

RUSSIAN AVIATION & MILITARY GUIDE

Special analytical export project of the United Industrial Edition

№12 (30) November, 2018

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The best defense technologies from Russia



HIGH-PRECISION
Russian holding creates innovative arms



INDO DEFENCE 2018
Special exposition for ASEAN states



WORLD EXCLUSIVE
Unique technology rescue from skyscrapers

A large photograph of a Rosoboronexport exhibition booth. The booth features a large illuminated sign with the Rosoboronexport logo and name. Below the sign, there are several large screens displaying images of military equipment, including a helicopter. A small sign on the left side of the booth reads "PVC ENG".

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MI-17V5
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EDITORIAL



Supporting international security

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

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

One can predict raise of defense means market in times like this. But together with developing of defense technologies in order to safety, rivalry among sellers of weapons and defense systems increases in order to achieve such goals as increasing profits and market share. International defence exhibition and seminar IDEAS-2018 presents in Karachi the best Russian weapons and innovations for global market, which are the undisputed world leaders on price and quality in their segments.

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

Taking part in IDEAS-2018 Russia continues the policy of open partnership with the Asian states. Russia has a wide product line that meets all the needs of this continent and ready propose the best technology and the best price offers.

Valeriy Stolnikov



COMPONENTS FOR THE INDIA SPACE CENTRE

The Ruselectronics holding company, which is part of Russian State Corporation Rostec, has supplied ferrite components to the Space Applications Centre of the Government of India. These materials will be used in super-high-frequency devices for space satellites.

Ferrite Domen Scientific Research Institute (part of the Ruselectronics holding) has delivered microwave ferrites for the space industry to the customer. They can be used under conditions of solar radiation and other interference to precisely control wave oscillations, switch energy flows from one direction to another, and partially or fully absorb the power flow. These characteristics mean that microwave ferrites can be used as components in space microwave equipment. 'India is continuing to actively increase its pace of space exploration and is spending more than \$1.2 billion per year in this field. The country is already ranked fifth among the space powers and intends to strengthen this position. The first supply of ferrites for Indian civilian satellites allows us to open a new area of cooperation and gain a foothold in this fast-growing market. Thanks to the expansion of cooperation with India, in 2018, we already expect to quadruple the share of exports of ferrite products compared to last year,' says Rostec's Executive Director, Oleg Yevtushenko. Ferrite Domen Scientific Research Institute manufactures around 40% of all ferrite products in Russia. The Space Applications Centre of the Government of India produces civilian satellites, which are used for telephone communications, radio broadcasting and satellite Internet. In addition, the organization develops optical and microwave sensors for satellites, and software for signal and image processing.

ZENIT & LEICA

Krasnogorsky Zavod, manufacturer of the Russian brand Zenit, in cooperation with Leica Camera AG, German manufacturer of premium cameras and optics, designed a new digital rangefinder camera Zenit M with a new generation lens. The Shvabe Holding, part of Rostec, has presented this product on its exhibition stand at Photokina 2018, the largest international trade fair for the photographic and imaging industries held in Cologne. One of the participants of this Russian-German project is Krasnogorsky Zavod (KMZ Zenit), one of the Russian leading designers of photographic equipment, is part of the Shvabe Holding. The Zenit M camera is technically based on the Leica M Type 240 platform, but has been modified both in terms of hardware and software.

Cooperation in Southeast Asia

The Russia-Singapore Business Council (RSBC) and the Singapore Manufacturing Federation (SMF), representing the interests of the country's manufacturing companies, have signed a cooperation agreement. The parties have agreed to expand the multilateral cooperation between companies of the two states, primarily Rostec's enterprises, in high technology areas that are most relevant for the Singaporean partners.

The agreement has been signed by Deputy Chairman – Executive Director of the Russia-Singapore Business Council Sergey Pronin and President of the Singapore Manufacturing Federation, candidate to the Parliament of Singapore Douglas Foo. The document also provides for establishing joint certification centers to promote Russian manufacturers' products in Southeast Asia.

'I firmly believe that this agreement will boost expansion and intensification of the cooperation between Rostec's enterprises and companies of the Southeast Asian countries,' stressed Rostec Deputy CEO, RSBC Chairman Nikolay Volobuev. 'Singapore is a leading financial center in rapidly developing Southeast Asia. Therefore, by strengthening our presence, we are laying the foundation for long-term collaboration between our enterprises

and companies of all states in the region.'

The official ceremony of signing the agreement took place within the Exhibition of Russian Technologies being held in Singapore on November 12–29. The exposition is organized at the facilities of the Center for Foreign Promotion of Russian High Technology Companies and Presentation of Investment Projects located in TechPlace II – a largest industrial park of the country.

Within the event, the parties have also signed a trilateral agreement between the executive body of the Business Council – RS Trade House, Singaporean company Progression Engineering (S) Pte Ltd and Autonomous Nonprofit Organization 'Far East Investment and Export Agency'. The partners have agreed to jointly promote high-tech companies and investment projects of the Far East in



Southeast Asia. Promotion will be supported by the Center for Foreign Promotion established by the RSBC with the support of the Rostec State Corporation and RSTrade – international electronic information and service B2B Platform.

Rostec continues implementing the large-scale program for promoting the State Corporation's high tech products abroad in accordance with the approved Strategy that includes 17% average annual rouble revenue growth, increase in the share of civilian products in revenue up to 50%, improvement of operating efficiency and entry into international markets.

Engine Components for MC-21

United Engine Corporation (UEC) and the All-Russian Institute of Light Alloys (VILS), both forming part of Rostec, will prolong the life of the PD-14 engine by using a new heat-resistant granulated alloy.

The new alloy has been used for making high pressure compressor discs and a turbine for the PD-14 engine created for the first Russian short and medium-haul MC-21 aircraft. According to current estimates, its implementation, along with other innovative technical solutions, will increase the life of these components of domestic engines for civil aviation from 5 to 30 thousand flight cycles.

'PD-14 is the result of the broad cooperation work of our enterprises. The innovative solutions applied in it, including new alloys, allowed to create a truly modern, powerful and highly resourced aviation engine. The first flight of the prototype MC-21 with PD-14 is scheduled for the



second quarter of 2019. Deliveries of PD-14 for MC-21 will begin in 2021,' said Anatoliy Serdyukov, Industrial Director of Rostec's Aviation Cluster.

