INTERNATIONAL AEROSPACE & TECHNOLOGY GUIDE

Special analytical export project of Industrial Weekly

№ 3(21) April, 2018

SPECIAL PARTNERSHIP

ILA BERLIN

Under the auspices of the PRESIDENCY OF THE REPUBLIC OF TURKEY

EURASIA AIRSHOW

Innovative solutions for the global aviation market

Russian Aviation Military Guide

#3 (21) April, 2018

'Industrial Weekly' special export project

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', published by the United industrial edition, is a winner of National prize 'Golden Idea 2016' FSMTC of Russia

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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

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EDITORIAL

The best aerospace decisions

Aerospace technologies is developing very actively. Experience in the supply of Russian technology to the many countries (include in the Europe and Asia states) confirms its high quality and reliability. Today efficiency and reliability are the main criteria. This is especially important given the difficult situation on the world stage. Threat of local conflicts to be evolved into global ones, the failure of the global system of safety and non-ending crisis.

But together with developing of technologies in order to secure people's safety, rivalry among sellers of aerospace systems increases in order to achieve such goals as increasing profits and market share.

World experience shows that it is not about how many airplanes you have, but quality and possibilities of every single one of them is what leads to victory on the different fields. Other significant factor is technological independence from seller – modern technologies make it possible to shut down any device from any place of the globe if you have appropriate access. With hitech technology, solid aftersales service and proven reliability of products, Russia is honest and friendly partner for many countries, ready for mutual work. At the premier Eurasia Airshow 2018 and at the well-known Berlin Ila-2018 Russia and other great aerospace countries again represents their best products, prepared for use in all over the world.

Valeriy Stolnikov

Under the auspices of the
PRESIDENCY OF THE
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Dear readers,

Although the aviation industry is susceptible to the vagaries of the global economy it is still able sustain its dynamism owing to its openness to international trade and competition. This first began with the unipolar new world order that emerged several decades ago, and which enables the discovery of new regions that offer new opportunities for the aviation industry.

In this regard, Turkey is situated in a geopolitically strategic position. As is the case in all other areas of trade, Turkey also serves as a bridge between the aviation industries of the West and the East. While the global aviation industry's growth rate has been 5 per cent in the last 13 years, Turkey's aviation industry achieved 15 per cent growth during the same period. Moreover, Turkey is still far from reaching its saturation point in the aviation industry.

Once the Istanbul's third airport is completed in 2018, this investment will become a hub for global air traffic, as the world's largest airport. The airport, which will offer employment opportunities for 225,000 people, is expected to host 3,500 flights and 200 million passengers annually.

"The Eurasia Airshow brings together Global Aerospace Industries' brands and their executives in Antalya, Turkey."

Taking advantage of high potential and the developments in the Turkish aviation industry and its region, we are adding a new air show to the premiere league of international exhibitions.

The Eurasia Airshow, which will be Turkey's first biennial international commercial and military aviation exhibition, is preparing to bring together global brands and their executives in a massive event that will take place in Antalya between April 25 and 29, 2018. We expect the Eurasia Airshow to create a business volume of approximately $40 billion in the commercial and military aviation industry.

We are organizing the Eurasia Airshow under the high auspices of His Excellency President Recep Tayyip Erdoğan. Our aim is to make the Eurasia Airshow (Turkey's first show-based aviation event) one of the most important Turkish global brands in the international aviation industry, along with Turkish Airlines and Turkish Aerospace Industries.

"Eurasia Airshow brings together aviation giants of the West and East."

We will hold the Eurasia Airshow in Antalya, which is Turkey's most popular tourism destination, and one that hosts very important events, such as the G-20. At the Antalya International Airport _ which, with its enormous size and tremendous infrastructure, is one of Turkey's three busiest airports _ there will be a 50 square metre indoor area, 65 chalets, and a static display area for 100+ aircraft with a total area of 300 square metres. At the Eurasia Airshow, our aim is to host 150 military and civil delegations, 100,000 professional visitors and more than 400 distinguished companies plus many airlines and aircraft maintenance companies. Alongside the airshow there will be an aerospace summit which already has 12 senior airline executives confirmed as speakers.

The air show will serve as a business development platform, where the aviation products of our country, as well its partnerships and business models in this field, will be introduced. Furthermore, all parties concerned will come together to talk about business, learn about each other's capabilities, and establish business contacts.

The Eurasia Airshow will also be a platform that will be attended by the industry's decision makers, the producers of commercial and military aircraft, sub-components and systems.

We are honoured to invite you to attend the Eurasia Airshow, as our guest, which will be a gathering point for the aviation industries' key players, from West and the East.

Ferhat Yenibertiz
CEO of Eurasia Airshow

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An airshow which is going to accelerate the aerospace sector!

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TWO SHIP-BASED KA-226T

Kumertau Aviation Production Enterprise (KumAPE) of Russian Helicopters Holding Company (part of Rostec State Corporation) delivered another two ship-based Ka-226T rotorcraft to the customer, thus completing contract execution ahead of schedule. The helicopters successfully accomplished the entirety of acceptance tests and are to join the special-purpose state aviation fleet shortly.

The current delivery is the third in line: at the end of March 2017, KumAPE hosted a ceremonial handover of the first two ship-based Ka-226T with another two helicopters delivered in December 2017.

'The enterprise's contractual obligations have been fulfilled in advance, and four rotorcraft delivered earlier are already inducted into the special-purpose aviation. Ka-226T has demonstrated an excellent performance in challenging sea conditions. I am sure that such experience will boost the demand for this helicopter both in Russia and abroad,' highlighted Andrey Boginskiy, Director General of Russian Helicopters Holding Company.

As distinct from the 'land-based' version, light utility ship-based Ka-226T helicopter features a blade folding system of the main rotor. Moreover, the helicopter boasts the state-of-the-art avionics suite, its components and systems are fit for operation under aggressive conditions of marine environment. Owing to its small dimensions, the helicopter can be deployed on ships and low-displacement vessels. Ship-based Ka-226T helicopter is intended for performing search and rescue and transport missions round-the-clock in standard or adverse weather.

COOPERATION AGREEMENT

The Roscongress Foundation and Moscow State Institute of International Relations (University) under the Ministry of Foreign Affairs of the Russian Federation have concluded an agreement on cooperation. The document was signed by Roscongress Foundation CEO Alexander Stuglev and Moscow State Institute of International Relations Vice Rector Artem Malgin. The parties agreed to cooperate in order to ensure the highest-level preparation and holding of congress, exhibition, and social events in Russia and abroad, involving Moscow State Institute of International Relations. Cooperation will consist of bilateral and multilateral consultations, webinars, forums, roundtables, seminars, conferences, joint projects and initiatives, youth projects, as well as conducting practice-oriented studies on areas of joint activities.

Tecmash in 2017

Tecmash Concern has summed up the results for 2017. More than 40 military-cum-technical cooperation contracts were fulfilled and a 45% increase in civilian production output was recorded during the reporting period.

For instance, the Concern delivered all the main targets under the State Defense Order, fulfilled more than 40 military-cum-technical cooperation contracts, and decreased the number of toxic assets almost by half. Eight federal target programs and ten restructuring projects have also been completed in 2017.

The annual volume of civilian goods production went up by 45%. It was RUR 11.2 billion last year against RUR 7.7 billion in 2016. New civilian products including drilling equipment and refrigerators, have been designed and put into batch production by the holding facilities as part of the Rostec overall strategy implying a 50%, increase of civilian products share by 2025.

Science-cum-production Concern Tecmash was founded by the Rostec State Corporation in 2011. The Tecmash holding structure includes 36 enterprises of the ammunition industry. Highly effective models of military hardware manufactured by the Tecmash holding are used in more than 100 countries around the world.

The scope of the Concern affiliates civilian production encompasses the fossil and power production complex equipment, industrial and medical refrigeration equipment, agricultural machinery and consumer goods.

Light Aircraft TVS-2DTS

The Rostec State Corporation launches manufacturing of TVS-2DTS light aircraft at the facilities of the Ulan-Ude Aviation Plant (U-UAZ), a member of the Russian Helicopters holding company. The aircraft will be utilised for regional passenger operations, initially – in Siberia and the Russian Far East where a new airline company will be established for these purposes.

The agreement on local airline operations was signed during the Russian Investment Forum in Sochi by the Ministry of Industry and Trade of the Russian Federation, the Ministry of Transport of the Russian Federation, representatives of the Republic of Buryatia and the Sakha Republic (Yakutia), as well as the Russian Helicopters holding company. According to the agreement, new TVS-2DTS aircraft manufacturing facilities will be built at U-UAZ by 2019. During the period of 2021-2025, the plant agrees to supply at least 200 vehicles for regional aviation.

TVS-2DTS is a lightweight multipurpose aircraft with an all-composite structure. It is equipped with an avionics system allowing to operate it during any time of day or night and in any weather conditions. Another advantage of the aircraft is that it does not require any special take-off or landing site. Its cruising speed reaches 350 km/h, load-lifting capacity – 3.5 tons, and the maximum flying range is 4,500 km.

TVS-2DTS aircraft will replace the obsolete An-2 aircraft built in USSR and abroad that are still massively used by regional airline operators. The vehicle was first demonstrated by the Rostec State Corporation at the MAKS Air Show in 2017.

RUSSIA-INDIA: MILITARY-TECHNICAL COOPERATION

The Russian Foreign Ministry's press center hosted presentation of a photo book titled Russia-India: Milestones of Military-Technical Cooperation. The event was organized jointly by the Russian Foreign Ministry and JSC Rosoboronexport, part of the Rostec State Corporation.

The event was attended by Sergey Goreslavsky, Deputy Director General of Rosoboronexport, Yury Kaptelkin, Director of the Office of the Company's Director General, Ambassador Extraordinary and Plenipotentiary of the Republic of India to Russia Pankaj Saran, as well as representatives of the Russian Foreign Ministry, Russia's Federal Service of Military-Technical Cooperation, Rostec State Corporation, and Russian defense enterprises involved in military-technical cooperation.

'The history of military-technical cooperation between Russia and India, which dates back almost six decades, is most clearly and exhaustively presented in the book. This cooperation began with a modest episode concerning a donation of two Il-14S aircraft in the de-luxe version by the head of the Soviet state to the Indian government. It has steadily evolved and today, within the framework of the strategic partnership between the two countries, shows the widest variety of the forms and types of relations: supply of military and dual-use products, joint ventures, licensed production of arms and military equipment, as well as joint R&D efforts on advanced weapons,' said Sergey Goreslavsky.

The photo book was prepared under the sponsorship of Rosoboronexport and with the assistance of the Company's employees, whose professional activities have been intrinsically associated with India for dozens of years. It includes previously unpublished photos of bilateral meetings and negotiations, including summits, ceremonies for the transfer of military equipment, its operation, joint exercises, and many others. Two hundred thirty pages of a peculiar photo record encompass the entire period of Russian-Indian military-technical cooperation. The text of the book tells about the formation, development and current status of the partnership between the two countries.

Development of the CR929 program

CRAIC, the joint venture of United Aircraft Corporation (UAC) and Commercial Aircraft Corporation of China (COMAC), has officially announced the commencement of Joint Concept Definition Phase (JCDP) within the program of CR929 aircraft development.

