

RUSSIAN AVIATION & MILITARY GUIDE

Special analytical export project of the United Industrial Publishing

№ 02 (63), March 2022

HISTORICAL MEETING

Vladimir Putin
and Narendra Modi



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Russian exposition
at DEFEXPO INDIA 2022



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High Technologies of Defense, Security and Cooperation



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EDITORIAL



High Technologies of Defense, Security and Cooperation

Famous and one of the biggest in the world military exhibition DEFEXPO INDIA 2022 presents in Gandhinagar Gujarat the best Russian weapons and innovations for India and global market, which are the undisputed world leaders on price and quality in their segments.

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

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.

Taking part in DEFEXPO INDIA 2022 Russia continues the policy of open partnership with the India and other countries. Russia has a wide product line that meets all the needs of India and Asia-Pacific region as a whole 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

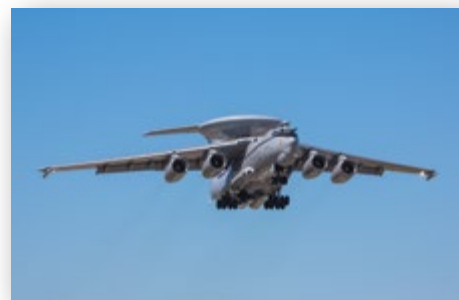
Specialists of the Vega Concern of Ruselectronics Holding and Beriev Aircraft Company (TANTK) of PJSC 'UAC' (both are part of the Rostec State Corporation) conducted the first flight of the A-100 long-range airborne early warning and control aircraft with the onboard radio equipment turned on. The tests 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 turboprop 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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AEXKS



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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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.

Ansar 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 Ansar helicopter and BAS-200, a helicopter-type unmanned aircraft.

A light multipurpose Ansar 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 Bespaliy, 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.

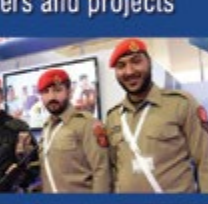


The 'smart' cargo parachute and the all-purpose parachute cargo harness were developed by the Polet Ivanovo Parachute Plant. 'At the moment, the product is undergoing flight development tests. It is planned that by the end of 2022 the prototype will be transferred for testing to the State Flight Test 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.

ANNUAL PHOTO ALMANAC FOR MILITARY-TECHNICAL COOPERATION



Achievements and prospects



RUSSIAN MILITARY TECHNICAL COOPERATION 2021 ANNUAL PHOTO REPORT

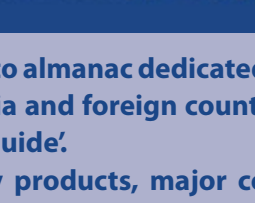
Main partners and projects



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.

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.



SU-57E

PERSPECTIVE

MULTIROLE FIGHTER

Multifunctional 5th generation aircraft system for execution of a wide range of combat tasks

Unique features of the 5th generation fighter provide covertness of combat operation due to low signature level in the radar field, ensure continued supersonic cruise flight, solve the whole range of fighter and strike tasks that are assigned on tactical aviation.

Su -57E Perspective multirole fighter is designed for execution of a wide range of combat tasks while operating against aerial, ground and surface targets day-and-night with the use of the up-to-date progressive guided and unguided weaponry.

The fighter is equipped with the most advanced avionics suite, armament and self-defense complexes. Advanced intelligent support of the fighter and high level of automation ensure effective piloting of the aircraft and execution of the whole range of combat tasks with one pilot.



Learn more about Su-57E fighter
e-mail: roe@roe.ru
www.roe.ru

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.



IL-78MK-90A. TANKER AIRCRAFT

Versatile platform – inflight and on the ground refuelling or transportation of cargoes

Simultaneous inflight refueling of one heavy or up to 2 tactical aircraft and up to 4 aircraft on the ground. Apart from its main mission it can be converted into a transport aircraft or for execution of other missions.

IL-78MK-90A tanker is intended for in-flight refueling of different types of aircraft by means of three aerial refueling pods and can perform fuel distribution on-ground. The aircraft may perform the take-off and landing from/on the paved and unpaved airfields.

In operation conditions during few hours the IL-78MK-90A can be converted and be employed as a transport aircraft for transportation and airdropping of vehicles, cargoes and paratroopers.

Main characteristics

Max takeoff weight, t	210
Transferable fuel inflight at a distance of 1000 km, t	78
Inflight refueling speed, km/h	450-600
Refueling pod transfer capacity inflight, l/min	up to 2.500
Maximum payload in transport version, t	60
Flight range (with 60 t payload), km	4.000
Number of transported troops / in a double deck version (in a transport variant):	145/225



Learn more about IL-78MK-90A aircraft
e-mail: roe@roe.ru
www.roe.ru



HISTORICAL MEETING

Vladimir Putin and Narendra Modi

Vladimir Putin's visit to India last December has already been called a historic milestone in the development of special friendly relations between Russia and India, two undoubtedly great countries. In addition, the two countries signed a package of documents before the Russian President's meeting with the Prime Minister of India. They include an intergovernmental agreement on technology protection due to cooperation in space research and the use of outer space for peaceful purposes, and on building and operating launch vehicles and ground-based space infrastructure; an intergovernmental agreement on the Military-Technical Cooperation Programme for 2021–2031; as well as a protocol amending the intergovernmental agreement on cooperation in manufacturing Kalashnikov series small arms of February 18, 2019. The expanded format meeting between the two delegations was followed by a face-to-face conversation over a working lunch. Following the summit, a Joint Statement Russia – India: Partnership for Peace, Progress and Prosperity was adopted.

The Indian army, the second largest army in the world, is switching to new Kalashnikov assault rifles, and the skies over India will now be protected by Russian S-400 systems. The first shipment of anti-aircraft missile systems to India coincides with Vladimir Putin's visit to New Delhi today, but defense cooperation is not the only element of Russian-Indian relations.

At his meeting with Prime Minister Modi they discussed the training of the second Indian cosmonaut in history, the construction of a nuclear power plant, cooperation in the manufacture of medicines and new

ships. All of this will help triple trade turnover in the coming years.

A foreign visit, a meeting of leaders is always an event, and given all the current covidial restrictions, an exceptional event. From the airport, the Russian president's Aurus heads straight to the heart of New Delhi – the government quarter.

Here we see Vladimir Putin's motorcade pulling up to the Hyderabad Palace. Prime Minister Narendra Modi is already waiting for him on the porch. This is the first meeting in two years.

The Indian prime minister is wearing a kurta, the traditional wool vest. The leaders greet each other and

walk out together to a specially prepared spot on the palace lawn so that the handshake can be captured by all from the best possible angle.

The focus of the leaders is to further develop a mutually beneficial partnership. The pandemic hit the trade turnover, but now instead of recession, the growth is 38%, and in the first 9 months the figure is almost 9 billion dollars. The goal is to bring the volume of trade to 30 billion in the near future.

The Central Bank of Russia and the Reserve Bank of India signed a cooperation agreement to fight cyber-attacks. Also, relevant agencies signed a number of agreements in

the sphere of education and memoranda of cooperation on intellectual property and on geological exploration and prospecting.

The documents signed included a roadmap for cooperation in science, technology and innovation; a programme of cultural exchanges for 2021–2024; a protocol on the organisation of culture festivals between the Russian Federation and the Republic of India in 2022–2023; as well as documents amending the intergovernmental agreement on merchant shipping of December 23, 1994, and concerning Russian oil supplies in 2022.

Vladimir Putin held talks with Prime Minister of India Narendra Modi in New Delhi. At the beginning of Russian-Indian talks Prime Minister of India Narendra Modi said: 'Your Excellency, my dear friend, President of the Russian Federation Vladimir Putin, I would like to welcome you to the annual bilateral summit in New Delhi. I would also like to welcome all members of the Russian Federation delegation.

I know that this is only your second visit abroad for almost two years. This shows your personal commitment to our relations. You are visiting India despite all the pandemic difficulties and this shows your love of India.