In 2019 the All-Russian Institute of Light Alloys (VILS) will conduct additional research in the inter-

ests of UEC, which will allow more extensive use of this technology for engines of civil aircraft. The research includes development of new alloys and products for a new generation of PD-35 engines based on these alloys.

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COOPERATION WITH SOUTHERN AFRICA

Rosoboronexport took part in the Southern African Development Community (SADC) Day celebrations. 'Rosoboronexport regards the Southern African Development Community as a promising partner. It is one of the largest and most influential subregional organizations whose activities are aimed at comprehensively promoting the development of its member countries. The Community's goals and objectives largely comply with our strategy on the African continent. We are working closely with member countries of the Community in strengthening infrastructural and state security, combating terrorism and organized crime, preparing and equipping peacekeeping missions under the auspices of the Community. We are pleased to have such a strong and reliable partner in Africa,' said Rosoboronexport's Director General Alexander Mikheev.

Today, Rosoboronexport notes an upward trend in the arms market in the sub-Saharan African countries, which is due to a number of objective factors. Among them are the fight against the spread of international terrorism and Islamic radicalism, the continuing threat of maritime piracy. In addition, different units from countries in the region are actively involved in peacekeeping operations.

The Company uses a comprehensive approach to cooperation with the countries of the region, offering its partners the delivery of final products, as well as the necessary logistics support throughout their life cycle, training and the establishment of facilities for the repair and maintenance of products.

RUSSIAN LADA IN GLOBAL MARKET

LADA continues to strengthen its positions on foreign markets. It was sold 27398 cars and SKDs in 9 months of 2018 that is by 65% more vs the same period of last year. Along with that it was opened 2 new directions and 9 dealerships. Since the early year LADA cars started to be sold in two new countries – Tunisia (Tunisia) and Chile (Santiago, Punta Arenas). LADA occupies the second position in Belarus by sales results for 9 months of 2018. The brand's dealership has been actively developed here: since the early year 6 new dealerships were opened in Minsk, Gomel, Mogilev, Pinsk, Vitebsk, and Grodno, fully meeting the new standards of design and service. For 9 months of 2018, 3 new LADA dealerships were opened in Uzbekistan – in Tashkent, Dzhizak and Bukhara. By results of 9 months LADA has again occupied the first position by sales in the Republic of Kazakhstan with a market share of 22,9%. And its growth took 5.2% points vs the same period of last year.

Aviation Revenue to Reach \$15 Billion

The inclusion of the United Aircraft Corporation (UAC) will enable Rostec's aviation cluster to increase its revenue to 1 trillion rubles (\$15 billion), and make the State Corporation join the ranks of the world's leading aircraft manufacturers, says the Director of Rostec's aviation cluster, Anatoliy Serdyukov.

Russia's President, Vladimir Putin, signed a decree on the transfer of a 92.31% stake in UAC to Rostec on October 24. According to the signed decree, the process of merging the aircraft corporation with Rostec structures will take a year and a half. The inclusion of UAC in the State Corporation's control loop will mean that the entire aircraft production chain can be combined into one, which will strengthen production cooperation between aircraft manufacturers and parts suppliers.

'For Rostec, integration with the UAC is a landmark moment. The share of the aviation cluster in the State Corporation's overall revenue will be approximately 50% – around 1 tril-

lion rubles. This means that the aircraft manufacturing unit will become the most powerful one in the State Corporation, and Rostec will be at the same level with the world's leading aircraft manufacturers,' said the Director of Rostec's aviation cluster, Anatoliy Serdyukov.

The total revenue of Rostec's aviation cluster in 2016 was 534.7 billion rubles; for UAC it was 417 billion rubles. In line with the development strategy of the aviation cluster, it is planned to increase this indicator by an average of 14% per year in ruble terms until 2025. The new structure with a larger turnover will be more attractive to investors. Rostec's other priority projects will include the cre-



ation of MS-21 medium-range aircraft – it is expected that about 55 billion rubles will be invested in this by 2025.

Rostec continues to implement a large-scale program for the development of the aviation cluster in accordance with the approved Strategy, the main objectives of which are to develop civilian production, improve operational efficiency, and gain access to global markets until 2025.

Mi-171A2 for Chinese company

China General Aviation Service reaffirmed its intention to procure a batch of Mi-171A2 helicopters manufactured at the Ulan-Ude Aviation Plant (U-UAZ). Russian Helicopters Holding Company (part of Rostec State Corporation) is planning to manufacture six rotorcraft and deliver them to the customer by 2022.

'For the first time, we are ready to start mass production of Mi-171A2 for a foreign customer. I hope that this contract shall enhance the trust of potential operators in our new helicopter. It represents a giant step in the evolution of Mi-8/17 family and embodies advanced technical solutions that improve comfort, safety and flight performance of this rotorcraft. Currently, Mi-171A2 is undergoing the process of certification in China to be finalized next year,' highlighted Andrey Boginskiy, Director General of Russian Helicopters Holding Company.

The Mi-171A2 multi-purpose helicopter is one of the most highly anticipated new products of the Russian rotorcraft industry, the result of a major upgrade of the Mi-8/17 family helicopters. The design of Mi-171A2 has undergone more than 80 modifications. The helicopter is equipped with VK-2500PS-03 engines (a civil version of engines installed on Mi-28 com-



bat helicopters) with a digital control system. One of the main distinguishing features of the Mi-171A2 helicopter compared to Mi-8/17 helicopters is the new rotor system. The helicopter features a more effective X-shaped tail rotor and a new main rotor with all-composite blades of an improved aerodynamic configuration. Therefore, thanks to the aerodynamics alone, the thrust of the Mi-171A2 main rotor has increased by more than 700

kg, which has had a positive impact on the helicopter's flight performance.

In August 2017, the helicopter received a Category A certificate from the Federal Air Transport Agency of the Russian Federation, which means meeting the most stringent requirements to flight safety set for civilian helicopters. In January 2018, Mi-171A2 successfully proved the operation feasibility in severe climatic conditions at an ambient temperature of as low as -50°C.