CRAIC General Manager Mr. Guo Bozhi emphasized that the formal commencement of JCDP was of great significance to promote the deep participation of potential suppliers in product definition, optimize airborne systems and aircraft technical concepts.

JCDP stage shall allow China and Russia joint team, together with key worldwide potential suppliers within JCDP phase of CR929 program, to perform a more thorough review of requirements to the main airborne systems: Propulsion System, Landing Gear, Environmental Control System, Avionics and others.

Chief CR929 Program Designer from Russian side Maxim Litvinov explained that this stage shall foresee more detailed analysis of technical aspect with regards to RFP Working Packages that are planned to be released by the end of 2018.

JCDP includes RFP stage during which airframer requests proposals from potential suppliers of the systems and equipments.

JCDP stage within CR929 Program doesn't include interaction in relation to the power propulsion system. As for this system, RFPs to the potential suppliers of long range wide body aircraft program were sent in December 2017 and the answer to such requests is expected to be received by the end of this May.

Completion of RFP-related procedures within the Chinese-Russian long range wide body aircraft program is expected at the end of 2019.

Rosoboronexport in 2018

JSC Rosoboronexport (part of the Rostec State Corporation) will make active exhibition efforts in 2018 to expand the reach of Russian defense manufacturers' displays. 'We consider participation in international defense exhibitions as one of the key areas of the Company's marketing activities. In 2018, our delegations will visit 23 events in various regions of the world. Particular attention will be paid to the most promising markets such as the Asia Pacific region, the Middle East and Latin America,' said Alexander Mikheev, Director General of Rosoboronexport.

The Company will organize joint Russian displays and will also present its stands at five venues in the Asia Pacific region and in three Middle Eastern states. In addition, there are plans to participate in three exhibitions to be held on the territory of the CIS countries, two European countries, and also in the South African Republic.

'Clearly, the exhibitions held in Russia continue to be priority and probably most productive for us. This year, Rosoboronexport traditionally organizes its displays at the Army Forum, International Helicopter Industry Exhibition (HeliRussia 2018), Interpolitex and will exhibit its promoted products at the International Far East Naval Salon 2018 in Vladivostok for the first time,' said Alexander Mikheev.

Rosoboronexport is continuously working to promote military-technical cooperation with new partner countries and increase its presence in various regions of the world. To meet these challenges, the Company makes its debut at new exhibition platforms.

'To strengthen our military-technical cooperation with the Philippines that received a major boost in 2017, we will for the first time organize a Russian display at the Asian Defense & Security (ADAS) 2018 Exhibition and Conference, to be held in September in Manila. I am confident that our participation will strengthen Russia's position on the highly competitive Asian and Pacific arms market,' added the head of Rosoboronexport.

Rosoboronexport is the only state-owned arms trade company in the Russian Federation authorized to export the full range of military and dual-purpose products, technologies and services. It is a subsidiary of the Rostec Corporation. Founded on 4 November, 2000, now Rosoboronexport is one of the leading world arms exporters to the international market. Its share in Russia's military exports exceeds 85 percent. Rosoboronexport cooperates with more than 700 enterprises and organizations in the Russian defence industrial complex. Russia maintains military technical cooperation with more than 70 countries around the world.

FIDAE 2018

JSC Rosoboronexport (part of the Rostec State Corporation) was organizing the Russian exhibit at the International Air and Space Fair FIDAE 2018 (April 3-8? Santiago, Chili). The official Russian delegation at the show was headed by Deputy Director of the Federal Service on Military and Technical Cooperation Anatoly Punchuk. Rosoboronexport's Deputy Head of the Department on Defence Technologies and Space Stanislav Andrukovsky was appointed the head of the combined delegation of the Rostec State Corporation and the special exporter.

'Rosoboronexport is considering the Latin American region as one of the most important and promising for the development of military and technical cooperation. Currently we are interacting on different projects related to all the services and branches of the armed forces, including our active cooperation on the modernization and re-equipment of the regional countries' air forces. The models of the aviation equipment, offered to the customers, have competitive combat, functional and operational features and characteristics, and are fully adapted for the use in the climatic conditions of the Latin American countries,' said Stanislav Andrukovsky.

Among the displayed items, the most promising for the Latin American market are the multipurpose Su-30 fighters of different modifications, multifunction MiG-29M/M2 fighters, (combat) trainers Yak-130, combat helicopters Mi-28NE, combat attack and reconnaissance helicopters Ka-52, multipurpose Mi-17 type helicopters as well as light multirole choppers 'Ansat' and 'Ka-226T'. The great demand for the modern Russian combat planes is justified by their high airworthiness, technical and tactical characteristics as well as combat capabilities to perform different missions.

The popularity of the Mi-17 type helicopters is determined mostly by their multi-functionality, high transportation performance, outperforming competitors, and enhanced survivability. Many Latin American counties have already tested the efficiency of these helicopters in hard-to-reach mountainous areas with rapid changes of heights and atmospheric temperatures, as well as in dusty conditions without any reductions in the operational life of the main assemblies.

'An extensive business program is planned for the period of the exhibition, which includes meetings with representatives of the different region's countries to discuss promising areas in the area of space technology and outer space infrastructure,' added Stanislav Andrukovsky.

TV7-117ST: premier at MFD-2018

In Moscow at the III International Forum of Engine Building (MFD-2018) the United Engine Corporation first time was demonstrated a full-scale specimen of the state-of-the-art TV7-117ST engine for the Il-114-300 airliner.

TV7-117ST is a base engine for the power unit of advanced Il-112V light military transport aircraft, and the civilian modification of the engine, TV7-117ST-01, will become the operational engine for the Il-114-300 regional passenger-carrying aircraft whose commercial output is to be revived in Russia. TV7-117ST-01 engine will also be certified as per the civilian standards.

More powerful as compared to the previous modification TV7-117SM, TV7-117ST-01 will increase the capacity of Il-114-300 and reduce the run time of the aircraft. Operation of the unified engine on the Il-112V and Il-114-300 aircraft will enable a reduction of production costs and will become an example of military technology transfer to the civilian sector.

Bench tests of TV7-117ST on an advanced test bench of UEC-Klimov started in September 2016. A year later, in September 2017, UEC commenced the flight tests of the power unit onboard of the Il-76LL flying laboratory. The first stage was completed in December 2017. As a result, the TV7-117ST engine and the AV-112 propeller were cleared for the first flight of Il-112V.

TV7-117ST engines are entirely made of Russian parts, units and assemblies. They are jointly manufactured by a variety of UEC enterprises.

It should be recalled that the import substitution programme for manufacturing of TV3-117/VK-2500 helicopter engines designed for most Mi and Ka helicopters has been successfully implemented at UEC-Klimov since 2014. In 2015, commercial output of the VK-2500 engines was launched in Russia.

After-sales service for military equipment

Rosoboronexport (part of the Rostec State Corporation) has discussed the issues of modernization and development of the technical readiness provision system for the military equipment supplied to foreign customers. The theme of the after-sales service of materiel was discussed at the meeting of the 'Equipment and weapons of the land forces' panel of the Science and Engineering Board of the 'Oreltechmach' public company, a part of the 'Proekt-Technika' Corporation.

'The present-day market of weapons and military equipment specifies very stringent requirements to the military products as far as the support of their technical and combat readiness for the complete life-cycle is concerned. This results in the desire of foreign customers to conclude total package procurement contracts, which clearly determine supplier's and customer's obligations on the after-sales service of purchased military equipment for the whole operating life. Rosoboronexport takes into account this trend in the global arms market and constantly develops its capabilities in relation to the offered products and services', said Rosoboronexport's Deputy Director Igor Sevastianov.

In the past several years the after-sales service of the exported military products has become a very important factor to provide a competitive ability, to which much attention is now paid both by the foreign customers and suppliers of those products. Rosoboronexport's experience in the area of foreign trade activities shows that the requirements of company's partners to the provision of successful and effective use of weapons and materiel are increasing.

Besides, Rosoboronexport is interested in the rise of attractiveness and effectiveness of the after-sale service of supplied products as fine-tuned business processes in this area are becoming a source of stable income and profit markup for the companies of the Russian defence industry.

'Today we are cooperating successfully with the 'Proekt-Technika' Corporation on the after-sales service of our supplied products. This is one of the global leaders on the development and production of solutions in the area of mobile and stationary infrastructure for special purposes. Within the concept of the comprehensive approach to maintenance, we have already successfully completed and continue to execute a number of contracts in Venezuela, the Republic of Cyprus, Uganda and the United Arab Emirates', noted Igor Sevastianov.

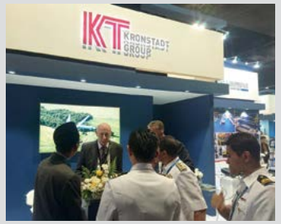
It was also acknowledged at the meeting that the companies of the defence industry should develop and offer to their foreign customers electronic operating documentation and electronic illustrated interactive catalogues, which now become an obligatory condition for purchasing the main nomenclature of the equipment.

CERTIFICATE FOR KA-226T

Russian Federal Aviation Agency (Rosaviation) has issued a supplement to the certificate for Ka-226T helicopter that allows the machine operation at high temperatures. The document makes it possible to start exporting the helicopters to countries with the hot climate. The Rosaviation issued certificate has become a result of testing, carried out by Russian Helicopters specialists and Iran Helicopter Support and Renewal Company technicians in Iran in September 2017. The testing was done in order to prove normal functioning of the machine at outdoor temperature of up to 50 °C.

'The potential users of our helicopter had a chance to learn about its capabilities at a news conference we had upon completion of the testing in Iran last fall. Naturally, the official approval will help us negotiate with companies interested to purchase the machine', Russian Helicopters Holding Director General Andrey Boginsky acknowledged.

KRONSTADT GROUP AT DSA & NATSEC ASIA



Kronstadt Group presented its Unmanned Aircraft Systems in Kuala Lumpur at Defence Services Asia 2018.

Kronstadt Group in delegation under the auspices of JSC 'Rosoboronexport' at DSA & NATSEC ASIA 2018 which was taking place on April 16 to 19. Defence and Security Ministries' officials and industry professionals got acquainted with Russia's latest developments in UAV technology during the first overseas appearance of Orion-E Medium-Altitude Long-Endurance Unmanned Surveillance Aircraft System.

DSA is the top Defence and National Security event for South-East Asia and ranked among top-5 global defence exhibitions, providing an excellent platform to share latest ideas, products and technologies for army, navy and airforce from around the world.

'Being part of Russia's official delegation chaired by Rosoboronexport is both an honor and an excellent opportunity to present our defence solutions to the Asia Pacific region,' stated Kirill Dybko, Executive Vice-President of Kronstadt Group. 'We are happy to witness a growing interest in our latest UAV solutions on behalf of regional clients.'

Russian 'Viking'

JSC Rosoboronexport (part of the Rostec State Corporation) is starting the promotion to the foreign markets of the newest air defence missile system (ADMS) 'Viking' (a 'Buk-M3' type ADMS).

