ground and flight tests in Yakutia, depending on the air temperature in the region. Each test phase is preceded by cooling of the aircraft and in the evening and at night it will be in the open parking lot for 12 hours. The Yakutsk Airport and Yakutia Airlines provide organizational and technical support for the tests,' he added. The aircraft is operated by Oleg Mutovin and Andrey Voropaev, first class test pilots of the Yakovlev Design Bureau. Tests of the MC-21-300 aircraft will be performed as part of the extension of the type certificate which currently allows its operation at outside air temperatures near the ground of minus 30 degrees Celsius. Previously, the aircraft systems were successfully tested on stands under temperature conditions of up to minus 55 degrees Celsius. The Irkut Corporation delegation will also have working meetings with officials from the Administration of the Republic of Sakha (Yakutia), the Ministry of Transport of the Republic of Sakha (Yakutia), and Yakutia Airlines to discuss the operation of the Corporation's civil aircraft in the region.

A-100 long-range airborne aircraft

*Specialists of the Vega Concern of Ruselectronics Holding and Beriev Aircraft Company (TANTK) of PJSC 'UAC' (both are part of the Rostec State Corporation) conducted the first flight of the A-100 long-range airborne early warning and control aircraft with the onboard radio equipment turned on. The tests confirmed that the special equipment as well as the aircraft's onboard systems function normally in a high-intensity radiated environment.*

The flight tested the aerodynamic performance of the aircraft, its avionics and the specific parts of the radio equipment that were meant to be checked. The aircraft systems performed according to the specified parameters and are ready for further tests.

'The flight was in a routine mode. All systems and equipment worked correctly. The crew fully completed the flight task, having checked the stability and controllability of the aircraft in required flight regimes, as well as the operation of the equipment installed on board the aircraft. The IL-76MD-90A platform confirmed the specified performance indicators,' said the crew commander Sergey Parkhaev, Honored Test Pilot 1st Class, test pilot of the Beriev Aircraft Company (TANTK)

The new generation aviation complex is based on the IL-76MD-90A aircraft, carrying a radome with a unique antenna system and the latest special radio equipment developed by the Vega Concern (part of Ruselectronics). A-100 can detect and track air and other types of targets, and help control fighter and assault aircraft guiding it to attack air, ground and naval targets.

The radio equipment for the A-100 aircraft includes technical solutions developed with the latest achievements of the Russian radioelectronics and high-perfor-



mance computing tools, as well as top electronic components. This applies to the equipment used to obtain information, the computer cluster processing the information, and the automated workstations of the system's crew.

'An important stage of testing the A-100, an aviation complex that includes our most advanced developments, has begun. Scientists and designers have confirmed that Russia has technologies to create AEW&C aircraft that are on par with global peers. During the year 2022, we plan to complete the cycle of preliminary flight tests and hand the complex over for state joint tests,' said Vladimir Verba, Chief Designer of the Vega Concern, Corresponding Member of the Russian Academy of Sciences.

SSJ-New Core Engine

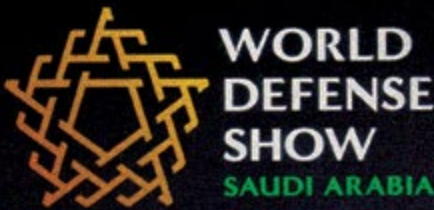
*Rostec's United Engine Corporation has successfully conducted the first stage of certification testing of PD-8 core engine intended for the mid-range aircraft SSJ-New. A test bench unique for Russia was used to simulate the aircraft engine operating conditions typical for altitudes of up to 12 kilometers.*

The engine core, which is also called the 'heart' of an aircraft engine, consists of a high-pressure compressor, a combustion chamber, and a high-pressure turbine that drives the propulsion system. The test facility was provided by the Central Institute of Aviation Motors named after P.I. Baranov (part of the National Research Center 'Zhukovsky Institute') and confirmed the pre-calculated thermal model of the compressor.

'In the course of our works on the latest Russian aircraft engine PD-8, we have reached a climax stage – the core engine certification tests. The simulation of the operational conditions of altitudes of up to 12,000 meters will facilitate evaluation of the power characteristics of the high-pressure compressor. The PD-8 core engine will have to pass a few more certification tests until March 2023. They will be conducted simultaneously with the power unit prototype tests, as their first launches are scheduled as early as March 2022,' says Vladimir Artyakov, First Deputy CEO at Rostec.



The PD-8 two-spool turbofan engine is intended for SSJ-New, a passenger aircraft projected to phase out imports, while employing the newest Russian materials and advanced processing, including additive manufacturing. A range of UEC enterprises is engaged in the works, with the PD-14 engine practices and technologies widely used.



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### PD-8 AIRCRAFT ENGINE

Rostec's United Engine Corporation has created an automatic control system (ACS) for the new PD-8 aircraft engine, which is planned to equip the SSJ-NEW passenger airliner. The equipment that controls the operation of the power plant, including thrust parameters and fuel consumption, is assembled from 100% domestic components and materials.



Specialists of the Perm-based 'UEC-STAR' enterprise completed the development of the PD-8 ACS in shortest time possible: it took just a year and a half to get from signing the technical assignment to the assembly of the first sample. Mass production of this equipment is scheduled to start in 2023 when the qualification work is completed and permits are obtained.

'The automatic control system for the PD-8 engine to equip the SSJ-NEW airliner used within the framework of the import substitution program will be assembled from completely domestic materials and electronic components. The system has a long service life and is resistant to failures. In January 2022, it will complete fine-tuning and bench testing, after which it will be handed over for bench tests as part of the engine,' said Vladimir Artyakov, First Deputy General Director of Rostec State Corporation.

To recap, Rostec presented the PD-8 gas generator, the 'heart' of the PD-8 engine, at MAKS air show in 2021. At the moment, two copies of the gas generator have been assembled and have successfully passed the tests. The tests confirmed the correct operation of the units, meeting the required temperature and pressure parameters, and their compliance with the relevant environmental standards. Obtaining a type certificate for the PD-8 is scheduled for 2023.

The creation of the PD-8 basic propulsion system for use in the SSJ-NEW aircraft is carried out in broad cooperation between UEC enterprises using the experience of making the PD-14 engine.

### Deep Space from Deep Baikal

*During 2022-2023, the United Engine Corporation of Rostec will anneal 2,100 permalloy screens for the observatory sensors, which will enable a 50% increase in its sensitivity. Neutrino telescope sensors positioned in the waters of Lake Baikal capture high-energy particles and identify their sources. This allows scientists to study events happening in deep space.*

The neutrino telescope is a network of several thousand optical recorders immersed in Lake Baikal at a depth of about 1,000 m, where the recording of high-energy neutrinos is carried out. A unique feature of these particles is their ability to travel astronomical distances preserving the movement direction, thereby they convey information originating from the farthest areas of the Universe. The purity of the Baikal water makes it possible not only to capture neutrinos, but also to determine the source of their origin with great accuracy.

'The Baikal Neutrino Telescope is one of the largest astrophysical facilities not only in Russia but also worldwide. Since 2016, Rostec has been involved in manufacturing screens for the observatory sensors. They are made of special permalloy composition, which prevents the distorting effects of the Earth's magnetic field on the detectors. To acquire the required properties, the screens must be annealed in vacuum furnaces of quite a large volume. Rostec's enterprise possesses unique competencies needed for operating such equipment. During this period, we have delivered over 3,800 items. In the next two years, we will ship 2,100 screens to scientists on Lake Baikal, which will increase the telescope's sensitivity volume by 50%,' said Oleg Yevtushenko, Executive Director of Rostec State Corporation.

The screens are annealed by the Salyut Production Complex (part of Rostec's UEC). The sensitivity volume of the Baikal Deepwater Neutrino Telescope increases annually by two clusters, or more than 600 optical recorders. It is planned to reach a volume of 1 cubic kilometer by 2024, with a significant improvement in its neutrino capturing performance.

On December 8, 2021, the neutrino telescope of the Baikal Collaboration witnessed a unique astronomical event: a radio blazar outburst, which may indicate intense processes in a far-away emerging galaxy. The event was first recorded by the Antarctic IceCube telescope, as well as by various measuring devices located in different parts of the planet and operating in a wide variety of electromagnetic radiation regions.

'From the scientific perspective, this is a completely unique phenomenon: never in history have two neutrino telescopes actually identified two different neutrinos coming from the same source in real time, and it also coincided with the activities of this radio blazar in all electromagnetic frequency ranges. Such coincidences have never occurred before, because the neutrino telescope was just being put into operation, and it was too small. This very event proves that the neutrino telescope of the Baikal Collaboration now has enough power to capture such meaningful phenomena. We can say that it joined the league of heavyweights who can do astronomy of this scale. This is a very important event for the Baikal Collaboration and for all of us,' noted Dmitry Naumov, Deputy Director of the Laboratory of Nuclear Problems of the Joint Institute for Nuclear Research, head of the neutrino program, Doctor of Science in Physics and Mathematics.

The neutrino observatory is operated by the Baikal International Collaboration, which includes the Institute for Nuclear Research of the Russian Academy of Sciences (RAS), the Joint Institute for Nuclear Research, Irkutsk and Moscow State Universities, the Institute of Nuclear Physics of the Czech Academy of Sciences, the University of Bratislava, and a number of other Russian and foreign research organizations.

### VR Simulator for Aircraft Training

*The United Aircraft Corporation of Rostec State Corporation will create a VR simulator designed for the training of technical personnel. This equipment will boost maintenance efficiency of Su-57 and Su-35 aircraft systems. The system tests are scheduled to be completed in 2022.*

The VR simulator incorporates a virtual reality helmet, handheld controllers, and a computer with a training program that simulates the entire aircraft system. This allows the ground personnel to practice and master all technological processes virtually and to increase maintenance efficiency for the real machine.

'Rostec pays close attention to improving aircraft after-sale support. The new VR simulator will provide aircraft technicians with enhanced practical skills, and it also will significantly improve the quality of service for combat vehicles. Primarily, the system is designed to practice the maintenance processes for the 5 Generation

combat aircrafts Su-57 and the 4++ Generation Su-35. The system tests are scheduled to be completed in 2022,' commented Vladimir Artyakov, First Deputy CEO of Rostec State Corporation.

The VR simulator is available both separately and together with new aircraft. The system is being developed by the Sukhoi specialists.

'The implementation of the system will provide significant advantages in terms of reducing financial and time costs for aircraft maintenance, recovery and repair,' First Deputy Managing Director, Director of the Sukhoi Design Bureau Mikhail Strelets said.

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**AEXKS**





### NEW PERSONAL PROTECTION DEVICE

Technodinamika Holding of Rostec State Corporation has created Pyrodefender, a new personal protection device against dangerous animals. It allows you to repel an animal without harming it. The device is already available for sale on Russia's multi-category e-commerce platform OZON and in gun stores.



Pyrodefender, a next-generation protection device, comprises two electric batteries for the initiation system and two types of cartridges, flash-bang and signal ones. The product body with an ergonomic pistol grip is equipped with a safety catch and a battery charge indicator.

When triggered, the cartridge produces a flash and a bang of up to 140 dB, which can repel an aggressive animal. At the same time, the device is perfectly safe and is not designed to cause any real harm.

'The latest data from the Ministry of Natural Resources and Environment indicates that there are more than half a million stray dogs in Russia. The device designed by the Scientific Research Institute of Applied Chemistry effectively suppresses acts of aggressive behavior of wild animals. Pyrodefender is already on sale and costs about RUB 4,500. 'The device is not a weapon, so no possession and acquisition license is required to purchase it,' commented Igor Nasenkov, General Director of Technodinamika Holding.

The next-generation Pyrodefender is an extension of the protection product line designed by the Scientific Research Institute of Applied Chemistry. The first product was the Antidog device, which has proven itself in both domestic and European markets. Pyrodefender is compatible with Antidog cartridges, and additionally has a battery charge indicator and ergonomic design. The device weighs only 95 grams. This allows you to put it in your pocket, briefcase or bag, and the push-button safety mechanism will eliminate any accidental 'shot' if you unintentionally press the release button.

### Visit to the UAC Enterprise in Voronezh

*Russian Prime Minister Mikhail Mishustin visited the IL-VASO branch of the United Aircraft Corporation during his working trip to the Voronezh region. The Prime Minister inspected the final assembly shop, where the IL-96 planes are now located, and had a conversation with the workers of the plant.*

Voronezh Aircraft Plant is the only enterprise in the country that has the competence to build long-haul wide-body passenger aircraft. The IL-96 project now provides the bulk of VASO's workload. The enterprise also participates in other UAC civil programs, such as SSJ100, MC-21 and IL-114 by producing pylons, engine nacelles, tail and wing elements. Wide cooperation of Russian manufacturers of aviation systems and equipment, many of which are members of Rostec State Corporation, was demonstrated to the Prime Minister.