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SERVICE CENTERS IN CHINA

The Russian Helicopters Holding Company and the Chinese company United Aviation Technology negotiated about establishing a maintenance and repair center for Russian helicopters in Shenzhen (China) as part of Airshow China 2018. The contract is to be signed by the end of the year. In February 2016 the holding company signed a framework agreement with CITIC Offshore Helicopters, AVIC International and Avicopter (which have formed the Chinese joint venture United Aviation Technology). The framework agreement provides for creating the maintenance and repair center for Russian helicopters Ka-32A11VS and Mi-171 in Shenzhen. The Chinese party also expressed interest in upgrading the maintenance, repair and overhaul base in Tianjin to carry out similar work. 'Currently, Russian Helicopters and United Aviation Technology are considering the draft general contract for creating a maintenance and repair center for the Ka-32A11VC and Mi-171 helicopters in Shenzhen and the draft contract for technical audit at the aircraft maintenance and repair base in Tianjin. At Airshow China we had another round of negotiations in order to sign both documents before the end of the year,' said Russian Helicopters CEO Andrey Boginsky.

NEW AIRPORT IN MOSCOW

The Zhukovsky International Airport is ready to provide its infrastructure for the Vietnamese air carriers. Expansion of air connections between Russia and Vietnam will promote the development of the trade and economic relations between the two states. The Zhukovsky airport is ready to provide its capacities to Vietnam's air carriers. The airport can accept all types of aircraft without any takeoff weight restrictions. The main 5.4 km airstrip of the airfield is the longest one not only in Russia, but also in Europe and is the third longest in the world. This enables the airport to accept all types of aircraft without any takeoff weight restrictions. In 2017, Vietnam recorded a notable growth in the tourist flow from Russia: 570 thousand Russian citizens enjoyed their vacations in Vietnamese resorts last year – this is 32% more as compared to 2016. From January through March 2018, the Russian tourist flow to Vietnam increased by 15.8% versus the same period last year.

'Vietnam is a key air destination for Russian citizens. The passenger flow to Vietnam has been demonstrating a considerable annual growth,' said Rostec CEO Sergey Chemezov. 'Rostec will welcome the Vietnamese airlines as future operators of the airport. We can guarantee world-class services for air carriers and passengers. I firmly believe that expansion of air connections between Russia and Vietnam will promote the development of the trade and economic relations between the two states.'

Presentation in Cambodia

Russian Helicopters Holding Company (part of Rostec State Corporation) has presented its Mi-171A2 and Ansat civil helicopters and financial instruments for purchasing Russian helicopters in Phnom Penh (Cambodia) during the South Asian Heli Tour. Cambodia has become the second stop for Mi-171A2 and Ansat during the South Asian Heli Tour. Earlier, these Russian-made helicopters were showcased in Vietnam.

Ansat is a twin-engine utility helicopter. The full-scale production of the rotorcraft is underway at Kazan Helicopters. According to its certificate, the helicopter design enables to promptly transform it either into

a cargo or into a passenger configuration enabling transportation of up to 7 persons.

Mi-171A2 is the most advanced model of the Mi-8/17 helicopter type. The aircraft is

powered by VK-2500PS-03 engines with a digital control system and features a more efficient X-shaped tail rotor and a new main rotor with composite blades and improved airfoil.

18th anniversary of Rosoboronexport

On November 4, 2018, Rosoboronexport, which is part of the Rostec State Corporation, celebrated the 18th anniversary of its founding. The Company was established in 2000 by decree of the President of the Russian Federation.

'For 18 years, Rosoboronexport has become a world leader in the supply of weapons and military equipment and reached record levels. Today, Russia assuredly ranks second in the world in terms of the scope of military-technical cooperation. The Company's order book stands well above \$50 billion, while the total value of deliveries has exceeded \$150 billion over the years. We continuously improve and offer foreign customers more and more new models of military equipment, often the best in the world in performance and competitive in terms of price and quality. More than 200 Rosoboronexport employees have been awarded state and departmental awards for their great contribution to the development of military-technical cooperation with foreign countries,' said Rostec's Director General Sergey Chemezov.

In 2018, the Company was actively engaged in efforts to promote and exhibit their products. Rosoboronexport took part in 16 international exhibitions and forums, and 6 are yet to come before the end of the year. The Eurasian Air Show in Antalya, Turkey, the International Far Eastern Maritime Show in Vladivostok and ADAS 2018 in the Philippines were debut exhibitions for the Company. Rosoboronexport is expected to participate in yet another new exhibition, EDEX 2018 in Egypt, to be held late this year.

'Despite unprecedented competition, Rosoboronexport continues to strengthen its position in the global market. Just recently, we signed the biggest-ever contract in company history to supply India with the S-400 Triumph anti-aircraft missile systems. In 2018, we delivered weapons and military equipment to more than 40 countries of the world. At the same time, over 1,100 contract documents worth about \$19 billion were signed, almost a quarter more in the whole last year. That statistics suggest that the quality of Russian weapons and their proven performance are a determining factor for our partners,' said Rosoboronexport's Director General Alexander Mikheev.

Rosoboronexport has expanded its catalog of military products over the year and is actively promoting a number of new pieces of military hardware on the world arms mar-



ket, including the Buk-M3 Viking and Tor-E2 SAM systems, the Sprut-SDM1 light amphibious tank, the ships Karakurt and Sarsar, Il-78MK-90A tanker aircraft, and Il-76MD-90A(E) military transport aircraft.

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 100 countries around the world.

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TEST COMPLEX FOR PD-35

United Engine Corporation (UEC), a part of Rostec, will build a test complex for the prospective PD-35 aircraft engine, which is proposed to be used in the Russian-Chinese CR929 aircraft. The testing facilities will be created at JSC 'UEC-PERM ENGINE'. There will be about 40,000 square meters of production, administration and accommodation, and engineering areas with state-of-the-art equipment on the premises of the out-of-town test facility in Russia's Perm Krai. The cost of the project is about \$300 million, the first test stands will be built in 2021.

'The most important objectives during the implementation of the prospective PD-35 project include exhaustive tests of both separate subassemblies and full-size engines. To achieve this, we are creating infrastructure that meets the latest requirements. We have already started preparing designs for facilities. I would like to remind that PD-35 is one of the most significant developments in Russian aviation. I am convinced that the joint project on creating the engine for the prospective Russian-Chinese CR929 aircraft, based on the PD-35, will combine the best technological and managerial competencies of the two countries and will become an example of successful international partnership in the sphere of high technology', said Victor Kladov, Director for International Cooperation and Regional Policy Department of Rostec. UEC started the development of the PD-35 engine in the summer of 2016. The bypass turbofan engine is expected to have increased thrust (up to 35 tonnes) and to be installed in prospective wide-body aircraft.

