RUSSIAN AVIATION & MILITARY GUIDE

Special analytical export project of the United Industrial Publishing

№ 06 (59), August 2021

The best security products and the best protection technologies from Russia

ARMY 2021
SPECIAL PARTNERSHIP

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Russian Aviation & Military Guide'
№ 06 (59), August 2021

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of the United Industrial Publishing

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OFFICIAL GREETINGS

Dear friends!

In August 2021, the seventh International Military-Technical Forum 'ARMY' will be held, organized by the Ministry of Defence of the Russian Federation.

It is one of the world's largest exhibitions of weapons, military and special equipment, presents an extensive program of exhibition, demonstration and scientific and business events.

Traditionally, unique conditions are created at its sites for constructive communication, exchange of experience, establishment of industrial cooperation ties and fruitful interaction of domestic and foreign specialists in the military-technical sphere.

Within the framework of this Forum, the achievements of the leading Russian defence enterprises will be presented, national expositions of foreign countries will be deployed. The exhibition area of the aviation cluster at the Kubinka airfield will be expanded.

As always, an extensive program is expected to demonstrate the capabilities of modern Russian weapons and military equipment, as well as military and dual-use products of domestic and foreign enterprises. A bright event will be the competition for the management of unmanned aerial vehicles and robotic systems 'Dronbiathlon'.

During the Forum, the most pressing issues of the development of the Armed Forces, the Russian defence industry complex and international military-technical cooperation will be discussed.

Together with the Government of the Russian Federation, it is planned to hold a plenary session and a congress on the diversification of the Russian defence industry.

It is noteworthy that at the same time another significant event will take place – the International Army Games.

This format has already shown its effectiveness last year – the level of representation of foreign states has increased, the opportunities for official negotiations and meetings have expanded.

I wish the participants of the ARMY-2021 Forum productive work and interesting ideas that will inspire new achievements, and many bright and unforgettable emotions for the guests.

Sergei Shoigu,
Minister of Defense of the Russian Federation, General of the Army

FIRST TWO KA-226T HELICOPTER FUSELAGES

Ulan-Ude Aviation Plant of the 'Russian Helicopters' holding has finalized the assembly line for the fuselage of the light Ka-226T helicopter. The fuselage is produced in two lines and will be transferred by the end of November to 'Technodinamika' for testing of the accident-resistant fuel system.

During the visit to Ulan-Ude Aviation Plant assembly line the Minister of Industry and Trade Denis Manturov familiarized himself with the Ka-226T assembly line. Until the end of 2020, Ulan-Ude Aviation Plant will assemble a number of stands and assemblies of the Ka-226T helicopter for static, dynamic and live tests. In particular, production testing for bird resistance and windscreen cleaning systems are underway.

The enterprise has already produced thousands of items of tooling: from small templates to large-sized assembly slipways. In September, overall fuselage assembly for the Ka-226T was completed and slipway installed which are already laid for manufactured assemblies: the bottom of the crew cabin, the central fuselage compartments, and the tail empennage beams.

The Ka-226T light multipurpose helicopter with a twin-rotor coaxial carrier system has a maximum take-off weight of 3.6 tons and is capable of carrying up to 1 ton. The Ka-226T is the first aircraft in the domestic helicopter industry which was developed entirely digitally without the use of paper drawings. This can significantly reduce risks and costs for both the development of the helicopter and for any subsequent modernization of the machine.

Russian Army Receives new 'Alligator' Helicopters

Arsenyev Aviation Company 'Progress' named after N.I. Sazykina of the Russian Helicopters holding handed over to the Ministry of Defense of the Russian Federation all the Ka-52 Alligator combat reconnaissance and attack helicopters scheduled for delivery in 2020 in accordance with the terms and conditions of the state contract.

In addition, the company is currently working on the modernization of the Ka-52 helicopter in conjunction with JSC NCV Mil and Kamov design bureaus.

'This year was challenging, first of all, from the point of view of the epidemiological situation. Despite the difficulties in the pandemic, we managed not only to fulfill all our obligations under the state contract on time, but also to lift our first modernized Alligator, the Ka-52M, into the sky', said Yuriy Denisenko, Managing Director of 'Progress'.

The new Ka-52M is equipped with an upgraded optoelectronic system with an increased target detection and recognition range and a new digital drive, which will improve the accuracy of cannon firing. The upgraded Ka-52 also received a new radar system with an active phased antenna array and a long-range guided missile.

The Ka-52M main rotor blades are equipped with a more powerful heating element, which will allow the aircraft to operate over the entire temperature range, including Arctic conditions. The helicopter is equipped with landing gear wheels with increased bearing capacity and wear resistance, as well as lighting equipment based on LEDs. The modernized Alligator also has a new cockpit interior, which will ensure the fulfillment of modern ergonomic requirements.

First 'Ansat' to European Customer

Russian Helicopters has handed over the first Ansat aircraft to a European customer. The operator of the vehicle, with medical specification, is the Ministry of Internal Affairs of Republika Srpska (Bosnia and Herzegovina). This is the first aircraft handed over under a three-helicopter contract.

Ansat aircraft for Republika Srpska are equipped with a medical module with a stretcher and a medical shelf. The cabin provides for transporting a patient and two chairs for accompanying doctors. The medical equipment includes an artificial lung ventilation system, a tele-ECG, which allows monitoring cardiac activity in real time, and other equipment for evacuating patients. The delivery set includes five seats that can be installed instead of the medical module to carry seven passengers in the cabin. The aircraft also has an active vibration damping system.

'This delivery demonstrates the competitiveness of the Ansat in the European market, and we see prospects for new orders. I am sure that other European operators will appreciate the favorable cost of operating the helicopter, its versatility and reliability. Two more Ansats for the needs of the police will be transferred to Republika Srpska in 2021 and 2022, they will be additionally equipped with searchlights, a parachute-free landing system, a winch and an external sling', said Andrey Boginsky, General Director of the Russian Helicopters holding.

WORLD MARKET FOR HELICOPTER

Russian share in the world market for helicopter engines ranges between 10 to 12 percent. This was reported to TASS by the Deputy General Director – General Designer of the United Engine Corporation (UEC, part of the Rostec State Corporation), Yuri Shmotin.

'Today UEC is represented on the global helicopter engine market by two types of motors: TV3-117/VK-2500 and TV7-117V. The corporation's market share in 2019-2020 amounted to around 10 to 12 percent', said Shmotin.

He predicts a gradual rise in the corporation's share in the global market. 'By 2035, it is planned to increase the market share to 18-20%. The main driver for growth will be the launch of VK-650V and 1600V engines, as well as the adaptation of the entire model range of Russian helicopter engines to foreign platforms in the UEC's traditional sales markets, Southeast Asia', added the General Designer.

As noted by Shmotin, the share of helicopter engines in the UEC revenue structure is about 6-9%. 'Considering that 95% of the fleet used by the state aviation consists of helicopters with engines that were produced in Ukraine until 2015, revenue is not considered as main indicator for UEC. The state's defense capability and maintaining the export potential of Russian helicopter technology in the international market is a higher priority' he emphasized. UEC is the sole Russian manufacturer of engines for light and medium helicopters.