The Prime Minister also visited the flight test station, where he boarded a new Russian medium-range aircraft MC-21-300 and toured its passenger cabin, which is particularly comfortable due to a wider fuselage compared with other aircraft of this segment. Yesterday MC-21-300 flew from Ramenskoye Airport (Zhukovsky) to Voronezh.

It is worth mentioning that at the end of December MC-21-300 received a type certificate from the Federal Air Transport Agency. The supply of these planes to the Rossiya Airlines is scheduled to begin this year.

After a tour of the production facilities, a meeting was held on the development of civil aircraft and the renewal of the civil aviation fleet of Russia.

Among the key tasks outlined by the Prime Minister of Russia was to increase the share of Russian aircraft in the fleet of the country's largest airlines to 30% over the next nine years. At the same time, the pace of construction of civil aircraft in Russia should exceed one hundred units per year in five years. According to Mikhail Mishustin, this will allow the United Aircraft Corporation to increase the share of high-tech products to 50% by 2030. 'It is important that Russian aircraft be both reliable and competitive. This is an



other strategic task that the President has set for us. The necessary funding is allocated. The three-year federal budget provides for more than 122 billion rubles as part of the state program for the development of the aviation industry,' said the Prime Minister.

Oleg Bocharov, the Deputy Minister of Industry and Trade of Russia, made the keynote speech. He spoke about the implementation of key civil programs.

Based on the results of the meeting Mikhail Mishustin instructed relevant agencies to prepare suggestions on the expansion of the state support mechanisms for the civil aircraft industry directed at the renewal of the airlines' fleet. Another instruction concerned the developers of domestic components. 'The Ministry of Industry and Trade, together with colleagues from Rostec, needs to conduct a comprehensive analysis and inventory with import-substituting components for both MC-21 and Superjet. Please evaluate the readiness of the developers and manufacturers for serial supply of these components and equipment taking into account the volume necessary to organize the scheduled production of aircraft and, most importantly, the after-sales service,' concluded the Prime Minister, addressing the participants of the meeting.

### Ansats helicopter and BAS-200

*'Russian Helicopters' Holding Company (part of Rostec State Corporation) took part in the 9th National Aviation Infrastructure Show – NAIS 2022. At the holding's exposition, for visitors and participants of the exhibition were presented a HEMS version of Ansats helicopter and BAS-200, a helicopter-type unmanned aircraft.*

A light multipurpose Ansats with a medical module is designed in order to transport one patient, accompanied by two paramedics. The helicopter contains equipment necessary for monitoring the patient's medical status and stabilizing the main vital functions during the flight. The use of helicopters for transporting patients to medical facilities ensures prompt casualty evacuation and complies with the 'Golden Hour' rule, which implies that rendering professional medical assistance during the first 60 minutes after an accident significantly increases the patient's chances for survival.

NAIS 2022 presented another debutant – a helicopter-type UAV BAS-200. The aircraft may be used for a broad range of aviation tasks: terrain monitoring, cargo delivery,

search and rescue operations, agricultural work. The UAV maximum take-off weight is 200 kilograms. It is capable of speeds up to 160 km/h and can carry commercial loads of up to 50 kg. At the same time, the BAS-200 can fly for up to 4 hours at altitudes of up to 3,900 meters.

The BAS-200 project development and flight trials are carried out by the Mil and Kamov National Helicopter Center. Today, as part of the business program of NAIS 2022, specialists of the Mil and Kamov National Helicopter Center held the 'Opportunities for Business Using UAV. Cases and Outlook' panel discussion, during which industry experts and potential operators reflected on the relevant aspects of developing aviation services market using UAVs.

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## UNIQUE AIR PURIFIERS FOR MIDDLE EAST

JSC Concern Radio-Electronic Technologies (KRET) of Rostec State Corporation presented its TIOKRAFT air purifiers at Arab Health, healthcare industry's top exhibition. The company's systems for air purification and disinfection are second to none and provide protection from any bacteria and viruses, including COVID-19. Tests held at the best laboratories of Germany and the UAE proved that TIOKRAFT purifiers are more than 99.99% effective. During the presentation, KRET delegation discussed potential supplies of the air purifiers to the Middle East, where the need to use them is indisputable and the demand is strong.



The company presented its most popular M-50, M-100 and M-1000 air purifier models at the event. These devices vary by size and performance, processing from 18 to 1,000 cubic meters of air per hour. All models are designed to work 24/7/365. The main parts that purify the air require no replacement throughout the life cycle of the device. The technology developed by JSC Ramenskiy Instrument-Making Plant (part of KRET) is based on photocatalysis, the process that reduces any organic matter, including all viruses and bacteria, to water and carbon dioxide, which are then released and not accumulated in the device.

Nowadays, when the epidemic situation remains very challenging, all public areas are high risk zones. In this context, one of the most effective ways of protection is to use air purifiers to fight viruses and bacteria. Today, TIOKRAFT air purification and disinfection system, designed by KRET, is far ahead of any functionally similar equipment by performance and form factor. In the Middle East countries, where the TIOKRAFT systems have already been tested, there is a strong demand for air purifiers. The presentation at Arab Health resulted in preliminary agreements on first supplies of these products. It should be noted that the devices will be in demand even after the pandemic is over, since people have changed their attitude to personal safety over the last two years, and this includes understanding that fresh air is important and, therefore, that air should be purified,' said Alexander Pan, KRET General Director. Arab Health is the largest health exhibition in the Middle East and the second largest in the world with over 103,000 participants from more than 150 countries.

## First Circular Flight

*As part of a flight testing program, the upgraded light helicopter Ka-226T has made its first circular flight at the flight-testing facility of the Mil & Kamov National Helicopter Center (part of Russian Helicopters). The vehicle was taken off the ground by the Mil & Kamov National Helicopter Center crew, consisting of Alexander Cherednichenko, a first class senior test pilot, and Maksim Bepaliy, a first class test navigator. The Ka-226T spent 12 minutes in the sky, flying in circles at about 100 km/h at altitudes of up to 300 meters.*



The modernized helicopter was first presented at the MAKS 2021 International Aviation and Space Salon; its foreign debut took place at the Dubai Airshow 2021. In November 2021, the Ka-226T, or the 'Climber', took off for the first time and performed a hover flight.

'Flight tests of the upgraded Ka-226T are successfully proceeding, and the first circular flight is one of the most important milestones in the development of the upgraded rotorcraft, which will be appreciated by Russian and foreign customers in the near future. The helicopter is maximally adapted for high altitude flights, which significantly expands the possibilities of its application and the range of tasks it can perform,' said Nikolay Kolesov, CEO of Russian Helicopters.

Due to its suitability for high altitude flights – a key feature of the helicopter – the Ka-226T upgrade project was dubbed 'Climber'. Setting it apart from the previous models of the Ka-226 family is a new design of the airframe and fuselage with considerably enhanced aerodynamic characteristics. The hull is made of modern lightweight materials. The bearing of the vehicle has also been significantly upgraded – Ka-226T has a new rotor head, blades, and main gearbox, as well as a shockproof emergency fuel system which meets the strictest safety requirements.

The helicopter is also fitted with new flight, navigation, and radio communication equipment, and it can be furnished with oxygen equipment, cylinders, and an air conditioning and heating system if needed.

Ka-226T has a coaxial rotor design, which ensures good controllability in thin air, resistance to strong side wind and a high rate of climb and enables takeoff and landing at high altitudes. Ka-226T is also highly efficient when flying over water. It can take off and land on the decks of marine vessels, including small ones.

The vehicle is characterized by low vibration, ease and simplicity of operation, the ability to take off and land on sites of minimum size (including within the urban infrastructure), high accuracy of hovering even when working with externally suspended cargo, safe landing of passengers with the propellers on.

## 'Smart' Cargo Parachute

*Technodinamika Holding of Rostec State Corporation has received a patent for its 'smart' cargo parachute system. It is able to provide airdrop delivery of goods in a fully automatic mode with increased accuracy using GLONASS or GPS systems. Currently, the development is undergoing flight tests.*

The automated cargo airdrop system consists of a landing platform, a controlled ram-air canopy, as well as special equipment for fully automated guidance and flight. The 'smart' parachute can be used to drop loads weighing up to 250 kg both in the guidance mode using the coordinates provided by GLONASS or GPS via a digital communication channel with the ground control equipment, and in the 'slave' mode. In the latter case, the cargo follows the 'leading' parachutist.

'Today we received a patent for a 'smart' cargo parachute system. The Juncker-DG-250 system is designed for landing from altitude up to 8,000 meters, and the landing error does not exceed 100 meters thanks to GLONASS and GPS systems. In addition, we have received a patent for all-purpose parachute cargo harness which, if need be, can help increase the payload of any parachute system to 500 kg. This will make cargo delivery much easier,' said Oleg Yevtushenko, Executive Director of Rostec.



The 'smart' cargo parachute and the all-purpose parachute cargo harness were developed by the Polet Ivanovo Parachute Plant. 'At the moment, the product is undergoing flight development tests. It is planned that by the end of 2022 the prototype will be transferred for testing to the State Flight Test Center of the Ministry of Defense of the Russian Federation. The all-purpose parachute cargo harness is undergoing research tests, including those needed to develop the guidelines for using it with various types of aircraft in service in the Russian armed forces,' commented Igor Nasenkov, General Director of Technodinamika JSC.



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## SKILLS IN OPERATING

The crew of the Berkut State Airlines from Kazakhstan underwent annual retraining under the supplemental professional training programs for the Mi-171A2 helicopter. It was held at the aviation training center of the Ulan-Ude Aviation Plant of the Russian Helicopters Holding Company (part of the Rostec State Corporation). The training program included 60 hours of theoretical classes.



'Such training allows us to improve our skills and knowledge gained during initial Mi-171A2 helicopter crew trainings held as part of the supply contract. The authorized body of civil aviation of the Republic of Kazakhstan has validated the enterprise's aviation training center. According to the Kazakhstan aviation rules, pilots from this country should annually improve their skills in order to ensure flight safety', said Nikolay Kolesov, Director General of the Russian Helicopters Holding.

The first Mi-171A2 helicopter was delivered to Kazakhstan in early 2019. The Mi-171A2 helicopter is the most modern modification of Mi-8/17 type. The use of a digital on-board equipment package on the Mi-171A2 helicopter, designed according to the 'glass cockpit' concept, makes it possible to reduce the crew to two members.

During the training, special attention was paid to the design and flight operation of the Mi-171A2 helicopter, its systems and units as well as the rotorcraft's flight characteristics. The training program included study of aviation and radio-electronic equipment, practical aerodynamics, navigation, aviation meteorology, aviation communications and radiotelephony, and flight safety management systems.

The training program covered an analysis of causes of civil aviation accidents for the last calendar and current year. It also focused on studying the use of rescue equipment and practicing the crew's actions in emergencies. Upon completing the training, the pilots from Kazakhstan received advanced training certificates based on the exam results.

## Kadet-100 Parachute System

*Technodinamika Holding Company of Rostec State Corporation handed the Kadet-100 parachute system prototypes over for official testing. The product is designed to replace the main parachute of the Russian Army, D-10, which has been used by airborne troops for more than 20 years.*

Kadet-100 is a round canopy parachute system designed for the landing of airborne units and for training jumps. The parachute allows paratroopers to perform jumps with a full set of weapons at speeds up to 350 km/h. The product's special features are increased stability and high maneuverability provided by the parachute system design with steering lines. Steering lines are mounted on the front risers of the parachute harness, are easy to grip and take little effort to engage. Pulling out the left or right steering line leads to a quick turn in the appropriate direction. The paratrooper can perform a 360° turn in less than 12 seconds, enabling him to avoid convergence with other paratroopers, survey the surrounding area and monitor the landing site.

'In comparison with the D-10, the Kadet-100 has an increased flight mass: 160 kg against 140 kg, which will allow the paratroopers to take 20 kg more equipment. The

vertical descent speed will not exceed 5 m/s, and horizontal will be no more than 3.5 m/s. The minimum drop height of the new parachute is 50 meters lower than the D-10 parachute, so special units can get to their tasks faster. The new parachute will significantly increase the capabilities of the airborne assault units of the Russian Army,' the Aviation Cluster of the Rostec State Corporation spokesperson said.

The parachute system was created by Polet Ivanovo Parachute Plant of Technodinamika Holding Company.

'Prototypes of the parachute system were handed over to the Governmental Flight Test Center of the Defense Ministry. The completion of the official tests for the Kadet-100 is expected in the 2023, after which we will start supplying the system to the troops,' Technodinamika CEO Igor Nasenkov said.