Despite the pandemic-related complications, the development of bilateral India-Russia relations has not slowed. We continue strengthening our specially privileged strategic partnership.

We have maintained close cooperation in countering COVID-19, be it during testing vaccine production, providing humanitarian aid or helping people return home in a difficult time.

Your Excellency, 2021 is an important year for bilateral relations for various reasons: this year we celebrate the 50th anniversary of the 1971 Treaty of Peace, Friendship and Cooperation between India and the Soviet Union and two decades of strategic partnership. This is why I am so pleased to meet you in this special year because you have stood behind our strategic partnership over the past 20 years.

Many fundamental changes have taken place in the world in the past few decades. Various geopolitical formations have come into being,

but one thing remained immune to change – the Russia-India friendship. Our countries not only cooperate with each other but also show special care for each other's sensitive issues. This is indeed a unique, trust-based model of interstate friendship.

Your Excellency, 2021 is important for our strategic partnership as well. The first meeting of foreign ministers and defence ministers in the '2+2' format took place today and thus launched one more mechanism to strengthen practical cooperation.

We have maintained regular contact on Afghanistan and on a number of other issues as well. The interregional side of our partnership, which goes back to the Eastern Economic Forum and our summit in Vladivostok, has become a specific part of cooperation between the Russian Far East and various Indian states.

In the economy, we have adopted a long-term vision to reinforce our relationship. Our goal is to increase mutual trade to US\$30 billion by 2025 and to increase mutual investment to US\$50 billion. To do so, we must issue the proper assignments to our respective business communities.

The various agreements that were concluded today will help us expand cooperation as well. Our defence cooperation is being strengthened through joint development and production efforts under the Made in India programme. Cooperation in space and civilian nuclear energy is expanding as well.

I would like to congratulate Russia on obtaining observer status in the



Non-Aligned Movement and dialogue partner status in the Indian Ocean Rim Association. We were delighted to support Russia's presence in these associations.

India and Russia have similar positions on many regional and global issues. We will have the opportunity to exchange views on these matters during today's meeting.

Your Excellency, Once again, welcome to India. I would also like to welcome all members of the Russian delegation. Despite your busy schedule, you made the time to visit us, and we appreciate this. I am sure that our discussions today will be very productive for our relations.'

President of Russia Vladimir Putin said: 'Prime Minister, my friend. It is an honour and a privilege for me to visit friendly India once again. We regularly hold summits at the highest level, in fact, they take place every year, with India and Russia taking turns in hosting them. Unfortunately, we had to skip last year due to the pandemic.





Still, it is our turn to come to India, and I thank you for your invitation.

Russia views India as a major power, whose people have been very friendly to us. Our relations proceed from a very positive foundation. They are developing and forward-looking.

In 2020, trade between our countries decreased by more than 17 percent, but in the first nine months of 2021 it grew by over 38 percent. There is no doubt that we have every opportunity to reach the trade volumes you have mentioned.

This also applies to investment, which currently stands at US\$38 billion and is more or less equally distributed between the two countries, with

Russia having a slightly larger share. That said, we have been working together in very important and promising areas, including energy, high technology, and space. I am certain that the programmes you have mentioned will be carried out, including the one to train an Indian cosmonaut.

We have been promoting military-technical cooperation like with no other partner of ours. Together, we develop and manufacture high-technology military products, including in India.

There is another essential item on our agenda, which is of interest for both India and Russia. I am referring to taking care of the environment. Our minds are set on this topic, the green agenda, as well as on the economy and ways of developing it. Of course, we are realistic in our efforts, seeking to fulfil the needs of our economies and improve the standard of living for our citizens on an ongoing basis.

We remain proactively involved on the international stage. Just as you have said, our positions coincide on many issues. Of course, terrorism and efforts to fight it are a matter of

grave concern, as are combatting drug trafficking and organised crime.

In this context, the developments in Afghanistan are of course a matter of serious concern for us. The foreign and defence ministers, who are present today, held their first meeting in such format, demonstrating our commitment to developing our relations in international and military affairs.

We hold joint exercises both in India and Russia. We are grateful for the attention you have given to this aspect of our cooperation and intend to keep moving in the same direction. Once again, thank you very much for your invitation.'



Partnership for Peace, Progress and Prosperity. India-Russia Joint Statement following the visit of the President of the Russian Federation (selected excerpts from the document)

1. At the invitation of Prime Minister of India Shri Narendra Modi, President of the Russian Federation H.E. Mr. Vladimir Putin paid working visit to New Delhi on 6 December 2021 for the 21st India-Russia Annual Summit.

2. The completion of 5 decades of the 1971 Treaty of Peace, Friendship and Cooperation and 2 decades of Declaration on Strategic Partnership is symbolic of the long standing and time-tested India-Russia relations characterized by mutual trust, respect for each other's core national interests and similarity of positions on various international and regional issues.

3. The Sides reaffirmed their commitment to the Special and Privileged Strategic Partnership between India and Russia. They underscored that as major powers with common responsibilities, this important relationship continues to be an anchor of global peace and stability.

4. The Sides positively assessed the multi-faceted India-Russia relations that span various areas of cooperation including political and strategic, economy, energy, military and security, science and technology, culture and humanitarian cooperation. They noted that while the traditional areas of cooperation are being further strengthened, new drivers of growth have led to diversification and expansion of bilateral cooperation.

5. The Leaders highly appreciated the sustained momentum in bilateral ties despite the negative impacts of the ongoing Covid-19 pandemic. They acknowledged that the Annual Summit could not be held in 2020 due to the Covid pandemic. The Sides noted with satisfaction the continued intensification of contacts at all levels including 6 telephonic conversations between the two leaders since the last Summit; visits of Foreign Minister,

Raksha Mantri, Minister of Petroleum and Natural Gas and Minister of Steel from Indian side; visit of Russian Foreign Minister and Secretary of Security Council to India; holding of Foreign Office Consultations, India-Russia Strategic Economic Dialogue, consultations on UN issues, Arctic, policy planning etc.

6. The Leaders welcomed the holding of back-to-back meetings of the India-Russia Inter-Governmental Commission on Military and Military-Technical Cooperation and the first 2+2 Dialogue of Foreign and Defence Ministers of India and Russia in New Delhi on 6 December 2021. They underscored the importance of regular annual 2+2 meetings for exchanging views on global and regional political-security developments.

7. The Leaders noted the ongoing interaction between the Parliaments of two countries and underlined the importance

of regular meetings of Inter-Parliamentary Commission as a valuable component of India-Russia relations.

8. The Leaders reiterated the importance of the security dialogue at the level of NSA and NSCS on bilateral and regional issues and welcomed regular interactions between them. This has served to enhance strategic understanding and coordination between the two countries.

Economy

13. The Sides appreciated the resumption of the positive trajectory of bilateral trade, with trade registering an increase of about 38% in the first half of 2021 compared to the same period in 2020 despite the pandemic-related restrictions. They positively assessed the overall increase of bilateral trade in 2019-20 compared to the previous year.

14. The Sides noted that the bilateral trade does not reflect the potential of strength and depth of India-Russia strategic partnership. The leaders stressed on the need for greater efforts to achieve the trade target of USD 30 billion by 2025. In this regard, they placed strong emphasis on new drivers of growth for long-term cooperation.

15. The Sides underscored the need for commencement of negotiations on Trade Agreement between India and The Eurasian Economic Union.

16. The leaders noted the relevance of continued engagement under the India-Russia Inter-Governmental Commission on Trade, Economic, Scientific, Technological and Cultural Cooperation (IRIGC-TEC) for bilateral economic cooperation in various priority areas. They acknowledged the holding of 12 Working Group and Sub-group meetings under the IRIGC-TEC and instructed the concerned officials to expeditiously conclude meetings of pending Working Groups. The sides also welcomed the setting up of the new Working Groups and Sub Groups on Transport, Urban Development and Railways and looked forward to the early holding of their inaugural meetings.