'That's good news for us and our foreign partners. The 'Viking' complex preserves the best characteristics of the famous line of the 'Buk' air defence missile systems and represents the milestone in the development of the medium-range ADMS. The producers allotted unique characteristics to it, which are in line with the current requirements in the area of force and infrastructure protection from the strikes of present-day and future air assault weapons in conditions of radio-electronic countermeasures and firing. The 'Viking' has no countertypes today in the world armaments market,' said Rosoboronexport's Deputy Director General Sergey Ladygin.

The multimissile highly mobile medium-range air defence missile system 'Viking' is the next step in the development of the famous 'Kub' – 'Buk' ADMS line. In comparison with the 'Buk-M2E' ADMS, its range of fire has increased nearly by 1.5 times – up to 65 kilometers. Besides, the number of simultaneously fired targets has also increased by 1.5 times, which is 6 by each self-propelled launching installation, and the number of ready-for-launch air defence guided missiles in one firing position made of two combat units has grown up from 8 to 18.

ADMS 'Viking' has received a number of unique features, which were not previously available in any air defence missile system. For instance, it has a capability of integrating launchers from the 'Antei-2500' ADMS, which provides for the capability of target engagement at a distance up to 130 kilometers and will boost the efficiency of the whole AD grouping in the fight against enemy's pilot-controlled aviation.

The 'Viking' was developed and designed with the account of the world market trends. Its technical characteristics allow the system to be adapted to the greatest possible extent for the priorities of Rosoboronexport's foreign customers. The combat control station of the 'Viking' has a possibility of integration with the organic radar system as well as with other radars, including the ones produced outside Russia, but possessing required characteristics. Besides, the ADMS envisages a capability of the autonomous use of the firing sections and even separate self-propelled firing installations, which enlarges the total defended area and increases the number of covered sites. In addition, it helps to minimize the expenses for the air defence configuration set up.

'Commissioned by the Russian Armed Forced 'Buk-M3' system and its export version 'Viking' have proved a very high level of combat efficiency during their daily operation and exercises. The 'Viking' has a very high kill probability in relation to enemy's aviation, attacking elements of precision-guided munitions, as well as tactical ballistic missiles, maritime and ground targets,' added Sergey Ladygin.

Next Generation Helicopter Engine

United Engine-building Corporation, a part of the Rostec State Corporation, has started works on development of a prospective helicopter engine of the next generation. New construction materials and additive technologies, as well as 3D-printing, will be used in the process of development.

In addition to proven effective technologies and materials, new design visions and aviation engines production methods will be implemented in the process of development. The contractor of the project Saint-Petersburg 'ODK 'Klimov' is planning to implement the technologies that were already used for other ODK aircraft engine models, such as PD-14 engine for civil aircraft MC-21, a prospective engine for Su-57 fighter of the fifth generation and BK-2500M helicopter engine. New construction materials and additive technologies, as well as 3D-printing, will be used in the process of development.

'While developing new products and technologies, the Rostec State Corporation has a unique chance to use the resources of not a single company or research center but employ the united effort of all companies that are parts of the corporation to contribute to the process of development of brand new equipment for aviation industry', Aviation Cluster Industrial Director of the Rostec State Corporation commented.

The sample engine is expected to be complete in 2021 while the power unit is supposed to be ready for serial production in 2025. The weight of the unit will be reduced by 15 per cent compared to existing competitive models while its operation costs will be 30 per cent lower.

PUTIN and ERDOGAN

Partnership, cooperation, friendship

Political and economic relations between Russia, Turkey, have been on the rise lately. Direct evidence of this is the frequent business friendly meetings between the leaders of the two states. Vladimir Putin and Recep Tayyip Erdogan regularly discuss ways to increase the economic partnership, including in the field of aviation high-tech cooperation. The recent visit of Mr. Putin to Ankara has become a serious stage in the development of bilateral relations. Both leaders clearly confirmed the growing business activity of the two countries.

In frame of Putin's visit to Ankara During joint news conference with the leaders of the two countries the presidents of Russia and Turkey made statements for the press and talked about relations between our states.

President of Turkey Recep Tayyip Erdogan said: 'Mr dear friend Mr Putin, ladies and gentlemen, I wholeheartedly welcome all of you. First of all, I would like to once again say with satisfaction that we are happy to welcome Mr Putin and the accompanying delegation to our country.

I would like to again congratulate Mr Putin, who is my friend, on his victory in the presidential election. It is highly significant that Mr Putin has made his first foreign visit following the election to Turkey. This visit is evidence of the high level of relations between Turkey and the Russian Federation.

I would like to offer our condolences to the Russian people over the Kemerovo tragedy. It is especially painful because the majority of the fire victims were children.

We have completed the seventh meeting of the High-Level Cooperation Council. We have compared views on many issues at the Council meeting and in the one-on-one format. The Council members also held separate meetings. I would like to point out that our political dialogue is having a positive effect on the economy, trade and cultural ties.

Compared to last year, our trade turnover has increased by 31 percent and exceeds $22 billion. Of course, we have a more ambitious goal. We want trade between our countries to grow to $100 billion.

On the other hand, the talks on services and investment agreements should be completed as soon as possible, which will accelerate our movement towards the $100-billion target.

As you know, today we launched the construction of the foundation for the Akkuyu Nuclear Power Plant. We plan to complete the first stage of this project in 2023. I hope we will be able to accelerate this process and so complete this project ahead of plan. As of now, we intend to invest some $20 billion or possibly more in this project. In the future, this plant will satisfy 10 percent of Turkey's electricity needs. Work is underway on the second line of the Turkish Stream.

We are also developing cultural and social relations. In 2019, Russia and Turkey will hold events within the framework of cross-years of culture and tourism. I believe that the Yunus Emre Cultural Centre, which opened in Moscow and the Russian Centre for Science and Culture in Ankara will seriously contribute to this.

The number of Russian tourists coming in Turkey reached 4.7 million in 2017. This is the largest number of foreign tourists from any country. I believe the figure will increase to 6 million this year. We are willing to resume the efforts to liberalise the visa regime as soon as possible.

The agenda of our talks included not just matters relating to bilateral relations but also and primarily the Syrian question, as well as other regional matters. As you know, we have coordinated the establishment of de-escalation zones during the Astana process. Tomorrow we will hold a trilateral summit with our Iranian friend to exchange opinions.

I think that we will be able to discuss Syria and other topics at this summit. We will discuss ways to resolve the Syrian conflict. I would like to take this opportunity to say that we have held consultations with our dear friend regarding Operation Olive Branch.

I have personally updated Mr Putin about this operation in Afrin. It was launched to ensure the security of Turkey and the territorial integrity as well as the national unity of Syria. We will continue to work together with Russia to restore stability, tranquillity and security in this region.

This has to do with the Syrian problem. We continue to cooperate with our Russian friends and to discuss our concerns.

Over the past 15 years, the rapid development of Russian-Turkish relations was promoted by neighbourliness, common interests along with mutual respect.

'Over the past 15 years, the rapid development of Russian-Turkish relations was promoted by neighbourliness, common interests along with mutual respect. Certain forces certainly wanted to poison Russian-Turkish relations. Praise be to Allah, we have withstood this test. None of these provocations have attained their goals. Our relations continued to strengthen and have become strong as steel. I believe that we have managed to further strengthen our relationship during the meeting of the High-Level Cooperation Council held today.'

Recep Tayyip Erdogan

Of course, this has not just benefitted the citizens of Turkey and the region, who faced major tribulations. Certain forces certainly wanted to poison Russian-Turkish relations. Praise be to Allah, we have withstood this test. None of these provocations have attained their goals. Our relations continued to strengthen and have become strong as steel. I believe that we have managed to further strengthen our relationship during the meeting of the High-Level Cooperation Council held today.'

President of Russia Vladimir Putin said: 'Mr President, ladies and gentlemen. To begin with, I would like to say that the programme of today's visit was fairly intensive and substantial. At a restricted format meeting, the President and I discussed bilateral issues and a number of urgent international and regional matters.

Later on, we reviewed the entire range of issues related to cooperation in politics, security, the economy, and the cultural and humanitarian area at a meeting of the High-Level Cooperation Council, which was attended by key ministers and heads of major companies. We mapped out areas for further joint work.

A package of interdepartmental agreements and commercial documents was signed following the talks. Relevant ministries were instructed to draft a number of new agreements.

I will note that cooperation between Russia and Turkey is making steady headway. Our political dialogue is intensive. Last year alone President Erdogan and I held eight full-scale meetings.

Our foreign and defence ministries are in close contact, in particular, in the Joint Strategic Planning Group. Industry-specific ministries and parliamentarians are consolidating their ties. Our business circles are engaged in productive discussions of joint initiatives.

I would like to add that today we focused primarily on economic and investment cooperation. The Mixed Intergovernmental Russian-Turkish Commission is playing an important coordinating role in the consolidation of economic ties.

I would like to note with satisfaction that Russian-Turkish trade increased in 2017. Mr President cited the figures, but, according to our information, our trade grew even higher, by 40.5 percent to $22.1 billion.

Russia has become the third largest market for Turkish exports after Germany and China. Meanwhile, Turkey has risen to 7th place among Russia's largest foreign economic partners.

We also intend to build up mutual investment. This will facilitate the creation of a joint investment platform with the participation of the Russian Direct Investment Fund and the Sovereign Wealth Fund of Turkey.

Our cooperation in nuclear energy has reached the level of strategic partnership. As you could see today, Mr Erdogan and I have launched the construction of the reactor building of Akkuyu, Turkey's first nuclear power plant. Our common task is to ensure that it becomes operational by 2023, the 100th anniversary of the Republic of Turkey.

Work is proceeding on schedule on the Turkish Stream gas pipeline. We are building two lines of the pipeline's underwater section. We will soon start implementing the onshore part of the pipeline, which will not just bring gas to the Turkish market and other countries in Southeast Europe, if they want this, but will also enhance the energy security of the region as a whole.

There are good prospects for promoting our cooperation in the iron and steel sector, automobile manufacturing, the agricultural industry and the production of agricultural equipment, as well as in finance, innovation, high technology and research.

We also discussed Russian-Turkish cooperation in the sphere of military technology, including the implementation of a contract for the supply of S-400 Triumf anti-aircraft weapon systems to Turkey. We have decided to accelerate the delivery of these highly effective Russian defence systems. We also talked about other promising military technology projects.

We prioritise expanding cultural and humanitarian contacts and ties between our countries' civil societies.

The flow of Russian tourists to Turkey continues to grow and develop dynamically. As we have already said, almost five million people (4.7 million) visited Turkey last year. We believe this figure may grow to six million next year.

In this connection, we have been discussing liberalisation of visa regime and negotiating what documents would allow visa-free travel. Today, we heard the proposals of the heads of relevant agencies.

We discussed possible joint efforts to help resolve the crisis in Syria, to consolidate the ceasefire regime and to create favourable conditions for the intra-Syrian negotiating process in the context of the results of the Syrian National Dialogue Congress, which was held in Sochi, and the recent trilateral contacts in the Astana format.