## Tu-160M: First Flight

*The first Tu-160M, the newly-manufactured strategic missile carrier, took off from the aerodrome of Kazan Aviation Plant, a branch of Tupolev (part of Rostec State Corporation's UAC). The 30-minute flight was at an altitude of 600-meters. The crew of Tupolev test pilots performed the required maneuvers to check the aircraft stability and control. The program for restoring the Tu-160 manufacturing in the Tu-160M modernized version was launched upon the decision of Russian President Vladimir Putin.*

As part of the governmental contract between the Ministry of Industry and Trade of Russia and Tupolev, the design documentation for the Tu-160M aircraft was fully digitized in a short time, the titanium vacuum welding process restored, the airframe component manufacturing resumed, and a new cooperation arranged, uniting industry leaders in metallurgy, aviation, mechanical engineering and instrument making, as the majority of them belongs to Rostec State Corporation.

Denis Manturov, Minister of Industry and Trade of the Russian Federation, emphasized, 'We have restored the full production cycle of the Tu-160, but now in the M version, having upgraded the engines, aircraft controls, avionics, and weapons. The revamp of Kazan Aviation Plant has greatly aided to the restoration of the unique model's manufacturing processes – the machines and testing infrastructure were upgraded and the world's largest plant for titanium electron-beam welding and vacuum annealing was put into operation. Today we see significant prospects for the Tu-160 platform – its further development will serve well for new types of promising weapons.'

The aircraft retains its predecessor's appearance, while being based on novel engineering concepts and digital technologies.

'Tu-160 is one of the largest and most advanced projects in Russia's aviation industry. This project has required both the infrastructure upgrade and the completely new digital environment. A number of aircraft designers have partici-



pated in preparing the digital documentation for the project. The fundamental importance of today's event is that the new aircraft has been completely rebuilt from scratch,' said Yuri Slyusar, UAC CEO. 'Its systems and equipment have been upgraded by up to 80 per cent.'

The program for upgrading and re-launching the Tu-160 strategic missile carriers has required a significant revamp of the plant infrastructure.

'Within the framework of the program, Kazan Aviation Plant had to renew or upgrade over 40 per cent of its equipment and deliver extra trainings for a majority of the staff. For Tupolev, the restoration of the Tu-160 production is the most significant project, reflecting not only the infrastructure upgrade and key competencies restoration, but also a new level of designing and mass manufacturing to yield most advanced aviation systems,' Tupolev CEO Vadim Korolev said.

Tu-160 is the largest ever and most powerful military supersonic aircraft with variable-sweep wing.



## UNITED INDUSTRIAL PUBLISHING

Russia's largest defense publishing house



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AFTER TESTING

The MC-21-300 prototype aircraft manufactured by Irkut Corporation (part of United Aircraft Corporation) has completed its testing under extreme cold temperatures in Yakutsk and returns to its base airport at Zhukovsky, Moscow Region.



Since January 23, 2022, the aircraft and its systems have been tested in Yakutia at temperatures below minus 30 degrees Celsius as part of efforts to extend the type certificate. Before each test stage, the aircraft was thoroughly cooled by spending about 12 hours outdoors. This was followed by the usual flight preparation procedures – fueling, turning the systems on, starting the engines and auxiliary power unit, warming up the aircraft, etc. During the flights, all of the aircraft's systems were jointly tested. A series of flights lasting up to 6 hours was performed over different areas of the Yakutsk region, including northern ones. The majority of landings were performed at nights when the lowest temperatures are registered. Challenging performance modes were tested, such as an in-flight shutdown and subsequent start-up of one of the propulsion engines. Andrei Boginsky, CEO of Irkut Corporation, commented: 'We have completed an important testing stage to extend the type certificate for the MC-21-300 aircraft. The Ministry of Transport and Roads of the Republic of Sakha (Yakutia) and Yakutsk Airport assisted us greatly in organizing this work. This year we are planning to intensively test the aircraft in different regions of our country and abroad, including conditions of high mountains, strong windshifts and high temperatures'. As Vladimir Sivtsev, Minister of Transport and Roads of the Republic of Sakha (Yakutia), noted: 'Currently, our airport is capable of accepting and servicing aircraft of any type and model. We wish the MS-21 program every success and look forward to seeing this type of aircraft bringing passengers to Yakutsk.' According to Sergey Ignatenko, General Director of Yakutsk Airport JSC, the airport is often used as a unique testing ground for new aircraft, providing extremely low temperatures. 'Over the past five years, Boeing, Kazan Helicopter Plant, and Mil and Kamov National Helicopter Center have tested their aircraft here,' he enumerated.

New System for Space Rockets

*The Technodinamika Holding of the Rostec State Corporation supplied the components of the ignition system for the igniter of the RD-0177 engine to the Roscosmos enterprise (JSC KBHA). The devices are intended for use in engines of reusable stages of Amur-LNG rockets and other space launch vehicles. As part of the ignition system, the elements have been successfully tested at KBHA JSC.*

The components of the ignition system in question are a special spark plug integrated into the ignition device of the engine, and the ignition unit. Their main feature is the increased structural strength allowing for multiple use.

'Fire tests are an important phase of the program with real fuel ignition, in which the performance and reliability of the product are tested under conditions simulating the operation of an engine. The new components of the ignition system meet the required weight and size parameters. The tests confirmed that the system matches the stated specifications and can be used multiple times. The product will find application in the reusable stages of the advanced launch vehicles, such as Amur-SPG,' Executive Director of Rostec Oleg Yevtushenko said.

The product was created by the Ufa-based Molniya Research and Development Enterprise of the Technodinamika Holding.

'In order to be suitable for the engines of the launch vehicles recoverable stages, the ignition system must be re-



usable. The Technodinamika's system successfully passed this test – it was engaged eight times as part of the testing program. The ignition systems developed by UNPP Molniya were used in the Energia launch vehicle that deployed the Buran space shuttle to the orbit in 1988. Today, the participation in the development of a new, modern, reusable two-stage launch vehicle with a methane engine is all about optimizing systems, improving technology, and expanding the competencies of the company,' said Igor Nasenkov, General Director of the Technodinamika Holding.

Gagarin Cosmonaut Training Center

*The Shvabe Holding of the State Corporation Rostec has delivered practice sights to Gagarin Cosmonaut Training Center. It is a simulation of actual spaceship sights to practice docking manned spacecraft with space stations. Training simulators are designed to improve the skills required for orientation in space and for docking spacecraft with space stations.*

The training devices are based on the actual nine-channel VSK-4 sights – space 'periscopes' which are used on all modifications of the Soyuz family spacecraft. On the central screen, the cosmonaut sees a small image of an object, such as the ISS or a docking port, while the peripheral mirrors show the surrounding space. With this equipment, cosmonauts can determine the positioning of the spaceship relative to the Earth, stars, other space objects, assess the course of movement and control the docking of the ship with the orbital station in manual mode.

In a simulator, the cosmonaut works with the standard cockpit part of the VSK-4, while the outer part is represented using an optical system with a projector that creates a virtual image of the outer space and the objects in it (ISS, Earth, and so on). The light and shades created by the simulator are similar to what cosmonauts see in real life when docking an unmanned spacecraft with the ISS.

'The sighting devices developed and produced by the Urals Optical and Mechanical Plant of the Shvabe holding have been used for more than 50 years, since the first launches of the Soyuz ships, and have repeatedly helped cosmonauts to get out of emergency situations when approaching. This device is more reliable, convenient and



failproof than cameras located on the hull of the ship. The sights use a system of mirrors to display the image, about the same way as the periscopes of submarines. To date, we have supplied three training devices for the Gagarin Cosmonaut Training Center in Star City, and we also continue to equip Soyuz spacecraft with our sights,' said Oleg Yevtushenko, Executive Director of Rostec State Corporation.

The VSK-4 sighting devices also became part of popular culture. In the Oscar-winning techno-thriller Gravity by American director Alfonso Cuarón, the protagonist of the movie, portrayed by Sandra Bullock, used this device to dock the spacecraft.

# ANNUAL PHOTO ALMANAC FOR MILITARY-TECHNICAL COOPERATION

Achievements and prospects

RUSSIAN  
MILITARY  
TECHNICAL  
COOPERATION  
ANNUAL PHOTO REPORT

Main partners and projects

Special directions of development

New export products

The new project of the United Industrial Edition is an annual photo almanac dedicated to the most important and most striking in military-technical cooperation between Russia and foreign countries. The Almanac is an annual supplement to the magazine 'Russian Aviation & Military Guide'.

The almanac includes key partners and supplies, new military products, major contracts and programs, participation in biggest international salons and exhibitions, supplies of dual-use products and much more. The almanac will be released in 2022.





# ROSOBORONEXPORT PRESENTS RUSSIAN EXPOSITION AT WORLD DEFENSE SHOW 2022

World Defense Show 2022 in the Kingdom of Saudi Arabia attracts global defence companies and associated industries, and Rosoboronexport as part of Rostec corporation is no exception. The show is a fully integrated and future-focused event which provides an ample opportunity to showcase the latest technological developments from all over the world. Russia is going to display the whole range of modern assets and comprehensive defence solutions at its venue.



**S**tarting with the most modern MI-28NE upgrade combat helicopter, designed to engage a wide list of targets round the clock in rough weather. It features powerful unguided and guided weapon systems with enhanced air-to-air capabilities, better flight performance and maneuverability, modern avionics, efficient protection against MANPADS with multispectral homing heads due to self-defence system. MI-28NE outperforms foreign competitors in max combat payload, flight speed, service ceiling and weight of armour.

The Orion-E reconnaissance and strike system with UAVs is designed for aerial reconnaissance and target engagement. It has 3 external racks where 200 kilograms of combat load can be suspended including guided missiles, guided and conventional air-bombs.

The system can accomplish tasks day and night in partially adverse weather conditions, any geographic and climatic zone while staying airborne for up to 30 hours. The deployment time is not more than 4 hours and one ground station can control up to 4 UAVs simultaneously.

Talking about integrated defence solutions Rosoboronexport will represent the concept of layered Missile Defence System which consists of Reconnaissance, C2 and Fire subsystems such as: long range Air-Defence Missile Systems S-400 capable of intercepting theatre/short and mid-range ballistic missiles in the range of 60 kilometers at an altitude of up to 25 kilometers, and other aerial targets within 380 km range at an altitude of up to 30 kilometers, and Abakan highly jamming immune and maneuverable ADMS with high-firepower designed to intercept active and perspective non-strategic ballistic missiles in the range of 45 kilometers and at an altitude of up to 25 kilometers; medium range Air-Defence Missile Systems Vityaz and Viking with 120 km and 65 km engagement range respectively and up to 25 kilometers in altitude. Both systems can also intercept theatre ballistic missiles within 25 kilometers; and direct cover Pantsir-S1M ADGMSs.



The T-90MS MBT is the major player on the battlefield with mighty armament and strong protection. Cutting-edge solutions in Armoured Vehicles' design merged with combat experience for your undisputed dominance. The tank has modern AFCS, powerful and robust engine with reliable transmission. The 125mm cannon engages targets at long distances with high accuracy

and keeps the MBT out of the enemy anti-tank weapons' engagement zone. Multidimensional protection and life-support systems ensure high survivability of the tank and crew on the battlefield.

With constant development of unmanned aerial technologies global market shows the growing demand for counter-UAV assets and Rostec corporation follows the trend. So let's have a look at the most perspective ones:

RLK-MTSE a system for detecting and countering UAVs which can be used for protection of critical infrastructure (military/transport/administrative/industrial and sports facilities). The System suppresses UAV's data and C2 channels at distances not less than 4 kilometers and satellite navigation not less than 2 kilometers.

Rubezh-Avtomatika portable radio surveillance and jamming system against small-sized UAVs is an unbreachable barrier for single drones and swarms of them attacking from different heights and directions within the area of 3 km. The system creates a protective dome over designated facilities.

Pischal electromagnetic gun is one of the most lightweight anti-drone guns available on the market, which provides jamming for UAV's C2 channels within 2 km.

Russian firearms are known all over the world and this year Rosoboronexport is going to display modern AK-19 and AK-308 Kalashnikov Assault Rifles, PPK-20 9x19mm submachine gun, PLK 9mm handgun and DXL-4M long-range multicaliber sniper rifle at our venue along with other battle-proven assets. All of them are made according to the international trends with light and robust materials, Picatinny rails and up-to-date design features. Their reliability is tested under harshest weather conditions in various climatic zones for your efficiency in combat and training.

Rosoboronexport as part of Rostec corporation would like to express its appreciation to the organizers of the Defense Show and welcomes everybody to attend public presentations and visit Russian venue. **/RA&MG/**





# TOP 5

## Rosoboronexport presented new russian export products of 2021

Rosoboronexport JSC (part of the Rostec State Corporation) has summed up its efforts to promote Russian weapons and military equipment on the world market in 2021.

**'In** 2021, the global arms market has largely adapted to work under coronavirus pandemic conditions. Exhibition activities have resumed largely, contacts with foreign customers have returned to the format of direct negotiations. Rosoboronexport took part in 10 international exhibitions abroad and 7 events held in Russia,' said Rosoboronexport General Director Alexander Mikheev. 'At the same time, the trend for promoting products on digital platforms has continued. Organizing web exhibitions, conduct of remote negotiations and multimedia presentations, and online demonstrations of new products have significantly increased interest in Russian weapons.'