CAMERA FOR NAVY

The SWIR camera can be used around the clock at low light levels and in the most challenging climatic scenarios. The camera's case is completely sealed and protects against damage, dust and water. The camera's range from 0.9 to 1.7 microns allows to see camouflage coatings and detect camouflaged objects. In addition, it is able to locate laser sources and thermal flashes such as shots, volleys and signals. The product developer is the Research and Production Association 'Orion'.

'Our camera is of interest to the Russian armed forces, since its broad scope of application includes security and control of situations on land as well as assistance in sea navigation. Participation in the development of an 18-day expedition to the Novaya Zemlya archipelago in the Arctic Ocean made it possible to fully assess its advantages, including in detecting and identifying objects in difficult meteorological conditions', said Pavel Abramov, acting director general of 'Orion'. During the Arctic expedition, representatives of the Russian Navy tested a number of special-purpose Shvabe developments, as well as the PO 3-12x50 'Zenith' civilian sight made by Krasnogorsky Zavod. The high-performance characteristics of the device guarantee its use in polar conditions.

New Generation Radar

Ruselectronics Holding of Rostec State Corporation has launched production of Miass mobile radars for airfields of light and regional aviation. Prototype tests are scheduled to begin in the second quarter of 2021.

The project is being implemented by the Chelyabinsk Radio Plant 'Polyot' of the Vega Concern of the Ruselectronics Holding jointly with the Industrial Development Fund, which has allocated a loan of 320 million rubles under the Conversion program.

A key feature of the new radar system is the mode of targeted information exchange with a specific aircraft, which facilitates air traffic control and reduces the likelihood of data transmission errors.

Miass radars transmit information about aircraft coordinates to dispatchers around the clock and without the presence of attendants via the primary channel within a radius of at least 100 kilometers and via the secondary channel within a radius of at least 300 kilometers.

Another important advantage is the radar's small size and reduced weight, which simplifies the process of its design, transportation, survey, construction and installation on site.

'The Industrial Development Fund's investments made it possible to quickly launch serial production of these radars and bring to the market a new product that will significantly increase the safety of air traffic and contribute to the expansion of regional traffic. Also, within the framework of the project, it is planned to modernize the production infrastructure of the enterprise, including measuring and testing equipment', said Alexander Nesterov, General Director of Chelyabinsk Radio Plant 'Polyot'.

SSJ100 Airplanes to Domestic Airlines

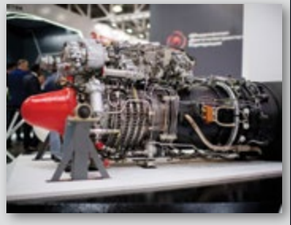
The Irkut Corporation of United Aircraft Corporation and PSB Leasing group of companies have signed three contracts for supply of eight SSJ100 airplanes for use by Aeroflot, Azimuth and Red Wings Russian airlines.

Under the terms of the contracts, Irkut Corporation will supply the eight aircraft. Five planes will be supplied to Aeroflot, two to Azimuth, and one to Red Wings. The airliners will be produced in two cabin layouts. Aeroflot's aircraft are manufactured in a two-class cabin layout: with 12 business-class and 75 economy-class seats, while Azimuth and Red Wings have a single-class cabin.

The contracts are financed under a Promsvyazbank credit line opened for PSB Leasing group of companies with the aim of acquiring and leasing aircraft in 2020 and 2021. The source of repayment of the loan obligations will be lease payments received from the airlines during the period of aircraft operation.

The SSJ100 is a regional airliner with a cabin capacity of up to 103 passenger seats. The aircraft has demonstrated economic efficiency during the pandemic due to its optimal combination of flight range and cabin capacity. The airplane is currently operated by fourteen carriers. In March 2020, the first contract was signed with the United Nations for the use of SSJ100 aircraft to provide services to UN peacekeeping missions.

UNIFIED ENGINE DESIGN



Rostec's United Engine Corporation successfully completed the first stage of testing the PD-8 gas generator for SSJ-NEW planes. Specialists of UEC-Saturn (Rybinsk) tested its launch and operation in a slow mode and in other modes. The full-size gas generator specimen will be presented at the International Aviation and Space Salon MAKS-2021.

The gas generator which is called the 'heart' of an aircraft engine consists of a high-pressure compressor and a combustion chamber – this part drives the power unit. As part of tests, estimates and experiments were carried out, and the optimal configuration of the gas generator (its electrical, hydraulic and pneumatic systems) was found. After that, specialists launched 'hot' starts of the engine using real jet fuel, which were successful.

'PD-8 is the 'youngest' one among Rostec's aircraft engines, which is designed for short-range aircraft. The gas generator of this power unit was assembled and installed on a test stand in May. During the first phase of tests, specialists successfully launched the engine and operated it in a slow mode. The tests confirmed that the design solutions were correct. This experience will be taken into account when subsequent gas generator samples and test samples of the PD-8 engine will be made and tested,' said Rostec speaker.

The PD-8 engine is being jointly created by UEC enterprises for SSJ-NEW – an upgraded version of the aircraft, which will be widely used for import substitution. The design of the power unit includes technologies which were tested during creation of the PD-14 engine for medium-range aircraft.

Currently, SSJ-100 have SaM146 turbofan engines designed by UEC-Saturn together with the French company Snecma in the first half of the 2000s. The French party makes gas generators for power units.

As it has already been reported, Rostec is also developing the PD-35 engine for wide-body long-range planes, which is the largest aircraft engine in Russia. This is one of the largest projects in the Russian aircraft industry. Engines with such characteristics had never been previously created in the USSR and Russia.

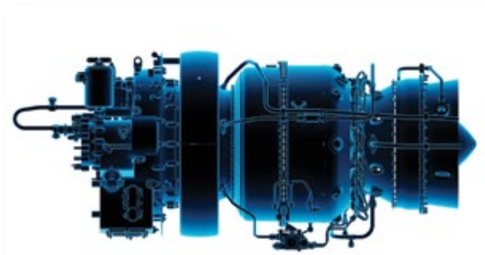
Klimov presents design of VK-1600V engine

The JSC Klimov Company of the United Engine Corporation has presented the design of the new VK-1600V engine for Ka-62 helicopters. The engine design was presented to a committee which confirmed that the submitted VK-1600V meets the requirements for engine airworthiness and environmental protection.

Consideration of the new engine by the committee is an important stage of development ahead of planning the certification tests. The prototype commission also green-lighted the automatic regulation and control unit for the VK-1600V – the BARK-15V, developed at JSC Klimov.

The task of the commission was to review the design of the products to determine the scope and methods of carrying out certification work and testing in accordance with the current regulatory documents. The engine model was presented in the form of an electronic 3D model.

'We have passed an important stage in the process of creating a new engine. It is noteworthy that in difficult conditions of restrictions we fulfill all obligations and comply with all deadlines. The project has been approved by the aviation authorities and further serious work lies ahead,' said Dmitry Yurchenko, Program Director – Chief Designer of JSC Klimov.



The VK-1600V engine in the 1300-1800 hp power class was designed for the Russian-made Ka-62 helicopter. At the beginning of 2021, it is planned to transfer a demonstration engine for benchmarking tests. Certification of the VK-1600V is scheduled for 2023.