Military and Military-Technical Cooperation

50. Russian side appreciated the participation of Indian Defence Minister Rajnath Singh along with a Tri-Service contingent of the Indian armed forces in the Victory Day Parade at Red Square in Moscow to commemorate the 75th Anniversary of Victory

of the Soviet People in the great Patriotic War of 1941-1945.

51. Military and military-technical cooperation has traditionally been the pillar of Special and Privileged Strategic Partnership between India and Russia. Responding to India's quest for self-sufficiency, the partnership is reorienting presently to joint research and development, co-development and joint production of advanced defence technology and systems.

52. The Sides expressed satisfaction with regular military contacts and joint exercises of the Armed Forces of the two countries which reached unprecedented heights this year with three exercises being held within a span of 60 days besides simultaneous participation of large Indian contingents in the International Army Games. The Russian side deeply appreciated participation of INS Tabar in the 325th Russian Navy Day celebrations. The Sides agreed to continue and expand regular defence dialogue, mutual training and exercises, subject matter expert exchanges and other activities under the aegis of India-Russia Intergovernmental Commission on Military and Military Technical Cooperation.

53. Both sides noted with satisfaction the successful implementation of the 2011-2020 Long-Term Program for Military and Technical Cooperation and welcomed the signing of a new long-term plan for the period 2021-2031.

54. The Sides reiterated their commitment to upgrade the defence cooperation, including facilitating joint development and production of military equipment, components and spare parts, enhancing the after-sales service system, progress towards mutual recognition of quality control and regular joint exercises of the Armed Forces of the two countries. The two leaders agreed that for peace, stability and mutual economic development, there is a need for the two countries to work closely together in the advanced and emerging fields of defence technology and for the Armed Forces of the two countries to work together in niche domains of military capabilities.

55. Both Sides agreed to take forward ongoing engagements to encourage joint manufacturing in India of spare parts, components, aggregates and other products for maintenance of Russian origin Arms and defence equipment under Make-in-India program through transfer of technology and setting up of joint ventures for meeting the needs of the Indian Armed Forces

as well as subsequent export to mutually friendly third countries.

56. The Sides recognized the requirement of an institutional arrangement for reciprocal provision of logistic support and services for the Armed Forces.

Science and Technology

57. Emphasizing the importance of joint research in science, technology and innovation, the two Sides welcome the signing of Roadmap for Science, Technology & Innovation Cooperation and expressed satisfaction with respect to launching joint calls in priority areas as states in the Roadmap.

58. The Sides expressed satisfaction on launching of India-Russia Technology Assessment and Accelerated Commercialization Program by the Department of Science & Technology, Govt. of India and Russian Foundation for Assistance to Small Industrial Enterprises (FASIE), which provides opportunities to Start-ups and SMES of the two countries to address societal challenges through innovative technologies.

59. The Sides also agreed to facilitate collaboration between government and private sector organizations to find ways of joint development of software products, platforms and services as well as in the area of electronics manufacturing. The Sides confirmed their interest in further developing cooperation in the sphere of digital technologies, including those related to information protection, security of critical infrastructure and law enforcement.

60. The Sides noted the promotion of youth exchanges by bringing together co-innovation programs at School level with the Support of Atal Innovation Mission, Niti Aayog and Talent & Success Fund (SIRIUS Centre, Sochi), Russia. These programs engaged students on both sides to generate hands-on technological solutions for societal problems such as Distance Literacy in remote areas; Rural Health & Well-being and Digital asset monitoring etc.

61. The Indian side congratulated the Russian side for its ongoing successful chairmanship of the Arctic Council from 2021-23 and expressed its readiness to play an active role as an Observer in the Arctic Council. Both sides recalled the bilateral consultations on the Arctic held last year. The Indian side also expressed its interest in collaborating with Russia on the Northern Sea Route.

/RA&MG/

ROSOBORONEXPORT PRESENTS RUSSIAN EXPOSITION AT DEFEXPO INDIA 2022



12th edition of DEFEXPO INDIA-2022 Exhibition on Land, Naval and Homeland Security is opening its doors to specialists from all over the world. The exhibition will be held from 10th to 13th March in Gandhinagar, Gujarat. Rosoboronexport, part of Rostec Corporation, is an active and loyal participant of the event and this year we are happy to come to India once again. Rosoboronexport organizes a joint Russian pavilion of a dozen booths bringing numerous Russian companies – producers of military materiel and services providers – under one umbrella in Hall 11.

And since the exhibition is equally dedicated to land, naval systems as well as security issues Rosoboronexport is offering cutting-edge solutions in all spheres, most of which can be fully integrated or blended into the 'Make in India' program.

The Russian exposition is wide and diverse. It includes tanks, armoured vehicles, artillery, air defence systems, electronic warfare complexes and modern ships.

The centerpiece of Uralvagonzavod display, part of Rostec Corporation, is the most advanced **T-14 Armata** main battle tank. The T-14 tank is

one of a kind by composition and technical solutions. It is equipped with a powerful 125 mm smooth-bore cannon-cum-missile launcher, two machine guns, one harboured in a remote-controlled weapon station and an automated digital fire control system. The protection has a multi-dimensional design with guidance jamming, active protection and modern ERA systems. The crew is safely accommodated in a well-protected compartment inside the hull.

Another tracked vehicle is the **Sprut-SDM1** light amphibious tank. In terms of specifications and capabilities no other vehicle comes close. The Sprut-SDM1 is the most light-

weight tank on the market, but is armed on a par with main battle tanks with a 125 mm cannon that is also used to launch missiles thus providing the light tank with an advantage over other heavy armour in terms of engagement range. Mobility characteristics of the Sprut-SDM1 are truly unique: it moves over all types of terrains no matter how boggy, sandy or unstable they are, it performs well in hot deserts, humid jungles and high mountains; the tank negotiates any bodies of water afloat using two waterjets which ensure both forward and rearward movement of the tank. Moreover, in the water the Sprut-SDM1 retains the ability to reconnoiter and engage targets at Sea State 3. Certain design and technological solutions provide the light tank with a unique capability to be transported by aircraft and air-dropped into the theater of operation.

The **Boomerang** Unified Combat Platform is an 8x8 amphibious armoured chassis. All the modern market trends and demands were taken into consideration during the development process. It has a new composition with the ramp door for the troops. APCs and IFVs are designed on this platform. The protection system of the vehicle is based on a multilayer principle and can be adjusted. The weapon systems allow engagement of a long list of targets in any environment. The operational characteristics, firepower, maneuver-

ability, protection, C2 capabilities and overall performance of the new Russian-made vehicle are up to present day and perspective combat and operational requirements.

Different families of armoured vehicles are presented at the booth of Rosoboronexport including models of TIGR armoured vehicles, Typhoon-K MRAP and Tornado K-53958 armoured multi-purpose chassis.

Rosoboronexport jointly with Russian industry is ready to cooperate also in the sphere of multiple launch rocket systems of different calibers.

The **9K515 MLRS** is a further development of the battle-proven 300 mm Smerch system. It is designed to engage motorized infantry, tank and artillery units, including those with high-precision weapon systems. Modern Automated Laying and Fire Control System ensures engagement readiness time of 30 seconds upon target data input and pin-point accuracy. The Guided MLRS rockets with mighty warheads and submunitions defeat targets at distances of up to 120 km.

Other calibers include 122 mm **Tornado-G** MLRS which embodies an upgrade of a well-known Grad system and 220 mm TOS-1A heavy flamethrower system.

The Tornado-G MLRS features an upgraded automated laying and fire control system with a navigation system that automatically calculates firing data, lays the tube pack and automatically inputs data into the fuzes of the rocket projectiles making the system quicker, more efficient, easier and safer to operate.





range and 15 km altitude which together with its ability to engage 4 targets simultaneously gives it a competitive edge of the rivals.

The **Vityaz** air defence missile system is a unique medium-range ADMS able to destruct all types of aerodynamic targets and ballistic missiles. The undeniable strength of the system is its ability to simultaneously engage targets approaching from different directions and at the entire altitude range. The Vityaz ADMS incorporates two types of surface-to-air missiles with the maximum engagement range provided – 120 km, and altitude – 25 km. One system can engage up to 16 targets at one time.