The PD-35 project widely uses the scientific and technical reserve obtained during the development of the newest Russian PD-14 engine for the prospective MS-21-300 aircraft. Currently, the design of the PD-35 engine has been determined, cooperation between industry enterprises has been established, and issues related to breakthrough technologies for project implementation have been identified. This allows creating a competitive engine of the late 2020s. A family of high thrust engines may be created on the PD-35 base. On September 20, 2017, during Aviation Expo China 2017 held in Beijing, UEC signed a cooperation memorandum with the Chinese company AECC Commercial Aircraft Engine Co., Ltd. (AECC CAE) on the development of a gas turbine engine for the prospective CR929 Russian-Chinese long range wide-body aircraft (LRWBA).

Rostec continues to implement a large-scale program on developing its Aviation Cluster in accordance with the approved strategy stipulating the main goals such as increasing ruble revenue by an average of 17% until 2025, increasing the share of civilian products in the revenue to 50%, improving operational efficiency and getting into global markets.

Cooperation with Southern Africa

Rosoboronexport JSC (part of the Rostec State Corporation) took part in the Southern African Development Community (SADC) Day celebrations.

'Rosoboronexport regards the Southern African Development Community as a promising partner. It is one of the largest and most influential subregional organizations whose activities are aimed at comprehensively promoting the development of its member countries. The Community's goals and objectives largely comply with our strategy on the African continent. We are working closely with member countries of the Community in strengthening infrastructural and state security, combating terrorism and organized crime, preparing and equipping peacekeeping missions under the auspices of the Community. We are pleased to have such a strong and reliable part-

ner in Africa,' said Rosoboronexport's Director General Alexander Mikheev.

SADC was formed in 1980. Today it comprises 16 member countries, including South Africa, Angola, Tanzania, Mozambique, Zambia, Zimbabwe, Botswana, which are striving to establish a single financial, legal, and trade and economic space. Rosoboronexport actively holds meetings with SADC at various levels to discuss possible cooperation projects.

Today, Rosoboronexport notes an upward trend in the arms market in the sub-Saharan African countries, which is due to a number of objective factors. Among them are the fight against the spread of interna-

tional terrorism and Islamic radicalism, the continuing threat of maritime piracy. In addition, different units from countries in the region are actively involved in peacekeeping operations.

The Company uses a comprehensive approach to cooperation with the countries of the region, offering its partners the delivery of final products, as well as the necessary logistics support throughout their life cycle, training and the establishment of facilities for the repair and maintenance of products. In addition, the possibility of organizing licensed production of Russian weapons and military equipment on their territory is being discussed with some countries.

Naval materiel for the external market

Alexander Mikheev, Director General of Rosoboronexport (part of the Rostec State Corporation), and Renat Mistakhov, Director General of the Ak Bars Shipbuilding Corporation, signed a cooperation agreement and a joint action program to promote naval materiel in the external market in 2019–2023.

'The agreement will undoubtedly strengthen Rosoboronexport's positions on proposals for naval forces. We are closely monitoring trends in the world weapons market, we are leading some of its directions, and we ourselves are making the rules of the game that competitors have to follow. The documents signed will make it possible to manufacture products that meet the needs of foreign customers as much as possible, and also provide technology transfer – a highly demanded service today – with our very responsive and reliable protection of the results of intellectual activity of the Russian developers and manufacturers,' said Alexander Mikheev.

The purpose of signing the documents is to organize effective interaction between the companies in developing, manufacturing and promoting Ak Bars Shipbuilding Corporation's military, special, civil and dual-use products and services in external markets.

'I am very pleased to consolidate cooperation with the leading ex-

porter of Russian weapons. We see Rosoboronexport as a reliable partner with many years of experience in external economic activities. I'm sure that our joint efforts will help the Corporation meet its primary strategic goal of increasing the revenues from the current level of 38.5 billion rubles to 100 billion rubles by 2025. In addition, I wish to note the social value of the agreement for Tatarstan: today the Corporation unites 10 enterprises and organizations that employ about 10,000 people. The portfolio of foreign orders for our products supports the modernization of production, permanent employment and growth in incomes,' said Renat Mistakhov.

Under the agreement signed, Rosoboronexport will consider Ak Bars as a possible participant in various military and technical cooperation projects with foreign countries, including in the course of its international naval market research. As is known, Rosoboronexport has been appointed the organizer of the joint Russian dis-



plays at international defense exhibitions abroad. In this role, the Company stands ready to provide organizational and information support to the Ak Bars Corporation.

'Rosoboronexport is proud to present Ak Bars products at international exhibitions. Navy representatives from the Company's partner countries pay great attention to the Gepard-class frigates, our bestsellers supplied to a number of countries. This year we have added new Ak Bars products to our catalog, namely the Sarsar and Karakurt-E class missile ships, which have generated enormous interest abroad, including through the battle-proven Kalibr cruise missile systems integrated into them,' added Alexander Mikheev.

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IDEAS 2018

Rosoboronexport showcases battle-proven counter-terrorism equipment



Rosoboronexport, part of the Rostec State Corporation, is the organizer of Russia's single exhibit display at the IDEAS 2018 International Defense Industry Exhibition, which is held from November 27 to 30 in Karachi, Pakistan. Rosoboronexport is showcasing a wide range of capabilities to provide security and counter terrorism and organized crime. Unfortunately, the countries of the region are very familiar with the threat of terrorism. Russia, too, has not been spared the threat, and today Russian enterprises are developing and producing unique means and solutions for detecting and neutralizing both small groups of extremists and fighting numerous highly organized terrorist groups. Most of them have been successfully tested under real battle conditions and appreciated by specialists during the operation in Syria.

Three leading Russian defense manufacturers, including High-Precision Systems Holding Company and SPARK, participate in Russia's joint exhibit display organized by Rosoboronexport. More than 200 defense products are

on display on the Rosoboronexport stand.

In the course of IDEAS 2018, the Company is ready to showcase the most advanced security equipment to foreign customers. The exhibits include military and service small arms, weapons and special technical

means, specialty equipment, special-purpose weapons and gear, non-lethal weapons, border and critical facility surveillance equipment, law enforcement gear.