Rosoboronexport and Russian defense manufacturers showed their

partners long-awaited new products at defense and security exhibitions held in 2021.

'The top 5 new export products unveiled in 2021 includes the Checkmate light tactical aircraft showcased at MAKS and Dubai Airshows, Orion-E reconnaissance/strike unmanned aircraft system demonstrated in Russia and abroad, TOS-2 Tosochka MRL with thermobaric ammunition, Kalashnikov AK-19 assault rifle and the S-350E Vityaz air defense missile system,' added Alexander Mikheev.

Rosoboronexport noted increased attention to other latest Russian-made products. In particular, great interest was shown in the Pantsir-S1M anti-aircraft gun/missile system, the Krasukha EW system and the Repellent-Patrol mobile EW system for countering small drones, which were contracted for the first

time in 2021. The full-scale models of the Mi-28NE, Ka-52 and Ka-226T helicopters in new configurations, showcased at the Dubai Air Show by Rostec's Russian Helicopters Company, have become among the most popular exhibits.

A full-scale demonstration of Russian shipbuilding industry's new ships in export configurations to foreign customers became the main achievement of the International Maritime Defense Show 2021. The delegations of Rosoboronexport's partner countries which visited the IMDS expressed satisfaction with the fact that they were able to see, visit and evaluate the ships offered to them.

'Rosoboronexport continued to strengthen its positions in regional markets. Its order book in Southeast Asia has grown significantly, the value of contracts signed in 2021 with sub-



Saharan African countries reached 2.5 billion euros,' said Alexander Mikheev. During the summit in India, a long-awaited contract was signed for the licensed production of AK-203 assault rifles with a final unprecedented 100 percent localization in the country. Negotiations on new breakthrough topics in the field of military-technical cooperation were also launched in New Delhi.

In 2022, Rosoboronexport plans to further expand the range of weapons and military equipment exported from Russia and its presence in the global market.

'We closely and timely monitor global trends, new challenges and threats to security at various levels and, in close cooperation with defense industry enterprises, respond

**'The top 5 new export products unveiled in 2021 includes the Checkmate light tactical aircraft showcased at MAKS and Dubai Airshows, Orion-E reconnaissance/strike unmanned aircraft system demonstrated in Russia and abroad, TOS-2 Tosochka MRL with thermobaric ammunition, Kalashnikov AK-19 assault rifle and the S-350E Vityaz air defense missile system.'**

**Alexander Mikheev**

to emerging market demands in a timely manner,' emphasized the head of Rosoboronexport. 'Next year we will focus on the development of proposals in the field of unmanned aircraft and robotics, AI-based high-tech products, and precision guided

ammunition. At the same time, the largest demand is expected to be for defensive systems designed to protect the sovereignty of our partners and repel air, sea and land threats, as well as for counterterrorism equipment.'

/RA&MG/





# DEFENSE MASTERPIECES

## Russian High-Precision Weapons Holding

In February this year, the High-Precision Weapons Holding (a part of the Rostec Corporation) was celebrated the 12th anniversary of its work on the global market. Years by years 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.

**A**lso every year Holding is increasing deliveries both to the Armed Forces of the Russian Federation and to the foreign market. According to an SIPRI expert, 'the Russian companies ride the 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 High-Precision Weapons Holding was founded in 2009. The holding consists of a number of largest leading defense enterprises that are well known on the world arms market. It is sufficient only to mention such brands as the Shipunov KBP Instrument Design Bureau, the Kovrov Electromechanical Plant, the Plant named after V.A Degtyaryov, the VNII 'Signal', the Kurganmashzavod, the Central Research Institute of Automation and Hydraulics and others. Most of them are national and international leaders in their segments.

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

The exports of the holding are based on warfare systems well known on the international market such as Pantsir-S1, Kornet-E/EM, Konkurs, Metis-M1, Igla-S, Arkan, Verba, Shmel, Kapustnik, and others as well as on training systems, armored vehicles upgrade, and so on.



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







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

It is evident that the demand for high-precision weapons only increases around the world. They do not miss. They are mobile, fast, maintenance-friendly, reliable, and the most modern.

The newest technological solutions are used. 20 years ago, the proportion of high-precision weapons used in local conflicts amounted to up to 7%. In recent years, this share has increased by up to 90-95%. The most designs of the 'High-Precision Weapons Holding' are the best in the world and determine the technological vectors of development in their segments.



There is no doubt that the main task of the 'High-Precision Weapons Holding' is to strengthen the defense capability of Russia and to supply the Russian Army with the most modern and the most reliable high-precision weapons. Within the scope of the contract, the holding regularly transmits to the Russian Ministry of Defense the corresponding quantity of planned weapons. Due to the holding, the Russian Army is armed with the best weapons in the world. At the same time, it is important that the holding itself also supplies the same weapon to the world market, where it enjoys consistent success.

Middle East states are always been and remains the most important strategic partner of the High-Precision Weapons Holding. The participation of the holding's enterprises in IDEX-2021 is an important stage of friendly and mutually beneficial cooperation in defence area.

/RA&MG/

***High-Precision Weapons Holding' belongs to the top 10 world's defensive rankings by an overall production and supply increase rate.***

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







# ALMAZ – ANTEY AT WORLD DEFENSE SHOW 2022

On 6-9 March 2022, Almaz – Antey Corporation will be exhibiting at World Defense Show, an international defence event to premiere in Saudi Arabia's capital city Riyadh. The Corporation will present an exposition featuring products by its subsidiaries NPO Almaz, Ulyanovsk Mechanical Plant and Izhevsk Electromechanical Plant Kupol.



**At** World Defense Show, Almaz – Antey will demonstrate mockups of its S-400 Triumf and S-350E Vityaz SAM systems and present its 98R6E Abakan advanced mobile non-strategic ballistic missile defence system, whose mockup premiered at the Army International Military-Technical Forum. In the medium-range category, the Vityaz SAM system will be demonstrated on the Almaz – Antey stand alongside mockups representing components of the Viking SAM system.

The company's short-range SAM solutions will be represented by the Tor-M2E, Tor-M2K and Tor-M2KM systems in both stationary and mobile variants.

For the first time abroad, Almaz – Antey will be demonstrating a mockup of the Taifun-PVO(E) MANPADS operator vehicle.

Also on show will be the Adjutant universal target system intended for the training and inspection of air-defence crews and equipment by way of creating a complex programmed aerial situation with simultaneous involvement of different target types. The Adjutant will be represented by one of its organic targets, the MV-R.

Apart from the defense products, Almaz – Antey will be presenting mockups of air traffic management and airport security solutions: the Sopka-2 en-route radar facility and the ROSC-1 optical radar intended for ensuring facility security and for countering UAVs.

Vyacheslav Dzirkaln, Almaz – Antey deputy general director for foreign economic activity, said in the run-up to the exhibition: 'At World Defense Show 2022, the Corporation will present the most popular products which are particularly topical for

the Arabian Peninsula, the Middle East and Northern Africa.'

According to Dzirkaln, the S-400 'is well known abroad as a reliable advanced asset intended for the protection of a country's airspace and state sovereignty, while the latest S-350 Vityaz system is already being added to the inventory of the Russian army and is of fairly great interest to foreign customers'.

The Abakan SAM system, which was designed with foreign customers in mind, is intended for bolstering the effectiveness of air-defence systems against the most dangerous ballistic targets.

The Viking SAM system's versatility makes it a universal air-defence asset for troops and sensitive facilities.

The Tor short-range SAM system family stands out for its mobility, ease of operation and cost-effectiveness, especially when it comes to protecting strategic facilities and infrastructure, including in oil production regions. The advanced Tor systems are the world's only SAM solutions capable of launching missiles on the move; they may be delivered to customer in both stationary and mobile variants.

'As for the Adjutant system, given the growing role of advanced air defences in the current environment, it stands out for its reusable targets emulating such contemporary aerial threats as a cruise missile, a helicopter, a piston-powered aircraft and a turboprop,' Dzirkaln said.

According to him, the recent hike in the number of local armed conflicts around the world, their intensity, and the increasing activity of terrorist

groups coupled with the accessibility of unmanned technologies make reliable and effective SAM systems essential, especially when it comes to countries with sizable natural resources.

'The new large-scale Riyadh show will certainly provide a platform for showcasing the advantages of the Russian defence industry, which includes Almaz – Antey as a flagship company,' Dzirkaln said.

Almaz – Antey is one of Russia's largest integrated defence companies uniting over 60 hi-tech enterprises. It employs more than 130,000 personnel and exports to over 50 countries. The Corporation pays special attention to training customer personnel for independent combat use of its products and also offers associated aftersales support, overhaul and disposal services.

/RA&MG/





MAIN PHOTO

# TOR-M2KM SAM SYSTEM



**ABSOLUTE  
PROTECTION**





# TOR-M2KM SAM SYSTEM: ABSOLUTE PROTECTION

Valeriy Stolnikov

**On 14 September 2019, Yemen's Houthi movement attacked oil production and refining facilities in Saudi Arabia. The Saudi army, with its third largest military budget in the world after the USA and China, proved unable to repel the attack. The country's air defence system, built to US standards and utilising US weapons, was helpless against makeshift cruise missiles and drones.**

**T**he unprecedented strike on the world's largest refinery in Abqaiq and the facility near the Khurais oil field, both owned by Saudi Aramco, led to a temporary drop in Saudi Arabia's hydrocarbons production by more than a half, from 9.8 to 4.1 million barrels per day, or almost 5% of global oil production. According to an 18 September briefing by the Saudi Defence Ministry, the refinery was attacked by 18 unmanned aerial vehicles (UAVs) and the Khurais facility, by seven cruise missiles. Only four of the missiles reached their target; the rest fell in the desert.

For comparison, let us consider the example of how air defences are organised at Russia's Khmeimim air base in Syria, which has been

attacked dozens of times by similar threats and successfully repelled all the attacks. The base was additionally equipped with the Tor-M2E SAM system, whose combat effectiveness exceeds 90%. We may state with confidence that this system is currently the best solution for combating UAVs, cruise missiles and precision weapon elements.

The Tor-M2E's equivalent, the Tor-M2KM, is a universal autonomous short-range SAM system. It ensures effective destruction of long-, medium- and short-range manoeuvring cruise missiles; anti-radiation missiles; anti-ship missiles flying as low as 5 m above the sea surface; glide and guided air bombs; UAVs; fixed- and rotary-wing aircraft flying at altitudes between 10 and 10,000 m. above the ground, at distances of

between 1,000 and 15,000 m and at a ground range of 8,000 m.

The system is highly immune to active and passive interference and can operate in all weather conditions, day and night.

The fully autonomous system can be mounted on any platforms of appropriate carrying capacity (automotive chassis, trailers and semi-trailers, trailers, rail flatcars, roofs of buildings and structures, decks of warships and civil vessels, in stationary locations, and at prepared sites in hard-to-reach areas). The system requires virtually no structural changes to its platform. It can be easily installed and dismantled by any lifting device with a capacity of at least 25 tonnes.

The system comprises combat and technical components.

The combat components are as follows:

- the 9A331MK-1 autonomous combat module (ACM);
- two 9M334D SAM modules each holding four 9M331D missiles (eight ready-to-launch missiles in total).

The technical components comprise a set of spares, tools and accessories for maintenance and repair. There is also an electronic training aid for the ACM crew.

The 9A331MK-1 autonomous combat module is capable of independently detecting, identifying and engaging aerial targets. It has its own round-the-clock radar and optical sensors, eight ready-to-launch SAMs, computer control system, crew workstations, navigation and positioning systems, main power supply (3x220V, 400Hz, 65 kW) in the form of a gas turbine or a diesel generator, back-up power supply (solid-state, converting 3x200V 50Hz to 3x200V 400Hz up to 90kW), fuel supply and life support systems.

All equipment and personnel are accommodated in one compact module. The ACM's operation is fully automated. It automatically seeks, detects and tracks up to 144 targets, of which 10 targets identified by the control computer system as the most dangerous are displayed on the commander's screen, each complete with its number from 1 to 10. To engage a specific target, the commander only needs to press the control panel with the number of the selected target on it.

The system automatically tracks three more targets in the 30-degree sector. The control computer system

determines the moment of launch to engage the target at maximum possible range and feeds the launch authorisation command to the commander's workstation. The commander then presses the launch button. Throughout its operation the functionality of all the system's equipment is automatically monitored and troubleshooted if need be.