Mi-171A2 in Vietnam

The Civil Aviation Authority of Vietnam (CAAV) has validated the type certificate of Mi-171A2 multipurpose helicopter produced at the Ulan-Ude Aviation Plant of the Russian Helicopters holding company. This opens the Vietnamese market for the latest modification of the Mi-8/17 helicopter family.

Earlier on March 13, 2020, the Federal Air Transport Agency (Rosaviatsia) and CAAV signed an airworthiness agreement aimed at supporting and simplifying the validation of Russian aircraft exported to Vietnam. This allows Rosaviatsia to support the development plan for the export deliveries of next-generation domestic aviation technology, formed together by the Ministry of Industry and Trade of Russia and companies from the Russian aircraft industry.

The first foreign operators of the Mi-171A2 were Kazakhstan and India. The helicopter type certificate has been validated by the aviation authorities of India, Colombia, South Korea and now Vietnam. The validation is also planned by China, Brazil, Mexico, Peru and other countries.

Mi-171A2 integrates the best characteristics of the famous Mi-8/17 helicopters. It is equipped with VK-2500PS-03 engines with a digital control system. The increased power output of its engines and modernized piloting, navigation and radio communication equipment have expanded the model's scope for various operations. They provide Mi-171A2 with fundamentally new capabilities when operating in mountainous regions and hot climates. Due to its more efficient X-shaped tail rotor, a new main rotor with all composite blades, and improved aerodynamic profile, the cruise and maximum speeds of Mi-171A2 helicopter are 10 percent higher and its load capacity is 25 percent greater than those of serial Mi-8/17 helicopters (up to 4 tons of cargo inside the cargo bay or up to 5 tons on an external sling).

Mi-171A2 comes with a modern KBO-17-1 digital 'glass cockpit' avionics suite, which allows to reduce its crew to two persons. Video cameras provide a better view during external load operations. Its flight safety is improved by modern terrain awareness and warning systems, airborne and obstacle collision avoidance systems. The model's cargo bay can be quickly modified for different operations by converting it between cargo transportation, search and rescue or passenger variants.

The helicopter was certified in A category, with the strictest flight safety requirements for civilian helicopters. The helicopter can perform search and rescue missions, medical and cargo operations, fight fires or carry passengers in daylight and during night, and at temperatures from -50 °C to 50 °C. It is suitable for high-mountain, desert, tropical or arctic climates and capable of carrying out long flights without landing.

LARGEST VOLUME OF SALES

The radio-electronic complex of Rostec State Corporation increased its annual revenue by 21% in 2020, up to 223 billion rubles. The share of civilian products increased to 27% and amounted to 60.3 billion rubles, which is 18% more than in 2019. The final indicators reflect the financial results of the Avtomatika concern, the National Center for Informatization, and the Ruselectronics Holding. In 2020, these structures implemented a number of large-scale projects: the development of the Unified State Healthcare System and the Regional Medical Information System, social facilities' connection to IT infrastructure, modernization of regional airfields, laying of trunk fiber-optic communication lines, and design and modernization of border checkpoints.

'Recent experience shows that foreign shipments of electronic components, products and software can be terminated at any time. That is why we are speeding up the creation of our own technologies and products', commented Sergey Chemezov, CEO of Rostec.

The largest volume of sales was made up of 'Kupol' data storage systems, workstations, equipment for marking goods, fiscal storage devices, medical equipment, telecom equipment, crypto-bio-cabins and videoconference systems. In addition, in the past year mass production of smart electricity meters and fire protection devices to mitigate wiring faults were launched.

MSTA-S AND ORLAN-10E

Rostec has demonstrated joint operation of Msta-S self-propelled howitzer, modernized for NATO-standard 155 mm calibre, and Orlan-10E reconnaissance drone to representatives of a foreign customer. During the demonstration, the artillery system created by Uraltransmash (subsidiary of UralVagonZavod under Rostec State Corporation) fired at a maximum range of 40 kilometers and showed excellent coordination capabilities with the UAV. The demonstration took place at the Staratel training ground in the city of Nizhny Tagil.

'The combat capabilities of the modernized 155 mm self-propelled howitzer 2S19M1-155 were demonstrated to a foreign customer. It fired at a maximum distance of 40 km with laying recovery in automatic mode. Msta-S has also shown excellent results when used in coordination with a control system and Orlan-10E UAV, reported the Rostec armaments cluster.

In this mode, Orlan-10E can transfer target coordinates to the control system, which calculates the proper firing arc and sends the data to the crew of the self-propelled howitzer.

Su-35S Multipurpose Fighter Jets

The Sukhoi Company of United Aircraft Corporation has handed over to the Russian Ministry of Defense three Su-35S multipurpose fighters of the 4++ generation. The aircraft were built at the Komsomolsk-on-Amur aircraft plant named after Yuri Gagarin, a branch of the Sukhoi company, and were sent to permanent airfields of the Russian Air Force.

'We have completed the implementation of the next long-term contract for 50 Su-35S to the Ministry of Defense. Komsomolsk-on-Amur aircraft plant is one of the most modern industrial sites in the United Aircraft Corporation, which has invested in the development and modernization of production capacities. This allows us to fulfill our obligations to customers in full and on time. The plant continues to execute state defense orders and is well prepared for future development', said General Director of United Aircraft Corporation and General Director of Sukhoi Yuri Slusar.

As a reminder, within the framework of the Army-2020 forum, United Aircraft Corporation signed a number of long-term contracts for the supply of the latest aviation equipment for the Russian Ministry of Defense, including Su-35S fighters. The Su-35S has an extensive range of possibilities over land and water. This aircraft and its associated technologies are distinguished by high maneuverability, a wide range of weapons and 'intelligent' crew support.

Production of Ropeway Transport Systems

RT-Business Development, a subsidiary of Rostec State Corporation, and the international manufacturer of ropeway equipment Bartholet Maschinenbau AG, with the participation of private investors, will create a joint venture RT-Bartholet. The new structure will become the first federal player in the ropeway transport systems market with localized production in Russia.

RT-Bartholet will build a high-tech plant for the production and assembly of ropeway equipment in Moscow at the Technopolis special economic zone. By the end of 2021, it is planned to launch the first production line with the creation of more than 150 highly qualified jobs. The joint venture plans to reach full production localization in Russia by 2022. The total investment of the partners in the development of Russian production will amount to up to 2 billion rubles.

'Ropeway systems are actively developing around the world as a safe, environmentally friendly and cost-effective form of public transport. The Russian ropeway market has great potential both in large cities, where it is required to reduce traffic and increase residents' mobility, and in regions where ski and tourist resorts are developing', commented Alexander Nazarov, CEO of RT-Business Development.

According to Bartholet, the current market for potential ropeways projects in Russia is estimated at over 40 billion rubles.

NEW PARACHUTES FOR SPECIAL FORCES

The Technodinamika holding of Rostec State Corporation has started supplying new 'Stayer' tactical parachute systems. The technology is intended for special-purpose units jumping from aircraft speeds of up to 350 km/h and can be used in extreme cold. Stayer is a special-purpose parachute system of the 'wing' type. It allows to jump at altitudes from 700 to 10,000 meters with a maximum flight weight of up to 180kg. In 2020, a group of Russian paratroopers used the new parachutes in harsh Arctic conditions, making a group jump in the Far North for the first time in world history from the lower boundary of the stratosphere – from a height of 10,000 meters above the Franz Josef Land archipelago.