Foreign customers are expected to pay particular attention to the Kornet-EM and Metis-M1 ATGM systems, Kalashnikov AK-101, AK-102, AK-103 and AK-104 assault rifles, Kalashnikov Pecheneg machine gun, and close-combat weapons like the Shmel-M rocket flamethrower and the Varna jet flamethrower, the Bur compact grenade launcher system, the AGS-30 and AGS-17 automatic grenade launchers, as well as live and non-lethal ammunition for them.

In addition, representatives of partner countries show considerable interest in the ground and air vehicles for transporting anti-terrorist units and their equipment. In particular, the BTR-80A, BTR-82A armored personnel carriers, the BMP-3M infantry fighting vehicle, the Tiger family of armored motor vehicles, as well as the Mi-35M transport /attack helicopter and the Mi-17-type military transport helicopters.

Countries of the region seek not only to eliminate the consequences of terrorist attacks, but also to acquire capabilities to prevent them effectively. For these purposes, Rosoboronexport is exhibiting a number of means for timely detecting and locating terrorist threats, in particular, the Orlan-10E and Takhion UAV systems, electronic devices and the Repellent electronic warfare



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 100 countries around the world.



Rosoboronexport pays great attention to both major billion dollars contracts and small deals. The company seeks to operate flexibly and efficiently by using modern and advanced marketing and customer settlement methods. The special exporter cooperates with more than 700 Russian defense-industrial enterprises and organizations, which enables it to offer partner countries the comprehensive and cost-effective solutions for strengthening their defense capability and national security.

system designed to counter small unmanned aerial vehicles.

It is important to remember that only Rosoboronexport has the right to supply the world market with a full range of arms and military equipment manufactured by Russia's defense industrial complex and approved to be exported. Rosoboronexport accounts for more

than 85% of Russia's arms exports. Rosoboronexport is among the major operators in the world market for arms and military equipment. This year JSC Rosoboronexport will mark its 18th anniversary.

Rosoboronexport was set up by RF President's Decree as a federal state unitary enterprise tasked to implement the national policy

in the area of military-technical cooperation between Russia and foreign countries. Since 1 July 2011 Rosoboronexport has been operating as an open joint stock company. Rosoboronexport operates under the strict supervision of the Russian President, the Russian Government and in full conformity with the UN arms control trea-

ties and the relevant international agreements.

The official status of the exclusive state intermediary agency gives Rosoboronexport unique opportunities to expand long-term mutually beneficial cooperation with foreign partners, provide guaranteed state support of all export-import operations, and strengthen Russia's leadership in the world arms market.

The main result of biography of Rosoboronexport, despite the difficult economic conditions and fierce, often unfair, competition in the global arms market, that company have managed not only to carry its sales, but also significantly enlarge its footprint in the traditional and new arms markets. Through integrated marketing strategies, company have ensured that order book today exceeds US\$ 46 billion.





The special exporter makes painstaking efforts on a daily basis to increase Russian arms exports resulting in more than a thousand contract documents signed with foreign customers every year. Over the period of its operation in the international market, Rosoboronexport has delivered hundreds of thousands of units of military equipment and weapons worth more than US\$ 120 billion to 115 countries.

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By concluding export contracts, Rosoboronexport supports the



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Rosoboronexport widely uses the optimal offset programs. With regard to foreign customers' interests and the opportunities of the Russian defense industrial complex to increase its exports, Rosoboronexport pays much attention both to major billion-dollar contracts and small deals worth the hundreds of thousands to several millions of dollars.



Russian defense industry, which is especially important under difficult conditions in the global market. High-tech products are in increased demand in the world arms market today and thus the company is interested in developing smart manufacturing in Russia. In addition, Rosoboronexport is actively involved in a number of charitable and sponsorship projects. The company provides assistance to military hospitals, military historical museums, and children's educational institutions. Rosoboronexport supports major sporting events and various sports federations, acts as sponsor and partner of the largest industrial

exhibitions and cultural events held in Russia and abroad.

Rosoboronexport pursues a marketing strategy targeted to expand the geography, range and volume of export deliveries. A number of special programs and projects for exporting products to specific countries have been developed based on a comprehensive analysis of the arms markets and foreign partners' needs. Rosoboronexport seeks to operate flexibly and efficiently in the market, using modern and advanced marketing and customers' settlement methods.

Foreign customers are offered package solutions for national systems intended to defend land, air and

seaside borders, which feature the optimal trade-off between cost and performance. These solutions may include both the supply of military products and services and organization of licensed production in customer countries, the setting-up of joint ventures to manufacture and maintain equipment, as well as joint R&D efforts. Rosoboronexport widely uses the optimal offset programs. With regard to foreign customers' interests and the opportunities of the Russian defense industrial complex to increase its exports, Rosoboronexport pays much attention both to major billion-dollar contracts and small deals worth the hundreds of thousands to several millions of dollars.

/RA&MG/

Core areas of activities of Rosoboronexport

- Export / import of all types of conventional weapons, military and dual-use equipment and services.
- Organization of licensed production of armaments and military equipment abroad, joint R&D efforts with foreign partners.
- Maintenance and repair of earlier supplied weaponry and military equipment.
- Modernization of Russian-made weapons and military equipment.
- Training foreign specialists in Russia and customer countries in the operation and maintenance of supplied military equipment.
- Technical assistance in the construction of military infrastructure facilities: defense plants, airfields, depots, ranges, training centers.

