INTERNATIONAL AEROSPACE & TECHNOLOGY GUIDE

Special analytical export project of the United Industrial Publishing

№ 7 (60), November 2021

The Best Innovations for Gulf, Middle East and Global Market

DUBAI AIRSHOW
SPECIAL PARTNERSHIP

UIP
UNITED INDUSTRIAL PUBLISHING

'International Aerospace & Technology Guide'
№ 7 (60), November 2021

Special analytical export project
of the United Industrial Edition

'International Aerospace & Technology Guide'
is the special edition of the magazine
'Russian Aviation & Military Guide'

Registered in the Federal Service for
Supervision of Communications, Information
Technology and Mass Media (Roscomnadzor)
09.12.2015 PI № FS77-63977

The magazine 'Russian Aviation & Military Guide', made by the United Industrial Publishing, is a winner of National prize 'Golden Idea 2016' FSMTC of Russia

General director
Editor-in-chief
Valeriy STOLNIKOV

Chief editor's deputy
Elena SOKOLOVA

Commercial director
Oleg DEINEKO

Head of international projects
Alexander STOLNIKOV (s.xander@bk.ru)

Managers
Tatiana SOKOLOVA
Natalia SHVETSOVA
Andrey PARAMONOV

Designed by
Svetlana SELIVERSTOVA

There are materials from the information agencies and from the press services of the federal authorities of the Russian Federation used in the project.

Edition is 3 thousand copies

Editorial office:
Malaya Gruzinskaya St., 39
Moscow, 123557
Tel.: +7-495-505-76-92, 778-14-47, 729-39-77

Media postal address:
Moscow, Russia, 123104, mailbox 29

doc@promweekly.ru
promweekly@promweekly.ru
www.promweekly.ru

The materials marked with R
published on a commercial basis

CONTENTS

EDITORIAL

The best world aerospace technologies

DUBAI AIRSHOW 2021 is definitely unique. Show is gathering in UAE obviously the best aerospace innovations that are intended for both Gulf and the entire AsiaAfrica region.

Political and economic situation in the world (conflicts, sanctions, threats of war and other) makes nations once again reconsider their technologies possibilities. 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.

One can predict raise of aerospace means market in times like this. But together with developing of technologies in order to safety, rivalry increases in order to achieve such goals as increasing profits and market share. DUBAI AIRSHOW 2021 presents the best world (Russian also) aerospace innovations for 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 planes you have, but quality and possibilities of every single one of them is fact what leads to victory 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 high technology products, solid aftersales service and proven reliability, Russia is honest and friendly partner for all countries, ready for mutual work. Taking part in DUBAI AIRSHOW 2021 companies from many countries continues the policy of open partnership.

Valeriy Stolnikov

SECOND CORE TESTS FOR SUPERJET ENGINE

Rostec United Engine Corporation has successfully completed tests of the second prototype engine core, the 'heart' of the PD-8 engine designed for the SSJ-NEW aircraft. The tests confirmed correct operation of components, required temperature and pressure parameters, and compliance with environmental standards. The next stage of the project is scheduled for the beginning of the next year, and will involve bench tests of the first prototype engine.

The engine core is called the 'heart' of an aircraft engine and consists of a high-pressure compressor, a combustion chamber and a high-pressure turbine that drives the propulsion system.

During the launches, the joint operation of the engine core assemblies was evaluated on the test bench, measuring temperature and pressure, as well as the emission of harmful substances and smoke. Results confirmed the correctness of the solutions used in the propulsion system hot section.

'The development of the PD-8 is carried out by the method of parallel development of the hot section of the engine and compressor, which allows the project to be implemented in less time. Rostec State Corporation has already completed tests of the second prototype engine core, which were successful and confirmed the adequacy of the technology used. Now, the assembling stage of the PD-8 prototypes has begun, with bench tests scheduled for early 2022,' said First Deputy CEO of Rostec State Corporation, Vladimir Artyakov.

Testing of engine cores will continue along with the PD-8 prototype assembly.

'Confirmation of design solutions at the stage of engine core tests is important for the entire course of certification work on the PD-8 engine. The plan is to test the engine core on the Central Institute of Aviation Motors altitude test rig under conditions close to actual operation. At the same time, the compressor will be tested as part of an autonomous unit at CIAM for examination and confirmation of the inherent characteristics,' said Yury Shmotin, Deputy General Director – Chief Designer of UEC.

As of today, the technical design stage of work on the propulsion system has been completed, working design documentation has been released, and prototypes of the engine are being manufactured. Obtaining a type certificate for the PD-8 is scheduled for 2023.

The development of the PD-8 primarily propulsion for the SSJ-NEW aircrafts is conducted in close cooperation with UEC enterprises, and based on the experience of the PD-14 engine project.

Production for the Aircraft Industry

Rostec State Corporation's Additive Technologies Center received a license from the Russian Ministry of Industry and Trade for the mass production using the additive manufacturing method. This is the first Russian enterprise that has confirmed its competences in mass industrial scale 3D printing for the aircraft industry.

The license allows for mass production and testing of components for civil aviation including aircraft, helicopters and engines.

'Aircraft construction is one of the most science-intensive industries with incredibly high safety requirements. The license confirms compliance with these requirements and allows for mass production. This is a new and important stage in the development of additive technologies, and for the Russian aircraft industry as a whole,' commented Vladislav Kochkurov, General Director of JSC 'ATC'.

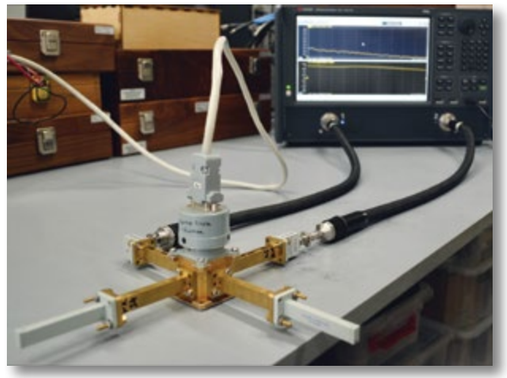
Industrial 3D printing allows for reduced production timings of certain individual components from 6 months to 3 weeks. Moreover, additively manufactured components are substantially lighter, while still retaining their functional properties, allowing for the increase in payload and carrying capacity as well as the improvement of various other aircraft characteristics.

Today, the company has mastered the production of 450 different parts. JSC 'ATC' has the largest fleet of 3D printing equipment in Russia comprising of 41 units of additive and auxiliary manufacturing equipment.

UHF Switches for Artificial Satellites

The Ruselectronics Holding of Rostec State Corporation supported by the Industrial Development Fund (IDF, VEB.RF Group) has commissioned the first domestic production of ultra-high frequency switches for artificial satellites. Delivery of the products to the enterprises of the rocket and space industry is scheduled to begin in January 2022.

The project's goal is to ensure the phase-out of imports and to reduce dependence on foreign UHF equipment in the space industry. Each satellite unit incorporates up to 20 amplifiers of ultra-high frequency signals, as well as transmitting and receiving equipment. All equipment is interconnected by UHF switches, providing energy transfer with minimal losses.



'Conclusion of the solid contracts and the launch of the new production will make it possible to replace the foreign UHF switches that are used in Russian satellites. As of today, negotiations are underway with customers to supply more than 600 units of equipment for installation on Russian spacecraft,' said Sergey Sakhnenko, General Director of the United Instrument Manufacturing Corporation (the managing company of the Ruselectronics Holding).

The production of UHF switches will be launched at the Saratov-based NPP Almaz (part of Ruselectronics), with a total project budget of 344 million rubles, 250 million of which Almaz received from the Industrial Development Fund in the form of a preferential loan under the Conversion program.

The UHF switches are used by enterprises of the rocket and space industry, including Russian Space Systems, FSUE NIIR and Reshetnev Information Satellite Systems.

FIRST SERVICE CENTER FOR YAK-130 ENGINES

The Rostec United Engine Corporation's service center is located at the training base of the Russian Aerospace Forces. It will service the AI-222-25 engines installed on Yak-130 training and combat aircraft. Operation of the service center will marginally reduce the time spent on maintenance of airworthiness of aircraft.

Yak-130 aircraft with AI-222-25 engines are operated by novice pilots, each of whom is required to fly a certain number of hours as part of the training program. Due to this fact, the propulsion systems exhaust their specified service life several times faster than under normal operating conditions. Therefore, AI-222-25 requires more frequent maintenance than other engines, and certain types of repair and maintenance are much more cost-effective and efficient if organized directly at the place of operation.

For that purpose, the United Engine Corporation and the Russian Ministry of Defense established a service center complete with modern equipment and all the special technologies necessary to assess the technical condition and perform maintenance of AI-222-25 engines.

At present, the AI-222-25 repairs at the service center are performed by the staff of Salut Production Center, the manufacturer of the aircraft engine. However, after completing the training of the center's staff, all repair and maintenance operations involving module replacement will be performed by specialists of the operating organization directly on site.

'The matter of after-sales service of the equipment we supply to customers, both military and civilian ones, is among our key priorities. Maintenance of the engine at the place of operation has become possible owing to mastering the technology of modular replacement of assembly parts. This approach allows engine maintenance and replacement of the damaged part or module without transportation to the manufacturer. The service center will cut the repair time of AI-222-25 engines 2 or 3 times. This will boost the efficiency of pilot training for the Russian Aerospace Forces and, ultimately, improve the defense capability of our country,' Alexei Gromov, CEO of Salut Production Center, said.

First Hybrid Engine for Aircraft

A mock-up of a hybrid aircraft engine was presented for the first time in the United Engine Corporation (part of Rostec) exhibition at the International Aviation and Space Salon MAKS-2021.

The mock-up consists of a gas turbine engine, electric motors, power electronics units, an electric generator and a battery pack. It is designed for next-generation unmanned aerial vehicles flying with four propellers.

'In 2022, we plan to create the first hybrid engine demonstrator capable of outputting around 150 kW. The demonstrator will be further used for testing a design with ultimate power output of 500 kW by 2023', said Mikhail Shemet, Deputy Director of prospective engine projects at UEC-Klimov.

The 500 kW hybrid engine demonstrator is based on the VK-650V engine. Potential aircraft of this power class are light multipurpose helicopters and unmanned aerial vehicles with a take-off weight between 2–8 tons, light local airliners, air taxis and various VTOL designs. After the first stage of the project, an additional objective was determined to develop a marine application with 200-250 kW of power.

The advantages of a hybrid power plant include increased fuel efficiency and flight safety, reduced emissions, increased thrust-to-weight ratio, capability for quick power boosts due to the electrical component, as well as increased service life and reliability.

Modern Electronic Components

Ruselectronics holding company of Rostec State Corporation has presented samples of unique electronic components to the Russian Prime Minister, Mikhail Mishustin. The demonstration took place during a visit to the Almaz Digital technopark, located on the territory of the special economic zone in Saratov. The delegation also included Chairman of the Russian State Duma Vyacheslav Volodin and the Russian Minister of Industry, Denis Manturov.

The guests of the technopark were shown unique quantum microwave devices developed by NPP Istok. The devices allow the onboard equipment of the GLONASS satellites to determine coordinates with an accuracy of tens of centimeters. NPP Almaz demonstrated the first Russian onboard traveling wave tube UV-A2014, capable of being cooled by infrared radiation in outer space. It more than halves the thermal load on the thermoregulation system and allows creating more stable satellites.

Ruselectronics subsidiaries NPP Almaz, NPP Contact and NPP Istok are among the key residents of the technopark. The enterprises specialize in the production of products used in radar, navigation and communication systems of land, sea, aviation and space-based systems. The equipment is designed for operation in severe climatic conditions of hot and arctic regions.

'Electrovacuum microwave devices produced by Ruselectronica enterprises are in line with best foreign models and surpass them in several parameters. This allows domestic manufacturers to create electronic equipment with exceptional technical and operational characteristics. For example, our products for spacecraft are capable of operating reliantly for 150,000 hours in the harsh conditions of outer space, while having around 25% lower price than foreign counterparts. Further development of these industries will contribute to the technological independence of Russia in critical areas', said Sergey Sakhenko, Director General of United Instrument Manufacturing Corporation (managing company of Ruselectronics).

NPP Almaz demonstrated a wide range of products for environmental monitoring. Their automatic gas analyzers are capable of continuous high-precision monitoring of volatile gas concentrations, which helps preventing production accidents. NPP Kontakt presented vacuum switching components for civilian use, including arc chutes and vacuum switches built on them, produced for the needs of the electric power industry to advance import substitution.

Ruselectronics is cooperating with Rosoboronexport to increase global supplies of domestic high-tech products.

'The unique products of the Ruselectronics enterprises and the enormous potential of Rosoboronexport in foreign markets allow us to carry out large-scale projects in technology transfer and interstate industrial partnership. We provide our foreign partners with modern intelligent systems, including those that are integrated into the products of other manufacturers. This approach allows us to adapt our offers as much as possible to the demands of the world market and the capabilities of specific buyers', said Alexander Mikheev, Director General of Rosoboronexport.

Almaz Digital techopark is located on the territory of a special economic zone in Saratov, created on the Decree of the Government of the Russian Federation No. 763 dated May 27, 2020. In addition to Ruselectronics enterprises, other key residents include ER-Telecom Holding and Russian Post.

BE-200ES: SUCCESSFULLY FIREFIGHTING OPERATION

The Russian Be-200 amphibious aircraft has successfully completed extensive firefighting operation in Greece under a contract with UAC (part of Rostec). The aircraft carried out missions for two months over the continental part and various islands of the country, overall making over 60 flights and dropping more than 5,000 tons of water. Its high performance coined the aircraft a nickname 'the Russian Beast' in the Greek media.