The parachute allows jumping at an aircraft speed of up to 350 km/h with an additional load of up to 50kg. The wing-type system has increased control maneuverability and significantly expands the capabilities of Russian special forces to perform tactical tasks. Stayer was developed by specialists of JSC Polyot of the Ivanovo parachute plant of the Technodinamika holding. The creators of the system were awarded with departmental awards 'For Strengthening the Combat Commonwealth'. 'The development of the Stayer parachutes was carried out in the interests of the Ministry of Defense. The system has no analogues in the Russian market, has unique capabilities and has proved its reliability during exercises. Stayer has been put into service and the first systems have already been sent to the troops', commented Igor Nasenkov, General Director of the Technodinamika holding.

ELECTRIC MOTOR TO PROTECT TROPICAL HELICOPTERS

The Technodinamika Holding of Rostec State Corporation has developed an electric motor for use in a dust protection device for tropical versions of helicopters. The device was developed as part of the import substitution program and the first prototype has already been submitted for testing. The electric motor is designed to operate in a dust protection device that protects the engine from dust and sand when flying at ultra-low altitudes. The device is intended for installation on Mi-38 helicopters and various modifications of the legendary Mi-8, capable of operating in tropical climates and in desert conditions.

'We plan that this technology will replace electric motors of foreign-made dust protection devices. The main customers of such products are African countries, but I am sure that this development will also be in demand in the domestic aviation market and will reduce dependence on imported components', commented Igor Nasenkov, General Director of the Technodinamika holding.

Interactive Assembly Complex

An interactive complex of technological processes for assembling aircraft has been launched at the production sites of the Russian Aircraft Corporation MiG, which is part of the military aviation division of United Aircraft Corporation.

The platform allows for detailed visualization of technological processes, storage and unification of unique data on aircraft assembly into a single database. With the introduction of this system, the corporation will complete the transition from the use of technological maps in paper form to electronic sources of information. Within the framework of the complex, a scheme of working instructions is used which allows to understand step-by-step the process of assembling an aircraft. With the help of the new system, employees can quickly familiarize themselves with materials structured by topics of reference books, view photo and video files, as well as study drawings and 3D models of all MiG aircraft that are currently in production.

'Assembling an aircraft is a complicated process. This interactive complex plays a significant role in raising the level of qualifications of personnel, training young specialists remotely and directly at our facilities. If a plant employee is faced with the task of assembling a certain unit, he can at any time turn to the interactive system to clarify the necessary details. This will significantly reduce the likelihood of any defects', said Managing Director of MiG Andrey Gerasimchuk.

The hardware part of the complex consists of a central server, user workstations in the corporate network and interactive public access stands. Employees can connect to the system from any corporate site.

Parachute systems for airborne personnel

The Ivanovo parachute plant 'Polyot' of the Technodinamika holding has ensured the early fulfillment of several state defense contracts for the supply of parachute systems to the Russian Ministry of Defense for airborne personnel. Among them are 'Malva-24' parachutes and the backup system 'Z-5'. The delivery to the end customer was completed ahead of schedule.

One of the technologies supplied to the Ministry of Defense is the Malva-24 parachute system, designed to perform all types of jumps both by individual paratroopers and by groups of parachutists from aircraft and helicopters. Its specifications and quality conform to leading international standards.

The main parachute is rectangular in shape and has seven sections. The 24.2 square meter canopy is suitable for skydivers weighing up to 100 kg. The set consists of the main and spare canopies, a satchel with a harness, a carrying bag, accessories, packing and spare parts. Depending on the configuration, the system is produced with two models of backpacks: 'Malva' (standard) and 'Comfort'.

The design of the Malva-24 parachute system with Comfort knapsack ensures reliable operation when the parachute system is put into action at an altitude of 2000m above sea level at a flight speed of 140 to 225 km/h, both with immediate deployment and with delay in opening the knapsack valves. In addition, 'Polyot' parachute plant is a reliable supplier of Z-5 reserve parachute systems compatible with almost all types of landing and training parachutes. 'Z-5' is quickly and conveniently mounted to main parachute harnesses.

MILITARY TECHNICAL COOPERATION

June, 7 in the Kremlin, Moscow President of Russia Vladimir Putin had a working meeting with Director of the Federal Service for Military Technical Cooperation Dmitry Shugayev.

Vladimir Putin said: 'Mr Shugayev, we discuss military technical cooperation on a regular basis. We have created a special agency to help promote our equipment on international markets. Still, I would like to hear your assessments of how this work has been progressing in the first months of this year compared to 2020.'

After this Dmitry Shugayev in his speech spoke to Vladimir Putin about key topics of military technical cooperation: 'Mr President, everything is going according to plan – that's the plan we adopted in 2020. Most importantly, we have kept with last year's figures. The total amount of our projects exceeds 15 billion, or 102 percent of the target. We have secured a portfolio of contracts, which is vital, exceeding $50 billion. This is one of the main indicators that give us confidence in the future, for defence companies as well as the entire military technical cooperation system.

'It is very important to note that we still have contacts with certain regions, primarily our partners from Asia and Africa. We maintain relations with more than 100 states, and we have supplied our equipment to 51 countries.'

Dmitry Shugayev,
Director of the Federal Service
for Military Technical Cooperation

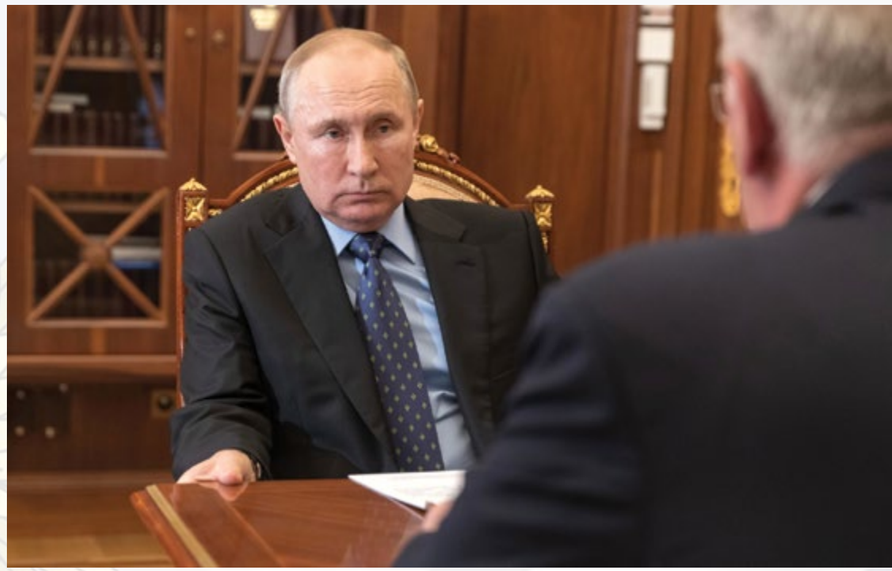
The military technical cooperation system has been naturally affected by the pandemic. This includes our relations with our partners: our relations, our contacts have shrunk due to objective circumstances. Our marketing activities have been severely affected. For example, almost all international exhibitions were closed. One exception was our Army 2020 forum in Kubinka. That was the only major international event actually held last year.