Electronic warfare remains an important and difficult topic nowadays. At the booth of Rosoboronexport you will be able to get insight on the newest developments in electronic warfare including Krasukha EW system, Repellent and Repellent-Patrol system for countering small-size UAVs.

The **Krasukha** mobile electronic warfare system is intended to protect military and state infrastructure against aerial reconnaissance and air strikes by jamming airborne side-looking radars, weapon-control radars, navigational radars as well as flight support terrain-following radars. The system is produced by KRET holding company within the state-owned Rostec Corporation.

The **Repellent** EW system is designed for signal intelligence of UAVs and suppression of their control and navigation systems. The system is capable of jamming command signals and telemetry channels at dis-

The **TOS-1A** is a powerful system that operates in immediate contact with the adversary on the frontline. The full salvo of 220 mm thermobaric rockets covers the area of 40,000 m² and it is extremely efficient against bunkers and fortifications, as after the detonation the thermobaric mixture penetrates any crevasse, cave or hole providing indisputable advantage especially in mountainous areas.

Air Defence sector is widely presented in the Russian pavilion, organized under the auspices of Rostec Corporation. Among these solutions are:

The **Pantsir-S1** air defence gun and missile system that is designed for destruction of aircraft, rotorcraft, cruise missiles, high-precision weapons, and other aerial targets. Main distinguishing features of the system are its construction that includes guns and missile launchers on one combat vehicle, target acquisition and engagement capability on the move, large ammunition allowance of missiles and 30 mm rounds. The Pantsir-S1 ADGMS boasts a large engagement envelope of 20 km



tances within line-of-sight (depending on the altitude of the drone). The suppression range of the navigation channel is at least 30 km.

Another system that effectively counters small-size unmanned aerial vehicles is the **Repellent-Patrol** complex. It is used to protect infrastructure facilities and convoys from drones, detecting and suppressing communication and navigation channels of the UAV. The Repellent-Patrol operates in sector and circular modes ensuring suppression range of aircraft-type UAVs in the sector mode of up to 20 km and suppression range of quadcopters of up to 4 km in the circular mode.

DEFEXPO INDIA-2022 is not only about ground-based systems but also about naval and security solutions as well. Rosoboronexport is bringing a large portfolio of marine and naval systems that we can offer to our partners in India.

The **Alexandrit-E Project 12701** minesweeper is produced by the United Shipbuilding Corporation, the largest shipbuilding corporation in Russia which is also present in the Russian pavilion at the exhibition. The Alexandrit-E minesweeper is capable of providing effective countermine reconnaissance, protection of naval bases, exclusive economic zones, ships and vessels on routes, but it also ensures highly accurate search and destruction of minefields.

Moreover, at the booth of Rosoboronexport specialists can find models of the Rubezh-ME and Bastion coastal missile systems.

The latter is designed to engage surface targets from the tactical depth using supersonic missiles.

The **Bastion** system armed with Yakhont missiles can overcome air defence of nearly every ship especially when launched in salvo. Thanks to the long range of fire and high velocity of the Yakhont missiles, the Bastion is capable of delivering sudden strikes against distant sea-surface targets. Flexible program-controlled flight path allows missiles to overcome air defence system and approach targets from unexpected directions.

The **Rubezh-ME** coastal missile system is designed to detect and engage sea-surface targets at littoral areas. The main advantage of the system is integration of target designation and combat systems into one platform, so that just one vehicle can effectively engage ships up to corvette class with up to 4 missiles reaching a target from different directions.

Additionally, Rosoboronexport is displaying other materiel at the booth including long-range high-precision rifles of LOBAEV ARMS and ORSIS brands as well as thermal rifle scopes designed and produced by Infratech, namely Titan and Deimos ones. These scopes are very weather-resistant, can operate in the harshest weather conditions, any time of day, any season.

DEFEXPO INDIA-2022 is a great venue for companies and state agencies to establish new and widen existing partnerships, share knowledge and experience. Rosoboronexport invites all specialists attending the exhibition to the Russian pavilion to enjoy the variety of arms, technologies, weapon systems, gear and equipment we offer.

/RA&MG/



NIMI AT DEFEXPO INDIA 2022

At 12th edition of DefExpo-2022, on Land, Naval & Homeland Security Systems Exhibition at Gandhinagar, India, JSC NIMI named after V.V. Bahirev (Technodinamika subsidiary of Rostec Corporation managed by Tecmash Concern) is presenting a broad range of ammunition for tank, field and naval artillery.

Mechanical Engineering Research Institute (NIMI) is a leading developer and manufacturer of field, tank, anti-tank and naval artillery rounds, as well as an ammunition supplier to the Armed Forces of the Russian Federation and for export.

Started in 1932, this year NIMI celebrates its 90th anniversary. Over the 90 years of existence, the engineers of the Institute have developed and put into service for the Army and Navy more than 1000 types of ammunition.

Two new tank rounds with armour-piercing projectiles occupy a special place in the exposition at DefExpo 2022: the 125-mm 3VBM23 Svinets-2 round and the Mango-M, an experimental model of upgrade

3VBM17 round. As compared to the 3VBM17 round, two new products feature 30% higher armour penetration performance, which allows for engaging all types of foreign armour and military equipment from more than 2 km away.

It is no coincidence that India became the demonstration venue for the Mango-M. India is traditionally one of the main and largest partners of Russian defence products, especially armour-piercing tank rounds.

For example, India is known to produce Russian T-90 tanks under license; there are already more than a thousand units in service. Moreover, the Indian version of the tank is equipped with an automated loader designed for regular ammunition. Therefore, a very important task was to develop a round that

would have superior characteristics, but would be suitable for vehicles used in India.

In addition to the upgraded Mango round, NIMI also demonstrates the Svinets-2 round. This is a 125 mm 3VBM23 round commissioned by the Ministry of Defence of the Russian Federation. In 2018, the Institute received the right to export it and demonstrated it for the first time during the Army-2019 forum in Russia.

This is a new generation of tank rounds with an armour-piercing sub-calibre projectile, its characteristics significantly exceeding those of both the regular Mango and its modernised version.

Therefore, in this situation, we can say that, firstly, NIMI constantly improve their ammunition, inventing complex technical solutions in non-standard situations; and secondly, company do not focus only on its tasks, but also try to create ammunition, that are suitable for any requirements of their partners.

Says Director General Nikolay Semenenko: 'India historically demonstrates an interest in our products, not least because the country's army operates a significant number of Russian-made combat systems. With military equipment becoming increasingly sophisticated and its protective characteristics increasing, upgrading and improving the ammunition is a critical objective. We offer our foreign clients both ready-to-operate products meeting their demands and production localization options. We are also prepared to extend the service life of previously supplied systems by way of assessing their condition and carrying out repairs as required.'

NIMI and the Ministry of Defense of India have long and interesting path of cooperation. One of the largest Russian projects in the field of military-technical cooperation with India was the creation of the production of Russian 125-mm tank rounds 3VBM17 'Mango' on Indian land. The project is extremely successful and continues to evolve, allowing us to learn and share experiences over the years with our esteemed Indian colleagues.



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The Indian Government held a course for development of its own industry. Russia, as an old partner and friend, is trying to provide all possible support at all levels. The 'Mango' project is the first and very important project in our cooperation history. We are confident that it will grow and continue, and our cooperation will only become stronger.

In addition, we would like to send our greetings to India for 75th

Independence Day, which is held on 2022. We are happy to compliment India on this great holiday and happy to be involved in it, because India is not only our constant partner, but also a reliable friend. Participating such large-scale joint projects that serve for the sake of safety and world peace, we are proud to be part of this great holiday and are glad that we manage to leave our small mark in the history of a great country.' /RA&MG/





ALMAZ – ANTEY TO PRESENT A NUMBER OF NOVELTIES AT DEFEXPO INDIA 2022

Almaz – Antey will be taking part in Defexpo India 2022, the 12th international of India's flagship defence exhibition in Gandhinagar, Gujarat on 10-13 March 2022. The Corporation's participation is aimed at bolstering its image as a reliable supplier of exclusive defence products.