The radio guidance system ensures high interference immunity and allows for missile guidance with different parameters depending on the target type. The guidance parameters are automatically selected by the control computer system. One of the guidance parameters makes it possible to reliably engage cruise missiles flying at down to 10 m above ground level (5 m above sea level). The second parameter is designed for diving targets such as the HARM anti-radiation missile. The third parameter is against guided air bombs. The fourth, fifth and sixth parameters are

intended for fixed-wing, rotary-wing and UAV targets, respectively. The system's ability to engage targets at a ground range of up to 8 km ensures coverage of an area measuring up to 480 sq. km.

The system is operational in the temperature range of between -50 and +50 degrees Centigrade. Its combat components are protected against the elements such as solar radiation, precipitation, salt mist and salt spray.

The 9A331MK-1's all-up weight does not exceed 15 tonnes, which allows for any mode of transportation, including underslung by heavy helicopters such as the Mil Mi-26T.

The system's universality allows for its use as an air defence asset for ground units, warships, auxiliary vessels, civilian vessels, airfields, ports, sensitive strategic government and military facilities.

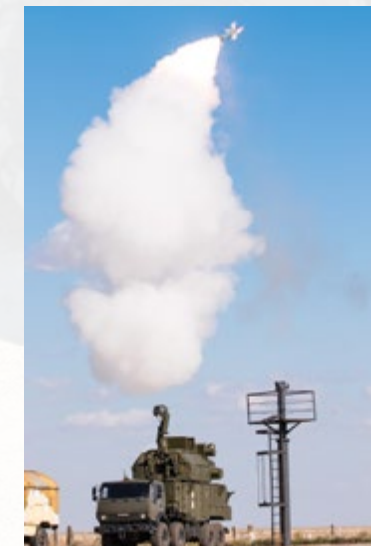
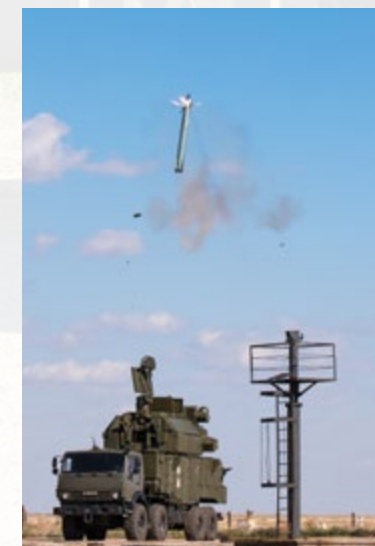
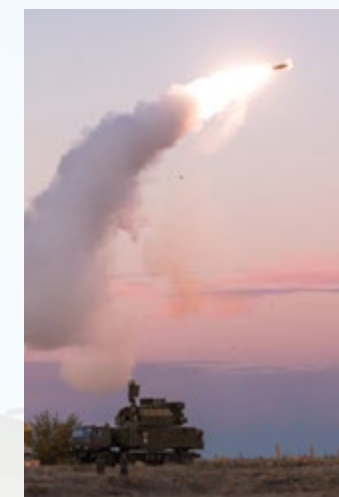
In addition, the Tor-M2KM can provide reliable protection of oil and gas facilities, including offshore oil platforms, as well as oil refineries, from terrorist attacks involving cruise missiles, strike UAVs and kamikaze drones.

The Tor-M2KM structure can be built depending on the type, area and location of the object to be protected. The best option is to use two to four 9A331MK-1 ACMs per object.

The system implements the one-for-one algorithm, as the kill probability exceeds 0.9.

According to military experts, in terms of the cost-effectiveness ratio the Tor-M2KM is the leading short-range SAM system both in Russia and abroad.

/RA&MG/







# RUSSIAN DRONES AT UMEX 2022

The delegation of Rosoboronexport JSC (part of the Rostec State Corporation) was taking part in the Fifth International Unmanned Systems Exhibition and Conference (UMEX 2022), which was from February 21 to 23, 2022 in Abu Dhabi, United Arab Emirates.



**T**oday Rosoboronexport is successfully promoting the Orlan-10E and Orion-E reconnaissance and reconnaissance/strike unmanned aircraft systems, the Kub-E kamikaze drone and is also preparing to launch a wide range of ultralight, heavy attack, rotary-wing and multi-rotor drones on the external market. At the UMEX 2022 specialized exhibition, we will showcase products from Russian manufacturers, hold presentations and negotiations on cooperation in this area with representatives of the United Arab Emirates and other Middle East countries,' said Alexander Mikheev, Director General of Rosoboronexport.

There is high interest today in unmanned systems in the Middle East, which has considerable poten-

tial for equipping its law enforcement agencies with high-tech products. This is one of the most promising market segments in the region.

'Along with the growing demand for drones, there is an increased attention to drone detection and suppression systems. These products are particularly relevant in the Middle East region, where drone attacks by terrorists occur repeatedly. Rosoboronexport offers its partners a wide range of means for equipping their law enforcement and army units, as well as private companies engaged in the protection of infrastructure facilities, oil and gas industry enterprises and critical organizations,' Alexander Mikheev added.

Rosoboronexport is ready to consider cooperation on the export of some UAV countermeasures systems, such as Repellent, Repellent-Patrol, Kupol, Rubezh-Avtomatika and Pischal. In addition, the company has developed and offers its partners a comprehensive counter-drone system combining electronic warfare and air defense systems of various classes.

/RA&MG/



*'Today Rosoboronexport is successfully promoting the Orlan-10E and Orion-E reconnaissance and reconnaissance/strike unmanned aircraft systems, the Kub-E kamikaze drone and is also preparing to launch a wide range of ultralight, heavy attack, rotary-wing and multi-rotor drones on the external market.'*

**Alexander Mikheev**





Sergey Kulik

# SECURE RESCUE AT ANY HEIGHT



*Unique autonomous rescue parachuting back-pack system for emergency escape*

The innovative Russian private Space Rescue Systems Ltd. (SRS Ltd.) company ([www.cosmic-rs.com](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:

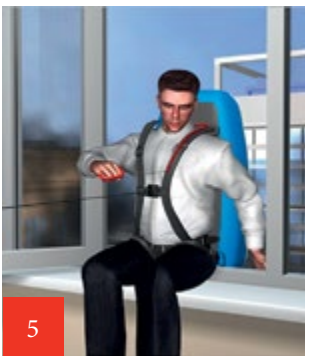
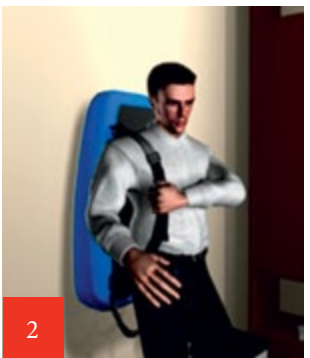
- thin coated/laminated fabric manufacturing;
- assembly from these fabrics a complex air-beam-frame air-proof inflatable structures;
- parachute canopy manufacturing;
- air-aspirator gas filling manufacturing;
- plastics (carbon) manufacturing and forming
- human field (air-borne) tests plastic forming 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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# EDEX 2021: GOOD RESULTS

## *Russia at the Egypt's leading tri-service defence exhibition*

The second edition of EDEX 2021 was held in the end of last year at the Egypt International Exhibition Centre (EIEC) in New Cairo. Organized by the Egyptian Ministry of Defense and Military Production, the exhibition was able to gather over 400 exhibitors and 30,000 visitors from more than 70 countries. There were armaments from 42 countries, in addition to the attendance of official delegations of dignitaries from 45 countries. At EDEX 2021 Rosoboronexport JSC (part of Rostec State Corporation) organized a large-scale demonstration of Russian defense products.

**E**gypt Defence Expo, or EDEX, is the first international defence exhibition in Egypt, covering air, land and sea military technologies. The exhibition is held every two years at the Egypt International Exhibition Center in the city of New Cairo. The exhibition is organised by Clarion Events Defence and Security, in cooperation with the Egyptian Armed Forces and Ministry of Military Production. EDEX aims to bring together key defence and security players from the region and across the world.

Egypt's President Abdel Fattah Al-Sisi inaugurated the second edition of Egypt Defence Expo (EDEX 2021). He said the turnout this year is huge and reflects the country's



ability to organise such international events.

The organising company announced that about 400 exhibitors from all over the world participated this year to display the latest technologies in the fields of defense and armaments from 42 countries, in addition to the attendance of official delegations of dignitaries from 45 countries.

EDEX is fully supported by the Egyptian Armed Forces and presents a brand new opportunity for exhibitors to showcase the latest technology, equipment and systems across land, sea, and air. In his speech during the opening session, Egypt's Minister of Defense Lieutenant-General Mohamed Zaki, had emphasised

Egypt's aspiration to receive the most important pioneers in the defense systems industry in the world.

He added that the event is expected to be developed in size and strength in its second edition compared to the successful first edition, stressing the keenness of the General Command of the Armed Forces to follow all precautionary measures and measures to ensure the health safety of visitors during the exhibition activities.

Zaki further noted that the exhibition opens new horizons of cooperation between Egypt and various countries in the field of military industries, as EDEX has become an effective international umbrella to showcase the latest systems of



military, defense and technological industries in the world.

Rosoboronexport JSC organized a large-scale demonstration of Russian defense products at the EDEX 2021.

'Egypt is Russia's important strategic partner. Military-technical cooperation between our countries has a long history and is continuously evolving in line with world market trends. Rosoboronexport is ready to continue to cooperate with the Egyptian side in any modern formats and across the entire lineup of military, dual-use and civilian export products,' said Alexander Mikheev, Director General of Rosoboronexport. 'At EDEX 2021, we will show high-level representatives of all services of the armed forces of Egypt and







other African countries the latest Russian military products and developments and will also hold meetings and negotiations on relevant security issues.

At EDEX 2021, Rosoboronexport was the organizer of Russia's single exhibit, within which seven major Russian defense manufacturers which showcased their products for all services of the armed forces.

Rosoboronexport's stand presented 350+ products, including scale models of the Yak-130 combat training aircraft, Mi-35M transport/attack helicopter, Ka-31 radar picket helicopter and the Rubezh-ME coastal defense missile system.

In addition, at the Rosoboronexport stand, Remdiesel exhibited models of the Typhoon and Tornado armored motor vehicles, Kalashnikov Concern demonstrated a wide range of small arms, including the Lebedev pistol, Kalashnikov assault rifles including AK-100 and AK-200 series, the most advanced AK-15, AK-19 and AK-308 rifles, as well as the newest PPK-20 submachine gun.

Uralvagonzavod Concern, the world's largest manufacturer of armored vehicles, displayed mock-ups of the T-90MS MBT and the

BMPT Terminator tank support fighting vehicle, the bestsellers of the arms market, which are extremely popular in the Middle East and Africa. The Petrovsky Plant unveiled a mock-up of the latest PTKM-1R top-attack anti-tank mine and the Special Technology Center exhibited the Orlan-10E unmanned aerial vehicles.

'Rosoboronexport notes a marked growth of interest among foreign partners in Russian-made unmanned aerial vehicles. In 2021, the Orion-E reconnaissance/strike UAV was launched to the external market and now we are negotiating its acquisition with more than 10 potential customers. In addition, more than 50 Orlan-10E drones have been delivered to customers this year. We are preparing to launch new models soon, including kamikaze and heavy attack drones,' Alexander Mikheev said.

Rosoboronexport was installed separate stands to demonstrate products from the Almaz-Antey Air and Space Defense Corporation, NII Stali Research Institute, as well as Rostec's High-Precision Systems, Russian Helicopters, Technodinamika and Roselectronics holding companies.

The Russian defense industry was presented in Egypt by 1,000+ products. Foreign partners could see air defense systems of various ranges, combat and transport aircraft, including IL-76MD-90A(E) military transport and Il-78MK-90A tanker, helicopters, armored vehicles, naval hardware, small arms, as well as a wide range of ammunition.

At EDEX 2021, Rosoboronexport was held a presentation of the Kornet-EM universal missile system and its crew equipment. The company's specialists toll in detail about

its characteristics and capabilities, as well as the features of its employment, including in view of combat experience.

As part of the business program of the exhibition, Rosoboronexport was held meetings and negotiations with representatives of various services and branches of the armed forces of the Ministry of Defense of Egypt and other countries. It was discussion about further cooperation in all areas of defense relevant to the region, including countering terrorist groups.

/RA&MG/





# DUBAI AIRSHOW 2021

*The largest aerospace show was very successful and promising*

17th edition of Dubai Airshow was from 14-18 November 2021 at Dubai World Central (DWC), Dubai Airshow Site. Dubai Airshow is one of the largest and most successful air shows in the world, connecting aerospace professionals across all areas of the industry to facilitate successful global trade. Dubai Airshow was held under the patronage of His Highness Sheikh Mohammed Bin Rashid Al Maktoum, Vice President, Prime Minister of the UAE, Ruler of Dubai and UAE Minister of Defence. The event was held with the support of the Dubai Civil Aviation Authority, Dubai Airports, the UAE Ministry of Defence and Dubai Aviation Engineering Projects, and organised by Tarsus Middle East. JSC Rosoboronexport (part of the Rostec State Corporation) was showcasing the latest Russian-made Air Force, Air Defense and Electronic Warfare equipment at the Dubai Airshow 2021.