The Be-200ES became the only aircraft capable of extinguishing fires at the most intense conditions; the period of extremely high temperatures, when other types of aircraft could not take off on missions due to temperature restrictions. In these conditions, the aircraft carried out more than 35 missions and dropped about 400 tons of water to stop several wildfires, one of which was threatening the capital of Greece, Athens.

'The assistance of Russian pilots and engineers, as well as the capabilities of the Be-200, were highly appreciated by our Greek partners, especially when flying missions in difficult conditions such as in mountainous areas and with high turbulence. The total flight time of the plane was about 200 hours, which included over 800 cycles of water intake and discharging over 5,000 tons of water on fires. The crew took part in extinguishing the most difficult fires in the Limni region on the island of Chios, Varympompi and Vilia in Western and Eastern Attica. Due to its high performance, reliability and other advantages, the aircraft has excellent export potential', said the Director for International Cooperation and Regional Policy of Rostec, Viktor Kladov.

Be-200ES is manufactured by the Beriev Aircraft Company (TANTK) in Taganrog. The amphibious aircraft has repeatedly demonstrated high efficiency in fighting forest and industrial fires in Russia and several other countries.

'Due to its high flying speed, our Be-200ES has a shorter approach time to the wildfire site, longer range and high thrust-to-weight ratio in comparison with other special aircraft. It can intake water in mountain lakes allowing it to operate in regions not available for other tanker aircraft. While operating in Greece, the aircraft has proved its capability to extinguish fires at critically high ambient temperatures', said the Honored Test Pilot Evgeny Yurasov. 'We have experience from operating in difficult terrain in Portugal and Italy. Due to its high maneuverability, the aircraft is especially effective in high turbulence conditions of mountainous regions', he added.

Newest Aviation Developments

Concern Radio-Electronic Technologies (KRET) (part of the Rostec State Corporation) presented its newest civilian and military products at the International Forum 'ARMY-2021'. This year was the debut of new systems for navigation, flight operation, on-board computing, as well as a weather station to be used in the Arctic, and 20 models of Tiocraft air cleaners, five of which will be presented for the first time. The Concern's exposition will include a total of 140 items.

One of this year's novelties is the SNV 1a helicopter navigation system. Thanks to its operating precision combined with small dimensions and weight, the product developed by Ramenskiy Instrument-Making Plant (part of KRET JSC) is particularly suitable for use in lightweight helicopters. In includes an attitude and heading reference system, a navigational instrument, which serves to measure yaw, roll, and pitch of the aircraft, and makes it possible to precisely determine the aircraft's position even if there are no landmarks.

'In addition to high accuracy, the important parameters of avionics are weight and dimensions. Making navigational instruments of smaller size and weight, while preserving their quality and reliability is one of the challenges the developers face when creating competitive aviation equipment. In this respect, we can confidently say that the new development by the Ramenskiy Instrument-Making Plant will be in demand; it has smaller dimensions than its peers, consumes less energy, and, at the same time, features higher reliability and competitive price', noted Nikolay Kolesov, CEO of KRET JSC, Supervisor of the Novgorod and Mariy-El departments of Soyuzmash (the Union of Russian Machine Builders). Among other promising developments were presented by the Concern, it is also worth to mention devices enabling instrument-based helicopter control. Developed by the Ulyanovsk Instrument Manufacturing Design Bureau, the navigational data collecting block BFNI-1 and the multi-functional indicator IM-23 ensure situation crew awareness, assist in navigation and control of the aircraft, guarantee 'smart' support and warn about external threats.

The BFNI-1 provides pilots with comprehensive information about weather conditions and terrain relief, and detects artificial land-based objects. All the data is accumulated and displayed as layers on a map with navigational information overlaid. In its turn, the multi-functional indicator IM-23 provides navigational support of the flight; receives, processes and displays the aircraft's position parameters, as well as its altitude and speed informs the pilot on the status of the aircraft utilities, displays video information submitted by on-board viewing systems, and guarantees the performance of computing tasks, including the prevention of critical flying modes and the activation of air weapons.

'Traditionally, our concern sees the Forum 'ARMY' as a very important venue, where we not only present our newest developments but also collect feedback from potential customers and identify prospects for cooperation. As part of the business program, the Concern representatives take part in the discussions of key industry development issues and resolving strategically important problems', Nikolay Kolesov explained.

Hydrogen-Powered Aircraft Engines

United Engine Corporation of Rostec announced the start of a program to develop hydrogen-powered engines for both aviation and ground applications. The project was launched in the summer of 2021 with forming a working group and launching R&D work. The announcement was made during the International Aviation and Space Salon (MAKS-2021) held in Zhukovsky airport, near Moscow.

The working group was formed from specialists of UEC subsidiaries. Development of the power plants will be carried out together with various scientific and industrial institutes, as well as with organizations that have comprehensive experience using hydrogen as fuel.

'To reduce the carbon footprint in aviation and the oil and gas industry, the use of hydrogen fuel is one of the most promising fields of development. We are considering two main technologies: direct combustion of hydrogen fuel in modified gas turbines and electrochemical conversion of fuel into electrical energy using fuel cells,' said UEC Chief Designer Yury Shmotin.

Hydrogen power is one of the promising development directions for engine building. There are two options for using hydrogen: burning gas in an engine and creating fuel cells, where hydrogen reacts with oxygen to form electrical energy, releasing only water vapor as a by-product. The creation of power plants with a low carbon footprint has several potential applications in the aviation industry, as well as in related industries.

FIRST RUSSIAN OFFSHORE HELICOPTERS

Vitaly Markelov, Deputy Chairman of the 'Gazprom' Management Committee and Andrey Boginsky, Director General of 'Russian Helicopters' (part of Rostec State Corporation) signed a Strategic Cooperation Agreement for the supply of certified domestic-made Mi-171A3 maritime helicopters.

The Mi-171A3 is the first domestically produced helicopter intended primarily for offshore operations (transportation of passengers and cargo over the sea). This helicopter was designed according to the International Association of Oil and Gas Producers (IOGP) standards.

Serial aircraft has a maximum take-off weight of 13 tons. Mi-171A3 helicopter meets the increased safety requirements for flights over the water surface. In particular, it will be equipped with an emergency-resistant fuel system, an auto-activated emergency water landing system, and external life rafts. Mi-171A3 will have installed an integrated flight and navigation complex for the most difficult weather conditions – a 'glass cockpit' with digital navigation equipment.

The helicopter will be available in two configurations. The first is for transportation of up to 24 passengers and cargo up to 5 tons. The second is for search and rescue operations and will be additionally equipped with specialized equipment, including medical. If required, the operator will be able to convert the cargo and passenger helicopter to a search and rescue helicopter independently.

The Mi-171A3 prototype was presented at the MAKS-2021 International Aviation and Space Show.

Under agreement terms, 'Russian Helicopters' will provide Mi-171A3 prototype tests, organize mass production and certification. There will also be established service centers for aircraft maintenance, simulators and training centers tutoring flight and technical personnel. 'Gazprom' intends to purchase Mi-171A3 helicopters, following the current needs, to place orders for repair and maintenance. They are scheduled to be used on the continental shelf fields.

Unique Aviation Sensors

The Ruselectronics holding company of Rostec State Corporation has developed a new generation hybrid TV sensor for detecting and observing distant objects in conditions of poor visibility, such as fog, rain, snowfall, dust storms or low illumination. The equipment is suitable for use in aircraft surveillance, and search and track systems. No similar Russian systems are currently available.

The device is designed to operate in the near-infrared range at a distance of up to 1.7 microns (0.0017 mm). This kind of sensitivity allows developing new properties for a night vision device, which is completely usable also during daylight to detect objects against a bright sky or in twilight haze, and transmit a clear high-resolution image.

The use of the device as part of passive sensor systems makes it possible to increase their range by 2-2.5 times. When using laser illumination, the equipment provides detection and identification of an object at a distance of up to 20 km. Compact size makes the device convenient for use as part of small-sized television equipment.

The device was developed by NRI Electron, a subsidiary structure of Ruselectronics holding company, part of Rostec State Corporation.

'Our new design is intended for tasks requiring the use of extremely sensitive devices in areas such as ultra-weak radiation in the infrared spectrum. The hybrid TV sensor provides a high-quality image in all weather conditions and can be used in both civilian and special-purpose equipment', noted the Director General of NRI Electron, Alexey Vyaznikov.

The device consists of a sealed housing and a radiation-sensitive photocathode and an electron-sensitive matrix inside in a vacuum. The design is has been patented as know-how of the developers, allowing to reduce the amount of noise interference and increase the resolution of the new device.

VK-650V Demonstrator Engine

Demonstrator prototype of VK-650V engine developed by UEC-Klimov, subsidiary of the United Engine Corporation of Rostec, has reached the second stage of its testing program. The engine was exhibited at the International Aerospace Salon MAKS-2021.

VK-650V has recently completed an intermediate stage of its testing program, covering tests of its individual components and update on its actual performance characteristics. Now the engine was passed on to second stage of the program. UEC-Klimov will proceed with testing the prototypes for required performance and preparing them for the qualifying stages.

'The VK-650V project is about to get its first external contracts. Russian Helicopters holding company has expressed its intention to sign first supply contracts. These engines will be used for design work aimed at replacing engines of various modernized helicopter models', said Anastasia Solovyova, Chief Designer at UEC-Klimov.

VK-650V is being developed in a wide cooperation project within the engine industry. Partner enterprises are manufacturing the material components of the prototype engines: FSUE VIAM acts as the manufacturer and supplier of additive elements (turbine nozzles, transition channels, etc.). UEC-Klimov and Ufa Engine Industrial Association (UEC-UMPO) further manufacture components and assemblies from products supplied by VIAM, with UMPO conducting welding and brazing works. By the time the third prototype of VK-650V is completed, UMPO will also have integrated technologies allowing full production of additive engine parts.

The VK-650V engine has a take-off power of 650 hp and is designed to operate in Russian Ka-226T light helicopters. Its modifications can be also installed on Ansat, VRT-500 helicopters and foreign helicopters of the same payload class. The main advantages of the new engine are its advanced after-sales service system and long service life.

The first VK-650V demonstrator engine was assembled in December 2020 and successfully started for the first time in 2021. Certification is due in 2023.

ARMS EXPORT CONTRACTS THIS SUMMER

The summer exhibition period 2021 has demonstrated strong demand for Russian weapons and military equipment. At the ARMY-2021Military-Technical Forum, MAKS-2021 Air Show and IMDS-2021 Maritime Defense Show, Rosoboronexport (part of the Rostec State Corporation) held negotiations with foreign partners and signed over 30 contract documents worth over 3 billion euros.

Rosoboronexport has leveraged the full potential of Russian summer defense exhibitions, thereby replenishing its order portfolio and increasing the workload of the domestic defense enterprises: the export plan now includesSu-30-typeaircraft,Mi-35M/P,Mi-171ShandMi-17V-5helicopters, aircraft weapons,Pantsir-S1/S1Mself-propelled anti-aircraft gun/missile (SPAAGM) system,VerbaMANPADS, Protivnik-GE radar, Krasukha electronic warfare system, Repellent-Patrol mobile anti-drone EW system,Kornet-EMATGM system, remote controlled weapon stations, weapons for surface combatants and submarines, small arms, ammunition. An agreement was reached on integrating Russia's Palma shipborne gun/missile close-in weapon system (CIWS) into a ship's foreign-made weapons system.

'Russia's successes in military-technical cooperation prove that the domestic industry is capable of developing new unique products and solutions that are in demand in the market. At the same time, a qualitative renewal of the plants and design bureaus' fixed assets, their timely retrofitting and upgrading at the expense of funds received from the implementation of state defense orders and export contracts, launches the processes of positive transformation of infrastructure in regions, from household facilities to science schools, technology parks and experimental laboratories accessible to youth,' said Alexander Mikheev, Deputy Chairman of the Russian Engineering Union (REU), Director General of Rosoboronexport.

Among new Russian products presented at Russian exhibitions this summer, foreign partners paid special attention to the T-14 Armata tank, combat vehicles based on the Boomerang platform, Orion-E reconnaissance/strike UAV, Antey-4000 battlefield air defense missile system, Pantsir-S1 MSPAAGM system, the fifth-generation Su-57 fighter, BMP-3 with the Berezhok combat module, other equipment. More than 80% of Rosoboronexport's annual deliveries fall on products manufactured at REU's enterprises: Rostec's holding companies, including Russian Helicopters, High-Precision Systems, United Aircraft Corporation, and other domestic defense enterprises.

'The enterprises associated in the Russian Engineering Union are a strong growth driver of the Russian economy, which greatly contributes to the development of military-technical cooperation: their high-tech products are heavily exploited by partners from more than 100 countries, in the most challenging climatic and combat conditions,' said Alexander Mikheev.

Systemic cooperation with REU enterprises is carried out in all regions of the country, enabling Rosoboronexport to continuously replenish its 'library of offset projects' aimed to promptly engage domestic enterprises in drawing up tender bids for foreign buyers. Today, Rosoboronexport's portfolio of export orders exceeds $52 billion. /IA&TG/

NEW PROJECT BAS-200

JSC Russian Helicopters, part of State Corporation Rostec, has presented its new project the BAS-200 at MAKS-2021 International Aviation and Space Salon. BAS-200 became the first UAV that took part in MAKS 2021 flight program.

The maximum take-off weight for the BAS-200 is 200 kgs. Capable of speeds up to 160 kms per hour, it can carry commercial loads of up to 50 kgs. The BAS-200 can fly for up to 4 hours at altitudes of up to 3,900 metres. Visitors to MAKS-2021 can also see the ground control station, which will allow operators to control the drone at a distance of up to 100 kms. With a length of 3.9 metres, the UAV is 1.2 metres high.