In conclusion, I would like to thank our friend, President of Turkey Recep Tayyip Erdogan, for the detailed talks and hospitality that was accorded to our delegation. I would like to note that expanding Russian-Turkish cooperation fully meets the interests of both countries and helps maintain peace and stability in our region and beyond.'

The first question asked at the press conference concerned a principled defense partnership. It sounded like this: 'You said today that the main drivers of bilateral relations are the largest projects, such as the Akkuyu Nuclear Power Plant, Turkish Stream and the supply of the S-400 systems. Given the negative and even confrontational agenda regarding Russia, do you see any factors that can hinder the implementation of these plans?'

'There are good prospects for promoting our cooperation in the iron and steel sector, automobile manufacturing, the agricultural industry and the production of agricultural equipment, as well as in finance, innovation, high technology and research. We also discussed Russian-Turkish cooperation in the sphere of military technology, including the implementation of a contract for the supply of S-400 Triumf anti-aircraft weapon systems to Turkey. We have decided to accelerate the delivery of these highly effective Russian defence systems. We also talked about other promising military technology projects.'

Vladimir Putin

'We have an agreement regarding the S-400. The manufacturing company will work on this project, and as for the price, we have reached an agreement. There is no problem with accelerating the deliveries. We have an agreement on this issue as well. It should be said that different opinions regarding defence projects are considered when such decisions are made. I believe that Russian companies are also transparent in this regard. Our agencies and defence companies will conduct and are conducting meetings on these issues. We are definitely monitoring the situation.'

Recep Tayyip Erdogan

Vladimir Putin answered: 'You mentioned negative and even provocative factors in international affairs. There are no such factors in our relations with Turkey. On the contrary, our bilateral relations are developing highly constructively. You can see the result in our trade and economic cooperation and in the speed with which we are implementing large projects, as I have just said.

This concerns Turkish Stream and our nuclear projects. As concerns the supply of gas to Turkey and the Turkish Stream pipeline project, negotiations with our European partners regarding the second line of Nord Stream 2 have been underway for years.

I hope these negotiations will produce a positive result, but we are still in talks, whereas a similar project with Turkey will be completed soon. It has entered the final stage.

Turkey is a priority and highly reliable partner in this and in all other spheres. This includes compliance with our agreements on many large regional problems that we face and want to resolve. I do not see any problems that would hinder the further development of our relationship with the Republic of Turkey.'

Recep Tayyip Erdogan also answered: 'First of all, I would like to tell our dear friend that Turkey took the decision regarding the S-400 missiles independently. And our dear friends in the Russian Federation gave an affirmative answer to our request, as a result of which we have reached an agreement on the supply of the S-400 systems. This matter is closed.

The missiles we are to receive are being manufactured. I would also like to say that our Russian partners have expedited the supply of these missiles to Turkey.

As for your other question, regarding the Akkuyu NPP, I can tell you that we should have launched this project sooner, because this power plant will generate 10 percent of the electricity Turkey needs. Russia has taken a decision that has facilitated this project.

Moreover, I would like to say that this decision will also help us

increase the number of skilled personnel. Taken together, this shows that our cooperation in this sphere has been fruitful. We are satisfied. Today we launched the construction of the reactor building. This will help create a new international image of Turkey.'

A few minutes later, the question of the S-400 again: 'Mr Putin, you have said a decision was taken to accelerate the delivery of the S-400 systems. What do you think about the idea of the joint production of these systems? Mr Erdogan, I would like to ask you if you discussed any other issues of military cooperation apart from the S-400.'

Vladimir Putin: 'I have said that we discussed various issues, including the possibility to expand our cooperation in the sphere of military technology. As for the accelerated delivery of the S-400 systems, we have taken this decision at the request of our Turkish partners and friends. We have accelerated the manufacturing of these systems and coordinated the price, which is very important. As for joint production, the transfer of technology is not a matter of trust or political interaction. It is a purely commercial issue that is decided between economic entities. There are no military or political considerations or limitations in this sphere.'

Recep Tayyip Erdogan: 'Friends, as Mr Putin has said, we have an agreement regarding the S-400. The manufacturing company will work on this project, and as for the price, we have reached an agreement. There is no problem with accelerating the deliveries. We have an agreement on this issue as well.

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RUSSIAN MILITARY AVIATION EXPORTS

Dmitry Shugaev:

'We produce equipment that meets the highest modern requirements, which is affordable for states that do not have ultra-high financial capabilities'

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 Shugaev, the Director of FSMTC, discusses main directions and tendencies in development of military-technical cooperation between the Russian Federation and Turkey, the peculiarities of Russian avia export at the present stage in his interview to our magazine.

– Mister Shugaev, 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 last year our defense exports exceeded $15 bln. The major part of this export is 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 modernization programs of defense ministries, financial solvency of countries that in its turn depends on their general economic health. Therefore, defense exports can hardly be expected to soar. Russia is aimed at building long-term relationships that will provide for sustainable growth of our export supplies.

Aviation equipment was the biggest part of Russian exported defense-dedicated goods. Russia delivers abroad a wide range of combat planes and helicopters. Besides, foreign countries have increasing interest in Russian aviation equipment. There are many reasons for that.

– Aviation products are certainly the biggest part of Russian exported defense-dedicated goods. Which technological, combat, service etc. particularities of Russian aviation products do facilitate its growing popularity at international markets?

– You were right to say that aviation equipment was the biggest part of Russian exported defense-dedicated goods. Russia delivers abroad a wide range of combat planes and helicopters. Besides, foreign countries have increasing interest in Russian aviation equipment. There are many reasons for that. Let us describe the main ones.

The first and perhaps the most important reason is that the majority of our aviation products has proven good during combat activities in Syria. Besides, we very much consider the experience gained, make necessary adjustments and improve

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

technical and combat performance of the aircraft.

Thereafter we create equipment meeting the highest modern requirements to be available for countries with no super financial capabilities. The equipment is not expensive. For example, these are generation 4++ Su-35 fighters and Mi-35M helicopters which outperform foreign sister ships 140% in terms of fire power.

Besides, one should not forget that Soviet and Russian aviation equipment has a rich experience of being used in nearly every country. The aircraft may be fault-free used in the hardest climatic condition, can combine sustainment and relatively easy-to-use as well as field repair capability. When making contracts we do not set unacceptable, sophisticated and unfair conditions for transferring defense products technologies hereinafter referred to as DP. However, it does not mean we are reckless to unveil our technological and production secrets.

– What trends of Russian aviation export development can be spoken of today?

– Apart from goods quality every customer is interested in the product to be maintained after sale, preferably at the customer's territory. This is a hard work accompanied by many problems. Nevertheless, we gradually improve service, repair and upgrade quality of the products delivered.

This also involves more contracts including provisions as to technologies to be transferred to a customer and local content of DP manufactured at the customer's land.

Next we expand the range of equipment required by other countries. For example, there is an obvious demand in combat turbojet planes capable of flying high and fast which are dedicated to fight illegal armed groups, armed drug dealers etc. There are forecasts for the equipment mentioned to be needed by the markets of African, Latin American, Caribbean and South-East Asian countries. I believe Russia can successfully work in this area.

Unmanned flying vehicles are important and interesting for us. Though being a bit outperformed by western states in this regard we also have good future.

There are growing requirements to marketing abilities of defense products promoted abroad.

Finally, we have to improve work methods amidst anti-Russian sanctions initiated by the USA and supported by their allies, especially in the light of recent events when the USA switched to a targeted imposing sanctions on certain Russian enterprises, companies, banks and individuals.

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– Which products are most demanded by our partners in military and technical cooperation?

– The most world popular defense products primarily include Sukhoi multi-purpose fighters Su-27, Su-30 and Su-35.

Different Su upgrades are used in almost every region of the world especially in Asian one and form the basis of fighter element of CSTO member-states. Despite the fact the planes had been dedicated to air fight our designers managed to develop fighters which met the challenges of the modern combat aircraft. That is how our success can be explained. These planes are heavy multi-purpose fighters capable of being both powerful strike force and efficient airborne units.

In addition to Sukhoi products our customers well operate MiG aircraft too. Multi-purpose MiG fighters and their upgrades are used by the armies of European, Asian, African, Latina America and Near East countries. I should mention that the brand new multifunctional light fighter MiG-35 was introduced in 2017. The aircraft had already been shown at international aerospace show MAKS-2017 and ARMY-2017 Forum.

In the near future it can be offered to would-be customers as an upgraded product for their aircraft pool. When speaking of counterparts we can say again that in terms of tasks performed MiG-35 is equal and mostly outperforms its US and European sister ships including those posed as leading edge ones.

– What is military and technical cooperation trend of Russia and Turkey?

– I may surely say military and technical cooperation with Turkey is growing fast. S-400 AD systems delivery contract was signed in 2017.

Besides, there are many different projects now being studied by specialists. This are armored vehicles, combat aircraft and space-dedicated cooperation. We are not ruling out the contracts to be undersigned in the near future.

– What hi-tech cooperation trends with Turkey including developing and creation of new products are the most promising?

– There are a few projects as to armored vehicles and aircraft. Nevertheless, it is difficult to say now which are to be successful the most. The specialists should have some time to make a detailed study of the cooperation. We are open for collaboration. I am sure we can agree on certain points in the near future.

– Why did Turkey's interest in Russian S-400 'Triumf' make our rivals at international markets so much nervous?

– First of all, the decision to buy the Russian air defense systems is evidencing that our products are able to meet competition. There are now similar systems in the world now like S-400. Moreover, these days our western partners feel free to use political pressure, black-mail and other unfair methods of competition to push out Russian products from international arms markets. Such efforts we can see in this case.

Turkey is a sovereign country which pursues its own national security interests. To choose military and technical partners, define quantity and range of military products to be purchased is an absolute right of any independent state.

Military and technical cooperation with Turkey is growing fast. S-400 AD systems delivery contract was signed in 2017. Besides, there are many different projects now being studied by specialists. This are armored vehicles, combat aircraft and space-dedicated cooperation. We are not ruling out the contracts to be undersigned in the near future.

Antalya international airport where the air show takes place meets every criterion required for a large aviation-oriented event to be held. First of all, it involves the possibility of carrying out flight demonstrations and performing special requirements dedicated to military airplanes. Besides, the airport has modern infrastructure and logistics, ground maintenance as well as hosting and accommodating capabilities.

The event's protector ship provided by Turkish President certainly improves its status among the participants and guarantees high level of preparation and arrangement.

– What is an objective interest of Russia in Eurasia Airshow?

– We have been always glad to take part in large international defense-oriented exhibitions and show our military and technical achievements, moreover, if the host country wants us to attend it. At this show Russia is well represented by our leading companies. It is evidencing a mutual interest towards enhancing Russian and Turkish cooperation. We have plans to carry out presentations of wide range of defense products including S-400 systems. We are especially glad to show this AD system in Turkey after the contract has been concluded. It also has a positive effect on attracting would-be customers to our products. /IA&TG/

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– What do you think is the particularity and importance of the new Eurasia Airshow? What is its place in the context of the world's presentation and negotiation sites?

– We consider the Turkish aviation industry as very fast-growing one. Such large airshow is proving this fact. The unique geopolitical position of Turkey as a link between the West and the East enables the show's sponsors to significantly increase the number of would-be customers. The event has good chances to be among the leading exhibition areas.