It is very important to note that we still have contacts with certain regions, primarily our partners from Asia and Africa. We maintain relations with more than 100 states, and we have supplied our equipment to 51 countries.

That is, today, Mr President, we are moving forward confidently. And the most important thing is, we are talking multibillion-dollar supplies, even today. I am primarily referring to our top-notch equipment for the air force and air defence, of course – these enjoy the greatest demand.

Still, we should not disregard our ground-force and naval equipment, of course – this equipment is also in demand. Admittedly, we have to operate in a tough competitive environment, and under very, very difficult conditions. Moreover, our competitors, despite the overall difficult situation, keep stepping up influence on our partners.

In this sense, we are facing unprecedented pressure and we can see that our partners are under very, very strong pressure. But we are taking into account the interests of our old partners and, of course, we are striving to establish good relations with new ones, to meet them halfway. Military technical cooperation seems to love silence sometimes.' /IN&TG/



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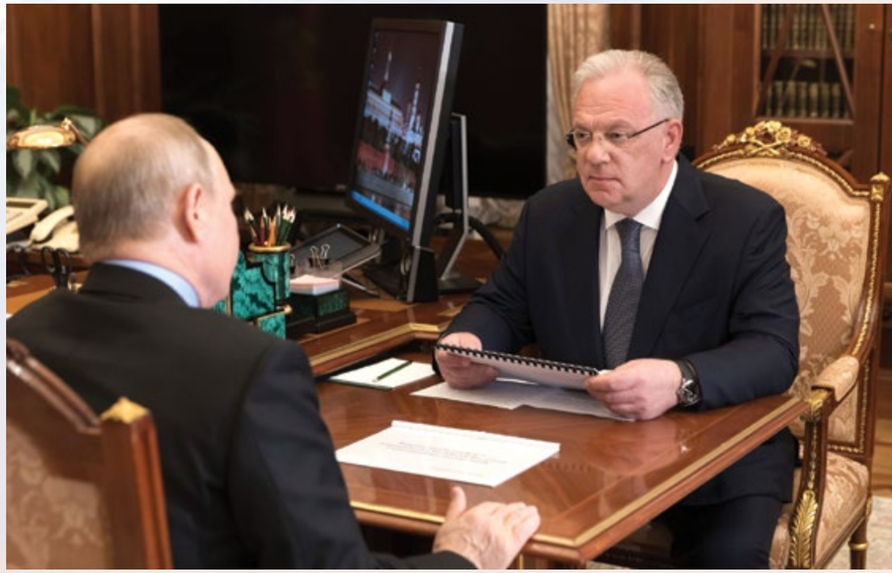

Dear colleagues and friends,

In 2021, two major international exhibitions, MAKS and ARMY, are held in Russia, where Russian and foreign companies will traditionally showcase all the latest military, dual-use and civilian products.

These are always bright and intense events that are attended by most of our partners and potential customers from major regions of the world. Rosoboronexport, a member of the Rostec State Corporation, provides sponsorship support to these events, given their particular importance for the development of military-technical cooperation between the Russian Federation and foreign countries.

The main goal of Rosoboronexport at MAKS and ARMY is to exploit all the opportunities to translate keen interest in Russian equipment into new contracts and replenish its order portfolio. To that end, we'll demonstrate the latest high technologies, as well as discuss with foreign partners the possibility of their participation in the implementation of joint industrial partnership projects.

The MAKS International Air Show, held in Zhukovsky near Moscow, was and remains the main venue for showing the best export versions of Russian aircraft and armaments, air defense and electronic warfare systems. In 2021, it will be held from July 20 to 25.

No MAKS show can do without new products. In 2021, we are going to present for the first time to our foreign partners the IL-114-300 aircraft, the Ka-32A11M, Ansat-M, Mi-171A3 helicopters, as well as the S-350 Vityaz long-range SAM system manufactured by Rostec companies. In addition, among the new products of MAKS-2021, foreign partners will undoubtedly be interested in the virtual reality Su-35 and Su-57E pilot station simulators, presented by Sukhoi, which enable pilots to practice skills to handle in-flight emergencies safely on the ground.

At its stand in Pavilion C2, Rosoboronexport will organize a demonstration of the Globe touch-screen interactive multimedia installation. With its help, it will be possible to get acquainted with 38 3D models of advanced Russian defense products, their performance characteristics, and view photo and video materials. In addition, scaled models of the IL-76MD-90A(E) military transport aircraft, Mi-35M transport/attack helicopter, Ka-52 scout/attack helicopter, Mi-26T2 heavy-lift transport helicopter, and the Mi-17V-5 military transport helicopter will be on display.

As part of MAKS, Rosoboronexport plans to carry out joint activities with Russia's major aircraft, air defense and electronic warfare systems manufacturers Almaz-Antey Air and Space Defense Corporation and Rostec's subsidiaries United Aircraft Corporation (UAC), Russian Helicopters, and High-Precision Weapons to promote Russian military and civilian products.

From August 22 to 28, the ARMY-2021International Military-Technical Forum will be held in pavilions and open areas of the Patriot Convention and Exhibition Center, the Alabino Training Ground and the Kubinka Airfield. The Forum will take place simultaneously with the International Army Games.

ARMY presents the main export novelties and bestsellers of the Russian defense industry for all services and branches of the armed forces, as well as for special forces and anti-terrorist units. Of all the exhibition events taking place around the world, the Forum has been steadily successful for Rosoboronexport from a monetization standpoint.

The format of the Forum, which combines the demonstration of the widest possible range of products in the static display area and in action at a test range, provides a more comprehensive understanding of the features and capabilities of the items and systems being exhibited.

Rosoboronexport's exhibit display at ARMY traditionally encompasses all segments of the modern market of weapons, military and special equipment. Advanced pieces of equipment showcased at the forum will undoubtedly attract attention.

As regards air materiel, these are the IL-112V aircraft, the modernized Mi-171SH special-purpose military transport helicopter, the Ka-226T light multi-purpose helicopter, and an extensive range of unmanned aircraft systems for various purposes.

Rosoboronexport expects that representatives of the ground forces of the partner countries will show keen interest in the Tosochka TOS-2 heavy flamethrower system, the Rubezh-ME coastal missile system will be of interest to representatives of the naval forces, and I am sure that AK-19 and AK-308 assault rifles, chambered for the NATO cartridges and included in a small arms exhibit, will evoke much interest. In addition, taking into account the experience of recent military conflicts, we expect strong market potential of the Repellent-Patriot, the latest electronic warfare system for combating small-sized UAVs.

The fight against terrorism, armed crime, and drug trafficking remains an urgent problem in the modern world, and Russian manufacturers offer a unique set of tools to effectively counter these threats. Rosoboronexport will showcase a wide range of security equipment, including service weapons, precision long-range sniper rifles, explosive and drug detectors, and the latest body armor facilities.

For Rosoboronexport, MAKS and ARMY are the most important marketing tools, since foreign customers can use them to identify key trends in the development of the Russian defense industry and discuss their needs in detail with us and representatives of the developers and manufacturers.