The BAS-200 may be used to carry out a wide range of tasks: monitoring, cargo delivery, search and rescue operations, agricultural work etc.

Flight tests are being conducted, and the BAS-200 project is being taken forward by the Mil and Kamov National Helicopter Centre, part of JSC Russian Helicopters.

CADET-75 PARACHUTE SYSTEM

Tests of the Cadet-75 parachute system of Rostec State Corporation's Technodinamika Holding confirmed a minimum descent altitude of 150 meters. The product, designed for training of novice parachutists, is successfully undergoing flight development tests at airfields in the Ivanovo and Belgorod regions.

'Cadet-75' is a round canopy training parachute system, allowing step-by-step training of separation from the aircraft and freefall skills with a progression to manual parachute deployment. It is suitable for dropping at aircraft speeds ranging from 80 to 280 km/h at altitudes up to 4,000 meters with a total flying weight of up to 120 kg. The parachute has increased canopy stability and allows the parachutist to make a full turn in no more than 12 seconds. The average vertical speed of descent in an area 30 - 35 m from the ground is not more than 5 m/s.

The 'Cadet' line, developed by the Polet Ivanovo Parachute Plant, includes three parachute systems with a round canopy. In addition to the Cadet-75, the Cadet-100 and Cadet-100D are designed not only for training but also for combat parajumping with full service weapons and equipment.

Contracts Worth Over €1 Billion

Rosoboronexport JSC (part of the Rostec State Corporation) has leveraged the full marketing potential of the MAKS-2021 International Air Show.

'Rosoboronexport has leveraged the full potential of MAKS-2021 by signing 13 export contracts worth over €1 billion for the supply of Russian military products on the sidelines of the air show,' said Alexander Mikheev, Director General of Rosoboronexport. 'Following the results of MAKS-2021, the Su-30SME fighters, Mi-35M and Mi-17V-5 helicopters, the Protivnik-GE radar, Verba MANPADS, as well as advanced air weapons, a number of armored and automotive vehicles have been added to the company's order book and Russian defense manufacturers' production plans.'

In Zhukovsky, Rosoboronexport held presentations of the major promoted aircraft, helicopters, air defense and electronic warfare systems for more than 30 delegations from 20 countries. During the negotiations at MAKS-2021, the company's foreign partners expressed interest in acquiring MiG-35D and Su-30SME fighters, IL-76MD-90A(E) military transport aircraft, IL-78MK-90A tanker aircraft, Mi-28NE and Ka-52attack helicopters, Mi-171Sh military transport and Ka-226T multi-purpose helicopters, as well as air defense systems, including the Pantsir-S1 SPAAGM system.

In the course of talks on the sidelines of the air show, Rosoboronexport discussed industrial partnership in the field of joint and licensed production of Russian combat aircraft and helicopters, as well as modernization of previously delivered aircraft equipment with customers from the Asia-Pacific region, the Middle East, Latin America, Africa and the CIS. 'Needless to say, Rosoboronexport's partners became interested in the newest Checkmate light tactical aircraft unveiled by Rostec at MAKS-2021. A number of customers were shown its prototype and even given the opportunity to sit in its cockpit. They praised its characteristics,' Alexander Mikheev added.

In addition, Rosoboronexport and Technodinamika signed joint programs to promote parachute equipment and research and development services in the external market. The signing ceremony was attended by Russia's Deputy Prime Minister Yuri Borisov, Minister of Industry and Trade Denis Manturov and Rostec CEO Sergey Chemezov.

New Generation Aircraft Engine PD-8

High performance and compliance with the latest environmental requirements grant the PD-8 engine a competitive edge on the market.

'PD-8 will be in line with other engines appearing on the international market during the next decade in terms of reliability, operating safety and maintainability,' noted Yuri Shmotin, Chief Designer of UEC. 'PD-8's design allows us to create a whole series of modern gas turbine engines with the ability to improve fuel consumption, reduce life cycle costs and strengthen focus on customers and operators.'

The final design of the engine has already been finished. The project has established responsible companies for further design and production, issued design documentation, and manufactured the first sample of the gas generator, which has successfully passed the first stages of technical trials. In the future, it is necessary to make full prototypes of the engine for certification tests. Several components of the first prototype have already been put into production.

The PD-8 propulsion system for the SSJ-NEW airliner is being created in broad cooperation between various UEC subsidiaries. It is completely built from Russian materials and components. The project utilizes engineering solutions, materials and technologies developed in various other UEC projects, which significantly reduces development costs and technical risks that could potentially hamper successful implementation. The use of digital twin and parallel engineering technologies allow keeping up with tight development deadlines.

The project is scheduled for the certification of SSJ-NEW airliner, which will ultimately use the PD-8 engine. Obtaining a type certificate for the PD-8 engine is scheduled for 2023. This document will confirm its compliance with requirements for airworthiness, safety and environmental regulations.

CIVILIAN PRODUCTS FROM RUSSIAN DEFENSE INDUSTRY

Alexander Mikheev, Director General of Rosoboronexport (part of the Rostec State Corporation) and Deputy Chairman of the Russian Engineering Union, took part in a wrap-up meeting of the Bureau of the Russian Engineering Union and the Bureau of the League for Assistance to Defense Enterprises on the 'Diversification in Russian Defense Industry.'

'The President of Russia has set a strategic objective for the defense industry enterprises to bring the civilian share of their output to 30% by 2025 and 50% by 2030. To effectively promote civilian products in external markets, Rosoboronexport set up a specialized cluster more than a year ago. We see our responsibility for the development of the economy of the Russian regions, machine-building enterprises and industry in general, as well as for ensuring foreign exchange earnings to the country's budget,' said Alexander Mikheev.

The company, together with enterprises inside and outside the defense industrial complex, is already implementing a number of projects to promote exports of defense industry diversification products.

'Rosoboronexport is engaged in contract work with foreign partners both directly and through more than 50 Rostec's representative offices in most regions around the world. It would be wrong for us not to use these advantages,' added the head of Rosoboronexport.

In sub-Saharan Africa, the company fulfills contracts for the supply of automotive and special equipment, civilian and service weapons. Russian metal products are in demand in the Asia-Pacific region, civilian and service weapons are popular in Latin America.

In addition, road construction equipment, workshops, oxygen production equipment and personal protective equipment are supplied to Africa and other regions of the world. A fundamentally new direction in the field of railway transport – the supply of rolling stock, construction, modernization and technical support of railway networks in a number of countries – is being developed.

Rosoboronexport has sent proposals for mobile hospitals, emergency response equipment and logistics equipment to more than 30 countries. The company also prepared and handed over to its partners advertising materials on passenger, cargo-passenger, cargo, fishing, research, special, service vessels, as well as industrial ships produced by Russia's major shipbuilding holdings USC, Ak Bars and others.

Rosoboronexport developed and published civilian product catalogs on a variety of media. They were sent to foreign customers in 64 countries of the world. The Internet version of the catalogs is also available on the company's website.

The company's employees regularly hold presentations and demonstrations of civilian products for potential customers. The promoted items are showcased at the leading international exhibitions: IDEX and Dubai Air Show in the UAE, Defexpo India and Aero India, China Air Show, Africa Aerospace and Defense in South Africa, LAAD in Brazil, FAMEX in Mexico, DSE in Vietnam, as well as at the MAKS International Air Show, Army Military-Technical Forum, the International Maritime Defense Snow in St. Petersburg, Interpolitex and others.

'Foreign partners highly appreciate the opportunity to cooperate with Russian defense industry enterprises in a one-stop shop format through Rosoboronexport as a unique organization offering a full package of services for the export of high-tech products, technology transfer,' said Alexander Mikheev. /IAATG/

DUBAI AIRSHOW 2021

Aerospace and defence startups to launch pad VISTA

Dubai Airshow 2021 is excited to introduce its new dedicated startup event, VISTA, which will be the ultimate platform for innovators, creators and market disruptors to display the latest technologies and play a part in accelerating the future of the aerospace and defence industries. The co-located event will connect startups with venture capitalists who are looking for disruptive new entrants that can out-hustle the big players. The event will be attended by national leaders, CEOs, investors, developers, technology disruptors, operators, and other key experts. Successful entrepreneurs from established global startups will also be present to inspire and guide aspiring startups.

During the 5-day programme, VISTA will feature a number of sub-events in partnership with Gothams, a leading accelerator that is helping to build the next generation of aerospace and defence startups. Entrepreneurs can take part in pitch competitions where they will be able to present their technologies to industry leaders and investors with the chance of winning some great prizes. They will have the opportunity to get involved in mentorship programs, workshops, and high-level networking, learn about market trends and receive the best guidance from experts, key decision makers, and global investors. A recent study has shown that startups that have helpful mentors and learn from thought leaders have almost four times better user growth and raise seven times more capital.

Espite the prevalent capital-spending curb due to the pandemic, investments by global venture capitalists continued to increase. According to a Magnitt report, Saudi Arabia's venture capital funding increased by 55% in 2020 reaching $152 million. Saudi Arabia continued its work to increase venture capital funding in 2021, in support of emerging startups. Saudi Arabia's Sanabil Investments recently partnered with the early-stage venture fund, 500 Startups, to support startups in the region. 100 startups are expected to receive $100,000 to accelerate their growth in the region, as a result of this partnership. Moreover, in the UAE, The Abu Dhabi Investment Office (ADIO) has partnered with Microsoft and Plug and Play on a range of initiatives to support technology startups in the region.

Commenting on his startup's participation in VISTA, Co-founder of SARsat Arabia, Ahmed Alzurabi, said: 'We are delighted to be taking part in Dubai Airshow 2021 and have the opportunity to display our technologies to the wider industry. We look forward to receiving high-level guidance from significant mentors in the field, to support us in achieving our goal of using cutting-edge Earth Observation satellite technologies to help improve life on Earth.'

Mohamed Shawky, the Founder and CEO of GeoDrones Aerial Services startup in Dubai, said: 'Our startup aims to provide superior quality drone commercial services as we see a great potential in drone technologies. We have a wide range of innovative ideas that are key for achieving a major transformation in the aerospace industry and we look forward to presenting these innovations to key experts in the field.'

Maximillian Buerger, Founder and Managing Director of Aviationfly startup, added: 'Exhibiting at the Dubai Airshow was an easy decision for us – the event will most likely be the largest aviation industry event of 2021 and the meeting point of aviation leaders from around the globe. Aviationfly is a United Arab Emirates headquartered startup, which similar to the Dubai Airshow connects different stakeholders in the aviation industry – our focus being the global pilot training ecosystem. The pandemic has significantly affected our industry but we used it as an opportunity to diversify our activities and are excited to be launching a new platform in time for the event in November.'

Several startups that launched in the last few years brought revolutionary innovations to the aerospace industry. One example is Heart Aerospace, which will deliver the first ES-19 electric airliner certified for commercial flight by 2026. Heart Aerospace's mission is to create the fastest, least expensive, and most sustainable mode of regional travel. Another example is Exodus Space Corp, a startup that aims to transform access to space through creating reusable AI-operated spaceplanes that can take off and land horizontally.

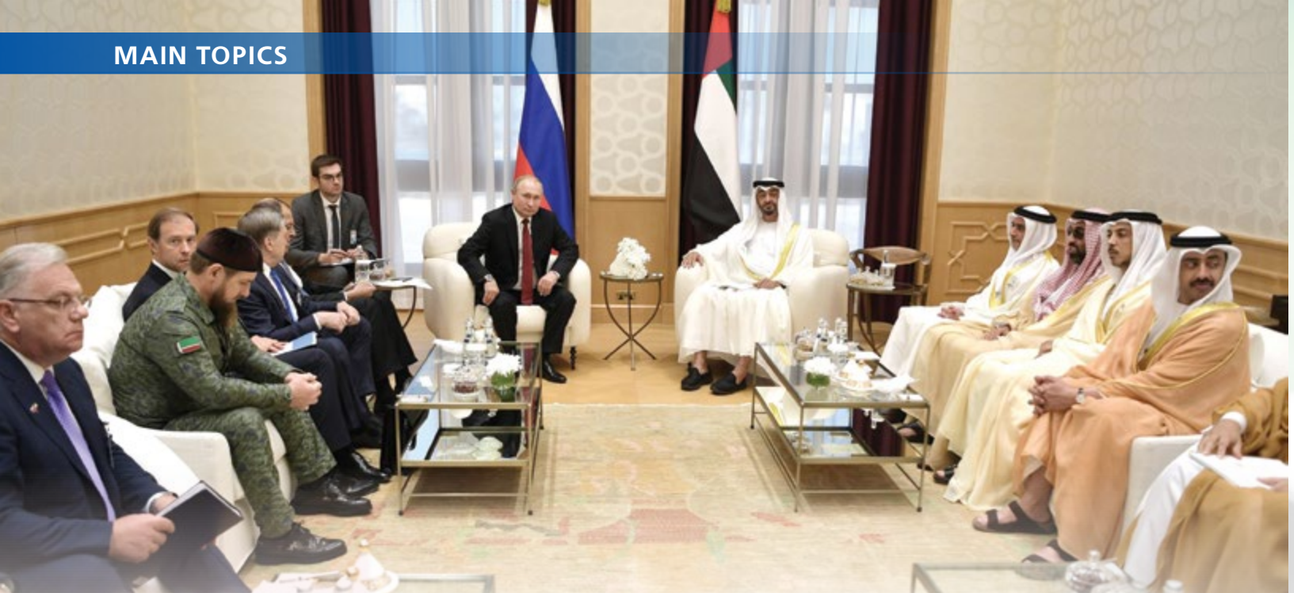
The aerospace industry has undergone an enormous transformation and development, making it one of the most lucrative industries within the startup ecosystem. In 2019, investments in aerospace startups reached nearly $1 billion. Moreover, in Q3 of 2020, the global aerospace company and late-stage venture capital SpaceX invested $1.9 billion in Space Technology startups, supporting the digital transformation of the aerospace industry.