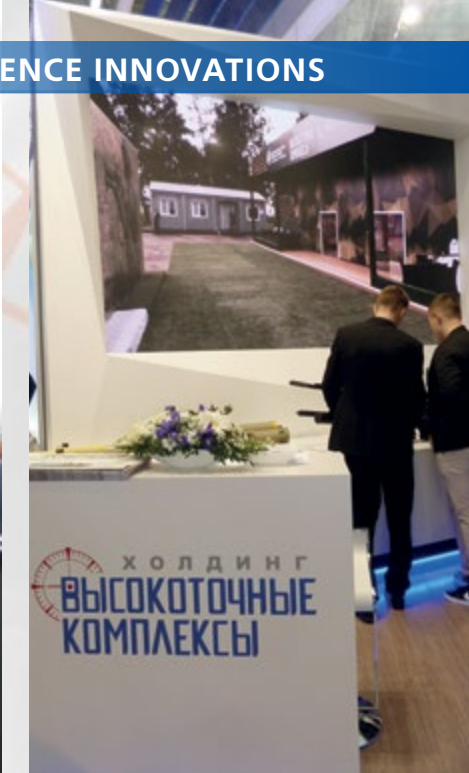


HIGH-PRECISION WEAPONS

Russian Masterpieces for Pakistan and South Asia

High-Precision Weapons holding creates absolute and unsurpassed military-technical innovations

The role of high precision weapons is growing reasonably worldwide. These are arms which primarily define reliability and efficiency of defensive and assault capabilities of modern armed forces including their tactical level above all. Among the largest manufacturers of the most advanced weapons of such kind is Russian High-Precision Weapons holding company within the state-owned Rostec group. The company is well-known all around the world thanks to its high precision weapons which outperform foreign counterparts and successfully serve in armies of all world continents. The military products made by High-Precision Weapons are known in all over the world and regularly are presented at the largest defense exhibitions in the world. And the company's participation in the 10th International Defense Exhibition and Seminar (IDEAS-2018) in Pakistan is another confirmation of the highest characteristics of the holding's products.



The main goal of High-Precision Weapons holding founded in 2009 was consolidation of technological capabilities of dedicated enterprises to create advanced weapons, defense and special-purpose equipment related to high precision weapon systems. Nowadays High-Precision Weapons holding includes 19 Russian defense enterprises among which are trusted centuries-old leaders in their industries such as Tula Arms Plant which is more than 306 years old.



High-Precision Weapons holding activities increase every year both at internal market (it is a major supplier of high precision arms for Russian Armed Forces) and external market. Export to various regions of the world grows on a constant basis. Annual export gain is 25-40%. Such stability is also record-breaking for the whole Russian engineering industry. The holding purports to double military equipment supplies by 2020. Among the most stable export regions are Middle East, Gulf states, Northern Africa and India. Its export-oriented activity has been increasing lately at promising markets of South East Asia, Latin America, Central and South Africa. The global success of High-Precision Weapons has been also proven by Stockholm International Peace Research Institute (SIPRI) which has given the holding 39th position in a global rating of world arms manufacturers.



HIGH-PRECISION WEAPONS



Most of experts emphasize not only quantitative success of the High-Precision Weapons holding at world arms market but also good quality indicators of its products. The majority of defense products exported by the High-Precision Weapons holding are best in class. Many of them are trend-setting and unrivaled in terms of efficiency, reliability as well unique price and quality criteria. According to experts the most world popular weapons made by the High-Precision Weapons holding include Pantzir-S1, Kornet-E/EM, Konkurs, Metis-M1, Krasnopol, Arkan, Verba, Sosna, Palma and many others.



The holding enterprises are mostly involved in development, production, upgrade, repairs and sale of arms, military and special-purpose equipment. Besides, the holding is a world trend setter as to a number of some high precision weapons since many products were made at holding-owned enterprises and later recognized worldwide. The holding designers form a technological benchmark dedicated to advanced weapons development even today.





SPLAV: NEW POSSIBILITIES OF MRLSS

Russian JSC 'SPLAV SPA' is the leading Russian enterprise in development and organization of production of the Multiple Launcher Rocket Systems (MRLS) for the Army, Navy, and Air Force.

Over its history from the time of its foundation in 1945, such outstanding systems as GRAD, URAGAN, SMERCH for the Army, GRAD-M, UDAV-1M, OGON', DAMBA, RPK-8 for the Navy have been developed at

JSC 'SPLAV SPA', dozens of unique techniques for the rocket projectiles, the artillery shell cases of calibers from 24 to 152 mm made of various materials have been elaborated. Nowadays our engineering developments and production techniques in the field of the rocket artillery and shell cases production are known worldwide.

The distinctive feature of the Russian MRLSs development is striving of their designers to constantly

enhance the rocket artillery combat capabilities through development of the new types of the rocket projectiles fitted with different-purpose warheads, as well as upgrade of the launch vehicles for the army-accepted systems.

Specialists of the enterprise have developed modernization programs for the GRAD and SMERCH systems which ensured execution of the fire missions on destruction of the enemy over a distance of, correspondingly, 40 and 120 km, enhancement of capabilities of fire engagement against the typical targets, computerization of the fire preparation and delivery, upgrade of the launch vehicles.

JSC 'SPLAV SPA', being the world leader in delivery of ammunition for the Russian-produced MRLSs, conducts active operations in the field of military and technical cooperation through Rosoboronexport, the Russian State Intermediary.

Nowadays JSC 'SPLAV SPA' offers at the international defense market upgraded GRAD and SMERCH MRLSs, including different-purpose

warheads rocket projectiles with the range of fire of, correspondingly, 40 and 120 km, as well as the new generation of the 80mm unguided aircraft rocket armament, C-80FP HE-Fragmentation penetrating warhead unguided aircraft rocket projectile and a small-type high energy solid rocket propellant motor.

Presently the following systems are being offered for export:

GRAD MRLS:

1. 122mm Rocket Projectiles (RPs):

- 9M521 RP with increased power warhead;
- 9M522 HE-fragmentation separable warhead RP;
- 9M218 shaped-charge fragmentation submunitions RP.

2. 2B17-1 Launch Vehicle (LV) is equipped with automated laying fire and control system (ALFCS).

Besides, the algorithm has been elaborated in order to upgrade GRAD and GRAD-1 MRLSs standard RPs by increasing the range of fire up to 40 km.

SMERCH MRLS:

1. 300mm RPs:

- 9M525 fragmentations submunitions warhead RP;
- 9M528 HE-fragmentation separable warhead RP;
- 9M529 fuel-air explosive warhead RP;
- 9M531 shaped-charge fragmentation submunitions warhead RP;
- 9M533 sensor-fuzed fragmentation submunitions warhead RP.

2. 9A52-2 LV (on MAZ chassis), 9A52-2T LV (on Tatra chassis) 9A52-4 LV (lightweight six-round launcher mounted on elongated KAMAZ chassis) equipped with ALFCS.

3. 9T234-2, 9T234-2T, 9T234-4 Transporter-Loaders.

4. 9F819 Arsenal Equipment.

5. 9F827 Training Aids.

6. 9F840 Training Set.