Ka-52 TO TEST NEW MISSILE WEAPON

'Russian Helicopters' Holding Company together with the Russian Ministry of Defence will conduct tests of the newest guided missiles on Ka-52 ship-based reconnaissance and combat helicopter. Specialists of the Holding Company will also test on-board equipment and armament of the helicopter for their resistance to electromagnetic fields.

Currently, the tests are performed on four Ka-52K prototypes. One of the helicopters is being prepared for tests to evaluate the resistance of avionics and air weapons to external electromagnetic fields. The second helicopter undergoes preliminary tests at the airfield, and on the third helicopter a new inertial navigation system is tested.

The fourth Ka-52K prototype is at the testing site of the Rusian Ministry of Defence, it is planned to test new guided missile weapons on this helicopter.

'Ka-52K helicopters are going through the final stages of the tests, and the Holding Company is ready to start serial production of this helicopter in the near future. We note interest of the Russian ministry of Defence in this helicopter. The design of the helicopter allows it to be placed on the decks of frigates, anti-submarine destroyers and the Admiral Kuznetsov aircraft carrier. Moreover, the Ministry of Defence made a decision to develop Russian helicopter carriers,' Andrey Boginsky, CEO of Russian Helicopters Holding Company, noted.

During tests Ka-52 helicopter was significantly improved. The helicopter was equipped with the state-of-the-art target sight systems and weapon control systems, combat survivability of the helicopter was enhanced and autonomous deployment system was improved. These modifications provided the Ka-52K with a range of competitive advantages as compared to the similar helicopters of foreign production.

Ka-52K helicopter is the next product in the range of sea helicopters designed by Kamov Design Bureau. The helicopter is designed for patrolling, fire support of assault forces when landing, performing anti-airborne defence missions on the forefront and in tactical depth, under any weather conditions and at any time of day or night. State-of-the-art on-board equipment ensures helicopter navigation in conditions with no visual references at sea.

Ka-52K helicopter differs from the baseline model by availability of a shortened folded wing, which was upgraded for the installation of heavy weapons, and a blade-folding mechanism, which ensures its compact arrangement inside a ship's hold. Reduced dimensions of Ka-52 ship-borne helicopters allow increasing the number of helicopters located on a ship to maximum. Armored cockpit and unique ejection system provide pilots with the maximum safety level, which cannot be ensured on any helicopter of this class produced abroad.

Another important feature of the Ka-52K is the use of corrosion resistant materials, which is conditioned by the necessity of helicopter's operation in conditions of humid marine climate. The helicopter is equipped with a single-point refueling and a modernized air conditioning system ensuring ventilation of sea rescue suits of the crew members. In addition, the helicopter is equipped with short-range radiotechnical navigation system, which was not used on the baseline model. /IA&TG/

MiG-35

MiG-35 is the "4++" generation multi-role fighter, exhibiting the further development of the MiG-29K/KUB and MiG-29M/M2 fighters in the field of the combat efficiency enhancement, universality and operational characteristics improvement.

The MiG-35 main features are the following:
– the fifth generation information-sighting systems integration into aircraft airborne avionics;
– possibility of advanced Russian and foreign origin weapons application;
– increased combat survivability due to integration of airborne integrated defense system.

State-of-the art avionics in combination with advanced weapons allow the MiG-35 fighters fulfill a great number of missions:
– air superiority gaining against four & fifth generation fighters;
– interception of existing and being developed air attack means;
– ground/surface targets destruction with high precision weapons without entering the air defense zone day and night in any weather conditions;
– air reconnaissance using optical-electronic and radio-technical equipment;
– participation in group actions and air control over groups of fighters.

IEMP KUPOL IS READY FOR THE CHALLENGE TO MAKE LAND AND SEA AD SYSTEMS UNIFIED

Military authorities of Russia had always realized that making land-based and sea-based weapons unified is one of the most important tasks of effective armed forces arrangement. Back in the end of XIXth century there was a pretty successful attempt made to create a 10-inch long-range gun unified for ships and land fortresses. In the second half of XXth century missiles and rockets became the main weapon, but even they were tend to be unified. Especially in areas where weapons enabled completion of similar tasks like in air defense. In fact, the first soviet union sea-based anti-aircraft missile systems were based on land-based air defense systems.

These were Volkhov-M M-2 AD system based on C-75 AD system of AD land forces and Volna M-1 AD system – a sea edition of C-125. But the Navy authorities were not quite satisfied with 'marinization' of land AD systems. Next systems – Osa-M AD systems – were manufactured, starting with initial design, in respect to the needs of the Navy, at that, it was required to make them unified with land Osa AD system. Sadly, the level of military and technical development didn't make it possible to complete this task that time. Special features of sea AD systems were supposed to ensure firing on the move – a destroyer or cruiser must not stop to counter an air attack. Anyway, such features require stabilization of all radar antennas in three dimensions and powerful computer systems, comparing to at-halt firing. This would increase the system weight. Heavy weight of an AD system is not a problem for heavy and medium displacement ships – their weapons weight of hundreds and thousands tons would be added only couple tens of tons. Such increase in weight would turn out to be critical for land AD systems – Osa AD system had only target acquisition radar antennas stabilized, missiles had to be guided at halt.

As a result, only 9M33 surface-to-air missile was unified. The same happened during development of

next-generation short-range AD system – land-based Tor and sea-based Kynzhal. Once again, using the same missile the systems were significantly different in arrangement and performance. To understand the difference in requirements to land and sea AD systems these systems need to be compared. The Tor AD system had 1 target channel, and the Kynzhal AD system, accepted for service in the same year, had already 4 channels. On the one hand, a combat ship is a much more attractive target comparing to a tank or a multiple rocket launcher and must have more features to counter mass air attacks, on the other hand, cruisers and destroyers of the Navy could carry heavier systems, comparing to those installed on land-based chassis: whereas total weight of Tor system was 32 tons, just Kynzhal launcher took 42 tons of its carrier's displacement. The truth is that in the USSR Navy effective AD systems were installed on heavy and medium displacement ships only because of Kynzhal systems heavy weight, and small-size forces of the Navy had to use just artillery AD units or sea editions of MANPADS.

However, for 30-45 years from the date of put of the first Osa and Tor systems into service the situation has changed greatly. On the one side, amount of combat ships in the Navy became less, but their capabilities increased significantly. One cannot compare patrol ships of the 159A project and their torpedo-artillery weapons to small missile-launching ships of the 21631 project, carrying the Caliber systems, – that much is the difference of their attack capabilities, after all, the latter have two times less displacement. Therefore, the value of each specific combat unit of the Navy has increased much. And leaving even small ships undefended against air attacks wouldn't be wise. On the other side, up-to-date industry is quite capable of providing the Navy with space-effective AD system suitable not only for cruisers and destroyers but for low displacement ships as well.

Present-day Tor-family systems, starting with Tor-M2U, have 4 target channels. New surface-to-air missiles 9M338K were adopted. The diam-

Present-day Tor-family systems, starting with Tor-M2U, have 4 target channels. New surface-to-air missiles 9M338K were adopted. The diameter of them is 35% smaller than the diameter of SAMs 9M330-2 used for Kynzhal AD system. That enables to increase ammunition load twice. Finally, development of radio-electronic components makes short-range AD systems capable to fire on the move. Thus, in 2015 Tor-M2U AD system destroyed airborne targets while moving at the speed of 25 km/h, and in 2016 the system performed successful training firings while moving at the speed of 45 km/h. Let us remind about a necessary requirement to a sea AD system capability to perform firing on the move.

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To clear up performance of the Tor-family systems in the Navy there were Tor-M2U firing carried out in 2015 from a shoreline at targets flying over water. The Tors destroyed targets properly that simulated modern air attack means. In September 2016 Tor-M2KM AD system carried out successful firing from the Admiral Grigorovych frigate, moving in the open sea at the speed of 8 knots, at targets of different type, including targets simulated an anti-ship missile. Applicability of the Tor-family system by the Navy has been proved.

Victor Visner, deputy general director for technical development of the IEMP Kupol, points out that 'making unified weapons for operation in different conditions – important task. The solution would greatly decrease cost of production and operation due to batch production enlargement, as well as to manipulate production facilities more effectively. Today we are already capable to perform major efforts in making sea and land short-range AD systems unified. Still, there will be some differences because of different operating conditions, but great options provided in the Tor system makes it possible to manufacture nearly all the equipment unified, i.e. the differences would only be in matching the AD system with the ship and computer systems algorithms.'

So, it is fair to say that domestic industry today is a footstep away to provide the Navy with effective, space saving and fairly low-cost air defense system. Soviet admirals dream is close to become true. **/IA&TG/**

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UAC, RUSSIA

High prospects in the civil and military segments

The United Aircraft Corporation (UAC) is the major Russian aircraft manufacturers and one of the biggest in the world. This Corporation unites more than 80 per cent of design and production assets of Russian aircraft industry. She also manages all key and most promising programs of development of the industry. UAC, which under one company represents the most well-known Russian aviation brands such as Sukhoi, MiG, Tupolev, Yakovlev and others, is today one of the world's biggest manufacturers and suppliers of aircraft.

Thanks to the success of its products UAC is one of the world's leading aircraft manufacturers. UAC's revenues have been lately growing on average more than 30% per year. Sukhoi Superjet 100 civil airliners, Su-30 and MiG-29 fighters, Yak-130 operational trainers are among the most popular aircraft exported by UAC. The document received by UAC is to much more simplify foreign market procedures, which is good news for present-day and future UAC's partners worldwide.

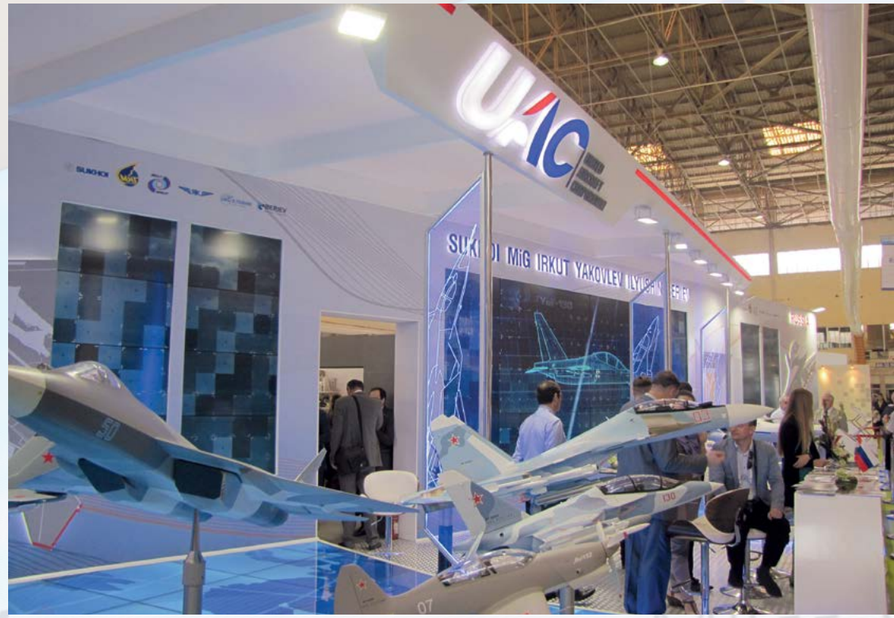
Moreover, one year ago as part of an effort to expand foreign presence UAC was given a military-dedicated foreign trade license to be implemented on a direct basis. The military-dedicated foreign trade license has been issued by Federal Service for Military and Technical cooperation. This helps UAC improve maintenance and repairs of equipment previously delivered abroad, which includes every Su, MiG, Il, Yak and Tu airplanes.