**D**ubai Airshow 2021 was the biggest edition of the event since it began in 1989. The Airshow brought the aviation, aerospace, space and defence industries together for what was the most extraordinary experience in the history of air shows.

This year, the event welcomed more exhibitors than ever before, including over 370 new exhibitors, and representatives from almost 150 countries. There were civil and military delegations from more than 140 countries and the event will feature 20 country pavilions, including new additions from the Czech Republic, Belgium, Brazil, Israel, and Slovakia.

The global event was welcomed more than 85,000 visitors this year. It

were featured world-class products, solutions, technologies, and services from market leaders and disruptors, enhanced networking opportunities and state-of-art aircraft display along with major industry announcements.

The event was officially inaugurated by His Highness Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum, the Crown Prince of Dubai who led the Royal Tour in the morning.

One of the biggest highlights of the show were the static park and flying display, which featured more than 175 of the world's most advanced aircraft on ground and in the air. The Airshow were featured aerobatic displays from the UAE Air Force's Fursan, the Russian Knights, the Saudi Hawks, Surya Kiran from

India and the Sarang Team of the Indian Air Force.

Checkmate, the next generation Sukhoi fighter jet was make its first international debut for the next generation Sukhoi fighter jet. The Boeing 777X and the Leonardo AW609 also debuted at this year's Airshow.

This year, Dubai Airshow has introduced a host of free-to-attend conferences featuring more than 250 industry experts, who will be providing more than 50 hours of invaluable insights and trends across nine tracks including cargo, sustainability, technology, and space among others.

Aerospace startups took part in the brand new startup hub where they had the opportunity to showcase their breakthrough solutions, take part in pitch competitions

with major local and global aerospace entities such as Etihad Airways, Mohammed Bin Rashid Space Centre (MBRSC), Amazon Web Services (AWS) and Boeing Applied Innovation. Entrepreneurs will also have the chance to get involved in mentorship programmes, workshops, and high-level networking with leading investors and accelerators.

There were new aircraft demos from Bellwether Industries presenting the Antelope, an urban vertical take-off and landing vehicle with hidden propellers as well as Manta Aircraft's ANN2, a two-seat model for personal air mobility with wide regional range at high speed.

Dubai Airshow 2021 had a major focus on technology, providing a dedicated platform for showcasing the latest emerging technologies, including Artificial Intelligence (AI), 5G, cybersecurity and automation. A brand new feature for the show this year is the Dubai Airshow application, which harnesses the power of AI to facilitate business matchmaking based on profile and interest.

## Significant Russian participation

JSC Rosoboronexport (part of the Rostec State Corporation) was showcased the latest Russian-made Air Force, Air Defense and Electronic Warfare equipment at the Dubai Airshow 2021.

'We are strengthening partnerships with Middle Eastern countries. This involves not only the supply of

military equipment – orders coming from this region through Rosoboronexport account for more than 30% of our order book – but also the development of cooperation in civilian areas. This year, Rostec is exhibiting a record number of new products. The Airshow will be hosting the world premiere of the MC-21 passenger airliner powered by Russian PD-14 engines, a VIP version of the Superjet 100 passenger aircraft in the style of the Aurus brand and the Checkmate fifth-generation stealth fighter aircraft. We have also brought the Ka-226T and Ansat civilian helicopters in various configurations and Ka-52 and Mi-28NE attack helicopters to the exhibition. All the new products will be displayed as full-scale mock-ups so that foreign partners can get better acquainted with our equipment,' said Rostec CEO Sergey Chemezov.

At its stand, Rosoboronexport exhibited scale models of air and air defense systems having a high market potential in the Middle East region. Among them were the fifth generation Su-57E stealth fighter and the generation 4++ Su-35 fighter, IL-76MD-90A(E) military transport aircraft, Mi-28NE, Ka-52 and Mi-17V-5 helicopters, S-400 Triumph air defense missile system and Tor-M2KM SAM system.

'Foreign partners in the Middle East are traditionally interested in new high-tech products, and every time we bring here the main new export products from the Russian



defense industry and unique proposals for industrial cooperation,' said Rosoboronexport Director General Alexander Mikheev.

For the first time at Dubai Airshow, Rosoboronexport showcased products at its stand using a kinetic multimedia installation composed of 60 moving screens. The Repellent-Patrol, Kupol and Pishchal-PRO counter-drone systems, as well as the most popular Russian-made unmanned aerial vehicles, Orlan-10E reconnaissance and the Orion-E reconnaissance/attack UAVs, was presented in such a format.

The Russian exhibit also comprised products from Rostec's holding companies including the United Aircraft Corporation (UAC), United Engine Corporation (UEC), Russian Helicopters, High-Precision Systems and Radio Electronic Technologies







Group (KRET). In addition, the National Aviation Service Company, a state intermediary for servicing exported Russian military aircraft, was present for the first time abroad.

Almaz – Antey Air and Space Defense Corporation, the world leader in the development and production of air defense and electronic warfare systems, exhibited a wide range of anti-aircraft missile systems that Rosoboronexport has been successfully promoting in the Middle East, including the S-400 Triumph, Antey-4000, S-350E Vityaz, Viking, Buk-M2E and Tor-M2E in various configurations.

At Dubai Airshow 2021, Rosoboronexport was orga-

nized a demonstration of the latest reconnaissance/attack and attack unmanned aircraft systems (UAS) developed by the Kronstadt Company. For the first time in the world, the largest Russian UAV developer and manufacturer unveiled scale models of the Inokhodets-RU (Ambler) long-endurance reconnaissance/attack UAV, the Helios-RDL long-range early-warning radar picket UAV and the Grom (Thunder) high-speed attack UAV at its stand.

In addition to organizing outdoor and indoor exhibits, Rosoboronexport conducted a large-scale campaign to promote Russian military, dual and civilian products on digital platforms. Text and multimedia materials, presentations of

the most promising products were posted on the company's website and in social networks.

'During the exhibition, we will pay special attention to technology cooperation. Today Rosoboronexport has a number of ongoing joint projects in the Middle East for the licensed and joint production of armored vehicles, small arms and anti-tank weapons. As a result, the countries in the region know us not only as a reliable supplier of final products, but also as a highly competent partner in technology transfer,' said Alexander Mikheev.

Several important documents were signed at the exhibition. For example, Russian Helicopters Holding of Rostec State Corporation and the UAE company AJ Holding LLC set up a joint venture Alpha Aviation LLC in the Ajman Free Zone to promote and sell Russian civilian helicopters abroad.

The key market for Alpha Aviation will be the Middle East, where it is expected to sell more than 20 civilian helicopters of various types, including the Ansats, Mi-171A2, Ka-32, and Mi-38 by 2026. The scope of responsibility of the joint venture also includes the organization of service maintenance of Russian helicopters in the region.

'AJ Holding is a reliable partner for the promotion of our civilian products in the Middle East. The joint venture format will allow us to expand our presence in a region that is extremely important for us. The company started operating a

few months ago but we can see the results already now: during Dubai Airshow 2021, Alpha Aviation signed a contract for the delivery of two Mi-171A2 helicopters to Peru and an agreement for the delivery of four Ansats helicopters and one Mi-17-1V to the police of Ras al Khaimah,' said Andrey Boginsky, Director General of Russian Helicopters.

### Three presentations from the UAC

The United Aircraft Corporation has presented three new products abroad for the first time: a medium-range MC-21-310 with Russian-made PD-14 engines, a new version of a business aircraft based on the Superjet 100, and a light tactical aircraft Checkmate.

'This is the first foreign aviation event of such scale after the global lockdown. We see quite a high level of interest in Russian equipment. And for us it is, of course, the opportunity to present our achievements. First of all, it's MC-21 with the PD-14 engine. The airplane have arrived here straight from the tests; its cabin is fitted with measuring equipment. Another premiere is a business jet Aurus. People here are very interested in such machines, even more so because our aircraft has an attractive combination of features and cost. And, of course, we are presenting to foreign specialists the fifth-generation single-engine Checkmate. This is a significant step forward for us: the aircraft will be unique in terms

of its combination of combat characteristics, possibilities of an upgrade, operating costs, and fifth-generation characteristics,' UAC President Yury Slyusar told to journalists.

MC-21-310 took part in the salon's air show program performing its first foreign demonstration flight, which included such elements as a quick climb to 800 m, turns with climb and descent, a zoom maneuver with a 45 degree angle and minimum speed of 210 km/h, a 2g turn, a 100 m high pass with a welcome rocking of the wing to the exhibition visitors. For the exhibition, a part of business and economy class cabin was installed on the airliner. This allowed the demonstration of one of the advantages of the MC-21 – a larger passage between seats, provided by the widest fuselage in its class.

The UAC exposition was visited by a number of delegations from the UAE and other countries. Particular attention was to the updated version of the business aircraft based on the Superjet 100 and presented for the first time in Dubai under the Aurus business jet brand, next to the Aurus Ansats helicopter and the Aurus Senat limousine. The aircraft is part of the line of Russian high-tech luxury products promoted under this brand.

On the same day, the first foreign presentation of the Checkmate light tactical aircraft took place. The prototype of the new aircraft was presented in a specially constructed pavilion, which allowed for a spectacular multimedia presentation. The pavilion is expected to be visited by representatives of potential customers, specialists and other guests on the following days.

The UAC delegation has an intensive business program scheduled for all days of the air show, including meetings and negotiations with current and potential partners, representatives of interested countries and heads of major corporations from the UAE and other states.

The UAC joint exhibition stand (No. 895) displays models and multimedia presentation of all current aircraft construction programs of the corporation, including Su-57, Su-35, MiG-35, Yak-130, Il-76MD-90A, Il-114-300, Be-200, Superjet 100 and MC-21.



### Special Premiere – Checkmate

At the Dubai Airshow 2021 was featured special presentation of the Checkmate light tactical aircraft, also in format for the delegations of several countries and an open demonstration for the media.

'It is not a coincidence that the first international presentation of the new 5th generation fighter is taking place here, at the Dubai Airshow. People in the Middle East appreciate the reputation of Russian weapons, show great interest in our advanced products and seek the development of partnership with Russia. The Checkmate combines low visibility and excellent equipment, and is ideal in terms of combat effectiveness and flight hour cost. All these factors make the aircraft a unique offer in





the international arms market,' said Rostec head Sergey Chemezov.

Checkmate is Russia's first fifth-generation single-engine aircraft, created by Sukhoi, part of Rostec State Corporation's UAC Holding Company. The fighter was first presented in July 2021 at the MAKS-2021 air show. The key features of the aircraft are its low visibility, low flight hour cost, open architecture and high cost-effectiveness.

'Checkmate was developed on the basis of scientific and technical groundwork gained in the course of creation of the export version of Su-57E. In particular, the aircraft inherited the cockpit, onboard systems, and some other elements. This reduces the aircraft's cost and simplifies its maintenance,' Rostec's Aviation Cluster spokesperson said.

Rostec State Corporation also unveiled the unmanned modification of the Checkmate 5th generation light tactical aircraft developed by Sukhoi Company of the United Aircraft Corporation.

The unmanned version of the aircraft complex was shown in a new video posted on the YouTube channels of Rostec State Corporation and the United Aircraft Corporation, as well as in a new informational special project.

The protagonist of the video, the Air Force commander of a foreign country, describes the advantages of the 5th generation aircraft and the project philosophy.

The Checkmate light tactical aircraft developed by Sukhoi Company (part of Rostec's United Aircraft Corporation), Russia's first single-engine fifth-generation aircraft, was first presented in July 2021 at MAKS-2021 air show. The key characteristics



of the aircraft are its low visibility, low flight hour cost, open architecture and high performance in terms of 'cost-effectiveness'.

### Light helicopter Ka-226T

During the Dubai Airshow 2021 the 'Russian Helicopters' Holding Company (a part of Rostec State Corporation) was demonstrated the deeply modernized climber light helicopter Ka-226T. Andrey Boginsky, Director General of Russian Helicopters Holding Company, reported on the progress of the Ka-226T light helicopter modernization project during a working meeting with President of the Russian Federation Vladimir Putin. For the first time, Ka-226T Climber was presented at the international aerospace show MAKS-2021, and at the eve of the Dubai Airshow 2021 the helicopter began flight tests and completed its maiden flight.

The modernized Ka-226T is the first helicopter in Russia to be manufactured according to digital design documentation. This initiative made it possible to significantly reduce time for building the machine and to start flight tests in a short time.

The modernized Ka-226T is the first helicopter in Russia to be manufactured according to digital design documentation. This initiative made it possible to significantly reduce time for building the machine and to start flight tests in a short time. At the Dubai Airshow 2021 Ka-226T aroused genuine interest among foreign customers due to its excellent flight performance, allowing it to operate at altitudes up to 6.5 kilometers, versatility, convenience and safety.