One of the prominent startup accelerator in the aerospace industry is ATI Boeing Accelerator program, which invests in and accelerates up to 20 startups a year. The program targets startups creating sustainability solutions applicable to the UK's aerospace industry, offering a £100k equity investment. Intellegens, a startup that aims to use AI to accelerate innovation in advanced materials, chemicals, and drug discovery, was one of the startups selected for the ATI Boeing Accelerator.

VISTA will include startups from 12 different sectors, including Artificial Intelligence (AI), Future Mobility, Software, Space, Aerospace, Material Science, Cyber Security, Defence, Tourism, Robotics, Drones, and Sustainability. The startup hub will provide entrepreneurs with an unrivalled opportunity to connect with investors, partners, and mentors to launch, scale and grow their startups, and bolster the growth of the aerospace and defence industries in the region.

/IA&TG/

Returning for its 17th edition, Dubai Airshow will be held 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. The event will be 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.



HISTORICAL STATE VISIT

Vladimir Putin in the United Arab Emirates

Relations between the Russian Federation and the UAE are developing systematically and progressively, demonstrating a mutually beneficial partnership in a number of political and economic areas. This was evidenced by the state visit of Russian President Vladimir Putin, which took place in 2019 on the eve of the global crisis with COVID-19. The visit of Russian President Vladimir Putin to the United Arab Emirates was one of the largest political events in the world. In Qasr Al Watan Palace in Aby Dhabi, Vladimir Putin held talks with Crown Prince of Abu Dhabi and Deputy Supreme Commander of the United Arab Emirates Armed Forces Mohammed bin Zayed Al Nahyan. Let us recall the details of this historic event.

The official meeting ceremony between the President of Russia and the Crown Prince of Abu Dhabi took place before the talks. Topics on the agenda included the further development of bilateral cooperation in trade, the economy and investment as well as major international and regional issues.

A package of documents was signed following the talks. Memorandums of cooperation in energy and the peaceful use of nuclear energy were signed by the two countries' corresponding agencies. In addition, a concession agreement on the Ghasha oil field between LUKOIL and the Abu Dhabi National Oil Company, a cooperation agreement between the Russian Direct Investment Fund, LUKOIL and the Abu Dhabi National Oil Company and a framework agreement on strategic cooperation between Gazprom and the Abu Dhabi National Oil Company were signed, as well as a cooperation agreement between the Russian Direct Investment Fund and the Mubadala Investment Company, which implements national projects, including projects on artificial intelligence.

Later, Vladimir Putin and Mohammed bin Zayed Al Nahyan toured the exhibition of investment projects dedicated to cooperation between Russia and the UAE. The President of Russia and the Crown Prince of Abu Dhabi also took part in a meeting with representatives of business circles from Russia and the UAE.

In addition, the sides exchanged gifts. Vladimir Putin presented the Crown Prince with a white gyrfalcon and, in return, received a model of the Qasr Al Hosn Palace, former residence of the UAE President.

> ***'We highly value our achievements in various spheres. We believe that friendship and strategic partnership between our countries serve as reliable guarantees of the successful development and expansion of our cooperation.'***
>
> *Mohammed bin Zayed Al Nahyan*

> ***'We hope that Russian and UAE businesspeople will continue to develop their mutually beneficial trade and economic cooperation. The Russian government will fully support you.'***
>
> *Vladimir Putin*

Crown Prince of the Emirate of Abu Dhabi and Deputy Supreme Commander of the United Arab Emirates Armed Forces Mohammed bin Zayed Al Nahyan said: 'First, I would like to welcome His Excellency Mr President of the Russian Federation. It is a heartfelt welcome to the second country you are visiting – the United Arab Emirates. I would like to extend warm brotherly greetings from President of the United Arab Emirates His Highness Sheikh Al Nahyan.

We very much appreciate the high- and top-level visits that our countries have exchanged in recent years. I would like to emphasise the importance and the scope of strategic relations between the United Arab Emirates and the Russian Federation and also to reaffirm that our country prioritises the efforts to promote a dialogue and relations with Russia. Our countries maintain friendly relations, as well as diverse cooperation in all areas, which has yielded tangible fruit and includes positive economic indicators.

Dear brother and friend, I am happy to meet with you after more than a year since our last meeting in Moscow. I consider Russia to be my second home and I would like to once again thank you for the warm reception.

I would also like to express my gratitude to you for your commitment to strengthen the bonds of friendship and cooperation that we are tied together by – a friendship that exists between the peoples of the two countries and the governments of the two countries, as well as the personal friendship between the leaders of the two countries.

The United Arab Emirates is honoured that you are visiting this country and it is a historical visit. We would also like to reaffirm that our two countries are tied together by deep strategic relations. The United Arab Emirates sees brotherly, friendly and strategic relations with Russia as a priority.

Mr President, we welcome and appreciate our mutual desire to bring bilateral relations to the strategic partnership level. This agrees with our common vision and our common concept and, in keeping with this vision, we are poised to further strengthen this strategic partnership in the interests of our countries and peoples.

Mr President, I would like to praise the outcome of the 9th Russian-UAE Intergovernmental Commission Meeting, which was held ahead of your visit. I would also like to thank the Russian Government for its successful efforts to hold the third edition of Aqdar World Summit in September 2019.

Also, Mr President, I would like to express my gratitude and appreciation for your support for the project that the United Arab Emirates sees as a historical one – the space expedition, in which the first cosmonaut from the United Arab Emirates, Hazza Al Mansouri, took part. Sending the first ever cosmonaut from the United Arab Emirates to the International Space Station is a historical achieve-

'Russia-UAE relations have been growing significantly and developing in all areas in recent years. We would like to reaffirm our strong wish to strengthen and expand these relations in the interests of our nations.'

Mohammed bin Zayed Al Nahyan

ment that had long been a dream of the founder of our country Sheikh Zayed and it has come true.

Mr President, dear friend and brother, I would like to yet again welcome you and the high-level delegation that is accompanying you. Hopefully, this visit will leave a deep impression and will be a qualitative breakthrough in developing our strategic partnership and taking it to a new level. I am also looking forward to meeting you again before too long.'

President of Russia Vladimir Putin said: 'First of all, I would like to thank you for this invitation. I am really delighted to be once again in the hospitable land of the United Arab Emirates. I could see from the window of the car I was being driven in for the short journey from the airport how quickly your country is developing and how it is looking better and better.

Relations between Russia and the United Arab Emirates continue to develop successfully in a friendly and constructive manner in accordance with the Declaration on Strategic Partnership signed in Moscow back in 2018. We are expanding ties in the trade, economic, cultural and humanitarian fields and we are maintaining close coordination on major global and regional affairs, primarily regarding Syria, Libya, Yemen and the situation in the Gulf.

Our political dialogue is regular and substantial. Our foreign ministers are in close contact. We have developed cooperation between our security councils, special services and defence ministries. I would like to ask you to convey my best regards and to wish good health to the President of your country, Khalifa bin Zayed Al Nahyan.

We continue developing trade, economic and investment cooperation. Last year our trade amounted to $1.7 billion, having increased by 3.6 percent.

We are grateful for your personal support of the partnership between the Russian Direct Investment Fund and the Mubadala Investment Company that are jointly investing in the Russian economy. These investments have already reached $2.3 billion. Your Russian partners are not letting you down: profits from these investments are much higher than on the markets of other countries.

We continue investing and cooperating in start-ups, in the energy sector and in the peaceful nuclear development. We continue coordinating our efforts and policy on the global hydrocarbon market, in part, owing to the OPEC plus agreement.

We are now working together in the car industry. Our cooperation in space exploration has reached a new level. I would like to congratulate you once again on the successful flight of the first astronaut from the UAE to the International Space Station. This event became possible owing to our friendship and your efforts to promote this idea. We are ready to continue rendering the necessary assistance to the United Arab Emirates in space exploration, including in such fields as satellite navigation and launching space vehicles into space.

We are developing humanitarian ties. The UAE is a popular destination for Russian tourists. Last year the tourist flow increased by 23 percent. According to the Central Bank of Russia, our tourists spent over $1.3 billion in the Emirates, which is comparable with the scale of our trade. Mutual exemption of visa requirements is designed to expand contacts between our citizens. This intergovernmental agreement was signed at your initiative and entered into force last February. We will continue moving in this direction.'

President of Russia Vladimir Putin and Crown Prince of Abu Dhabi and Deputy Supreme Commander of the United Arab Emirates Armed Forces Mohammed bin Zayed Al Nahyan took part in a meeting with representatives of business circles of Russia and the UAE .

Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces Mohammed bin Zayed Al Nahyan said: 'We would like to note that we do our utmost to develop our bilateral relations. This visit of yours is clear proof of our deep

'Relations between Russia and the United Arab Emirates continue to develop successfully in a friendly and constructive manner in accordance with the Declaration on Strategic Partnership signed in Moscow back in 2018. We are expanding ties in the trade, economic, cultural and humanitarian fields and we are maintaining close coordination on major global and regional affairs.'

Vladimir Putin

friendship and strategic partnership that connect the Russian Federation and the United Arab Emirates.

We are also glad to welcome representatives of the two countries' largest economic operators, who make their contribution to strengthening and promoting bilateral strategic partnership, here at this table.

Russia-UAE relations have been growing significantly and developing in all areas in recent years. We would like to reaffirm our strong wish to strengthen and expand these relations in the interests of our nations.

During my last visit to Moscow, we discussed issues related to the development and expansion of economic and investment cooperation between Russia and the UAE. Today we will hear reports from several representatives of large businesses who will talk about new trends and new aspects in these relations, as well as new goals and tasks for the future.

I would like to note the high level of cooperation with the Russian Direct Investment Fund, with which we have built a truly strategic investment partnership.

We highly value our achievements in various spheres. We believe that friendship and strategic partnership between our countries serve as reliable guarantees of the successful development and expansion of our cooperation.'

President of Russia Vladimir Putin said: 'I believe it is very important to discuss Russian-UAE trade, investment and business cooperation. I have just had talks with Crown Prince of Abu Dhabi Mohammed bin Zayed Al Nahyan, where we focused on bilateral economic cooperation.

The United Arab Emirates is Russia's key trading partner in the Persian Gulf region and in the Middle East in general. Last year, trade grew almost four percent and reached $1.7 billion.

We have also succeeded in the investment sphere. The Mubadala Investment Company was among the first partners of the Russian Direct Investment Fund; over 45 projects worth $2.3 billion in total have already been implemented. The profit from them is significantly higher – sometimes three times as high – than the global standards. Investment is made in petrochemistry, transport and medicine.

Today we have made new deals; the projects are worth about $1.4 billion, and cooperation encompasses different areas. We are doing and will do everything necessary to help investors, including from the UAE, feel comfortable on our market.

There are new opportunities in digital technology, telecommunications, logistics, transport, finance, banking and, of course, energy. Let me note the effective work done by the joint enterprise of Gazprom Neft and Mubadala Petroleum to develop fields in the Tomsk and Omsk regions of Russia. LUKOIL is beginning to cooperate with the Abu Dhabi National Oil Company and has joined the oil and gas concession on the UAE shelf.

Our friends in the Emirates can count on Russia's cooperation in developing nuclear power generation. Rosatom offers its unique capacities, experience and advanced technology, which meet the highest standards, including in security.

Industrial cooperation is also expanding. We welcome our UAE friends as shareholders of the company that produces Aurus luxury cars.

We are ready to step up our cooperation in agriculture. Russia can cover the UAE market's demand for agricultural products and food, such as meat, including halal meat, and grains.

We are ready to continue joint work in space exploration.

Colleagues, friends, I have only outlined part of the wide range of opportunities for cooperation. We hope that Russian and UAE businesspeople will continue to develop their mutually beneficial trade and economic cooperation. The Russian government will fully support you.' /IA&TG/

FSMTC OF RUSSIA

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

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

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

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

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

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

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

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

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

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

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

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

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

– First of all, I'd like to note that Russia is second in the list of world top exporters of military purpose products. It is not a secret that part of our export is made up by aviation equipment; export of the equipment related to aviation varies in the range of 40-50% of the total volume. Of course, we positively appreciate this fact, and we wish exporters of other weapon types to achieve these figures as well.

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

It is important to participate in long-term programs, providing

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

technical support to our clients and creating maintenance stations with an understanding that many of our clients aspire to improve their own industry, for example.

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

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

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

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

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

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

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

– The experience of contemporary local conflicts demonstrates that the side which commands the more powerful air defences usually has an edge over the adversary. It is, therefore, only natural for Russia, which is a world-leading manufacturer of advanced air defence systems, to be looking to capitalise on this advantage in the global arms market.

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

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

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

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

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

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

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

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

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

ALMAZ – ANTEY TO TAKE PART IN DUBAI AIRSHOW

Almaz – Antey Corporation will take part in Dubai Airshow 2021, to be held in the UAE on 14-18 November.

Dubai Airshow will see the international debut of the Corporation's S-350E Vityaz SAM system and 98R6E Abakan non-strategic ballistic missile defence system, the latter intended against existing and future tactical and theatre ballistic missiles. The 98R6E comprises the 98L6E multifunctional radar and one or several 51P6E2 launchers. It is a reliable solution against the most dangerous ballistic targets and may be used both independently and as part of air-defence concentrations.

The Vityaz is intended to defend administrative, industrial and military facilities against mass strikes involving various types of contemporary and prospective air threats, including against concerted attacks from multiple directions at nap-of-the-earth to high altitudes.