During the exhibitions, in parallel with the traditional business program, Rosoboronexport will be actively promoting products in the Internet space, as well as through video conferencing, which will significantly increase the number of partners and improve their awareness of new models of weapons and military equipment that we offer. The company will hold online presentations and video broadcasts, show video reviews of new products and events at MAKS and ARMY. The materials will be available on the website of Rosoboronexport (www.roe.ru), on our YouTube channel and Facebook and Instagram accounts.

I wish all participants and guests of the exhibitions the most intense and fruitful work, new business contacts and great mood. Together, I'm sure, we will maintain Russia's leading position in the defense field, will be able to withstand any challenges and will continue the successful development of Russia's military-technical cooperation with foreign countries in the Asia-Pacific region, the Middle East, Europe, Africa and Latin America.

Alexander Mikheev,
Director General of Rosoboronexport JSC

NITEL: THE BEST OF THE BEST RADARS

NITEL is a leading Russian radar's manufacturers. The company produces advanced radars, upgrades and maintains existing systems and provides components for equipment operated by the Russian air defence troops. NITEL products are in high demand both in Russia and abroad; the company has sold numerous products outside Russia over the past years. NITEL radars have long been among the most covetous medium-to-high-altitude products due to their efficiency, cost-effectiveness and reliability. NITEL is proud to present at Army 2021 three of the more demanded radars…

Highly mobile two-coordinate surveillance and target designation radar P-18-2 ('PRIMA')

Meter wave band Radar P-18-2 'PRIMA' is intended for surveillance and target designation of aerial objects including those made by STEALTH technology, its coordinate determination in range and azimuth and direction finding of active jammers.

The Radar is accommodated on a cross-country chassis and offers increased mobility due to arrangement of equipment, antenna – feed system and power supply source on a single transport unit.

The Radar can be operated at ambient temperature from minus forty to plus fifty degrees Celsius.

The power supply of the Radar can be provided by the built-in primary power supply sources such as power take-off generator or its own generating set as well as by industrial network.

The Radar unrolling by combat crew of two persons takes not more than five minutes including time of automatic leveling.

The Radar orientation takes place automatically with the aid of the satellite navigation systems.

The Radar employs three scan rates of 3, 6 and 12 rpm as well as mechanical sector target search when antenna moves within a sector.

The Radar can detect and automatically track low speed and low observable unmanned aerial vehicles in the zones of local interference and airborne moisture targets. Reliable acquisition and tracking of targets under heavy interference environment is implemented by dual-frequency probing mode.

The Radar maximum detection range of aerial objects is 400 km.

The Radar performance specifications are favorably distinguished by high accuracy of coordinates measurement, high resolution and high jamming immunity.

To protect combat crew the Radar is equipped with remote operator's work stations that allow remote control of the Radar at a distance of 1000 meters. P-18-2 'PRIMA' is capable to coact with modern digital Automated Control Systems, Air Defense Missile Systems and exchange data with them including radio link.

To identify friend-or-foe of aerial objects, the Radar is equipped with the Secondary Radar.

The Radar possesses maximum automation at all stages of radar operation modes from the moment of unrolling / rolling up, combat performance, data output to consumer as well as high reliability and capability of survival.

The Radar can be operated at outdoor temperature from minus forty to plus fifty degrees Celsius.

The Radar can be powered both from the industrial network and from a diesel generator with 100% redundancy. The Radar unrolling by combat crew of six persons takes not more than sixty minutes.

The Radar station uses two scanning modes with speeds of 3 and 6 revolutions per minute. The Radar is capable to detect and automatically track air objects of various classes, including unmanned aerial vehicles, in the zones of clutter and airborne moisture targets. Reliable acquisition and tracking of targets under heavy interference environment is implemented by dual-frequency probing mode. The limits of Radar in range detection of aerial objects are 5 to 330 km. The Radar performance specifications are favorably distinguished by high accuracy of coordinates measurement, high resolution and high jamming immunity.

To protect combat crew the Radar is equipped with remote operator's work station that allows remote control of the Radar at a distance of 500 meters. P-18-2 is capable to coact with modern digital Automated Control Systems, Air Defense Missile Systems and exchange data with them. P-18-2 is equipped with the Secondary Radar for friend-or-foe identification of aerial objects.

The Radar has a computerized monitoring system, a referral information system, documentary system and training system.

According to the customer's requirements, additional devices for integration into the Customer's air defense system can be included in the Radar, automotive equipment and diesel generators can be replaced.

The Radar has modern performance characteristics, reliability, ease of operation and maintenance.

Highly mobile two-coordinate surveillance and target designation Radar P-18-2

Surveillance and target designation Radar P-18-2 of VHF band is intended for target acquisition and tracking of single and multiple aerial objects including stealth technology targets, its coordinates measurement in range and bearing and feeding the interfacing external objects with Radar data. The station is mounted on URAL automobile chassis with high cross-country capacity. The Radar is built according to solid-state technology, including a transmitting and receiving device with digital signal processing.

Three-dimensional duty mode Radar 55Zh6UTE

The three-dimensional VHF band duty mode radar 55Zh6UTE is intended for air surveillance and tracking of air objects (AO) of different classes and types (including stealth AO) in automatic and semiautomatic modes, coordinate measurement and coordinate data transmission of AO (range, azimuth, altitude) to automation means of consumer, direction finding of active noise jammers, friend-or-foe identification of air objects and radar data acquisition on air environment from air objects equipped with onboard transponders operating in the international secondary radar system ATCRBS modes and in the radar friend-or-foe identification Mk XA. The Radar is capable to coact with modern digital automated control systems.

Transmitting, processing and display equipment is accommodated in one van body. One more van body accommodates van-type electric power station. Radar antenna is arranged on three semitrailers.

The Radar can be operated at outdoor temperature from minus fifty to plus fifty degrees Celsius.

Power supply of the radar can be carried out both from the industrial network and from diesel generators.

The radar is built according to solid-state technology, including a transmitting and receiving device.The radar utilizes digital signal processing.

Acquisition limits of radar are 3,5 to 600 kilometers. The radar is distinguished by high accuracy of coordinates measurement, high resolution capability and high radar immunity.

The radar set includes Automatic Dependent Surveillance – Broadcast (ADS-B) equipment.

To protect radar combat crew the set of equipment has remote operator's work stations able to remotely control the radar at a distance of 1000 meters.

The documentary system providing registration of radar data, modes of operation and technical condition of equipment, recording voice responses of combat crew including playback with documenting of registered information is implemented in the radar.

On the request of the Customer the radar set may include additional equipment for integration into its AD system.

The radar has high reliability and meets all the tactical and technical requirements demanded from modern radars.

/RA&MG/

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WE SERVE THE NAVY 100 YEARS!

In 2021, JSC 'Concern 'Granit-Electron', that is part of 'Tactical Missiles Corporation', one of the first scientific centers in Russia, the founder of the creation of modern radio-electronic warfare systems for the Navy, celebrates its 100th anniversary.

JOINT STOCK COMPANY
"Concern "Granit-Electron"
FEDERAL SCIENTIFIC AND PRODUCTION CENTER

JSC 'Concern 'Granit-Electron' participates in the International Military Technical Forum Army-2021 on JSC 'Tactical Missiles Corporation' integrated exposition area, situated in the demonstration centre of the Corporation in the Patriot park, Kubinka, Moscow region, Russia.