The company will be demonstrating its research, development and production potential related to designing, manufacturing, servicing, life extension, modernisation and disposal of products. The Corporation's umbrella exposition will feature products of its five subsidiaries: NPO Almaz, Izhevsk Electromechanical Plant Kupol, All-Russian Research Institute of Radio Engineering, NPO Novator and RATEP.

At Defexpo India 2022, Almaz – Antey will be displaying mockups of S-400 Triumf and S-350E Vityaz SAM systems. The short-range category will be represented by mockup combat vehicles of the Tor-M2E and Tor-M2K SAM systems, as well as by mockup autonomous combat modules of the Tor-M2KM SAM system. Corporation specialists will present

information about the programme to upgrade the OSA-AKM SAM system to OSA-AKM1 standard.

The S-350E Vityaz will be making its debut in India. The system is intended for defending administrative, industrial and military facilities against mass attacks by various types of contemporary and future aerial threats, including simultaneous attacks from different directions and at extremely low to high altitudes. The S-350E Vityaz may operate autonomously or as part of the customer's defence system.

Also for the first time in India, Almaz – Antey will be showcasing a mockup of the Podlyot-E automated 3D low-altitude radar, which is used by air-defence and air force units for detecting, locating, tracking, identifying friend-or-foe and calculating the flight parameters of aerial targets and advanced low-altitude aerial threats, including low-observable targets, under intensive active, passive and combined jamming and suppressive fire.

'One of the radar's key advantages is its mobility. It can be quickly moved to the location where it is needed the most. The Podlyot-E demonstrates consistently high effectiveness in detecting both hypersonic missiles and low-flying UAVs,' said Vyacheslav Dzirkaln, Almaz – Antey deputy general director for foreign economic activity.

Defexpo India 2022 will also be offered exhaustive information about the Resurs and Rif-M naval radars, the Komar air-defence turret, and mis-

siles used in conjunction with the Kalibr integrated missile system.

Apart from the Podlyot-E, Almaz – Antey will also provide information about the Gamma-DE, Kasta-2E2, Furke-E and Istra-E radars.

Also exhibited at the Corporation's stand will be a mockup of the Adjutant universal target system and a turbojet unmanned vehicle as one of its elements.

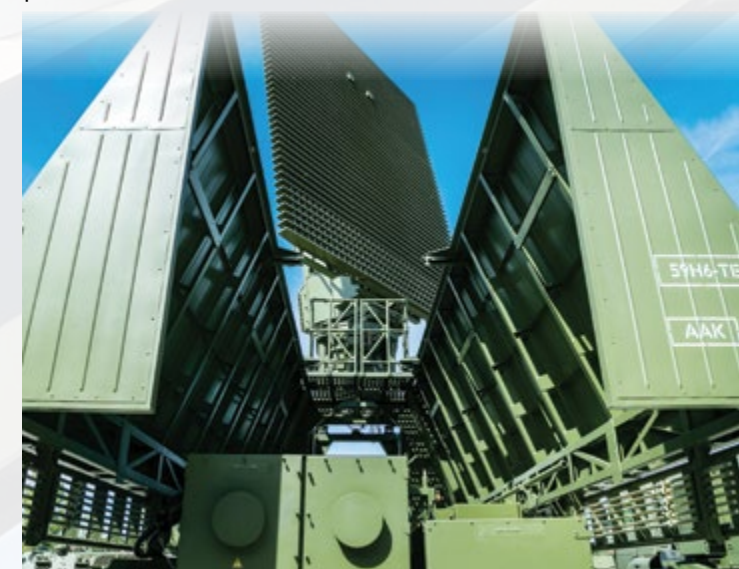
'India is a big country, a powerful state with one of the world's strongest armies,' Dzirkaln noted. 'We see the Indian Armed Forces' need for continuous training of SAM system crews. In our opinion, the Adjutant is the best available solution for these purposes.'

He continued: 'Almaz – Antey has repeatedly demonstrated that it is

a constantly evolving innovative integrated structure of the Russian defence industry, whose scientific, technological and production capacities allow for developing and manufacturing highly effective air- and missile-defence systems that meet the highest advanced requirements and for producing civilian produce to world standards.'

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/



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/





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.



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

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

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

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

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

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

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

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

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

case of emergencies than traditional evacuation methods are impossible.

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

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

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

absorbing systems entered into force in 2013.

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

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

New SPARS® escape solution provides the following advantages:

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

The SPARS® General Specifications

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

Actual Landing Impact Loads:

Acceleration directions:

'chest-to-back' – up to 8÷10 g

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

Acceleration Exposition Time – less than 0.5 s

Acceleration Growth Velocity – less than 500 1/s

User's age – 18÷70 years

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

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





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

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

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



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

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

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

essary intellectually property rights protected.

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

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

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

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

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

For a strategic industrial Partner sought who would be interested to

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

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

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

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

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

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

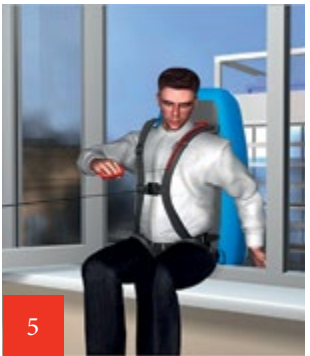
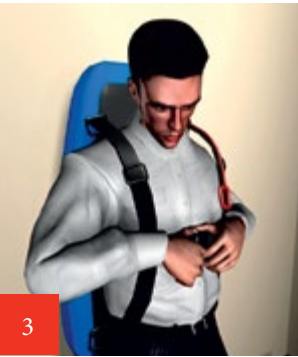
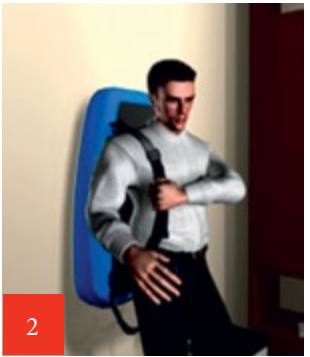


There are following innovations in the proposed SPARS® technology:

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.

Egypt 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.

Dubai 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 were 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 Ansat, 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 Ansat 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 Ansat 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/

RUSSIA-INDIA MILITARY COOPERATION THROUGH THE LENSES OF THE INDIAN MEDIA

DefExpo India traditionally becomes a major ground for demonstrating Russia's military industry's latest developments in different domains. For Moscow and Delhi it is a perfect ground for discussion of the ongoing and future programs. Russia is the major defense partner of India with large-scale military projects (unequalled by other countries) unleashed by Moscow and Delhi in the past years.

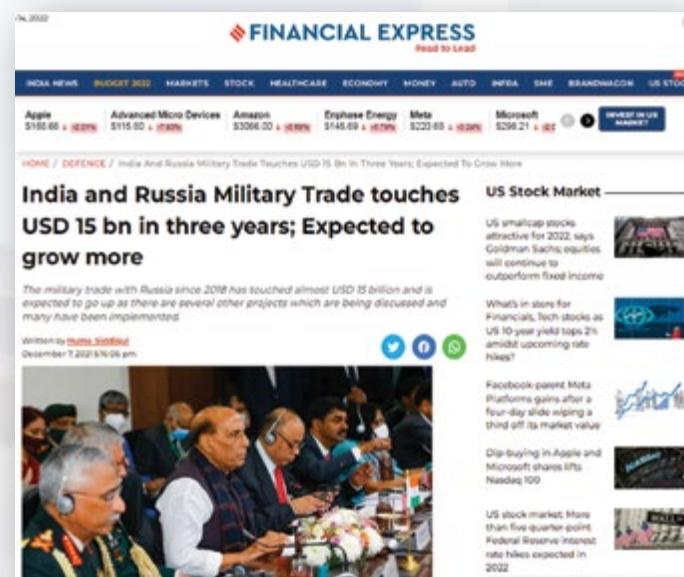
Rosoboronexport's Director General Alexander Mikheev: 'Russia and India have been maintaining and building up mutually beneficial strategic partnership. Military and technical cooperation between our countries is expanding every year. It is very important for us to have such a strong and reliable partner on the global stage as India. Rosoboronexport is ready to cooperate with India in all areas'.