Like the Abakan, the Vityaz can operate autonomously or may be integrated into the customer's air-defence system.

The Corporation will also demonstrate mock-ups of long- to short-range air-defence assets: the S-400 Triumf, Viking and Tor SAM systems.

Also showcased at the Corporation's stand will be the Sula space surveillance radar with a range of up to 6,000 km. The radar has a compact modular active phased array antenna and is operated from a computer command centre. Its modular design allows for prompt deployment.

Other topical exhibits will include the ROSC-1 radar/optical system intended for guarding facilities and neutralising enemy drones. The system detects, tracks and counters drones with the use of advanced radio-controlled interceptors. It can also be used for monitoring the bird situation around airfields. It includes the Wolf-18 UAV, which can be used against intruder drones around airports whenever electronic countermeasures are not an option. The system will be of interest to law-enforcement agencies and special services.

The Corporation delegation at the Dubai exhibition will include representatives of five subsidiary companies: NPO Almaz, Ulyanovsk Mechanical Plant, Izhevsk Electromechanical Plant Kupol, Dolgoprudny Research Production Enterprise and Radiofizika.

At Dubai Airshow 2021 Almaz – Antey representatives will hold a number of business meetings and negotiations. They will brief potential customers on the Corporation's capabilities related to the development, production, aftersales support, modernisation and repairs of air-defence assets. Videos, presentations and various other information materials will be used to familiarise potential clients with the Corporation's product range.

Almaz – Antey Corporation, one of the Russian defence industry's largest integrated groups, comprises over 60 hi-tech enterprises. The Corporation employs more than 130,000 personnel. Its products are exported to over 50 countries.

Almaz – Antey General Director Yan Novikov stressed in the run-up to the exhibition that, apart from ensuring Russia's defensive capacity, the Corporation's key objective is to expand its presence on the international arms market, thus not only strengthening its positions with regard to military technical cooperation but also enhancing Russia's image as a reliable supplier of advanced air-defence systems and weaponry solutions. According to Novikov, the Corporation's traditional participation in the world-renowned Dubai exhibition undoubtedly brings its fruit: 'We hope that this time, too, we will manage to reach new mutually beneficial agreements which will help the Corporation to secure new contracts and benefit our customers' security and peace.'

Yan Novikov also noted that Almaz – Antey not only develops and manufactures exclusive defence products in support of its clients' security and sovereignty but also, as a subject of military technical cooperation, has the right to independently supply products to foreign customers. **/IA&TG/**

TOR-M2KM
AUTONOMOUS MODULE

TOR-M2KM AUTONOMOUS MODULE

The best choice for point air defences

Aerial strikes have remained among of key war threats for over a century now, but the nature of that threat has recently changed in a major way. Unmanned aerial vehicles and precision munitions are playing an ever more significant role. In fact, UAVs nowadays puck a striking punch incomparable to their small size and low cost, as illustrated by the attacks on the oil refineries in Abqaiq and Khurais and also by the recent Armenian-Azerbaijani conflict.

Aerial strikes have remained among of key war threats for over a century now, but the nature of that threat has recently changed in a major way. Unmanned aerial vehicles and precision munitions are playing an ever more significant role. In fact, UAVs nowadays puck a striking punch incomparable to their small size and low cost, as illustrated by the attacks on the oil refineries in Abqaiq and Khurais and also by the recent Armenian-Azerbaijani conflict.

These factors are affecting the structure of air defences. Short- and medium-range surface-to-air missile systems, though indispensable against manned aircraft and tactical ballistic missiles, have proved suboptimal against low-flying UAVs and precision munitions. Whatever the case, interception of low-flying airborne threats is only possible within the radio horizon. This factor is turning short-range SAM systems into an important component of air defences, at least as regards the cost/effectiveness ratio. In fact, the buying price and operating cost for such an asset may vary depending on the operational environment. For example, SAM systems defending stationary facilities such as military bases and airfields do not require a chassis, which contributes significantly to the system's price tag.

One example here is the Tor-M2KM autonomous combat module manufactured by Izhevsk Electromechanical Plant Kupol (a subsidiary of Almaz-Antey Corporation). The module only weighs 15 t (against the tracked version's 37 t), which both substantially reduces its cost and simplifies transportation. The Tor-M2KM can actually be transported by a helicopter (to be deployed in difficult-to-reach areas), whereas airlifting the baseline variant requires a heavy transport aircraft. The autonomous module may also be transported on any overland platform with a payload capacity from 30 t; its loading by a crane capable of lifting at least 25 t takes just 10 minutes. The successful 2016 sea trials on board the frigate Admiral Grigorovich demonstrated that the module could be used for rapid build-up of air-defence capability for individual ships and vessels or convoys.

The Tor-M2KM has the same reconnaissance and firepower capabilities as the Tor-M2U baseline; and its effective range is actually somewhat greater thanks to the use of the 9M331D missile instead of the 9M331. It should be noted that Kupol adheres to a responsible marketing policy, so always provides the guaranteed parameters in technical specifications even though the actual performance may be much higher.

The target detection range of 32 km is more than enough for meeting the air-defence objectives within the system's area of responsibility. The tracing of targets travelling at altitudes of 100 m and higher is possible from a distance of 27 km; for targets flying at 50 to 100 m, from 24 km. The target acquisition radar's antenna completes one full rotation every second (that is a world record), allowing for a high data refreshment rate and prompt reaction to any changes in the airspace situation.

The guidance radar ensures the locking of up to four missiles onto four different targets simultaneously (provided that the targets are situated in a sector of 30ox30o relative to one another). The system automatically tracks standard targets from a distance of 22 km.

Reaction times between target detection and missile launch vary from five to 10 seconds depending on the target's course. Each system is armed with eight 9M331D missiles.

The system features protection from active interference generated by special assets with power density of 3,000 W/MHz, from the target's own active interference with power density of 3 W/MHz, from the range gate pull-off tactic and from passive countermeasures with a density of two clusters per 100 m (each cluster measuring 100 m2). It should be noted that during tests conducted by the Hellenic Air Force, Nato troops were not using countermeasures against Tor family SAM systems. The same result was achieved during tests with the use of Russian electronic warfare assets.

The system's kill area for targets with a radar cross-section of 1m2 and higher travelling at up to 300 m/sec is between 1 and 15 km in range, between 0.01and10 km in altitude and ±8 km in the ground track parameter. If travelling at 600 m/sec, the kill area for similarly sized targets is somewhat smaller, with an altitude of up to 7 km and a ground track parameter of up to ±7 km. The kill area for precision munitions with a radar cross-section of ≥0.1 m2 travelling at 700 m/sec is 1.5 to 7 km in range, 0.05 to 6 km in altitude and ±6 km in the ground track parameter. Representatives of the Belarusian army, which operates Tor-M2K systems of comparable firepower and target detection capability, say they are capable of engaging targets travelling at up to 1 km/sec (i.e. projectiles of the Grad MLRS).

Deployment times are among the most important parameters for any SAM system. The Tor family, including the Tor-M2KM, are unsurpassed in this sense. They are prepared for operation within three minutes, against 10-15 minutes for comparable Western short-range SAM systems and 30 minutes for the Patriot system. In other words, if the air surveillance radar detects an aerial target of the Bayraktar TB2 class (with a maximum airspeed of 220 km/h) at a distance of 30 km, the Tor-M2KM will be able to intercept the target early on. By contrast, the IRIS-T SLS, whose deployment time (10 minutes) is the best among the contemporary Western short-range SAM systems, will only be able to intercept the UAV in immediate proximity to the guarded facility, whereas the Patriot will have no time to react to the threat at all. This was demonstrated during the attack on the oil refineries in Abqaiq. Back then Western analysts suggested that the local air defence assets' failure to react was explained by the low skills of their crews. However, even with the highest level of skills a UAV travelling at 200 km/h needs to be detected at over 100 km away for a Patriot system to have enough time to engage it. Given the UAV's size and altitude, this would require setting up an entire radar early warning system. Point air defences based on the Tor-M2KM are devoid of such problems if they are augmented with an air surveillance radar such as the Nebo-SVU.

The aforementioned parameters are relevant to the Tor-M2KM which is based on the Tor-M2U, the penultimate upgrade level for the Tor family. Given an interested customer, the Kupol designers will undoubtedly be able to promptly come up with an automated combat module version of the latest Tor-M2 system, whose specifications are considerably better with an effective altitude of up to 12 km and the target's maximum airspeed at 800 m/sec. The Tor-M2's computer screen shows information about the airspace situation outside the range of the system's radar, including with the radar switched off. The latter factor significantly improves the system's stealth and allows for ambushing aerial threats.

All this shows that the Tor-M2KM autonomous combat module is an optimal point air defence asset capable of effectively protecting key military and administrative facilities from contemporary and future aerial threats.

/IA&TG/

UNIVERSAL BRAHMOS

Redefining Modern Warfare

The development and evolution of modern precision-guided weapons has completely revolutionised warfare strategies and tactics of 21st century. The capability and lethality of such weapons to undertake high-value combat missions with speed, precision and power has made them a highly sought-after asset for a nation aspiring to build up a powerful and formidable military force.

Supersonic cruise missile BRAHMOS – the 'unparalleled leader' among worldwide precision strike weapons – has strengthened its position over the years owing to its incredible features of speed, accuracy, deadly firepower, stealth and universality. A finest product of high-technology military cooperation between India and Russia, BRAHMOS has charted a spectacular journey since its inception over two decades ago.

Initiated as a Joint Venture (JV) military programme between India's DRDO and Russia's NPO Mashinostroyenia (NPOM) on February 12, 1998, the tactical missile, designed and developed by the JV entity BrahMos Aerospace, has come a long way, charting milestones after milestones. Rightfully reckoned as the world's fastest, best and deadliest precision-guided missile, BRAHMOS has evolved from being an anti-ship weapon to a multi-role, multi-platform system that has proved its dexterity and formidability in over 80 test firings, having set the highest success rate no other weapon has ever recorded in the world.

Today, BRAHMOS has made India only nation in the world in possession of a supersonic cruise missile triad, ensuring the Indian Defence Forces' formidable capability to undertake modern-day, highly complex combat operations from across the spectrum of warfare. The tactical weapon has been successfully deployed by the Indian Army, Navy and Air Force on their frontline platforms.

Since its maiden successful test firing conducted on 12 June, 2001 from a land-based launcher in anti-ship mode, to subsequently being developed and tested in land-to-land, land-to-sea, sea-to-land, sea-to-sea, subsea-to-land, air-to-sea and air-to-land configurations, the state-of-the-art BRAHMOS missile has completely redefined new-age technology involving missile science and aeronautics.

Capable of cruising at a top speed of Mach 3, the 3-tonne missile can operate in hi-low trajectory and instantly hit on its target with very high precision without giving any time or scope to the adversary's air defence system to react. The immense kinetic energy released by the powerful weapon can completely decimate high-value enemy targets within a very short time. It has also established its 'salvo' launch capability wherein more than one BRAHMOS can be fired in quick succession in one or different directions to knock down single or multiple enemy targets and positions.

According to Dr. Sudhir K Mishra, DS & DG (BrahMos), DRDO, and CEO & MD of BrahMos Aerospace, 'BRAHMOS is a well-proven weapon having no parallels in the world. We are proud that we have developed such a uniquely powerful system which has evolved over the years and impeccably proved all its capabilities in successful test firings conducted in the most divergent modern combat scenarios as and when required by the Indian Defence Forces. Our missile is undoubtedly the ultimate 'force multiplier' for modern network-centric warfare operations.'

The Indian Navy in 2005 became the first force to deploy BRAHMOS on its large guided missile destroyers to undertake maritime combat missions. The naval variant of the weapon continued its evolution thereafter to further bolster and expand the Navy's strike capability and outreach from both littoral and high-sea zones. The missile offers wide-ranging strike options – sea-to-sea, sea-to-land, coast-to-sea and subsea-to-land – in modern, multi-threat maritime environment. Indian Navy has deployed the missile as the 'prime strike weapon' on its frontline destroyers and frigates.

In its anti-ship configuration, BRAHMOS can cruise at a very low trajectory above the sea-surface and can launch surprise attacks on enemy positions. Also deployed in land-attack configuration on Indian warships, the missile has proved its power to engage targets deep in-land from stand-off ranges. An underwater variant of the weapon system has also been successfully tested in 2013, thus validating its flexibility to be integrated onto conventional attack submarines in future.

BRAHMOS has also proved its capability to be fired from a static or mobile naval platform in solo or salvo mode in vertical or inclined configurations to engage single or multiple targets located in different directions. During a number of flight tests conducted from India's surface combat ships, the formidable weapon has proved its deadly prowess to directly strike on a target with pin-point accuracy, and completely obliterated it in few seconds.

The most recent successful test firings involving BRAHMOS anti-ship configuration were conducted by the Indian Navy from two of its large missile destroyers off India's western and eastern sea coasts on 18 October, 2020 and 1 December, 2020. Like all previous 'text-book' launches, the latest missions once again proved the weapon's deadly combat capability to precisely engage and annihilate the naval target at maximum range.

BRAHMOS land-attack version has been deployed with the Indian Army since 2007. This variant has also been improvised and enhanced over the years and deployed in advanced Block I, II and III versions for divergent and complex land warfare operations.

On 22 November, 2017, the highly advanced air-to-surface configuration of BRAHMOS made a world-record feat when it was successfully test fired for the very first time from the Russian-origin Sukhoi-30MKI combat aircraft of the Indian Air Force (IAF) against a sea-surface target off India's eastern coast. This illustrious mission made India the first and only nation in the world in possession of a 'supersonic cruise missile triad.'