Ka-226T has a coaxial rotor design, which provides good controllability in thin air, resistance to strong side winds, high rate of climb, ability to take off and land on sites located at high altitudes. Helicopter is also highly effective when flying over water surfaces. It can take off and land on the deck of even small marine vessels.

The aircraft is characterized by low vibration level, ease and simplicity of operation, ability to take off and land on minimum size grounds (including urban infrastructure), high accuracy of hovering even when working with cargo on the external sling, and safe passenger boarding with working rotors.

Thanks to its key feature – adaptability to high altitude flights – the Ka-226T modernization project received operating name 'Climber'. Aircraft airframe features new design with significantly improved aerodynamics which distinguishes it from previous models of the Ka-226 family. The fuselage of improved aerodynamic shape is made using modern lightweight materials. Ka-226T has received a new rotor head, blades, and main gearbox, as well as a shock-proof emergency-resistant fuel sys-



tem, which meets increased safety requirements.

The helicopter is also fitted with a new complex of pilot navigation and radio communication equipment; it can optionally have oxygen equipment, ballonnets, air conditioning and heating systems.

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Mass manufacturing of upgraded Ka-226T helicopter in close cooperation with Kumertau aviation production company at Ulan-Ude Aviation Plant is scheduled to begin in 2022.

### First flight Mi-28NE abroad

At Dubai Airshow 2021 Mi-28NE attack helicopter manufactured by 'Russian Helicopters' Holding Company (Rostec State Corporation) made its first demonstration flight as a part of the flight program international exhibition. Guests and participants had the opportunity to enjoy complex aerobatics of the combat helicopter with the unique maneuverability. Famous Russian Mi-28 attack helicopter in its export modi-



fication made its debut at this exhibition. This was its first demonstration outside of Russia.

Mi-28 helicopter family is called 'Night Hunters' (or 'Havoc' according to NATO classification). Mi-28 has been taken in the inventory of the Russian Armed Forces as the main attack helicopter of the Aerospace Forces. 'Night Hunter' showed its outstanding flight performance in Dubai sky. Mi-28 can perform a number of aerobatics available only to aircraft.

Many aerobatics were performed at minimum altitudes and speeds, which is especially important for survivability of the helicopter in real combat conditions. Mi-28NE demonstrated combat turns, nose diving, pitch-up maneuvers, rearward flight, hovering and climb with rotation under the supervision of Sergey Barkov, honored test pilot and hero of Russia.

The pilots demonstrated the dynamic capabilities of the rotorcraft, its stability in the air, and ease in control. Combat characteristics of the 'Night Hunter' are significantly expanded due to its maneuverability.



It is able to reach the target quickly even while active maneuvering.

Mi-28 attack helicopter has a powerful armament complex which includes a mobile automatic 30 mm gun with a left to right rotation range of  $\pm 110^\circ$ , three types of anti-tank guided missiles with a range of 6 and 10 km, air-to-air guided missiles, unguided missiles of two types, suspended cannon containers, aerial bombs of up to 500 kg grade.

Main rotor blades of the 'Night Hunter' are capable of withstanding a 30 mm projectile. It has high-power engines, with 2,400 horsepower each. It is possible to fly it with one engine if the other is damaged. 'Night Hunter' features high survivability. Front and side windows of the cockpit are armored. Mi-28NE cabin is protected by ceramic armor, and Mi-28NE is able to effectively perform its tasks in a hot climate. It has a new exhaust infra-red suppression system and particle separator.

Mi-28NE is manufactured at the Rostvertol enterprise, which is a part of 'Russian Helicopters' Holding Company.

/RA&MG/



# RUSSIAN HIGH-TECH DEFENSE SOLUTIONS FOR THE GULF

World Defense Show in Riyadh, the capital of the Kingdom of Saudi Arabia, is to bring together the world of defense & security to demonstrate integration and the future of defense interoperability across air, land, sea, space and space. The leading Russian producers are to showcase the latest high-end defense technologies as part of a single exposition organized by the Rosoboronexport. Let us take a closer look at the Russian-Saudi relations and the Russian technologies offered to the region, through the eyes of the Arab media.

## Russia and Saudi Arabia

Relations between Russia and Saudi Arabia have a long history. The Soviet Union was the first country to recognize an independent Saudi state. The USSR established diplomatic relations with it on February 19, 1926 by exchanging notes. In 1932 Prince Faisal, Minister of Foreign Affairs of the KSA, made an official visit to the USSR.

The most significant recent bilateral development took place in October 2019, when Riyadh hosted talks between President of Russia Vladimir Putin and King Salman bin Abdulaziz Al Saud of Saudi Arabia. As Kremlin reported, the talks focused, among

other things, on coordinating measures to stabilise oil prices, as well as the situation in Syria and the Persian Gulf region, and the Palestinian-Israeli settlement. In addition, the leaders discussed building up their multi-dimensional cooperation in various areas, such as energy, agriculture, industry and military-technical cooperation, as well as cultural and humanitarian exchanges.

'Following the visit, a package of bilateral documents was signed, including both interagency and commercial agreements. The sides signed the Charter of Cooperation of Oil Producing Countries and the programme for high level Russian-Saudi strategic cooperation of the Joint Intergovernmental Commission on Trade, Economic, Scientific and Technological Cooperation. Other documents concern cooperation in manned cosmonautics and the GLONASS global navigation satellite system, energy, culture, healthcare, mass communications, tourism, mutual visa facilitation agreements, encouragement and protection of capital investment and mutual expansion of agricultural and food exports. A number of documents regulate specific issues of joint investment and joint projects', – reported Kremlin.

Later, Vladimir Putin held talks with Crown Prince Mohammad bin Salman Al Saud of Saudi Arabia. The sides also exchanged gifts.

'Bilateral relations were established over 90 years ago in 1926, the dawn of the state of Saudi Arabia. The Soviet Union was the first foreign country to recognize the young Kingdom of Hejaz and Nejd led by your father. Your Majesty, we appreciate your personal contribution to promoting multifaceted Russia-Saudi Arabia cooperation. Your first ever visit to Russia in October 2017 was quite effective. The agreements reached back then are being successfully implemented', – said President of Russia Vladimir Putin.

According to Russian President, Russian-Saudi coordination is an indispensable element for ensuring security in the Middle East and North Africa.

'I am convinced that without your country, it is hardly possible to achieve a just and long-term settlement of any problem in this region', – said Vladimir Putin.

**Arab News** reported at the time in the Putin, Saudi crown prince chair first meeting of Saudi-Russian Economic Committee article, that the The speeches dealt with areas of cooperation between the two countries and common opportunities to enhance bilateral cooperation.

In April 2019 Russia's Minister of Defence General of the Army Sergei Shoigu announced, that Russia was ready to make maximum use of the potential of military cooperation with Saudi Arabia.

## ARMY-2021

Deputy Defence Minister of the Kingdom of Saudi Arabia Prince Khalid bin Salman Al-Saud visited the ARMY 2021 International Military-Technical Forum in Russia and held the meeting with Sergei Shoigu. Saudi Arabia is committed to strengthening cooperation with Russia, which will help to jointly respond to threats and challenges, said Khaled bin Salman Al-Saud. According to him, the cooperation that exists between his country and Russia 'will contribute to a common response to all modern challenges, which we will carry out together'.



'The challenges that exist,' he noted, 'will require even greater cooperation and efforts from us.'

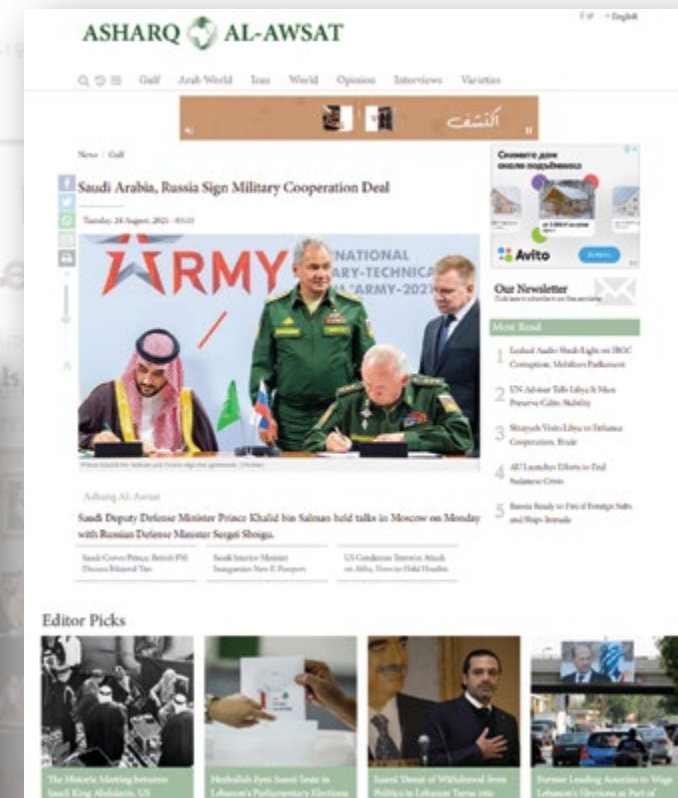
The Deputy Minister thanked Shoigu for the invitation to the ARMY 2021, which he called a 'wonderful event' and conveyed greetings from the King of Saudi Arabia, the leadership of the Ministry of Defence of his country.

In the article *Saudi Arabia, Russia ink deal aimed at developing military cooperation* **Arab News** reported on the agreement aimed at developing military cooperation with Russia signed at the ARMY-2021.

'We discussed our common endeavor to preserve stability and security in the region, and reviewed shared challenges facing our countries,' – quoted Arab News Prince Khalid.

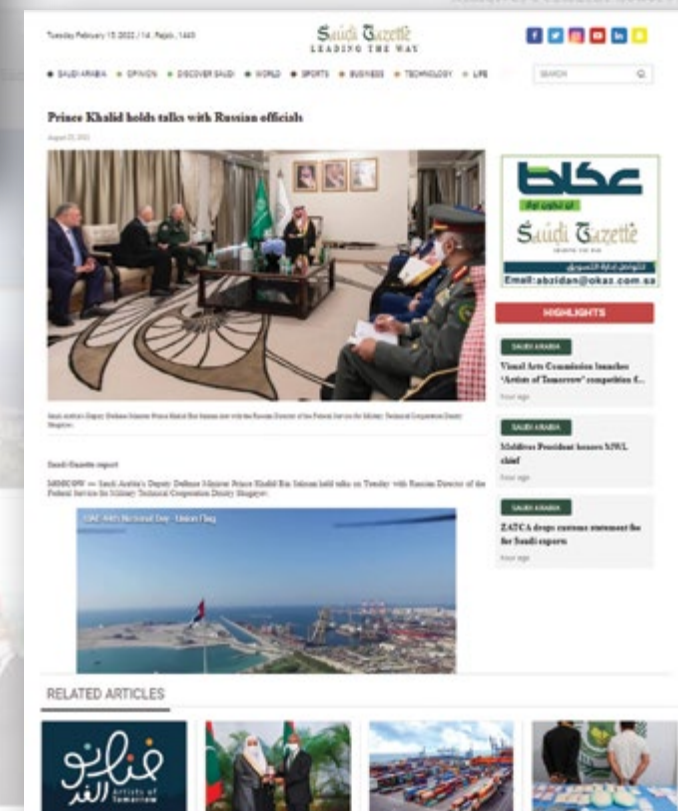
The **Al-Awsat** newspaper wrote, that the officials discussed military and defense cooperation and joint efforts to preserve regional security and stability, and also tackled challenges facing their countries.

The **Saudi Gazette** also reported in details on Prince Khalid Bin Salman's visit to Russia.



'Prince Khalid also met with the Russian Deputy Minister of Foreign Affairs and Special Representative of the President for the Middle East Mikhail Bogdanov and Chairman of the Committee on International Affairs of the Russian State Duma Leonid Slutsky.

During the talks, they reviewed recent international and regional developments, and discussed our efforts to address mutual challenges faced by our two countries', – wrote the **Saudi Gazette**.





## Russian high-end technologies for the Gulf

‘We are strengthening partnerships with Middle Eastern countries. This involves not only the supply of military equipment – orders coming from this region through Rosoboronexport account for more than 30% of our order book – but also the development of cooperation in civilian areas’ said Rostec CEO Sergey Chemezov.



‘Foreign partners in the Middle East are traditionally interested in new high-tech products, and every time we bring here the main new export products from the Russian defense industry and unique proposals for industrial cooperation,’ said Rosoboronexport Director General Alexander Mikheev.