The prospects and developments in Russia-India military cooperation are being constantly assessed and analyzed by both mainstream and specialized military media and expert community of India. Here is an overview of the latest coverage.

Delhi summit

The 21st India and Russia annual summit on 6th December 2021 and Russian President Vladimir Putin's visit to Delhi was in the focus of the Indian media, with both mainstream and professional military editions covering the issue in details.

The **Financial Express's Huma Siddiqui** delivered a large bilateral military cooperation analysis in the article *India and Russia Military Trade touches USD 15 bn in three years; Expected to grow more*.



'At the end of the 21st India and Russia annual summit on Monday, both sides inked more than two dozen agreements and MoUs covering a wide range of sectors including extension of 10-year defense cooperation pact. Four defence related agreements



and protocols were inked at the end of bilateral talks between Defence Minister Rajnath Singh and his counterpart from Russia. The military trade with Russia since 2018 has touched almost USD 15 billion and is expected to go up as there are several other projects which are being discussed and many have been implemented', – wrote the **Financial Express**.

Briefing the media at the end of the summit, Foreign Secretary Harsh Vardhan Shringla said 'The agreements and MoUs show the multi-faceted nature of our bilateral partnership and cover a wide range of areas like energy, science and technology, education, intellectual property and trade.' At the end of talks, a joint-statement issued indicated that the two leaders – Vladimir Putin and Narendra Modi – agreed to upgrade the defence cooperation, stressed the **Financial Express**. Both countries agreed to facilitate joint development and production of military equipment, enhancing the after sales service, recognition of quality control, components and spare parts, and regular joint exercises of the Armed Forces.

'Compared to the US, Russia remains the number one arms supplier to India. According to a report from the Stockholm International Peace Research Institute (SIPRI), 23 percent of Russia's arms exports between 2016-2020 were to India', – wrote the **Financial Express**.

The newspaper quoted Rosoboronexport's Director General Alexander Mikheev who named the five largest deliveries since 2000: Smerch multiple rocket launchers; Mi-17V-5 helicopters;

Project 11356 frigates; supply and licensed production of T-90S tanks, and aircraft carrier INS Vikramaditya.

In the defence field, India and Russia are conducting joint research work on more than 100 promising topics, added the **Financial Express**.

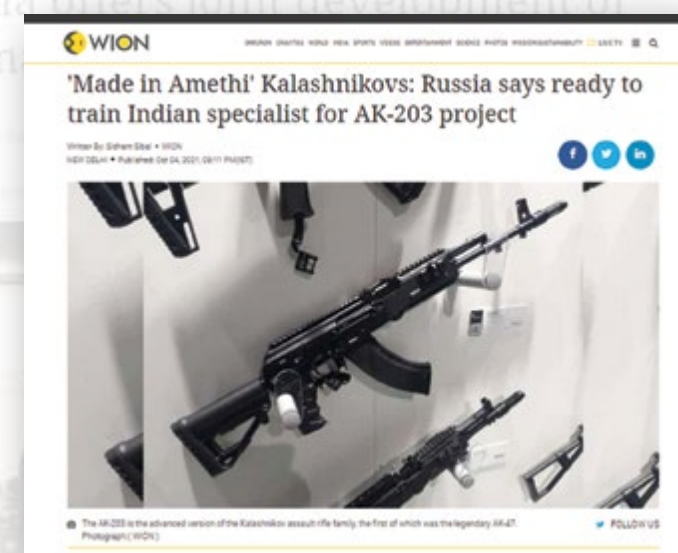
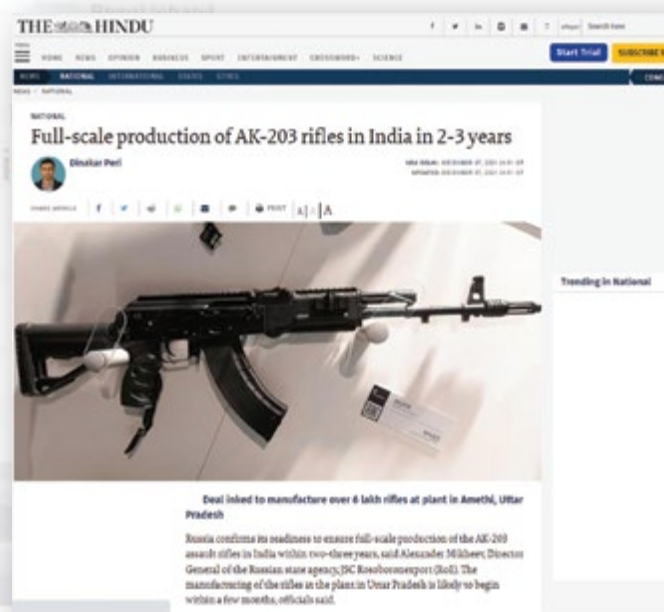
Defenseworld.net published the large overview of the Russia-India projects, including the detailed presentation of the Sprut-SDM1 light tank project.

'Rosoboronexport, with the Sprut-SDM1 light amphibious tank, will definitely take part in the Indian tender for the supply of light tanks and will even offer the transfer of technology and, quite possibly, the localization of production of some units and components. The Sprut-SDM1 light amphibious tank is the only light amphibious combat vehicle in its class that has firepower of a main battle tank and is equipped with a 125 mm cannon. All the ammunition produced in India for use with T-72M1 and T-90-S tanks can be used for the Sprut -SDM1, which is unrivaled throughout the world. It can overcome water obstacles and at the same time fire the main armament, disembark from a ship, operate day and night on terrain that is impassable for other similar vehicles – high in the mountains in a rarefied air environment, at very high and low temperatures. This tank is of great interest to the countries with difficult geographical conditions (water barriers, swamps and mountains). The vehicle is equipped with a guided missile system designed to defeat armored targets, including those equipped with ERA, at ranges up to 5 km', – quoted the **Defenseworld.net** Alexander Mikheev.

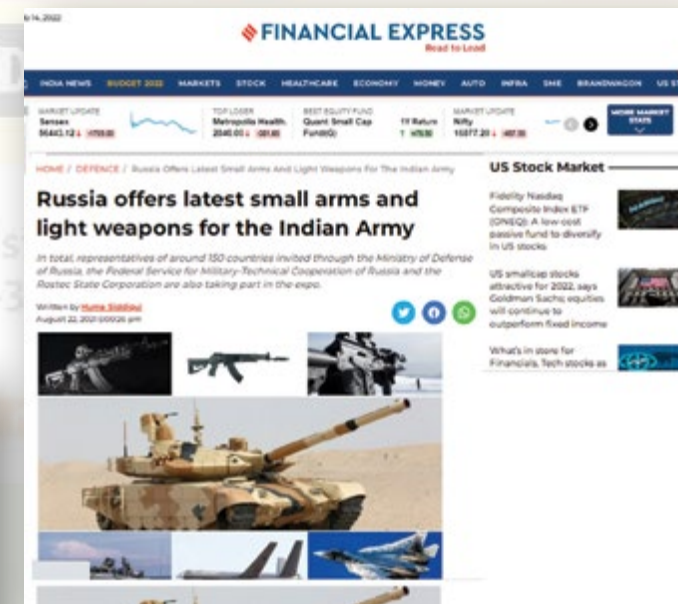
Kalashnikov rifles for India

The long-awaited deal to organize the licensed manufacturing of AK203 assault rifles in India was signed on the day of the Russia-India summit in Delhi. **Hindu's Dinakar Peri** dedicated to the contract *the article Full-scale production of AK-203 rifles in India in 2-3 years*. He quoted the Kalashnikov spokesperson Maria Vorobyeva saying, that the company was ready to start producing the AK-203 assault rifles in India in the upcoming months.

The **Hindu** underlined, that since 2019, Russian and Indian specialists have completed a huge amount of preparatory work to optimize the price and tech parameters of the contract.