The highly coveted BRAHMOS air-launched weapon development programme was jointly undertaken by the scientists and engineers of India and Russia who modified the original anti-ship BRAHMOS configuration so as to integrate onto the Sukhoi-30 air combat platform. After validating its capability to engage naval targets from large, stand-off ranges in day & night and all-weather conditions, the formidable BRAHMOS-ALCM (air-launched cruise missile) subsequently proved its power to accurately engage and neutralise strategic land target during a successful test launch mission conducted by the IAF from India's Car Nicobar Islands on 22 May, 2019.

On 20 January, 2020, the IAF raised the 'TigerSharks' squadron consisting the BRAHMOS-armed Su-30MKI strike fighter to keep a 'strategic vigil' over the Indian Ocean Region (IOR) ensuring peace, tranquillity and prosperity. Today, BRAHMOS ALCM has become the world's most powerful conventional air-borne weapon system in terms of its outreach, lethality and combat capability.

Having recorded all these illustrious milestones to its credit, the 'universal' BRAHMOS has thus garnered a lot of interest among many nations across the world who are willing to acquire this powerful weapon for their military.

BrahMos Aerospace, meanwhile, has also initiated work on more advanced, futuristic variants of BRAHMOS, including a miniature version to be called BRAHMOS-NG (next-gen) which, owing to its smaller, smarter, stealthier dimensions, would be integrated onto a wider number of modern military platforms in near future.

/IAATG/

MAKS-2021

The hybrid format and export success

The 15th International Aviation and Space Salon MAKS-2021 held on July 20-25, 2021. The hybrid format of the event allowed us to bring the business program and international participation to a new level. The Salon took acknowledgement as the largest business event: the amount of contracts and letters of intent reached RUB 265 bn. During six open days the air show welcomed more than 135 thousand participants and guests.

Vladimir Putin attended MAKS-2021

MAKS-2021 was officially opened by President of the Russian Federation Vladimir Putin. In his welcome speech for the participants and guests of the air show Vladimir Putin emphasized that MAKS fully meets its high international status despite the difficulties caused by the coronavirus pandemic. The partner country of MAKS-2021 was the Republic of Kazakhstan, which takes part in the implementation of mutually beneficial projects with Russia in the field of aviation and astronautics, including the assembly of helicopters of Mi family and a joint project Baiterek on launch services from the Baikonur Cosmodrome. V. Putin emphasized that Russia is certainly open to cooperation in the field of aviation and astronautics with all countries.

The President of Russia highly appreciated the new products presented at the show. 'Everything that we can see in Zhukovsky today shows vividly that Russian aviation has an impressive development potential, and that the national aircraft industry continues to create new competitive aviation products, he said. – Russian air carriers are acquiring modern Superjet airliners. The brand-new MC-21 passenger airliner is to start flying soon. The current Aviation and Space Salon MAKS features its modified version with a Russian-made PD-14 engine for the first time. This aircraft will be followed by Il-114-300 regional airliner, the Baikal light-engine multipurpose aircraft and the long-awaited new helicopters. I am confident that modern, efficient and safe Russian-made aviation products will help domestic airlines to meet the growing demand for flights and hold decent place in the world market and thereby fortify Russia's positions as one of the recognized aerospace industry leaders'.

The opening ceremony was followed by a tour to view the exhibition. Vladimir Putin took a look at promising domestic aircraft, in particular, the light multipurpose aircraft LMS-901 Baikal, the helicopter Ka-62, a specialized helicopter for offshore operations Mi-171A3, the upgraded helicopters Ansat-M, Ka-32A11M, unmanned helicopter VRT300. The Russian president also came on board of the Sukhoi Business Jet. The head of state inspected the state-of-the-art light tactical aircraft developed by Sukhoi (part of the United Aircraft Corporation of Rostec State Corporation). After visiting the exhibits and viewing the demonstration program Vladimir Putin held a meeting on the implementation of key projects in the field of civil aircraft engineering.

Export contracts worth over €1 billion

'Rosoboronexport has leveraged the full potential of MAKS-2021 by signing 13 export contracts worth over €1 billion for the supply of Russian military products on the sidelines of the air show,' said Alexander Mikheev, Director General of Rosoboronexport. 'Following the results of MAKS-2021, the Su-30SME fighters, Mi-35M and Mi-17V-5 helicopters, the Protivnik-GE radar, Verba MANPADS, as well as advanced air weapons, a number of armored and automotive vehicles have been added to the company's order book and Russian defense manufacturers' production plans.'

In Zhukovsky, Rosoboronexport held presentations of the major promoted aircraft, helicopters, air defense and electronic warfare systems for more than 30 delegations from 20 countries. During the negotiations at MAKS-2021, the company's foreign partners expressed interest in acquiring MiG-35D and Su-30SME fighters, IL-76MD-90A(E) military transport aircraft, IL-78MK-90A tanker aircraft,Mi-28NE and Ka-52 attack helicopters, Mi-171Sh military transport and Ka-226T multi-purpose helicopters, as well as air defense systems, including the Pantsir-S1 SPAAGM system.

In the course of talks on the sidelines of the air show, Rosoboronexport discussed industrial partnership in the field of joint and licensed production of Russian combat aircraft and helicopters, as well as modernization of previously delivered aircraft equipment with customers from the Asia-Pacific region, the Middle East, Latin America, Africa and the CIS.

'Needless to say, Rosoboronexport's partners became interested in the newest Checkmate light tactical aircraft unveiled by Rostec at MAKS-2021. A number of customers were shown its prototype and even given the opportunity to sit in its cockpit. They praised its characteristics,' Alexander Mikheev added.

In addition, Rosoboronexport and Technodinamika signed joint programs to promote parachute equipment and research and development services in the external market. The signing ceremony was attended by Russia's Deputy Prime Minister Yuri Borisov, Minister of Industry and Trade Denis Manturov and Rostec CEO Sergey Chemezov.

MAKS-2021 exhibition program

The MAKS-2021 air show took place in the context where the opportunities for an international presence were significantly limited by the pandemic of a new coronavirus infection. Despite all the stress factors, the exhibition retained a large-scale representation of both Russian and foreign companies. The exhibits represent 538 Russian companies and 91 foreign participants from 20 countries. A real feat for MAKS was its hybrid format that allowed attracting 202 foreign companies from 53 countries. Thus, the exhibition was attended by 831 exhibitors from 56 countries.

The leaders of Russian aerospace industry and the world's largest manufacturers presented their products on an area of 105,000 square meters in the pavilions, outdoor areas and aircraft aprons. In particular, the pavilion of partner country – the Republic of Kazakhstan hosted stands of 11 companies and organizations on 750 square meters. Also, more than 1000 square meters were offered for national expositions of Belgium, Germany, Iran, Canada, the Republic of Belarus France and the Czech Republic.

MAKS-2021 has become the venue for premiere shows on a global scale. The state-of-the-art Checkmate light tactical aircraft has excited roaring interest. For the first time ever the MC-21-310 medium-haul air liner, equipped with domestic PD-14 engines, was presented to the general public. The premiere of MAKS was regional turboprop IL-114-300. One more novelty was the Baikal light multipurpose aircraft. Russian Helicopters Holding Company presented upgraded Mi-171A3 helicopters for operation on offshore oil platforms, Ka-32A11M with an upgraded aircraft propulsion, new avionic equipment and SP-32 fire-fighting system, and Ansat-M with an extended flight range. United Engine Corporation presented the projects of VK-650V and VK-1600V shaft-turbine engines, and a demo version of PD-8 engine core, designed for use in SSJ-New aircraft propulsion.

Foreign aircraft producers exhibited their products, including those never demonstrated in Russia before. The show premiers included wide-body long-haul Airbus A350-1000, medium-haul Airbus A220-300, turboprop Pilatus PC-12NGX. For the first time ever the US Company – Cirrus took part in MAKS with a presentation of two aircraft.

Special exhibits were dedicated to business aviation (the number of participants in 2021 doubled as compared to 2019) and so-called general-purpose aviation (with the demonstration of 65 aircraft as compared to 46 two years earlier).

Business Program

The business program of MAKS-2021 extended its scale as compared to previous air shows. The International Aviation and Space Salons are unparalleled in the world in terms of their intensity, breadth of topics covered and the high status of the participants. Over 100 conferences, workshops, round tables and strategy sessions were held during the exhibition. More than 350 reports were

delivered here. Over 3,000 specialists attended the events at the MAKS Congress Center and about 2,000 more joined the discussions at the Future Hub Congress Hall. An innovation for 2021 was the live streaming of events. About 33 thousand people were watching the show through live streaming on the official website of the air show.

The Future Hub section, first open in 2019, has had a strong development. Its platform was widely used for presentations, discussions, and career guidance events. An integral part of the section activities was a large-scale youth program, which included the Student's Day organized for the fourth time. On Friday, August 23, about 4 thousand full-time students of higher and specialized secondary educational institutions took the advantage of visiting the exhibition for free. A large-scale program in 2021 was organized by the Sistema Charitable Foundation, which made a presentation of its flagship career guidance project Lift to the Future. Broadcasts of speeches of special guests, live reports from MAKS-2021, online quiz and other events gathered more than 1 million views on the channel of the project.

High status of MAKS as a large-scale trade exhibition is evidenced by the amount of signed contracts and agreements for the supply of aircraft estimated at 265 billion rubles in 2021. Major agreements relate to the supply of Sukhoi Superjet 100, Il-114-300 aircraft and Mi-8AMT, Mi-38PS, Mi-171A3 helicopters. The Kazakhstan Aviation Industry Company acquired 20% of Baikal-Engineering, the developer of the light multipurpose aircraft. Novikombank, the general financial partner of the Salon, signed cooperation agreements with the largest Russian aircraft manufacturers.

Demonstration program

The eventful flight program is a landmark of the MAKS air show. During the MAKS-2021 days the aerobatics groups of the Russian Aerospace Forces – Russian Knights, Swifts, Russian Falcons and Berkuts demonstrated their airmanship. The new discovery of the demonstration pro-

gram was a bright performance of the Indian aerobatic team Sarang on four Dhruv helicopters. The audience welcomed The First Flight group as goods friends. The program performed by Svetlana Kapanina won the plaudits of the audience.

All in all, 80 aircraft took part in the flight program, including 39 aircraft with eight aerobatic teams. 133 aircraft were displayed on the aircraft aprons of MAKS 2021. Given that some airplanes and helicopters were demonstrated both on aircraft apron and in flying display, there were totally 202 aircraft demonstrated during the show.

A high level of flight safety was ensured by highly professional work of the members of the inter-departmental commission, specialists of the M.M. Gromov Flight Research Institute, JSC Aviaprom and JSC Aviasalon.

General issues

The 2021 Salon was held in the context of the current outbreak of a new coronavirus infection, which could not but affect the number of visitors who attended the exhibition. During six days, MAKS-2021 welcomed 135,020 aviation professionals and visitors fond of aviation.

Of particular relevance was the organization of transportation, considering the need for social distancing in buses and electric trains. 289 units of rolling stock were scheduled for six special routes from platforms Otdykh and Eseninskaya, Zhukovsky airport, car parking P7 and points in Zhukovsky town. Railway service organized by the Central Exurban Passenger Company operated with shortened intervals with additional electric trains. Guests arriving by car enjoyed 10 thousand parking places in the territory of the exhibition complex.

A substantial assistance in conducting MAKS-2021 events provided 122 volunteers of the Russian Union of Youth. They worked in car parking areas, at checkpoints and in the aircraft apron area. In addition, 50 volunteers invited by the Sistema Charitable Foundation helped with implementation of the business program, the operation of congress center and the Future Hub section, interacted with media representatives on the media platform and in the press center, and organized distribution of printed materials.

During MAKS-2021, social and anti-terrorism security in the territory of Gromov Flight Research Institute and the municipal district of Zhukovsky was ensured by 2000 policemen and servicemembers of Federal National Guard Troops Service. The surveillance over the territory of the exhibition complex was carried out from the air with an air-balloon.

The MASK-2021 organizers granted accreditation for more than 2600 journalists from 485 Russian and 94 foreign media. This acknowledges the high level of interest in aeronautics and space on the part of leading media outlets. The exhibition events were watched by 328,000 people on the official web-site of MAKS. The social media outreach of the MAKS air show during the six days of the exhibition is estimated at 2.1 million users.

Domestic parachutes in external markets

During the MAKS-2021 International Air Show, Technodinamika JSC and Rosoboronexport JSC, both are subsidiaries of the Rostec State Corporation, signed programs to jointly promote airdrop equipment and research and development activities in external markets. The signing ceremony was attended by Russian Deputy Prime Minister Yuri Borisov, Minister of Industry and Trade Denis Manturov and Rostec CEO Sergey Chemezov.

'Technodinamika is Russia's flagship developer and manufacturer of various parachute systems. The holding company carries out the full cycle of development, from research to manufacturing, testing and modification. Today, the Russian Army is 97% equipped with Technodinamika-produced parachutes, they are used in the armed forces and special forces units of the CIS countries, the Middle East and Rosoboronexport's key partners on the African continent. The joint promotion program will enable us to strengthen Russia's positions in this segment in the markets of 24 countries in the Asia-Pacific region, Sub-Saharan Africa, Europe and the CIS,' said Alexander Mikheev, Director General of Rosoboronexport, who supervises the Yaroslavl and Saratov regional branches of the Russian Engineering Union.

The joint action program, signed during a solemn ceremony at Technodinamika's pavilion, implies that the holding's airdrop equipment, designed to equip special forces units of various law enforcement agencies, rescue parachute systems required for emergency abandonment of military aircraft and helicopters, as well as braking landing systems used to shorten the landing distance or rejected take-off distance of combat (combat training) aircraft, will be promoted in external markets.