Alongside with the right for direct maintenance and repairs of the equipment previously delivered abroad, the document also specifies UAC's capabilities to update such equipment and train foreign personnel to maintain and repair UAC products. Besides, the license authorizes UAC to establish joint ventures abroad which can maintain and repair aircraft.

The license enables UAC to proceed to coordinated efforts in this area, develop a single enterprise after-sale service system based on current experience and ensure the most efficient activities at markets with several brands available.

The new capabilities confirm there is a steadily growing demand for UAC aircraft. Moreover, operational reliability and relatively low prices become increasingly significant. In this regard there is a reasonable increase of export of Russian aircraft having better reliability, up-to-dateness and well-balanced prices both for airplanes and further maintenance.

According to experts, it is Russian aircraft which in terms of life-cycle cost appear today as the most attractive in international markets.



Thanks to the success of its products UAC is one of the world's leading aircraft manufacturers. UAC's revenues have been lately growing on average more than 30% per year. Sukhoi Superjet 100 civil airliners, Su-30 and MiG-29 fighters, Yak-130 operational trainers are among the most popular aircraft exported by UAC. The document received by UAC is to much more simplify foreign market procedures, which is good news for present-day and future UAC's partners worldwide.

UAC products include many aircraft which are proven international bestsellers. Thus, Su fighters exported by Russia number in the hundreds making these fighters come second and first worldwide. In 2011-2014s Su planes were the first in amount: in four years customers have received 139 aircraft, while Lockheed Martin delivered only 89 and Boeing delivered 60 planes.

UAC places big stakes on supplying fighter planes given that many countries plan to have their aircraft fleets upgraded. Among the most world popular planes is Yak-130 operational trainer which has been already delivered and being deliv-

However, Russian aviation export is notable not only for military aircraft. In recent years rather good results have been shown by civil segment for which UAC has been making big plans. Among Russian civil aircraft the Sukhoi Superjet 100 regional aircraft of a new generation is the most popular at foreign markets. The aircraft combines new aircraft engineering technologies, passenger convenience, significant economic advantages for airlines, proper environmental specifications.

ered to many countries. This is a top-class aircraft. It can be upgraded as a light fighter or close support plane which is highly demanded by Indian Air Force.

However, Russian aviation export is notable not only for military aircraft. In recent years rather good results have been shown by civil segment for which UAC has been making big plans. Among Russian civil aircraft the Sukhoi Superjet 100 regional aircraft of a new generation is the most popular at foreign markets. The aircraft combines new aircraft engineering technologies, passenger convenience, significant economic advantages for airlines, proper environmental specifications.

The key advantage of Sukhoi Superjet 100 is lower operational costs as compared to its 100-seat competitors. Operational costs are minimized due to higher fuel efficiency and lower take-off weight. According to the aircraft operation study, its ownership cost is averagely 15-20% lower than the other similar class aircraft. The highly competitive lease rate supported by a state guarantee of depreciation value is also worth being taken into account.

SSJ100 capable of carrying 98 passengers is the first in its class aircraft featuring five-across seating, with big 32 inch distance between seats. Thanks to a combination of wider seats and higher cabin (over 2 meters) SSJ100 has more cabin space and bigger stowage bin capacity than such of competitors. The airplane has been built with the use of the latest design procedures and technologies by leading manufacturers such as French Snecma (engines) and Thales (avionics), US Goodrich (wheels) and Honeywell (APU). The interior has been designed by Italian office Pininfarina. In February 2012 the aircraft was certified by European Aviation Safety Agency (EASA).

According to UAC President Yuri Slyusar the Corporation has stable rate of mass production of Sukhoi Superjet 100. There are plans that every year more than 30 such aircraft shall be delivered to customers. Today about one hundred SSJ100s are being operated including those in other world regions, from South America to Southeast Asia.

Currently with available manufacturing capacities UAC enterprises are capable of producing up to sixty Sukhoi Superjet 100 per year. The Russian aircraft sparkles profound interest in Southeast Asia and Latin America. Experts confirm that in the context of 70-100-seaters this aircraft is becoming the most attractive for many international airlines. When interviewed Yuri Slyusar says UAC is intended to focus on further development of the Sukhoi Superjet 100 aircraft family to offer customers a range of regional planes.

It is worth noting that today a business jet version of the SSJ100s is also available. Following the results a number of measures, including auxiliary fuel tanks installation and other engineering solutions the range of the business version of the SSJ100 is increased to about 8,000 km-long nonstop flight.

At the Dubai Airshow 2017, which was held from November 12 to 16 in Dubai, United Arab Emirates, The United Aircraft Corporation became one of the major exhibitor. UAC had a strong presence at the show with an extensive product lineup at the show's static and aerial displays.

The Corporation demonstrated its Sukhoi Superjet 100 aircraft with a VIP interior, a premiere for the Middle East is the participation in the show's flying programme of the Su-35C supermaneuverable 4++ generation fighter. The static display was also host a Be-200ES multipurpose amphibian and an Il-76 heavy transport aircraft.

The region's airlines have established very high comfort standards. The Sukhoi Superjet 100 aircraft as well as the new Russian MC-21 aircraft family that was showed at the UAC's stand both demonstrate an optimal combination of commercial effectiveness and maximum passenger comfort. The Sukhoi Superjet 100 in its VIP configuration enjoys high demand – 8 aircraft have been delivered to customers to date. After a number of enhancements such as installation of additional fuel tanks and other system improvements the flight range of the VIP-version of the Sukhoi Superjet 100 was increased to 7,000 km that should satisfy the needs of most demanding customers.

Middle East customers also show interest in the Be-200ES multipurpose amphibian that, considering the region's geographic and climatic features, can be used in a number of unique configurations. The Be-200ES capabilities allow using the aircraft with maximum effectiveness and flexibility.

The show's flying programme was also brightened up by the "Russian Knights" aerobatics group on their new supermaneuverable multifunctional Su-30SM fighters that were supplied to the group in late 2016. Before that the group that was created in 1991 was using Su-27 and Su27UB fighters.

The Middle East is one of the most important regions for promotion of UAC's civil product lineup. According to the UAC's Market Outlook the region's average annual growth rates of passenger air transportation in 2017-2036 will be around 6%. In the long term the demand for new aircraft will be largely made up of narrow-body aircraft with more than 120 seats and wide-body aircraft. The total demand for aircraft by the airlines of the Middle East is forecast at 2,975 units for the next 20 years.

The demand for UAC's military product lineup is stable, however, lately, the interest in the world and in the Middle East in particular has risen considerably after successful performance of such aircraft as the Su-35C, Su-34, Su-30SM and MiG family fighters in real combat missions. Russian-made aircraft have once again proven their high combat effectiveness and flight and technical characteristics. **/IA&TG/**

SUPERJET 100: PROGRAM STATUS

At the moment about 117 the Superjet 100 aircraft are operated around the world. In total aircraft have performed more than 395 000 flight hours for more than 260 000 commercial flights since entering into service in 2011. The following Russian airlines and governmental agencies are among SSJ100 operators: Aeroflot, Gazpromavia, Yakutia, Yamal, IrAero, Ministry of Internal Affairs of the Russian Federation, EMERCOM of Russia, "Russia" Special Flight Squadron, RusJet. Interjet (Mexico), CityJet (Ireland) and the Royal Thai Air Force make the list of foreign customers.

Aftersales. Spares Distribution Program is supported by two services packages. The first is Basic SuperCare Plan including exchange parts pool access, guaranteed availability and LRU-off wing maintenance and SuperCare Plan Option implying on-site stock, Landing Gear/APU maintenance, engineering services. Spare parts warehouses for SSJ100 operation support are located in Russia and abroad, particularly in Fort Lauderdale (USA) and Munich (Germany). The partner of the project, engine manufacturing company PowerJet, has opened its own warehouse in Moscow Region for SSJ100 in-service support. SCAC is considering optimization of spares distribution network and increase of part numbers in stock thus ensuring 24/7 support of operators of this aircraft type around the world.

Market Overview. SSJ100 modifications created on the basis of the current platform, such as SSJ100 with 2960 km and 4320 km flight range and Business Jet (SBJ), certified by Russian and European aviation authorities, as well as particular national aviation authorities, can take up to 10% of the market share in 100-seat segment. During next five years it is planned to deliver about 170-180 aircraft, including business configurations, with the aim to deliver 35-40 SSJ100 per year.

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Saberlets. On the 21st of December, 2017 Superjet 100 performed its first flight with the installed saberlets in Zhukovsky. The results of research and experiments showed that the installation of the saber-like tips allows to simultaneously improve the take-off and landing performance and decrease the fuel consumption for not less than 3%. The expected improvement of the take-off and landing characteristics will be obvious for the carriers operating the aircraft at regional runways and in hot weather conditions as well as on mountain aerodromes

SCAC is consequently implementing the Superjet 100 improvement program aiming at market expansion and the increase of the number of Customers, the current Operators satisfaction level growth and the maintenance of the high competitive level of the product. The installation of the wing tips has become the part of the improvement program. The SSJ100 winglets are called "saberlets" for their saber-like shape. This configuration turned out to be the result of a number of research, engineering and experimental activities.

(Hot&High). SCAC is consequently implementing the Superjet 100 improvement program aiming at market expansion and the increase of the number of Customers, the current Operators satisfaction level growth and the maintenance of the high competitive level of the product. The wing tips installation being the part of the improvement program will provide the operators with cost cut up to $70000 per year per one SSJ100.

SBJ. Built on SSJ100 platform, Business Jet (SBJ) can boast the cabin with enhanced comfort. The aircraft can carry from 8 up to 60 passengers depending on the configuration. SSJ100 aircraft also can give origin for the special-purpose aircraft with increased interior comfort equipped with multi-media systems, SATCOM and with provisions for internal and external videoconference. The aircraft can also be modified in medical-evacuation configuration for transportation of injured and newborns. Within the period from 2015 till 2034 the demand in the corporate jets segment built on passenger airliners platform (Liners), SBJ being the part of this segment, can reach up to 400 aircraft, at that, share of SBJ can make up to 10%. Implemented auxiliary fuel tanks resulted in introduction of extended range version of Business Jet capable to perform flights at the distance of 6000 km. SCAC will continue the activities targeted on flight range increase of SSJ100 business configuration up to 7000 km, this option can also feature built-in stairs, high-speed SATCOM and other business-aviation attributes at customer's request. As of today SBJ fleet operated mostly by governmental agencies and commercial entities from different countries consists of nine airliners. **/IA&TG/**

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AEROSILA ONE OF THE MOST EXPERIENCED COMPANIES IN THE WORLD

AEROSILA is a public multi-profile company possessing both the facilities for highly intensive R&D and its own production plant. Established in 1939 as a design bureau for the development of automatic air propellers, the company has also been designing and developing gas turbine engines for more than 60 years.