In the year of 100-th anniversary, based on a principled foundation of scientific and technical achievements, focusing on contemporary trends and requirements, Concern continues to develop warfare systems, mature critical technologies.

During Army-2021 Concern 'Granit-Electron' and its subsidiaries demonstrate the best-in-class military, civil and dual-purpose products:

– Ship-borne fire control system of 'Uran-E' missile weapon system with X-35E cruise missile;

– Ship-borne target designation radar system 3C-25E;

– Homing head from the ship's missile weapons system with Yakhont cruise missile;

– Radioelectronic systems for submarines for anti-interference of surface environment surveillance MRK-50UE and KRM-66E;

– Coastal mobile radar system for detecting surface targets Mys-E (JSC 'Saratovski radiopribornyi zavod');

– Coastal stationary radar system for detecting surface targets MR-10 (JSC 'Saratovski radiopribornyi zavod');

– The technology of realization of the Unified Information Space of the Arctic Zone of the Russian Federation;

– Autonomous power supply source AIP-30 for various objects, including unmanned aerial vehicles and light aircraft (JSC 'Severniy press');

– Coherent all-round radar system for high-latitude application (JSC 'Severniy press');

– Coastal radar Irtysh-3S1 for surface monitoring, including Arctic zone waters (JSC 'Saratovski radiopribornyi zavod');

– Navigation radar Tersa to provide safe navigation of river-class and confined open water vessels (JSC 'Saratovski radiopribornyi zavod').

Each new highly effective military, civil and dual-purpose equipment of JSC 'Concern 'Granit-Electron' has a great upgrading capacities and versatility of technologies for producing state-of-the-art systems to meet high standards of quality and performance and enable us to solve customers' most pressing challenges.

100 years of R&D experience of sophisticated high-tech products is a reliable reference point for the further development strategy for the Concern and a significant advantage in the implementation of new advanced projects.

www.granit-electron.com

ADJUTANT AT ARMY 2021

Kupol's universal target drone system pushing envelope of applications ever further

Specialists concur that one of the most prominent and innovative exhibits at the Army 2021 International Military-Technical Forum will be the new-generation Adjutant universal target drone system by Izhevsk Electromechanical Plant Kupol (a subsidiary of Almaz – Antei Air and Space Defence Corporation), which serves as a versatile training and advanced qualification solution for air-defence system crews. The Adjutant's unique characteristics allow for significant improvements to the quality and effectiveness of personnel training while considerably cutting relevant expenses. There are currently no equivalents to the system in the international market.

For some years now Russia's science and industry have been focusing on the development of advanced weapon systems. However, owing to certain circumstances, it was only recently that the country turned to the creation of target solutions.

Furthermore, the lack of indigenous target systems ever since the USSR's collapse eventually has started to affect the quality of training and advanced qualification of air-defence system operators. It is evidently difficult to train personnel and perform training launches using advanced air-defence systems in the absence of advanced target solutions.

In this situation Izhevsk Electromechanical Plant Kupol, which manufactures the cutting-edge Tor short-range SAM system, was among the first to face the shortage of advanced targets. This moved the enterprise to create a target drone system that proved to be unsurpassed in the global market.

Kupol's concept of an advanced target drone system was presented to the Russian Defence Ministry, which expressed a great deal of interest in it: such a system was urgently needed, and Kupol's proposal stood out for its uniqueness, efficiency and versatility.

It only took Kupol under five years to develop, manufacture and fully test the system. The official tests have been successfully completed. The next step will involve the interdepartmental commission assigning an official designation to the Adjutant and approving its series production in the interest of the Russian Defence Ministry.

Versatility is the key feature of the Adjutant. The system can be used for ab-initio training, routine training, and retraining of personnel operating different air-defence systems, as well as for live firing practice. The Adjutant can be used in conjunction with the entire spectrum of air-defense systems: both man-portable, short- and medium-range. According to open-source information, the Adjutant has been successfully tested as a short-range target for advanced Russian long-range SAM systems.

Another indisputable advantage of the Adjutant is its high mobility and autonomy, allowing for deployment to any unprepared position within two hours, after which the system may be operated straight away.

The system is unique in that it can simultaneously emulate several aerial target types: airplanes, missiles and helicopters. Moreover, each of these types may be further subdivided into different subtypes. At present the Adjutant can credibly emulate five types of targets that may be used for practicing the engagement of a variety of aircraft, virtually in parallel. This means that a single ground command post can simultaneously keep up to six targets in the air, thus creating varied and extremely complex target environments most closely simulating various situations of modern warfare.

The Adjutant targets emulate current aerial threats and their tactics. Many contemporary air threats are capable of complex maneuvers including pitchups, nosedives, S-turns and ground-hugging flight. All these can be reproduced by the Adjutant targets, and their flight trajectory can be set to be very complex. At the core of the current aerial assault tactics lies a mass raid, which the Adjutant is capable of emulating: one mobile ground control station can create a complex target environment with the simultaneous participation of six targets of different types.

Thanks to the Adjutant it is possible to use several different types of targets simultaneously over the same training range. The targets will follow the pre-programmed scenario or fly under manual control to simulate attacks on ground-based air-defence facilities, allowing the air-defence crews to practise detection, tracking and engagement of a variety of aerial targets in the most effective way.

The Adjutant has a huge modernisation potential, which will allow it to remain current and leading in the world market of target systems for many years.

Another advantage of the Adjutant is that it is easy to operate and maintain. Learning to operate the system confidently only requires an ab-initio training course of some two to three months. This simplicity factor contributes to the maximum effectiveness of training involving the Adjutant. It should also be noted that when designing the system Kupol intentionally decided against using any hazardous components, such as high-pressure bottles, powder boosters and explosives.

Specialists are confident that the Adjutant has a very high operational potential in a variety of military branches and services. They believe thesystem will shortly reach full operational capability in the Navy, the Aerospace Forces and other branches and types of troops, as well as in dozens of related areas and industries. The system's adaptability and versatility allow for a virtually unlimited spectrum of potential applications.

According to open sources, Kupol specialists are currently working to further perfect the Adjutant. While at present the system offers five types of targets, in the near future two more types should be added: a small-sized fixed-wing jet, which will be able to perform a number of interesting functions unavailable to other target types and a high-speed target capable of flying at 250 to 300 m/s.

The Adjutant developers are also working to integrate the system into existing and prospective automated control systems. This domain is currently undergoing an active process of digitalisation, transition to modern methods of information transmission and visualisation, improvements to anti-interference systems and so on. The Adjutant will be able to integrate into a single information space with modern warfare control systems.

In general, the multitude of the Adjutant's obvious advantages explains the particular interest in the system at Army 2021. Despite the fact that the global market of targets and simulators is characterised by very tough competition, the objective advantages and unconditional effectiveness of the Adjutant allow us to say with confidenvr that it will carve its market niche. **/RA&MG/**

WHEELED PLANSHET SYSTEM

Contemporary military conflicts and practice of artillery engagement in combat operations make new demands on the artillery automated fire control systems. The main issues being on the agenda today are the improvement of the efficiency of combat performance and maneuverability of command and control posts, unification of the system component parts, easy training and maintenance, size and weight optimization, and cost saving.