7. MP32M1 Unified Command and Staff Vehicle.

8. 1B44 Radio Direction-Finding and Meteorological Complex.

Upgrade of GRAD and SMERCH LVs ensured the new capabilities of these systems:

- Fire delivery from the unsurveyed in the topographical respect firing position thanks to the autonomous calculation of the LV ramp longitudi-

nal axis azimuth and plotting of the own coordinates;

- Cutting time from the moment of taking up of the temporary firing position to the moment of commencing fire by a factor of three;

- The LV ramp laying operable from the cab and without usage of the aiming points;

- Visual presentation on the computer screen of a graphical information for the LV ramp laying, the ground map with indication of the LV position, destination point, and route of advance;

- Increase in the LV survivability thanks to cutting time in the firing position;

- Increase of the operator-layer comfortability, especially in the adverse weather conditions and at night;

- Increase of the LV self-sustainment thanks to imparting to it of the navigation and topographical survey functions, which ensures shoot-and-scoot tactics, autonomous movement to the assembly point after firing, compensation of errors due to the human factor;

- reduction in the crew number up to 2 persons (GRAD MRLS), and up to 3 persons (SMERCH MRLS).

Beginning from 2003, the enterprise has been granted the right to independently carry out foreign trade activities with respect to the products for military purposes to the extent concerning delivery of spare parts, aggregates, assemblies, devices, completing units, special, training, and auxiliary equipment, technical documentation for the earlier deliv-



ered products for military purposes, carrying out of works on technical inspection, repair (including modernization subject to carrying out of R&D works), and other works ensuring complex service maintenance of the earlier delivered products for military purposes, as well as training of the foreign specialists in carrying out of the above works. /RA&MG/

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MAIN PHOTO

'PANTSIR-S1'

AIR DEFENSE MISSILE-GUN SYSTEM



The system is designed for air defense of small military and administrative-industrial objects and areas against aircrafts, helicopters, cruise missiles and high-precision weapons, guided air bombs and unmanned aerial vehicles as well as for reinforcement of AD groups during repulse of massive air strikes and ensuring of engagement of lightly-armored targets.



AD ACS Polyana-D4M1

INCREASING OF EFFECTIVENESS OF AD GROUPING OPERATION

Automated control system over AD anti-missile brigade Polyana-D4M1

To provide reliable defense in military units as well as in government control objects and important industrial areas against air attack weapons it is necessary to create a modern air defense system.

Automated control system Polyana-D4M1 is used as a main element of AD system. Polyana-D4M1 is a flexible integrated system able to be an air defense control system of any state.

ACS Polyana-D4M1 is a backbone complex of multiple-element combat information system functioning on the base of a set of radars, anti-missile complexes, interacting and subordinate AD forces and means interacting in time and space in order to provide the effective control over military units.

Complex of the article is mounted on 4 vehicles and includes combat control post (CCP), command-staff vehicle (CSV) and two mobile power plants. Besides the mobile model, the article ACS Polyana-D4M1 has autonomous workplaces (article 9C929) meant for the equipping of command posts of AD troops.

Objects of control for ACS are anti-missile complexes of long (of C-300), medium (of BUK) and small (TOR type) range. Polyana-D4M1 provides defense with AD means for the area of 800x800 km. Moreover, up to 500 air objects may appear simultaneously in the responsibility zone.

ACS Polyana-D4M1 provides the following:

- collection and processing of radar information from subordinate and interacting means, air situation notifications;
- collection and processing of ground situation data;
- control over alert forces;

- elaboration of recommendations for control over subordinate units and sections and interaction support by means of automated solving of tasks of target distribution, combat actions coordination, effort distribution in interaction zones at repelling air and space attack;

- automated exchange of operational-tactical information and command-awareness information with higher level and interacting objects using data transmission equipment;
- solving of calculation tasks and recording of the results.

Article 9C929 provides full solving of functional tasks of Polyana-D4M1



Interior of the article ACS Polyana-D4M1

article, it copies all equipment in ACS Polyana-D4M1 and may serve as a main, alternate command post as well as an auxiliary one for stationary deployment.

Automated control technical means complex of MANPAD from the composition of mobile control post PU-12M7

When conducting modern combat actions the importance of AD formations significantly grows, especially of those that are equipped with portable air defense complexes. Such mobile complexes appear to be most enduring on the battlefield in the conditions of total electronic and space reconnaissance, and, therefore, the most effective in organizing countermeasures against enemy aviation. Besides, the effectiveness of air defense is greatly affected by the quality of MANPAD units control system functioning given the dynamic and rapid change of air situation.

Specialists of JSC Radiozavod developed the automated control technical means complex for AD units equipped with MANPADs, which allows to significantly extend functional abilities of units with different MANPADs.

It is possible due to the following:

- increasing of controllability of system elements due to introducing individual means of targeting;
- increasing of commands drill precision provided by using satellite orientation system;
- simplifying the procedure of MANPAD targeting provided by using interactive aiming system;
- increasing the size of the affected area by increasing the number of controlled elements and the range of information interaction.

Automated control technical means complex of MANPAD includes automated control module of the commander and up to nine individual automation complexes of MANPAD gunners.

Automated control module includes complex of automation facilities (PC of laptop type, data transmission equipment, navigation device), power supply facilities and radio communication set for organiz-



MANPAD unit interaction scheme

ing radio channels of telecode and voice communication with higher command post, radar and MANPAD gunners.

Each individual automation complex includes visualization device combined with the protective goggles, spatial orientation device and tactical vest with radio transceiver for organizing radio communication, computing unit (minicomputer), accumulator batteries, and micro telephone headset.