In addition, Technodinamika and Rosoboronexport will promote training facilities, parachutist training centers and special simulators intended for classroom training and practical exercises of parachutists and paratroopers, including emergency drills. Such facilities can be made for any type of parachute, with their help it is possible to practice group jumps using controlled parachute systems, emergency situations, including failures, under any weather conditions.

'Technodinamika's parachute systems meet international standards and surpass foreign counterparts in many respects. A number of the holding's competencies and capabilities are unique. So, Technodinamika is the sole holder of the authentic documentation for brake parachutes used on all Russian- and Soviet-made aircraft, which means that only our systems are licensed. I am sure that with the support of Rosoboronexport, we'll be able to strengthen our positions on the international market,' commented Igor Nasenkov, Director General of Technodinamika Holding, who supervises the Ulyanovsk and Penza regional branches of the Russian Engineering Union, a member of the bureau of the League for Assistance to Defense Enterprises.

Another document signed by Technodinamika and Rosoboronexport at MAKS-2021 is a program for promoting research and development activities carried out by the holding's enterprises for foreign customers.

'Industrial partnership is a leading trend in the global arms market. A number of Rosoboronexport's strategic customers see further development of our cooperation precisely in building up the high-tech component, and we are ready to cooperate on the topic. The company carries out hundreds of technology transfer projects and has vast experience in implementing such contracts in various forms. These are licensed production of Russian products abroad, assistance in the construction of special facilities in foreign countries and joint development of prototypes with foreign customers,' Alexander Mikheev added. /IAATG/

DEFEA 2021: HIGH RESULTS AND PROSPECTS

DEFEA 2021 was globally the first covid-free defence exhibition that took place in total compliance with all safety measures and health protocols, creating efficiently through excellent organisation and planning a safe environment for networking and cooperation. Metropolitan Expo, the largest and most advanced exhibition centre in Southeast Europe, hosted highly specialised visitors from 53 countries representing the most important private and state-owned companies in the world, offering top-tier services and facilitations. The combined Russian exposition at the exhibition was presented by Rosoboronexport.

Inaugurating DEFEA 2021, the Greek Minister of National Defence, Mr. Nikolaos Panagiotopoulos underlined that the exhibition 'is a platform for international contacts, industrial cooperation and exchange of information on modern technological developments'. He also added: 'There is no doubt that the exhibition will present the most advanced systems that global defence market can provide, proving once again that the evolution of defence systems is a 'driving force' for technology.'

The largest and most prominent defence industries around the world participated as exhibitors showcasing their latest technologies and the defence systems that will prevail in the future. Impressive national pavilions with state of the art products and equipment and private companies with the most advanced solutions in every category of the defence and security sector covered the halls of the exhibition centre offering to visitors and officials an integrated view of the capabilities of modern military technology.

The official delegations that visited DEFEA were comprised of political and military leaders of the highest level, invited by the Hellenic Ministry of National Defence. The countries that were represented through official presence were: Albania, Algeria, Armenia, Austria, Bahrain, Bosnia-Herzegovina, Bulgaria, Canada, Croatia, Cyprus,

Czech Republic, France, Georgia, Germany, Hungary, Indonesia, Jordan, Iraq, Israel, Italy, Netherlands, North Macedonia, Pakistan, Philippines, Portugal, Republic of Korea, Rwanda, Romania, Russia, Saudi Arabia, Slovakia, Slovenia, Spain, United Arab Emirates, United Kingdom and United States of America.

During the exhibition, leaders of the delegations had important meetings with the Greek hosting Minister of National Defence, Mr. Nikolaos Panagiotopoulos, and the Hellenic military leadership led by the Chief of the Hellenic National Defence General Staff, General Konstantinos Floros.

A roundtable discussion about the European Defence was carried out, in which the Ministers of Defence of Slovenia, Mr. Matej Tonin, of Portugal, Mr. Joao Gomes Cravinho, and of Cyprus, Mr. Charambos Petrides commented. The discussion was coordinated by the Executive Director of European Defence Agency (EDA), Mr. Jiri Sedivy, while the Commissioner of Internal Market, Mr. Thierry Breton greeted through video message. The event was streamed live through the official channel of Hellenic Ministry of Defence and the social media with the presence of the Greek Deputy Minister of National Defence, the Chief of the Hellenic National Defence General Staff and the Chiefs of the three branches of the Hellenic Armed Forces.

The procurement programme of the Hellenic Navy of 4 new frigates, as well as the parallel solution and the upgrade of in-service frigates was again at the centre of general interest. Mr. Nikolaos Panagiotopoulos, referred to the programme, emphasising: 'We are going to purchase four frigates that we believe it is necessary some of these ships to be built in Greek shipyards and we must work for that. Not only to have them built in our shipyards, but to have more defence industries that will take part in their construction. One of our two

shipyards, the 'Hellenic Shipyards' of Skaramagas, was acquired by a group of businessmen, led by a Greek shipowner. I think this will give a boost to the domestic shipbuilding industry, beyond the problems of the past'. Regarding the development of Greek shipbuilding industry, the Greek Minister of Development and Investments spoke in a related conference in front of an international specialised audience.

In parallel with the exhibition, an impressive static display was organised at the nearby international airport of Athens, in a specially designed area. The airport static dispay was comprised of multi-role aircrafts and helicopters, with highlights an AH-64 Apache attack helicopter, a S70 Aegean Hawk naval multi-mission helicopter, a tactical transport NH90 helicopter and an OH-58 Kiowa helicopter for armed reconnaissance.

'Rosoboronexport notes with great satisfaction the systematic effective work with Greek partners despite the serious restrictions associated with the manifestations of unfair competition on the part of most European countries. The company is now fulfilling its obligations under the previously signed contracts. The partner has no problems with after-sales service of the supplied Russian naval equipment and air defense facilities. Rosoboronexport looks forward to expanding military and technical cooperation both with Greece and other friendly European countries participating in the exhibition,' said Rosoboronexport Director General Alexander Mikheev.

At DEFEA 2021 the representatives of the land forces of Greece and delegations of other countries were shown new small arms – Kalashnikov AK-15 and Kalashnikov AK200 series assault rifles, Kalashnikov Pecheneg machine gun and 12.7 mm 6P50 machine gun. In addition, the visitors of the exhibition were shown the T-90S tank and BT-3F armored personnel carrier in the form of models at the Rosoboronexport stand.

European partners showed increased interest to the modernized self-propelled howitzer Msta-S for the 155 mm NATO caliber, the Khrizantema-S and Kornet EM anti-tank systems, a 300 mm Tornado-S multiple launch rocket system and also the 57 mm A-220M remote controlled combat module.

The Rosoboronexport stand also displayed samples of thermal imaging scopes Phobos, Atlas, Deimos, and Titan, which Rosoboronexport promotes on the world market under the INFRATECH trademark.

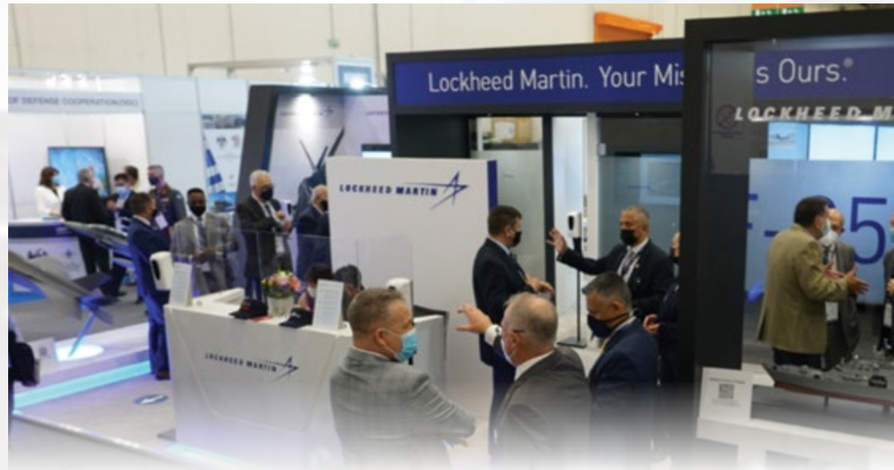
The most promising models for the air forces on the regional market are the Yak-130 combat trainer, the Su-35 multipurpose super maneuverable fighter, the MiG-35D dual-seat multifunctional front-line fighter and the Il-76MD-90A(E) military transport aircraft.

The exhibition provided detailed information about the Orion-E unmanned aerial vehicle, which Rosoboronexport began to promote to the world market in a reconnaissance and strike variant.

At DEFEA 2021 Rosoboronexport also presented a wide range of Russian military helicopters. Visitors could see models of combat helicopter Mi-28NE, and get detailed information about the multipurpose helicopter Ka-226T, combat reconnaissance attack helicopter Ka-52, transport-combat helicopter Mi-35M, military transport helicopters Mi-17B-5, Mi-171Sh and radar surveillance helicopter Ka-31.

The Russian Navy also presented the frigate Gepard-3.9, corvette Project 20382 Tiger, high-speed transport and amphibious boat BK-16E and high-speed assault boats BK-10, BK-10M and BK-9. Rosoboronexport also presented Project 636 and Amur-1650 diesel-electric submarines as well as P-750, Piranha and Piranha-T small submarines. For coastal zone defense the company showed modern coastal missile systems Rubezh-ME and Bastion with anti-ship cruise missile Yakhont.

Rosoboronexport demonstrated in Athens a wide range of modern air defense and electronic warfare systems. In particular the Viking anti-aircraft missile system, the Triumf long-range surface-to-air missile system, the Verba man-portable air defense missile system and the Tor-E2 surface-to-air missile system and the Pantsir-S1 surface-to-air missile system that have proven their worth



in countering UAVs have good chances in the arms market of the region.

In addition, Rosoboronexport offers radioelectronic countermeasures to small unmanned aerial vehicles that have positive experience in combat use – the Repellent system and its ultra-mobile version, Repellent-Patrol, mounted on light military off-road vehicles.

All participants expressed their satisfaction with every detail of the exhibition and they emphasised their return in two years time. The next edition of DEFEA – Defence Exhibition Athens will take place on 9th-11th of May, 2023, at Metropolitan Expo, in Athens, Greece. /IAATG/

IDEF'21

RUSSIAN DEFENSE INNOVATION AT IDEF 2021

Rosoboronexport JSC (part of the Rostec State Corporation) was the organizer of a joint Russian exhibit at the International Defense Industry Fair (IDEF) 2021, which was held in Istanbul, Turkey.

'The IDEF exhibition is among the ten largest international defense industry exhibitions and is one of the most important venues to showcase armaments in Europe. Rosoboronexport will unveil the latest Russian military products in Istanbul for the first time in Turkey,' said Alexander Mikheev, Director General of Rosoboronexport. 'Among them are the Su-57E fifth-generation fighter, Typhoon K-63969 MRAP vehicle, Orion-E reconnaissance/strike UAV system, BK-16E high-speed craft for special operations, as well as the Msta-S self-propelled howitzer modified to fire NATO-standard 155 mm ammunition.'

Rosoboronexport featured products from Russia's leading defense manufacturers: Kalashnikov Concern, UralVagonZavod (UVZ) Concern, United Aircraft Corporation (UAC) and Russian Helicopters, which are Rostec's subsidiaries, Almaz-Antey Air and Space Defense Corporation and a number of other companies. In particular, scale models of the Su-57E fifth-generation fighter, Su-35 multirole supermaneuverable fighter, Ka-52 scout/attack helicopter, T-90S MBT and the BMPT tank support fighting vehicle will be on display. In total, the company will present information on 400+ Russian military, dual-use and civilian products at the exhibition.

At Rosoboronexport's stand, Naberezhnye Chelny-based Remdiesel showcased scale models of the Typhoon K-63968, Typhoon K-53949 MRAP vehicles and a protected tactical ambulance vehicle. Automatika Concern exhibited the Kupol portable counter-drone system, while KBIS LLC presented Lobaev Arms sniper rifles that are well known among professionals: tactical TSVL-8 Stalingrad, long-range DXL-3 Vozmezdie and ultra-long-range DXL-4 Sevastopol. Special Technology Center, the manufacturer of the most popular Russian Orlan-10E UAV, and the Ural Instrument-Making Plant, which produces aviation and airfield equipment, presented promotional materials on their products.

Almaz-Antey and Kalashnikov also took part in the joint Russian exhibit. They showcased their most in-demand products marketed by Rosoboronexport, including the S-400 Triumf long-range air defense missile system, the Viking and Buk-M2E medium-range SAM systems and various versions of the Tor-M2E short-range SAM system.

Kalashnikov Concern, a Rostec subsidiary, exhibited mockups of Kalashnikov assault rifles of all modern series (AK-101, AK-102, AK-103, AK-104, AK-201, AK-202, AK-203, AK-204 and AK-15), SVD, SVDS sniper rifles and the Vityaz submachine gun.

As part of the IDEF 2021 business program, Rosoboronexport was held meetings and negotiations with representatives of the Turkish armed forces and other law enforcement agencies of the country, as well as with partners from other countries in the region. Rosoboronexport discussed the implementation of ongoing contractual obligations and promising military-technical cooperation projects.

/IA&TG/

RUSSIAN DEFENCE MANUFACTURERS AT PARTNER 2021

Rosoboronexport JSC (part of the Rostec State Corporation) was the organizer of the first-ever single Russian exhibit at the 10th Partner 2021 International Defence Exhibition, which was held at the Belgrade Fair.