MAIN ACTIVITIES

- APUs and small size gas turbine engines
- air propellers and propfans
- lifting and propulsion mechanisms
- power converters for supersonic aircraft
- inflowing and exhaust fans, also jet axial fans

APUs and SMALL SIZE GAS TURBINE ENGINES (up to 1700 hp)

Modifications based on the family of new generation gas turbine engines are being operatively created for the APUs of new, advanced and modernized aircraft and helicopters, ships and hovercrafts, other vehicles and also for a wide range of usages.

These APUs are equipped with an electronic system of control and adjustment (FADEC) and meet up-to-date requirements regarding dimension, weight, specific performance, noise level, emissions release, launch and operation altitude, and fuel economy and maintainability.

Currently, our efforts are concentrated on the development of:

- advanced small size gas turbine engines
- on-board power units with increased electrical power bleed including implementation of concepts such as "electric" aircraft and helicopters, ships and hovercrafts, vehicles, etc.
- base gas generators for small size main engines

AIR PROPELLERS, PROPFANS and HYDROMECHANICAL GOVERNORS

Air propellers and propfans ranging from 15 to 30,000 hp feature an aerodynamic efficiency of up to 0.9. The implementation of a multi-blade concept, using light composite blades, and the presence of an electronic control loop in the propellers' automatic control system have achieved the following advantages:

- Dimension & weight reduction
- Design service life increase & reliability improvement
- Durability of a repaired composite blade to the standard of a new one
- Expanded set of control functions & diagnostics
- Phase-synchronization with additional noise level reduction

LIFTING & PROPULSION MECHANISMS for HOVERCRAFT and WIG AIRCRAFT

Air propellers and lift fans are provided for creating an air cushion under a ship's body, also for direct and reverse thrust, enabling high speed, maneuverability, efficient landing and to aid a ship's movement on land.

INFLOWING / EXHAUST FANS, JET AXIAL FANS

A series of highly effective variable pitch fans for ventilation of tunnels and underground premises.

QUALITY & RELIABILITY of our products has been verified by users around the world

AEROSILA FEATURES

- Full cycle of new product creation from scientific research to pilot stage, plus comprehensive testing and technical support
- Modern technology to facilitate full-scale production and wide production cooperation
- Mutually-beneficial interaction and a personal approach with partners and customers
- Cooperation with the leading scientific centers and design bureaus
- High professionalism of its personnel
- Continuous quality improvement for developing and modernizing products/services

As a high-level integrator **AEROSILA** coordinates the creative efforts of developers with regard to materials, control systems, fuel devices, starting and ignition systems, heat exchangers, sensors, and other aggregates; it also shapes prospective requirements and sets long-term objectives

On CUSTOMER' DEMAND AEROSILA provides:

- Adaptation of serial products
- Design and development of new products
- Localization of manufacture under license agreements
- Technical audits

EFFICIENT USE is guaranteed by **MANY YEARS** of **EXPERIENCE** in **DESIGNING** such products, **MODERN TECHNOLOGICAL OPPORTUNITIES** for manufacturing and testing, a rigorous quality management system (to **ISO 9001:2015**, **EN 9100:2016** standards), and a **GLOBAL TECHNICAL SUPPORT** network

MEETING CUSTOMER REQUIREMENTS IS OUR HIGHEST PRIORITY

Mi-2 with AI-450M-B

MOTOR SICH AT ILA-2018

MOTOR SICH JSC is specialising in designing, manufacture and aftersale support of aircraft gas-turbine engines, industrial gas-turbine drives and gas-turbine power generating sets with these drives. Currently, the Company actively creates helicopter industry in Ukraine. Quality and reliability of our aircraft engines is confirmed by their long-term operation as part of airplanes and helicopters in more than 100 countries of the world.

One of the Company's success criteria is participation in the international air shows. MOTOR SICH JSC constantly represents new engines and other products at aerospace shows in Kazakhstan, United Arab Emirates, France, Germany, Great Britain, India, China and other countries.

Today, the list of our series-produced and developed engines for passenger and transport airplanes includes turboprop and propfan engines with power from 400 to 14000 h.p. The most perfect engine of this type is the D-27 turbopropfan engine. MOTOR SICH also manufactures the D-18T turbofan engine with high bypass ratio and thrust from 1500 to 23400 kgf for the An-124 Ruslan and An-225 Mriya, which are the biggest load-lifting transport airplanes in the world.

It is necessary to mention the D-436-148 engine for the An-148 passenger aircraft. It complies with current ICAO requirements and is as good as similar foreign engines. From the middle of 2013, a 100-seat An-158 aircraft (a new version of the An-148 aircraft) is in service in the Republic of Cuba.

At present, designers of IVCHENKO-PROGRESS State Enterprise and MOTOR SICH JSC develop the D-436-148FM engine for the An-178 transport aircraft with load-carrying capacity from 16 to 18 tons. It is intended to replace the An-12 veteran transport aircraft. The D-436-148FM engine is a new version of the D-436-148 engine with the takeoff thrust increased up to 7900 kgf and the contingency power thrust of 8790 kgf due to application of more efficient engine units.

Vyacheslav A. Boguslayev,
President of Motor Sich JSC

Currently, MOTOR SICH JSC is collaborating with IVCHENKO-PROGRESS State Enterprise in the development of a new generation of the AI-28 bypass engine family of 8 to 10 tons thrust class. The family basic engine is developed based on the Company's research and development potential and advanced technologies. It will have an ultra-high bypass ratio due to application of the geared fan drive.

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

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

MOTOR SICH JSC is one of world leaders in production of helicopter engines. In the course of years, the Company has produced more than 30 thousand of the TV3-117/TV3-117V engines. And they are constantly upgraded.

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

Nowadays, Kamov Ka-32 helicopters powered by the TV3-117VMA (VMA series 02) engines are widely used for transportation of cargo on the external load sling system with multiple takeoffs during the flight cycle.

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

TV3-117VMA-SBM1V series 4E

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

The TV3-117VMA-SBM1V series 4 and 4E engines (with air or electrical starting systems) are versions of the TV3-117VMA-SBM1V engine. They are intended for re-engining of the Mi-8T helicopters in order to improve their performance.

The TV3-117VMA-SBM1V series 3 engine was designed for the Mi-8MSB1-V helicopter (and other similar helicopters). Its power ratings and service conditions correspond to those of the basic TV3-117VMA-SBM1V engine. Its distinctive feature is electrical starting system instead of air starting system. In December 2017, MOTOR SICH JSC has got Main Change Approval of the IAC Aviation Register No. СТ267-АМД/ОГИ-15 for the TV3-117VMA-SBM1V series 3 propulsion engine.

The TV3-117VMA-SBM1V series 5 engine is a new project. This engine is developed in cooperation with IVCHENKO-PROGRESS SE. The engine has takeoff power of 2800 h.p. and 2.5-minute OEI power of 3200 h.p. It has higher power due to the changed design.

MOTOR SICH is working on development, manufacture, and overhaul of helicopter gearboxes. The company has mastered overhaul of the VR-8A, VR-14, and VR-24 main gearboxes for helicopters of the Mi-8, Mi-17 and Mi-24 family.

MOTOR SICH and IVCHENKO-PROGRESS SE are developing the VR-17MS main gearbox, which is a new version of the VR-14 gearbox for the Mi-17 helicopters with take-off weight increased up to 14 tons.

MOTOR SICH JSC is one of world leaders in production of helicopter engines. In the course of years, the Company has produced more than 30 thousand of the TV3-117/TV3-117V engines. And they are constantly upgraded. To improve helicopter performance in high-mountainous regions of countries with hot climate, MOTOR SICH JSC has developed the TV3-117VMA-SBM1V engine with the total service life of 12000 hours/12000 cycles and the first overhaul period of 5000 hours/5000 cycles.

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

In 2017, there was successfully extended application range of the AI-9V APU. Starting altitude was increased from 4550 m up to 6500 m.

In order to improve performance of the APU, IVCHENKO-PROGRESS SE and MOTOR SICH have created new versions of this engine. One of them is the AI-9V series 1 APU. This version features the following modes: air bleed for the cabin conditioning system, simultaneous air bleed and up to 3 kW power offtake, 3 to 4.5 kW generator mode. This APU also features extended continuous operation time.

The other versions of the AI-9V family are the AI-9V-1 APU (with STG-9M starter-generator) and the AI-9V-1T APU (with THALES starter-generator). They have an improved performance and wider operating range than the basic AI-9V APU. In particular, they have the following advantages: increased critical altitude, improved power efficiency, extended power settings.

Nowadays, small aircraft are very popular throughout the world, that is why MOTOR SICH and IVCHENKO-PROGRESS actively develop small-size turboshaft and turboprop engines of the AI-450 family.

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

MOTOR SICH is developing the MS-500V turboshaft engines of new generation. These engines will have take-off power from 600 to 1100 h.p. They are intended for different helicopters with take-off weight from 3.5 to 6 tons. The MS-500V engine with take-off power of 630 h.p. and the MS-500V-01 engine with take-off power of 810 h.p. have passed tests, and the Company has got Type Certificates of the IAC Aviation Register for these engines.

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

At present, MOTOR SICH is intensely developing its own Helicopter Program. MOTOR SICH helicopter production facilities include modern machining and assembly workshops, paint removal and application section, Flight-Test Complex, Simulator Complex for training of flight crews in all types of helicopters produced by the Company.

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

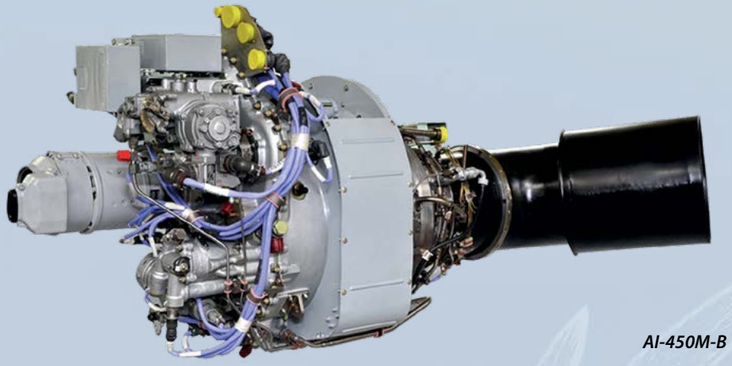
The Mi-8MSB medium multipurpose helicopter with maximum take-off weight of 12,500 kg is the first implemented project under MOTOR SICH Helicopter Program. The helicopter is equipped with a powerplant consisting of two TV3-117VMA-SBM1V Series 4E gas-turbine engines with electrical starting.