To meet these requirements VNII Signal JSC (a subsidiary of High-Precision Weapons Holding, Rostec Corporation) has developed Planshet-A portable fire control system (PFCS). The most prominent feature of this system is the use of tablet computers made on the base of domestic Komdiv-64 CPU. The system provides automation of work of artillery battalion officers and gun/mortar commanders.

The system components are placed in a space-saving manner in up-to-date combat uniform and can be used under various conditions at any time of the day or night. The system is adapted to any artillery unit, including mixed ones, which are composed of various artillery systems. The system advantages are as follows: small size, fast deployment of artillery unit, and relatively low cost.

However, the absence of such system component as vehicle platform considerably narrows down the capability of use of extra communications and data transmission equipment, and autonomous power supply equipment. The system mounted on the vehicle chassis ensures improved mobility and increased time of autonomous operation.

Precisely for this reason VNII Signal worked out and realized the mounting of Planshet-A system on Atlet advanced special armored vehicle (SAV) (manufactured by LLC 'MIC' company), which is a successor to Tigr SAV, a wide-spread in the Russian Army special armored vehicle. Atlet SAV outperforms its predecessor in several characteristics. The FCS itself has been also updated and its functionality has been considerably enhanced. This new updated system was named Planshet-M-IR. The experts say that Planshet-M-IR system outperforms the portable one.

The system comprises eight unified command and control vehicles (CCV) to provide work of artillery battalion officers at command and control posts. CCV are equipped with the most up-to-date communications and data transmission equipment, topographic survey and navigation units, and devices to ensure interface with technical reconnaissance equipment, weather and ballistic support of fire equipment.

The main purpose of the system is still the same, namely to provide command and control of artillery units that comprise towed artillery guns, MLRS, or mortars. Modified Planshet-A system has a new capability to enable command and control of firing the artillery guns equipped with standard automated fire control and laying system (AFCLS).

The capability to use portable command and control equipment outboard the SUV provides high mobility of this system. In other words, the commander needs only to take the tablet computer out of the vehicle and continue his work at the portable command and control post still being a part of the whole system whatever his position is. It makes the operation considerably easier and reduces the time of fire mission preparation.

The system employs radios of the 6-th generation. Thus more robust and secure communications of battalion/battery is provided, communications system adjustment and operating frequencies setting are simplified, intercommunication with radios of tactical command link is ensured, and communications rate is increased by three times.

Besides, there appears the capability to use mesh-nets[1], thus ensuring automated interaction with higher echelons of command and control posts.

[1] A mesh-net is a distributed, peer-to-peer, self-organizing network with mesh topology.

The modified version of FCS also extends the range of integrated equipment. Planshet-M-IR FCS provides fast communication with such systems as Yastreb-AV radar system (designed by NPO Strela PAO, Almaz-Antey Corporation), Ulybka-M weather radar (designed by Vektor UPP, Almaz-Antey Corporation), and others.

Another important advantage of Planshet-M-IR FCS is the use of computing facilities based on a new line of domestic high performance CPU. Special-purpose mission areas, which are embedded into software, provide automated performance of all combat missions assigned to artillery units.

Lately unmanned aerial vehicles, which already have rather impressive service records, have made a huge leap in their development and application. Previously, only position data exchange and mission assignment were provided when operating UAV in automated mode. Now Planshet-M-IR system ensures reception and display of images transmitted from UAV in real time. Thus the commander will be able to watch the situation at the battlefield and take timely decisions on fire control even when onboard the carrier.

Besides, Planshet-M-IR system ensures fire control of Krasnopol-M2 and Kitolov – 2M high-precision guided artillery projectiles designed by Instrument Design Bureau named after Academician A.Shipunov JSC (a subsidiary of High-Precision Weapons Holding, Rostec Corporation), and this feature makes this system a unique one in this weapons class. Krasnopol-M2 and Kitolov – 2M guided artillery projectiles of new generation proved their perfect performance in demonstration tests, training maneuvers, and regional conflicts.

It should be noted that VNII Signal company pays great attention not only to the development of artillery fire control systems, but also to several other R&D areas, which are of great importance for equipping and development of Armed Forces. Game-changing prototypes are being designed and advanced technologies are being worked out. VNII Signal is one of the main Russian designers of gun laying and stabilization drives for armored vehicles, artillery, combat helicopters, and combat ships. Design of land navigation and survey systems, and automated fire control and laying systems is also a very important area of VNII Signal activities.

More than 65 years of activities proved VNII Signal to be a reliable and successful company possessing great technological advance. But the key to successful company development is its high-professional team. It is remarkable that more and more young, gifted and active people join its ranks.

/RA&MG/

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. /RA&MG/

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. /RA&MG/

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.

INTERNATIONAL AEROSPACE, MILITARY, NAVY AND TECHNOLOGY GUIDES

2021

ISSUE	DEADLINE	SPECIAL PARTNERSHIP
'GUIDE' №07 (60)	September 20th	**Partner 2021** (05-08.10.2021, Serbia, Belgrade)
'GUIDE' №08 (61)	October 10th	**Defense & Security 2021** (01-04.11.2021, Thailand, Bangkok)
'GUIDE' №09 (62)	October 31th	**Dubai Airshow 2021** (14-18.11.2021, UAE, Dubai)
'GUIDE' №10 (63)	November 05th	**Vietnam International Defence Expo 2021** (18-20.11.2021, Vietnam, Hanoi)
'GUIDE' №11 (64)	November 15th	**EDEX 2021** (29.11-02.12.2021, Egypt, Cairo)

2022

ISSUE	DEADLINE	SPECIAL PARTNERSHIP
'GUIDE' №01 (65)	January 18th	**DEFEXPO INDIA 2022** (February, India)
'GUIDE' №02 (66)	February 15th	**World Defense Show 2022** (06-09.03.2022, Saudi Arabia, Riyadh)
'GUIDE' №03 (67)	March 12th	**Eurasia Airshow 2022** (23-27.03.2022, Turkey, Antalya)
'GUIDE' №04 (68)	March 15th	**DSA 2022** (28-31.03.2022, Malaysia, K.Lumpur)
'GUIDE' №05 (69)	March 20th	**ArmHiTec 2022** (31.03-02.04.2022, Armenia, Yerevan)
'GUIDE' №06 (70)	March 20th	**FIDAE 2022** (05-10.04.2022, Chile, Santiago)
'GUIDE' №07 (71)	May 03th	**SOFEX 2022** (16-19.05.2022, Jordan, Amman)
'GUIDE' №08 (72)	May 10th	**KADEX-2022** (23-28.05.2022, Kazakhstan, Astana)
'GUIDE' №09 (73)	August 10th	**ARMY-2022** (August 2022)
'GUIDE' №10 (74)	August 20th	**ADEX 2022** (06-08.09.2022, Azerbaijan, Baku)
'GUIDE' №11 (75)	September 06th	**Africa Aerospace and Defence 2022** (21-25.09.2022, South Africa, Pretoria)
'GUIDE' №12 (76)	November 12th	**INDO DEFENCE 2022** (02-05.11.2022, Indonesia, Jakarta)
'GUIDE' №13 (77)	November 18th	**Airshow China 2022** (November 2022, Zhuhai, China)

ANNUAL PHOTO ALMANAC
FOR MILITARY-TECHNICAL COOPERATION

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

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

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