'I would like to thank the organizers of Partner 2021 for inviting Rosoboronexport to the exhibition. It's our first time exhibiting here and providing the presence of Russian manufacturers. I am sure that this event will give new impetus to Russian-Serbian bilateral military-technical cooperation, which marks its 15th anniversary this year,' said Alexander Mikheev, Director General of Rosoboronexport. 'In recent years, thanks to the efforts and position of President of the Republic of Serbia Alexandar Vucic, the level of interaction between our countries has grown significantly. Today, the volume and range of issues pertaining to our cooperation stand out markedly in the European market and have a steady growth trend. We work on topics relevant to all services and branches of armed forces within the framework of direct product deliveries, industrial partnerships, cooperation, including in the interests of third countries, as well as the import of Serbian products to Russia.'

Rosoboronexport presented scale models of the advanced Viking surface-to-air missile (SAM) system, the Orlan-10E unmanned aerial vehicle and the Be-200 multifunctional amphibious aircraft, which has repeatedly flown out of Russia to extinguish wildfires in European countries, including Serbia.

The stand was feature the Orion-E reconnaissance/strike unmanned aerial vehicle, one of Russia's main export novelties of 2021, as well as the BT-3F amphibious armored personnel carrier, K-16 armored personnel carrier and K-17 infantry fighting vehicle based on the newest Boomerang unified combat platform, Sprut-SDM1 light amphibious tank unique for the global arms market, Tornado-G multiple rocket launcher, Typhoon-K armored MRAP vehicle, as well as the Project 03160E and BK-16E boats.

In addition, a number of Russian enterprises showcase their products at the Rosoboronexport stand. Argus-NV exhibited a line of various thermal imaging sights, Dedal-NV demonstrated optical and thermal imaging sights, Stilsoft Group presented the AVANPOST and MUROM stand-alone video and thermal imaging surveillance systems, as well as the VIDEOZASLON linear perimeter security and video surveillance system. The Polyus-ST company showcased mock-ups of the KAYMAN mobile intrusion alarm system and the Radiobarrier perimeter security system.

The Burevestnik Central Research Institute provided mock-ups of the 30mm 32V01 remotely controlled weapon station and the 57mm AU-220M automatic weapon station, which are installed on Serbian armored vehicles. This is a vivid example of the possibility of cooperation between Russian and Serbian Defence manufacturers.

As part of the single Russian exhibit, Rosoboronexport organized stands for Rostec's Technodinamika and Shvabe holding companies. Companies affiliated to Technodinamika will showcase a wide range of ammunition for various weapons and military equipment, while Shvabe will exhibit civilian products manufactured under the diversification program. /IAATG/

NEWEST SECURITY EQUIPMENT AND SOLUTIONS AT INTERPOLITEX 2021

JSC Rosoboronexport (part of the Rostec State Corporation) took part in the 25-th International Exhibition of Means of State Security Provision Interpolitex-2021 at the Crocus Expo International Exhibition Center?n Moscow. At Interpolitex-2021, Rosoboronexport promoted civilian and dual-use products, special equipment for law enforcement and security agencies, developed and manufactured by leading Russian companies.

'At the invitation of Rosoboronexport, over 130 guests from 30 countries will visit the exhibition in 2021. These are representatives of law enforcement agencies, emergency response agencies, private security and IT companies, as well as regional authorities,' said Alexander Mikheev Director General of Rosoboronexport and Deputy Chairman of the Russian Engineering Union. 'We, together with industrial enterprises, will show our partners the full range of professional security equipment exhibited at Interpolitex and familiarize them with Rosoboronexport's integrated solutions to counter the main challenges and threats confronting modern society.'

At Interpolitex-2021, Rosoboronexport showcased modern personal protective equipment manufactured by NPP Klass, NR-2000 nonlinear junction detector and Larets-4 cell phone anti-eavesdrop safe-box from the YUTTA Group, non-lethal self-defense and defense systems from the Research Institute of Applied Chemistry, a Federal Research and Production Center, stun guns from the MART GROUP, thermal and optical sights produced by Argus-NV and Dedal-NV, and screening systems and devices offered by JSC Set-1.

In addition, Lobaev Arms and ORSIS small arms and hunting weapons, as well as anti-UAV systems produced by the Avtomatika Concern (part of the Rostec State Corporation) was on display at the company's stand.

Representatives of security agencies were most interested in a line of electroshock weapons offered by Rosoboronexport, which have proved effective in practice. The Cerberus precision and easy-to-use metal detector with a built-in stun gun is ideal for use at various checkpoints, airports or secure facilities where it is necessary to screen persons.

To provide VIP security, specialized law enforcement units need special precision weapons. Thanks to its modular design, Lobaev Arms DVL-10V3 Volkodav (Wolfhound) compact, light and accurate sniper rifle is suitable for various tasks. The user can change the barrel using ammunition of different calibers, including in the field. The Volkodav accurately hits a target at a range of up to 1000 m, allowing the shooter to maintain a high level of mobility.

The modern Taktika versatile bulletproof vest is designed to perform a wide range of tasks. Its unique feature is the opportunity to adapt to any conditions encountered by law enforcement agencies. A set of removable ballistic inserts and an ergonomic design provide reliable protection and a wide variability of optional equipment, whereby the vest can be easily adapted to specific needs. The officer chooses the level of necessary protection, which is provided by removable ballistic inserts. The basic bulletproof vest with installed front, back and side armor panels can be fitted with Level II to V removable ballistic inserts

Rosoboronexport introduced these products in detail during public presentations at the company's stand: 'Personal Armor', 'Equipment for Law Enforcement Agencies' and 'Anti-UAV Weapons'. In the conference hall of the exhibition, the company gived the 'Comprehensive Presentation of Russian Security Equipment'.

In parallel with its offline activities at the exhibition, Rosoboronexport promoted its products online. Presentation broadcasts and product reviews were available on the company's website and social media accounts.

/IA&TG/

RUSSIAN ARMAMENT AT SITDEF 2021 IN PERU

Rosoboronexport JSC (part of the Rostec State Corporation) was the organizer of Russia's single exhibit at the VIII International Exhibition of Technology for Defense and Natural Disasters Prevention, SITDEF 2021 in Lima, Peru. The exhibit was featured products developed by the Almaz-Antey Air and Space Defense Corporation, the Kronstadt Company, as well as Rostec's Kalashnikov Concern, United Aircraft Corporation (UAC), High Precision Systems, Russian Helicopters and other manufacturers.

'Rosoboronexport highly appreciates the level of military-technical cooperation between Russia and Peru. This country is our long-standing and reliable partner that successfully operates Russian aircraft and helicopters, armored vehicles and anti-tank systems,' said Alexander Mikheev, Director General of Rosoboronexport. 'We are ready to further develop mutually beneficial cooperation in the interests of the Armed Forces of Peru, as well as other law enforcement agencies of the country, including the police and special operations forces. During the exhibition, we will also discuss with our partners cooperation in training personnel to operate Russian weapons, as well as the issues of after-sales service of previously purchased equipment.'

About 300 pieces of military hardware was displaed at the Rosoboronexport stand. The company showcased scale models of the Yak-130 training (combat training) aircraft, Mi-28NE attack helicopter, Pantsir-S1 anti-aircraft gun/missile system and the BTR-82A armored personnel carrier, which have high potential in Latin America.

In addition, Rosoboronexport provided comprehensive information on the Russian weapons and military equipment offered at the exhibition. In particular, Su-35, Su-30SME, and MiG-35 fighter aircraft, Mi-35M, Mi-171Sh, Ansat helicopters, as well as advanced aerial weapons. Visitors to the company's stand were see a wide range of air defense and electronic warfare systems of various ranges, including the S-400 Triumph and Antey-4000 air defense missile systems, Viking, Buk-M2, Tor-M2KM SAM systems, as well as Igla-S and Verba MANPADS.

The Tigr and Typhoon-K armored vehicles, Khrizantema-S, Kornet-E and Kornet-EM ATGM systems, BTR-80A and BTR-82A armored personnel carriers, which have proven their reliability and effectiveness during real combat operations, as well as new K-16 and K-17 wheeled fighting vehicles, based on the Boomerang common combat platform were interest to representatives of the ground forces and special operations forces of the countries in the region.

At the Rosoboronexport stand, the Special Technology Center (STC) showed promotional materials on the Orlan-10E unmanned aircraft system, which is extremely popular among Russia's partners in the global arms market. Representatives of all services and branches of the armed forces were pay increased attention to modern training sets and systems from leading Russian manufacturers.

More than 350 Soviet and Russian-made helicopters, both civil and military, are in operation in Latin America today. At SITDEF 2021 in Lima Russian Helicopters Holding Company introduced potential customers to civilian helicopter technology: Light Twin Helicopter Ansat and Heavy Utility Helicopter Mi-171A2.

During the exhibition, Russian Helicopters focused on meetings with civil operators and dealers of Latin American aviation industry. The delegation hold negotiations with Peruvian partners and representatives of other countries on the topics of helicopter fleet renewal, service maintenance and physical infrastructure upgrade.

'Peru is one of our main partners in the South American market. More than a hundred Russian-made helicopters are in operation in the country. In particular, civil airlines and armed forces of the country have several Mi-171 helicopters in their fleet. Operators appreciate our machines, noting their flight and technical characteristics, high reliability, ease of maintenance, and ability to use them in challenging conditions,' said Andrey Boginsky, Director General of Russian Helicopters.

Considering the growing demand for fire-fighting aviation machines, during SITDEF 2021 Russian Helicopters' specialists shared with potential customers the experience of using Russian helicopters to fight fires, particularly in difficult terrain. This year, Russian Helicopters machines extinguished a fire at the Lago Peñuelas national reserve in Chile, and triumphed over the elements in Mexico, participating in operations in Sierra de Arteaga and Michoacán, and in Cusco, Peru.

Furthermore, the Latin American region demonstrates

significant potential for the development of air ambulance services. To expand the fleet of medical helicopters the Holding Company is ready to offer its customers the Ansat, which is actively used in Russia within the national program of air ambulance development for urgent transportation of patients, including COVID-19-infected ones. It is worth noting that Russian helicopters are already actively used by medical services in the region, for example, multi-purpose Mi-17s were involved in operations to deliver vaccines against COVID-19 in Mexico and Peru.

The Ansat light multipurpose helicopter, which has the largest cabin in its class, is suitable for a variety of applications: search and rescue, patrol, medevac, training, cargo-passenger, VIP and firefighting. The Ansat has successfully passed mountain trials which proved its capabilities to operate in mountainous terrain at altitudes of up to 3,500 meters. In some countries of Latin America, such as Brazil and Mexico, the machine has already passed preliminary certification.

The Mi-8/17 family, to which the newest Mi-171A2 belongs, has been well known in Peru for a long time. High-power engines and an upgraded complex of pilot navigation and radio communication equipment have expanded the scope of the helicopter's application and give the Mi-171A2 completely new capabilities to operate in high altitude areas in hot climates. The helicopter is designed to solve a wide range of tasks, from patrolling and coast guard to search and rescue operations, and is able to perform long non-stop flights. The Mi-171A2 has already been certified in Colombia, and the validation process is underway in Brazil.

/IA&TG/

INTERNATIONAL AEROSPACE, MILITARY, NAVY AND TECHNOLOGY GUIDES

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)
'GUIDE' №03 (64)	March 12th	**Eurasia Airshow 2022** (23-27.03.2022, Turkey, Antalya)
'GUIDE' №04 (65)	March 15th	**DSA 2022** (28-31.03.2022, Malaysia, K.Lumpur)
'GUIDE' №05 (66)	March 20th	**ArmHiTec 2022** (31.03-02.04.2022, Armenia, Yerevan)
'GUIDE' №06 (67)	March 20th	**FIDAE 2022** (05-10.04.2022, Chile, Santiago)
'GUIDE' №07 (68)	May 03th	**SOFEX 2022** (16-19.05.2022, Jordan, Amman)
'GUIDE' №08 (69)	May 10th	**KADEX-2022** (23-28.05.2022, Kazakhstan, Astana)
'GUIDE' №09 (70)	August 10th	**ARMY-2022** (15-21.08.2022, Russia, Moscow)
'GUIDE' №10 (71)	August 20th	**ADEX 2022** (06-08.09.2022, Azerbaijan, Baku)
'GUIDE' №11 (72)	September 06th	**Africa Aerospace and Defence 2022** (21-25.09.2022, South Africa, Pretoria)
'GUIDE' №12 (73)	November 12th	**INDO DEFENCE 2022** (02-05.11.2022, Indonesia, Jakarta)
'GUIDE' №13 (74)	November 01th	**Airshow China 2022** (November 2022, Zhuhai, China)

The 'Russian Aviation & Military Guide' is English-language international magazine distributed all over the world.

The 'Russian Aviation & Military Guide' magazine subscription can be ordered after any issue of the magazine with the delivery anywhere in the world. The price of any one issue of the magazine is $8,88 plus the cost of postal delivery.
Send your requests for invoicing for the subscription at the address ramg@ramg.info or rus.avia.military@gmail.com. The number of copies, period of the subscription, the address for invoicing and for delivery and your contacts, including information about the person who pays for the subscription, should be in the request.

The editing office send only paid subscription.

doc@promweekly.ru
promweekly@promweekly.ru
www.promweekly.ru
www.ramg.info

Media postal address:
Moscow, Russia, 123104, mailbox 29, Industrial Publishing

Almaz - Antey
Corp.

Destined for guarding blue sky

"Almaz – Antey" Air and Space Defence Corporation", Joint Stock Company

Legal/Trading address:
41 Vereyskaya street, Moscow, 121471 Russian Federation

Inquiries:
Tel. (495) 276 29 75
Office:
Tel. (495) 276 29 80
Fax (495) 276 29 81
E-mail:
antey@almaz-antey.ru

General Director's Office:
Tel. (495) 276 29 01
E-mail: antey@almaz-antey.ru
Press-service:
Tel. +7 (495) 276 29 75, ext. 2055, 2935
E-mail: press-service@almaz-antey.ru
www.almaz-antey.ru