Rosoboronexport in 2021 presented to the Middle East newly-designed products from its export catalogue, including the new armoured personnel carrier and infantry fighting vehicle on the basis of the Boomerang unified wheeled combat platform, air defence missile systems Antei-4000, Viking and Tor-E2, tank T-14 Armata and new types of firearms of Russia's production – assault rifles KORD, Lebedev pistol and the newest Kalashnikov assault rifle AK-19.

One of the integrated solutions is the counter-UAV system.

‘The great availability of drones and the possibility of acquiring them by various terrorist groups, as well as the experience of recent local wars and military conflicts, poses new challenges to

the countries of the region and forces them to revise the existing air defense system, designed to protect against classical attack weapons,’ – said Rosoboronexport.

The Russian special exporter has offered a new package solution – a system capable of effectively countering attacks by unmanned aerial vehicles, combining electronic warfare and air defense systems of various classes. It combines UAV jamming systems and hard-kill components (air defense systems).

‘The integrated use of the proposed electronic warfare and air defense assets will enable effective countermeasures against UAVs of any class provided air enemy reconnaissance and automated control systems are in place... Traditionally, Rosoboronexport is ready to treat each foreign customer individually. During technical consultations, the company's specialists can offer the optimal configuration of the system components for countering UAV threats depending on the customer's needs and its vision of security threats to its infrastructure, transport, energy and military installations,’ – explained Rosoboronexport.

Another recent Russia's novelty for the Middle East are the latest small arms – KORD balanced action assault rifle, the latest Kalashnikov AK-19 assault rifle and the Lebedev compact pistol (PLC), exhibited abroad for the first time last year.

Rosoboronexport: ‘The 6P68 Kord assault rifle from world-famous Russian arms manufacturer ZiD (JSC Degtyarev Plant) shows the wonders of accuracy in the hands of special forces soldiers. Experts especially note its unique characteristics in automatic firing mode owing to an innovative balanced action system. Vast experience in the development of machine guns, sniper rifles and other weapons has enabled the manufacturer to select the most advanced light and durable alloys to achieve high reliability of the weapon, and close interaction with law enforcement agencies has helped develop the most convenient design for various missions’.

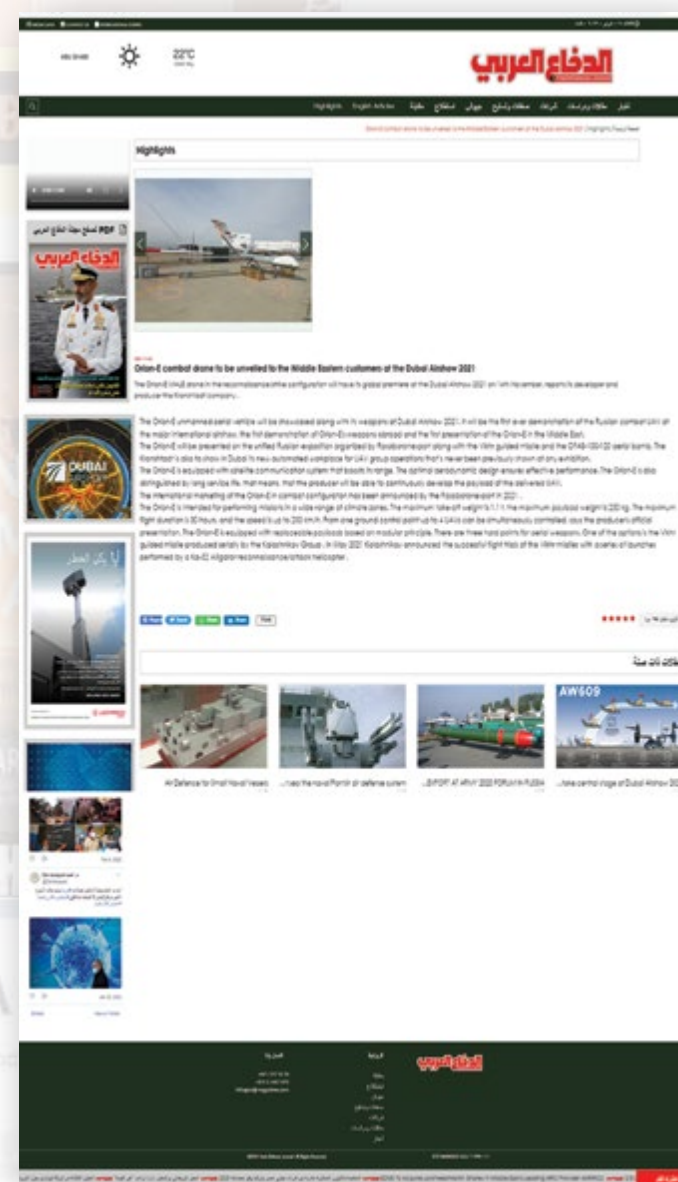
The renowned Kalashnikov AK platform has further evolved into the long-anticipated AK-19 assault rifle in the world market, chambered for 5.56x45mm NATO.

Rosoboronexport: ‘The AK-19, like any Russian Kalashnikov assault rifle, gives confidence in every shot. With its telescopic stock and other technical solutions that improve ergonomics, the weapon is extremely handy to a soldier of any army in the world, regardless of his anthropometric data’.

**Al Defaiya** in November published a large analysis on the Russian military product line offered to the Middle East. Touching the issue of Mil Mi-28NE Night Hunter and Kamov Ka-52 attack helicopters, it reported, that both gunships featured round-the-clock operation ability being armed with an impressive set of smart weaponry.

‘For the first time the rotorcraft was shown with the latest guided missiles, namely Vikhr (Whirlwind) and A305E with firing range of 10 and 15 km respectively. The missiles were developed by the High Precision Weapons holding subsidiaries – Tula-based Shipunov KBP and Kolomna-based KBM,’ – said **Al Defaiya**.

Al Defaiya: ‘The rotorcraft Ka-226T is intended for operations in the highlands and so has been nicknamed as the ‘Climber’. It features new airframe and fuselage design with increased aerodynamic characteristics. Being made of modern lightweight materials the Ka-226T is equipped with an impact-resistant fuel system to meet special safety requirements. The machine received up-to-date avionics package to ensure safe and cost efficient operations. The vehicle module design makes Ka-226



real ‘Jack of all trades’ as passenger, transport, SAR or medical-evacuation work horse. The Ka-226T versatile design draws interest of both commercial and military operators. The helicopters are in serial production at the Ulan-Ude Aviation plant in the Russian Far East and has been chosen for ambitious light helicopter program of the Indian Army aviation and Air Force to comprise 200 units in total’.

The **Arab Defence Journal** covered in details the latest Russian Orion-E MALE drone in the reconnaissance/strike configuration which had its global premiere in 2021 .

‘The Orion-E is equipped with satellite communication system that boosts its range. The optimal aerodynamic design ensures effective performance. The Orion-E is also distinguished by long service life, that means, that the producer will be able to continuously develop the payload of the delivered UAV. The international marketing of the Orion-E in combat configuration has been announced by the Rosoboronexport in 2021. The Orion-E is intended for performing missions in a wide range of climate zones,’ – reported the **Arab Defence Journal**.

It added, that one of the armament options for the Orion-E UAV was the Vikhr guided missile produced serially by the Kalashnikov Group. The company in May 2021 announced the

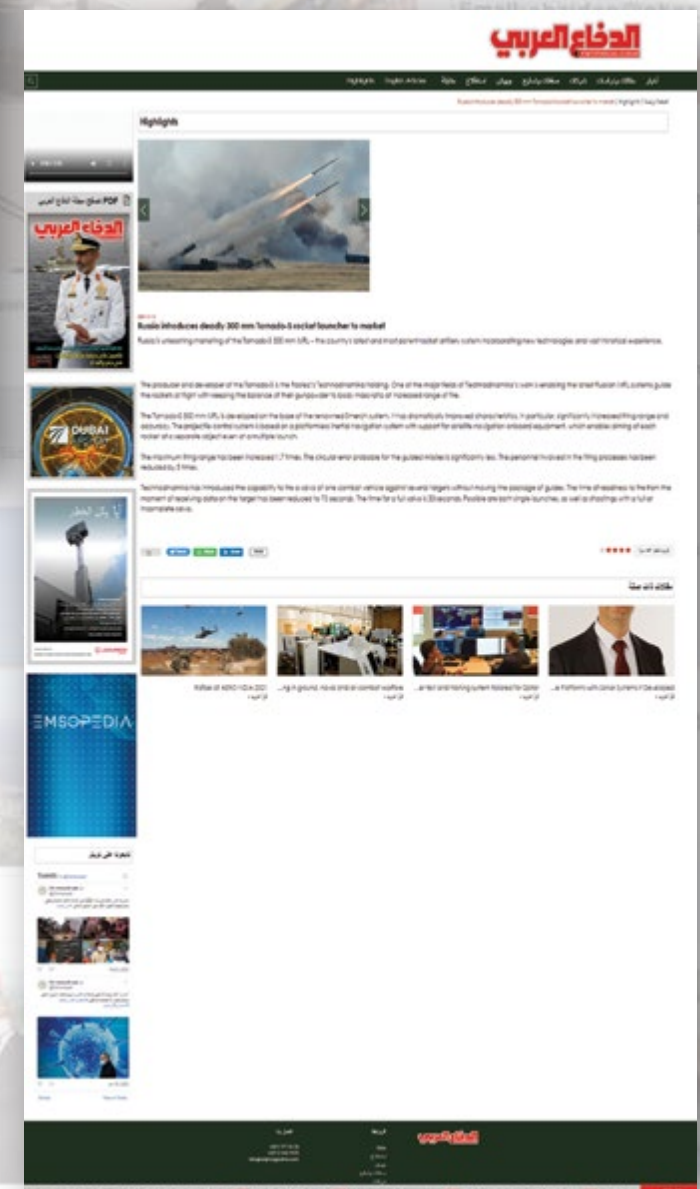
successful flight trials of the Vikhr with a series of launches performed by a Ka-52 Alligator reconnaissance/attack helicopter.

Another Russian product covered by the **Arab Defence Journal** was the Tornado-S 300 mm multiple launch rocket system.

‘Russia is unleashing marketing of the Tornado-S 300 mm MRL – the country's latest and most potent rocket artillery system incorporating new technologies and vast historical experience.

The producer and developer of the Tornado-S is the Rostec's Technodinamika holding. One of the major fields of Technodinamika's work is enabling the latest Russian MRL systems guide the rockets at flight with keeping the balance of their gunpowder to body mass ratio at increased range of fire. The Tornado-S 300 mm MRL is developed on the base of the renowned Smerch system. It has dramatically improved characteristics, in particular, significantly increased firing range and accuracy. The projectile control system is based on a platformless inertial navigation system with support for satellite navigation onboard equipment, which enables aiming of each rocket at a separate object even at a multiple launch,’ – reported the **Arab Defence Journal**.

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## INTERNATIONAL AEROSPACE, MILITARY, NAVY AND TECHNOLOGY GUIDES

ISSUE	DEADLINE	SPECIAL PARTNERSHIP
'GUIDE' №01 (62)	February 18th	<b>World Defense Show 2022</b> (06-09.03.2022, Saudi Arabia, Riyadh)
'GUIDE' №02 (63)	February 22th	<b>DEFEXPO INDIA 2022</b> (10-13.03.2022, India, Gandhinagar)
'GUIDE' №03 (64)	March 12th	<b>DSA 2022</b> (28-31.03.2022, Malaysia, K.Lumpur)
'GUIDE' №04 (65)	March 15th	<b>ArmHiTec 2022</b> (31.03-02.04.2022, Armenia, Yerevan)
'GUIDE' №05 (66)	March 20th	<b>FIDAE 2022</b> (05-10.04.2022, Chile, Santiago)
'GUIDE' №06 (67)	March 25th	<b>Eurasia Airshow 2022</b> (13-17.04.2022, Turkey, Antalya)
'GUIDE' №07 (68)	May 12th	<b>KADEX-2022</b> (23-28.05.2022, Kazakhstan, Astana)
'GUIDE' №08 (69)	August 05th	<b>ARMY-2022</b> (15-21.08.2022, Russia, Moscow)
'GUIDE' №09 (70)	August 15th	<b>Defense &amp; Security 2022</b> (29.08-01.09, Thailand, Bangkok)
'GUIDE' №10 (71)	August 20th	<b>ADEX 2022</b> (06-08.09.2022, Azerbaijan, Baku)
'GUIDE' №11 (72)	September 10th	<b>Africa Aerospace and Defence 2022</b> (21-25.09.2022, South Africa, Pretoria)
'GUIDE' №12 (73)	October 18th	<b>SOFEX 2022</b> (31.10-03.11.2022, Jordan, Amman)
'GUIDE' №13 (74)	October 22th	<b>INDO DEFENCE 2022</b> (02-05.11.2022, Indonesia, Jakarta)
'GUIDE' №14 (75)	October 25th	<b>Airshow China 2022</b> (08-13.11.2022, Zhuhai, China)

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