'The project was announced by Indian PM Modi and the Russian President in 2019 and aims to produce huge numbers of these rifles that will ultimately become part of the Indian security forces' essentials. The joint program also opens the possibility of rifles being exported to other countries. The AK-203 is the advanced version of the Kalashnikov assault rifle family, the first of which was the legendary AK-47. The AK-203 can be equipped with accessories like sights and flashlights and has been successfully tested under extreme heat and cold conditions', – reported **WION's Sidhant Sibal** in the article *Made in Amethi' Kalashnikovs: Russia says ready to train Indian specialist for AK-203 project*.



India and Russia in 2019 signed an intergovernmental agreement for setting up Indo-Russian Rifles Private Limited – a joint venture to manufacture the AK-203 assault rifles. The project will see a production of Russia's iconic assault rifles being produced in India with 100% localization.

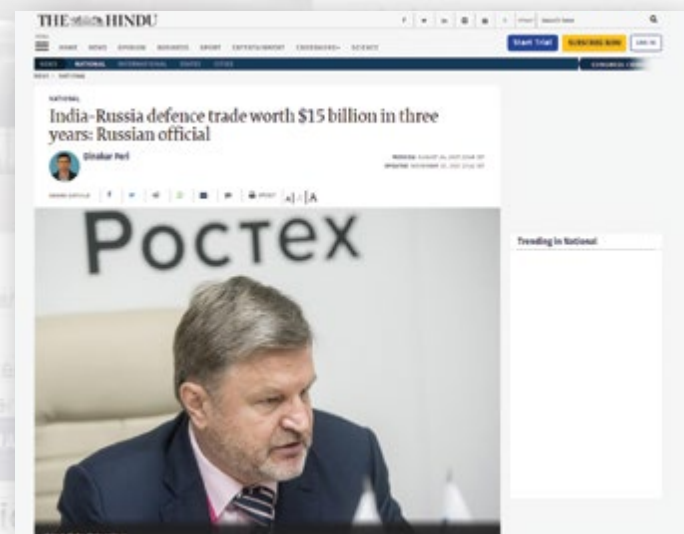
WION added, that AK-200 series assault rifles were showcased at the Army-2021 International Military-Technical Forum in Russia earlier this year, and aroused great interest among potential customers from different regions of the world with Rosoboronexport already having signed contracts for the supply of the latest AK-200 series assault rifles.

The **Financial Express** elaborated on the general prospects of the Russian-Indian potential cooperation in the field of small arms.

'Ahead of the inauguration of the Army 2021 Expo in Moscow on Sunday, Rosoboronexport JSC expressed its readiness to offer to India the whole range of small arms and light weapons, including assault rifles, machine guns, sniper rifles, submachine guns, pistols, grenade launchers etc... All what is being offered to India have been tested and are known for their reliability, and lots of these weapons have proven their effectiveness in real combat use. Russia has also developed technical means to train small arms use, which can be integrated into a joint virtual environment to conduct full-scale training sessions', – wrote the **Financial Express**.

ARMY-2021

The Army-2021 International Military and Technical Forum expo in Russia also found significant coverage in the Indian media. **NDTV** described the Indian national pavilion at the forum. It reported, that the India Pavilion at the Army forum was inaugurated by Secretary (Defence Production) Raj Kumar and Indian Ambassador DB Venkatesh Varma.



The **Aviation Defense Universe** listed the Indian military products exhibited at the ARMY show.

'The cutting edge designs and developments from DRDO are translated into state of the art products and systems through a large industry base consisting of various public and private industries, in line with the vision of 'Aatmanirbhar Bharat'. With defence systems developed in India finding success in export market, ARMY-2021 will reinforce the strength and marketability of these products in the global arena', – stressed the **Aviation Defense Universe**.

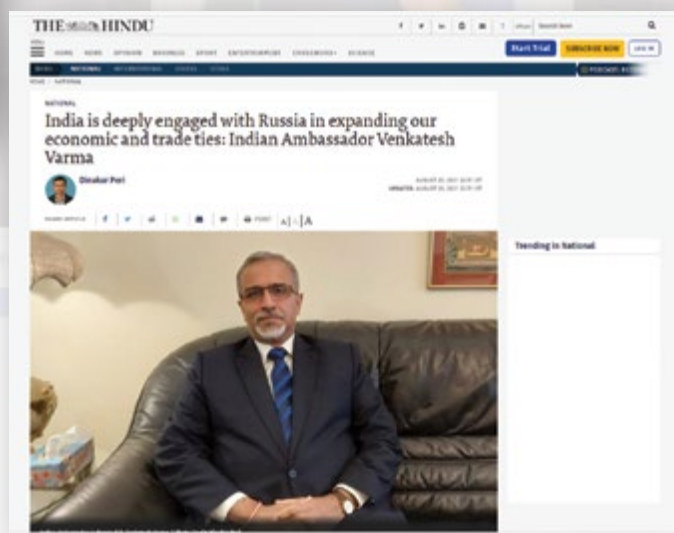
The **Hindu** published an interview with Head of International Cooperation and Regional Policy of Rostec state corporation Victor Kladoy.

'Russia had been undertaking joint projects and technology transfer much before India announced the Make in India initiative, Mr. Kladoy said, while acknowledging that competition was getting 'very much stronger' in the last few years from countries like the U.S., France and Israel among others. So Russia had taken several measures like improving quality of equipment, setting up joint ventures (JV), undertaking technology transfer, and spares and support among others, he stated', wrote the **Hindu**.



The newspaper also published a large interview with Indian Ambassador to Russia Venkatesh Varma.

'We are pleased that Russia is responding positively to our suggestion that key servicing facilities, such as servicing of Russian-origin engines, aircraft, and other equipment be established in India. We are also implementing the Inter-Governmental Agreement signed in 2019 for creating joint ventures for the manufacture of spare parts of Russian-origin equipment in India for our Armed Forces. Some RFPs have been issued and we intend to take these forward. We have also invited our Russian partners to partake of the opportunities in the two defence corridors – in Uttar Pradesh and Tamil Nadu... With regard to ongoing projects, we are getting additional T-90s for the Army; additional top-up numbers of the Sukhoi-30 MKIs and the MiG-29s for our Air Force. Ongoing cooperation in other areas including high technology areas of long term strategic importance is continuing; not only continuing, it is deepening', – said the Ambassador.



Zee News covered the ARMY-2021 in details. One of the stories was dedicated to the brand-new Kalashnikov S-8L missile with HEF warhead.

'The advanced 80-mm S-8L guided missile with HEF warhead is designed to engage single and group ground targets, both stationary and moving. The S-8L is launched from the helicopters and aircrafts using the B8V20 or B8M1 rocket launchers. The firing range of

the rocket is up to 6 km. It can effectively engage lightly-armoured targets. At the ARMY-2021 forum, the rocket will be demonstrated integrated with a helicopter-type UAV. Moreover, the Kalashnikov Group and the cooperation companies are currently seeking opportunities to apply the air-launched guided missile Vikhr-1 using various types of carriers', – reported **Zee News**.