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

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

Development and manufacture of light helicopters is another line of MOTOR SICH Helicopter Program. The Mi-2 helicopter powered by the AI-450M-B engines has become the first certified light helicopter that was developed by MOTOR SICH

Mi-8MSB



AI-450M-B

JSC. Main design change involves replacement of obsolete GTD-350 engines with modern AI-450M-B engines developed by IVCHENKO-PROGRESS and manufactured by MOTOR SICH.

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

The Mi-2 helicopter powered by the AI-450M-B engines has the following advantages as compared to the Mi-2 helicopter: fuel flow rate is reduced by 30 %; flight range without additional external tanks is increased by 40 %; service ceiling is increased from 4 to 5 km.

Thanks to the changed shape of cowlings, the helicopter has received a renovated, more dynamic external view. The cowlings are made of advanced composite materials in order to reduce the structural weight. It was changed design of the structural frame, engine fuel, oil and cooling systems.

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

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

Another advantage of the helicopter: it may be stored without hangar. Almost all similar helicopters do no have such feature.

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

New flexible U-shaped fuel tank which configuration ensures exit of rope of the external sling system. Another advantage of new design of the external sling system is location of lock at the helicopter center of gravity. At present, new design of the external sling system is tested at our company and confirmed the possibility to increase the load-carrying capacity by 25% (from 800 to 1000 kg).

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

The dual-control helicopter version may be used for training of pilots. The helicopter has one more advantage for training purposes: its design is similar to heavier helicopters of the Mi-8 type. The Mi-2 helicopter powered by the AI-450M-B engines as well as the Mi-8 helicopter has 2 gas-turbine engines and wheeled landing gear with nose landing gear.

The helicopter may also be used for treatment of agricultural fields and may be equipped with spraying or fertilization system featuring two composite tanks having total volume of up to 1200 litres.

The Mi-2 helicopter powered by the AI-450M-B engines may be equipped with medevac equipment. Rescue variant may be equipped with the search floodlight, the winch for fast lifting of 2 persons, and other mission equipment.

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

The helicopter design is optimal for passengers transportation, search-and-rescue operations and medical evacuation. As compared with the Mi-2, the MSB-2 helicopter has the following additional advantages: fuel flow rate is reduced by 30 %; cargo compartment space is expanded by 1 m3; automatic drive of the cargo-and-passenger compartment door; large area of the flight compartment windows.

At present, the first MSB-2 helicopter is assembled for ground tests at MOTOR SICH. The first prototype model is also prepared for flight tests and static tests of the helicopter airframe.

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

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'KB RADAR': FROM BELARUS – TO ALL OVER THE WORLD

JSC 'KB Radar' – Managing Company of the 'Radar Systems' Holding – is one of the leading research and production enterprises of the military-industrial complex of the Republic of Belarus, and one of the recognized world leaders in its segment. The products of the enterprise are well known and are used practically on all continents of the world.

JSC "KB Radar" – Managing Company of "Radar Systems" Holding, whit has been set up with the purpose of joint coordinated implementation of the processes of development and commissioning of radar systems and EW assets, other military and dual-use systems in accordance with the specialization and regulations of the Managing and Participant companies of the Holding, based on the latest achievements of science and innovative technologies.

The "Radar Systems" Holding is one of the leading organizations of the Military and Industrial Committee of the Republic of Belarus conducting the uniform policy in the sphere of defense, development of the military industries sector, cooperation of the Republic of Belarus with foreign states in military technologies.

The Holding would perform a "turnkey" work cycle – from development to production and follow-up of the equipment designed, training the Customer's specialists in its operation, maintenance and repairs.

The Holding joins the companies with a long-standing record, offering their specialization, unique technologies and achievements.

The company's history starting from April 6, 1974 when a special department was set up at the Science Research Institute of Automation Means (city of Minsk), is the history of selfless service of the team of scientists, specialists, all employees in the interests of the country, strengthening its defense, scientific and industrial potential.

9th March 2006 is today's company founding date. The RUE "KB Radar", based on resolution of the Minsk City Council, was registered in the Unified State Register of Juridical Entities and Individual Entrepreneurs as Entry No 190699027.

From 30 December 2010, the company bears the legal status of an Open Joint Stock Company (JSC "KB Radar"). Currently 100% of the shares belong to the State.

In connection with establishment of the "Radar Systems" Holding, as from 17th October 2011 the company was re-named into JSC "KB Radar" – Managing Company of "Radar Systems" Holding controlled by the State Military and Industrial Committee of the Republic of Belarus.

KB RADAR
RADAR & EW SYSTEMS

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РОССИЙСКО-ТУРЕЦКИЙ ДЕЛОВОЙ ЖУРНАЛ
TÜRK-RUS IŞLETME DERGISI
№ 01 (01) Октябрь / Ekim 2018

13 НОВЫЕ ВОЗМОЖНОСТИ ЭКОНОМИЧЕСКОГО РАЗВИТИЯ
Ekonomik kalkınma için yeni fırsatlar

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ЖУРНАЛ ДЕЛОВОГО СОТРУДНИЧЕСТВА ДВУХ ДЕРЖАВ

Объединенная промышленная редакция реализует проект по выпуску «Российско-Турецкого делового журнала», который выступает в роли информационно-аналитическое сопровождения по развитию взаимовыгодных деловых связей между российскими и турецкими предпринимателями.

Материалы в журнале публикуются параллельно на русском и турецком языках. Журнал поступает по адресной целевой рассылке в структуры государственной власти России и Турции, связанные с реализацией промышленной и экспортной политики, в союзы международного сотрудничества, торгово-промышленные палаты, международные и национальные инвестиционные фонды, крупнейшим игрокам взаимного делового сотрудничества между Россией и Турцией.

Ключевые темы «Российско-Турецкого делового журнала»:
– динамика и тенденции торгово-экономических отношений;
– меры государственной поддержки и содействия международному бизнесу обеих стран;
– инвестиционные проекты, программы, предложения;
– совместные предприятия;
– опыт реализованных проектов российско-турецкого делового сотрудничества;
– межрегиональные программы и проекты;
– изменения в законодательстве двух стран;
– вопросы финансирования международных индустриальных проектов;
– сотрудничество в области высоких технологий;
– развитие культурных, туристических, молодежных программ;
– предложения по проектам сотрудничества, отраслевой консолидации, совместным разработкам;
– презентация новой продукции высокого экспортного потенциала.

Выход первого номера «Российско-Турецкого делового журнала» – 08 октября 201 года. Среди главных тем: «Инвестиции», «Безопасность», «Энергетика», «Строительство», «Туризм».

Выход первого номера приурочен к проведению в Стамбуле 22-й международной выставки средств и технологий индустрии безопасности и защиты ISAF 2018 (11-14 октября 2018, Istanbul Expo Center).

İKI YETKILI İŞ İŞBIRLIĞI DERGISI

«Türk-Rus Işletme Dergisi», Rus ve Türk girişimcileri arasında karşılıklı yarar sağlayan iş ilişkilerinin geliştirilmesine yönelik bilgi ve analitik bir destektir.

Dergide materyaller Rusça ve Türkçe olarak paralel olarak yayınlanmaktadır. Dernek, Rusya ve Türkiye arasında, sanayi ve ihracat politikasının, uluslararası işbirliği birliklerinin, ticaret ve sanayi odalarının, uluslararası ve ulusal yatırım fonlarının, Rusya ve Türkiye arasındaki karşılıklı ticari işbirliğinin en büyük oyuncularına uygulanmasına ilişkin devlet yetkililerine gönderilmektedir.

Anahtar konular:
– ticaret ve ekonomik ilişkilerin dinamikleri ve eğilimleri;
– her iki ülkenin uluslararası ticaretine devlet destek ve yardım önlemleri;
– yatırım projeleri, programlar, teklifler;
– ortak girişimler;
– Rus-Türk iş işbirliğinin uygulanmış projelerinin deneyimi;
– bölgelerarası programlar ve projeler;
– İki ülkenin mevzuatındaki değişiklikler;
– uluslararası endüstriyel projelerin finansmanı;
– Yüksek teknolojiler alanında işbirliği;
– Kültürel, turistik ve gençlik programlarının geliştirilmesi;
– işbirliği projeleri, sektörel konsolidasyon, ortak kalkınma önerileri;
– Yüksek ihracat potansiyeli olan yeni ürünlerin sunumu.

«Türk-Rus Işletme Dergisi» nin ilk sayısı 8 Ekim 2014'te. Başlıca konular şunlardır: Yatırımlar, Güvenlik, Enerji, İnşaat, Turizm.

İlk sayının yayınlanması, güvenlik ve savunma sanayii ISAF 2018 (11-14 Ekim 2018, İstanbul Fuar Merkezi) 22 uluslararası araç ve teknolojinin İstanbul'daki holdingine zamanlandı.

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	Release dates	Additional distribution
'RA&MG' №01 (19)	March 09th	**DIMDEX 2018** (12-14.03.2018, Qatar, Doha)
'RA&MG' №02 (20)	April 10th	**DEFEXPO INDIA 2018** (11-14.04.2018 Chennai, India)
'RA&MG' №03 (21)	April 23th	**Eurasia Airshow 2018** (25-28.04.2018, Turkey, Antalya)
'RA&MG'№03 (21)	April 23th	**ILA Berlin Air Show 2018** (25-29.04.2018, Germany, Berlin)
'RA&MG'№04 (22)	May 04th	**SOFEX 2018** (08-10.05.2018, Jordan, Amman)
'RA&MG'№05 (23)	May 21th	**KADEX-2018** (23-26.05.2018, Kazakhstan, Astana)
'RA&MG'№06 (24)	August 20th	**ARMY-2018** (21-26.08.2018, Russia, Moscow)
'RA&MG'№07 (25)	September 10th	**GIDROAVIASALON-2018** (13-16.09.2018, Russia, Gelendzhik)
'RA&MG'№08 (26)	September 17th	**Africa Aerospace and Defence 2018** (19-23.09.2018, South Africa)
'RA&MG'№09 (27)	September 24th	**ADEX 2018** (26-29.09.2018, Azerbaijan, Baku)
'RA&MG'№10 (28)	September 26th	**Istambul Airshow 2018** (27-30.09.2018, Turkey, Istambul)
'RA&MG'№11 (29)	October 15th	**Future Forces 2018** (15-19.10.2018, Czech, Prague)
'RA&MG'№12 (30)	October 22th	**EURONAVAL 2018** (23-26.10.2018, France, Paris)
'RA&MG'№13 (31)	November 05th	**Airshow China 2018** (06-11.11.2018, Zhuhai, China)
'RA&MG'№14 (32)	November 07th	**INDO DEFENCE 2018** (07-10.11.2018, Indonesia, Jakarta)
'RA&MG'№15 (33)	November 10th	**BIAS 2018** (14-16.11.2018, Bahrain, Manama)
'RA&MG'№16 (34)	November 26th	**IDEAS 2018** (27-30.11.2018, Pakistan, Karachi)
'RA&MG'№17 (35)	November 27th	**JIAE 2018** (28-30.11.2018, Japan, Tokyo)
'RA&MG'№18 (36)	December 01th	**EDEX 2018** (03-05.12.2018, Egypt, Cairo)
'RA&MG'№19 (37)	December 03th	**Expo Naval 2018** (04-07.12.2018, Valparaiso, Chile)

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

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