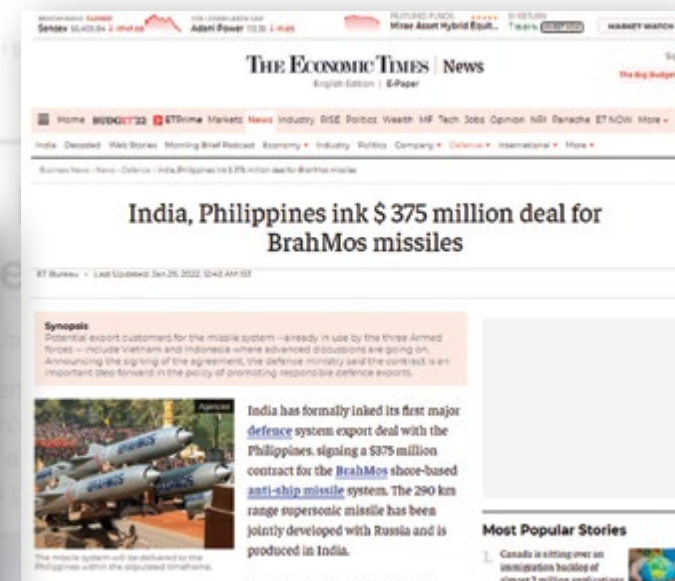
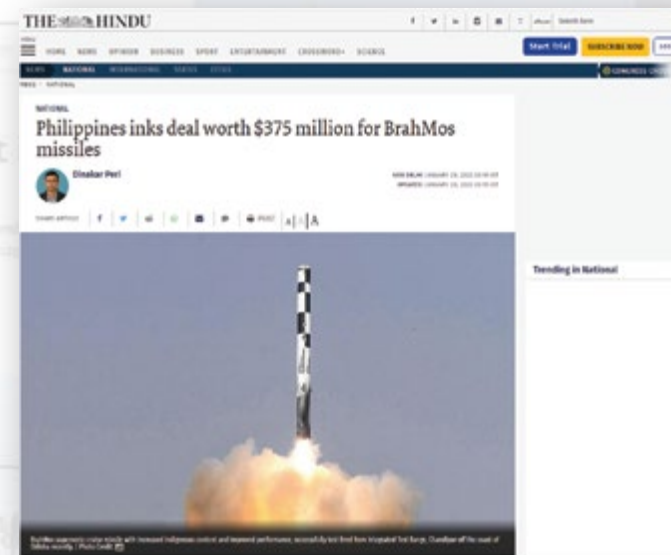


Milestone for BrahMos project

The first foreign contract for the Russian-Indian BrahMos supersonic cruise missile expectedly made significant news for the Indian media. Philippines signed a deal with BrahMos Aerospace Private Ltd for the supply of shore-based anti-ship variant of the BrahMos missile.

'Terming the contract 'history in the making', Indian Ambassador in Philippines Shambhu Kumaran, who physically represented the Indian side at the event, said on social media that they were today one step closer to elevating ties between the two democracies 'to a strategic partnership and our shared objective of a free and peaceful Indo-Pacific. 'It is also a moment of deep pride as India establishes itself as a source of high-technology equipment and a trusted partner towards capability development of friendly nations', Mr. Kumaran said on Twitter', – reported the **Hindu** newspaper.

Several countries have shown interest in acquiring the BrahMos missile, added the **Hindu**.



'The 290 km range supersonic missile has been jointly developed with Russia and is produced in India... Announcing the signing of the agreement, the defence ministry said the contract is an important step forward in the policy of promoting responsible defence exports', – reported the **Economic Times**.

Reacting to BrahMos's export order, DRDO chairman G Satheesh Reddy said, quoted by the **Business Standard**: 'Surface to air missile Akash, Astra, anti-tank missiles, radars, torpedoes gain the interest of various countries. More systems are being developed which have export potential'.



BrahMos is a joint venture between DRDO (Defence Research and Development Organisation) and Russia's NPO Mashinostroyeniya (forms part of the Tactical Missile Corporation) and the missile derives its name from the Brahmaputra and Moskva rivers. It is capable of being launched from land, sea, sub-sea and air against surface and sea-based targets and has for long been inducted by the Indian armed forces.

'With regard to Russian engagement with the 'Make in India' program, let us first recall that Brahmos program is the first example of a 'Make in India' program that has produced a product that is of the highest global standards. Our services have acquired a Brahmos variant; we are also actively looking at exports to third countries', – said Venkatesh Varma in his **Hindu** interview.

/RA&MG/

ISSUE	DEADLINE	SPECIAL PARTNERSHIP
GUIDE' №01 (62)	February 18th	World Defense Show 2022 (06-09.03.2022, Saudi Arabia, Riyadh)
GUIDE' №02 (63)	February 22th	DEFEXPO INDIA 2022 (10-13.03.2022, India, Gandhinagar) <i>Special analytical export project of the United Industrial Publishing</i>
GUIDE' №03 (64)	March 12th	DSA 2022 (28-31.03.2022, Malaysia, K.Lumpur)
GUIDE' №04 (65)	March 15th	ArmHiTec 2022 (31.03-02.04.2022, Armenia, Yerevan) <i>Historical meeting of Vladimir Putin and Narendra Modi at DEFEXPO INDIA 2022</i>
GUIDE' №05 (66)	March 20th	FIDAE 2022 (05-10.04.2022, Chile, Santiago) <i>Top five new Russian export products of 2021</i>
GUIDE' №06 (67)	March 25th	Eurasia Airshow 2022 (13-17.04.2022, Turkey, Antalya) <i>EDEX 2021 Egypt's tri-service defence exhibition</i>
GUIDE' №07 (68)	May 12th	KADEX-2022 (23-28.05.2022, Kazakhstan, Astana)
GUIDE' №08 (69)	August 05th	ARMY-2022 (15-21.08.2022, Russia, Moscow) <i>36</i>
GUIDE' №09 (70)	August 15th	Defense & Security 2022 (29.08-01.09, Thailand, Bangkok)
GUIDE' №10 (71)	August 20th	ADEX 2022 (06-08.09.2022, Azerbaijan, Baku) <i>CON</i>
GUIDE' №11 (72)	September 10th	Africa Aerospace and Defence 2022 (21-25.09.2022, South Africa, Pretoria)
GUIDE' №12 (73)	October 18th	SOFEX 2022 (31.10-03.11.2022, Jordan, Amman)
GUIDE' №13 (74)	October 22th	INDO DEFENCE 2022 (02-05.11.2022, Indonesia, Jakarta)
GUIDE' №14 (75)	October 25th	Airshow China 2022 (08-13.11.2022, Zhuhai, China)



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Главный форум!!!
The Main Forum!!!

ОФИЦИАЛЬНОЕ ЕЖЕДНЕВНОЕ ИЗДАНИЕ ФОРУМА

Дорогие друзья!

Dear friends!

По традиции этот масштабный смотр новейших разработок оборонной промышленности собирает ведущих российских и зарубежных специалистов, служит востребованной площадкой для обсуждения вопросов военно-технического сотрудничества и, конечно, содействует укреплению партнерских контактов между оборонными ведомствами разных стран. Ведь только вместе, доверяя друг другу, мы сможем противостоять общим вызовам и угрозам, обеспечить глобальную стабильность и безопасность.

A portrait of Vladimir Putin, President of Russia, wearing a dark suit and tie, standing in front of the Russian flag.

Just as in previous years, this major event offers an opportunity to review the latest defence technology, bringing together leading Russian and foreign experts. It is also an important platform for discussing matters related to military-technical cooperation. It goes without saying that the forum facilitates partnerships among the defence industries of the two countries.



August 15-21, 2022

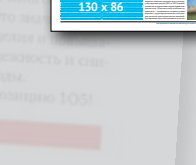
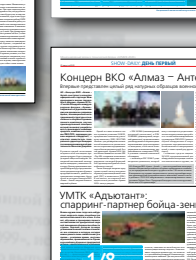
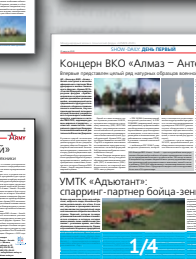
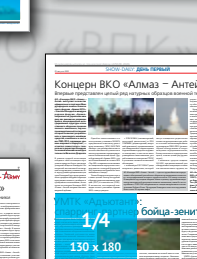
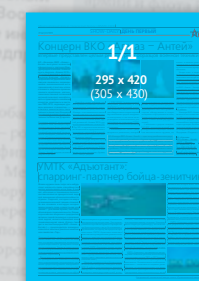
The Patriot Congress and Exhibition Centre with the Military and Patriotic Park of Recreation and Leisure of the Armed Forces of the Russian Federation

Official information analytical edition of the
forum – newspaper show-daily 'ARMY-2022'

Six issues: 'First day', 'Second day', 'Third day', 'Fourth day', 'Fifth day' and 'Special edition' for open days

Reports on the work of the Forum, the most important current business and presentations, the representation of participants, their exposition and programs.

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