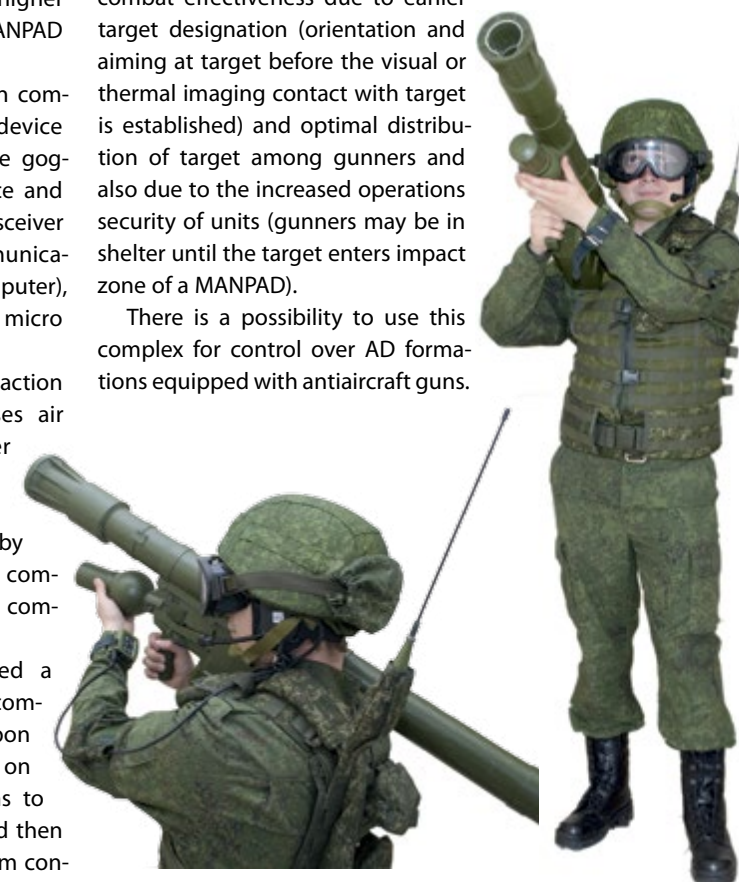
When conducting combat action the platoon commander uses air situation data from higher command post or radar in automated mode to carry out control over gunner actions by issuing target designation command from his computer to computing units of gunners.

The gunner, who received a command from the platoon commander in the form of target mark on the visualization device, turns to the direction of the target and then using interactive aiming system controls the change of coordinates and target movement direction. When the target enters impact zone, the MANPAD seeker captures it. The further actions of the gunner are defined by instructions for MANPAD firing. After launching the missile and hitting the target, the gunner changes the missile and sends a message to the commander about combat readiness by pushing one button.

Using of automated control system for units with portable air defense developed by JSC Radiozavod will

allow to significantly increase their combat effectiveness due to earlier target designation (orientation and aiming at target before the visual or thermal imaging contact with target is established) and optimal distribution of target among gunners and also due to the increased operations security of units (gunners may be in shelter until the target enters impact zone of a MANPAD).

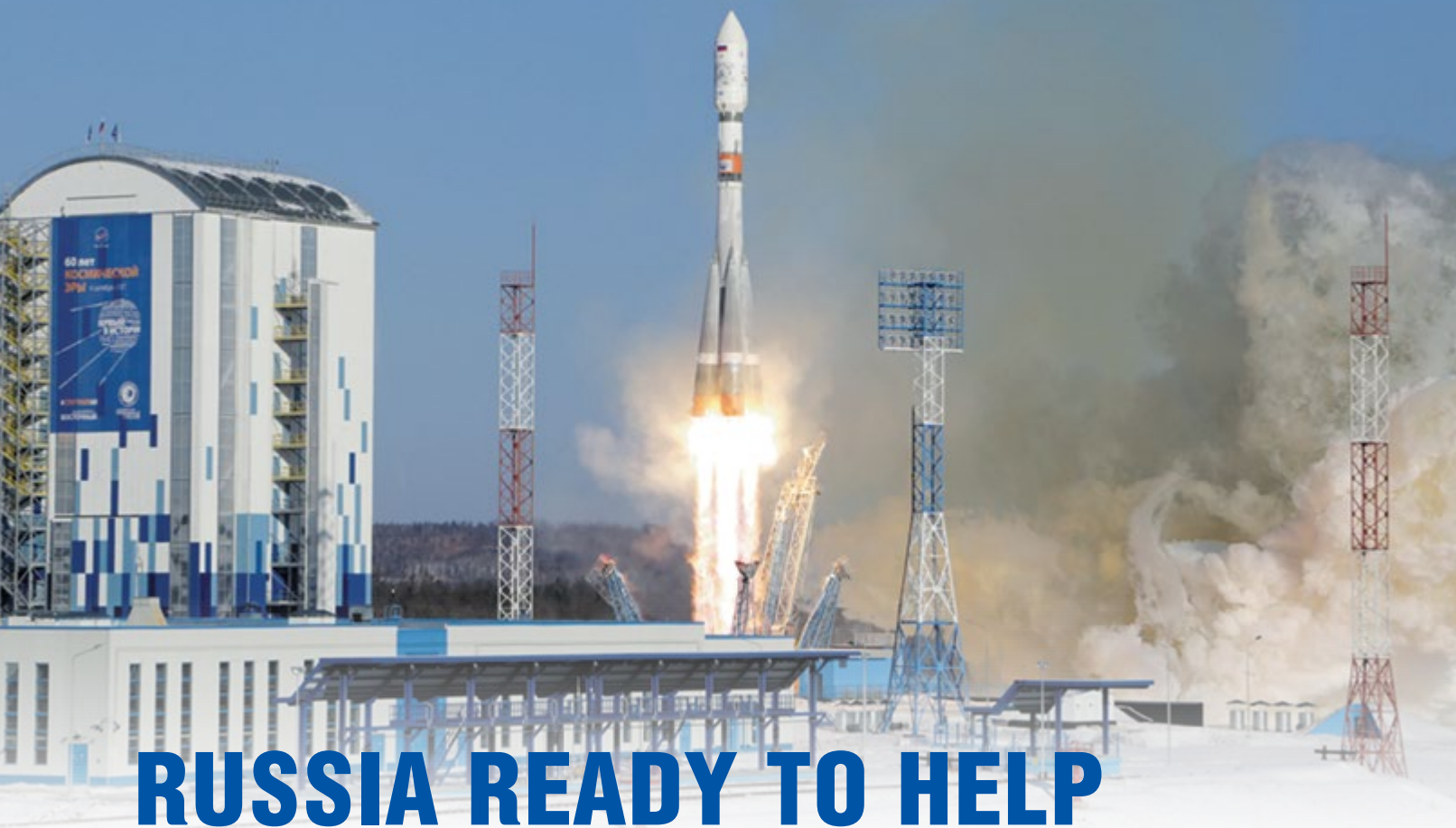
There is a possibility to use this complex for control over AD formations equipped with anti-aircraft guns.



Picture of a MANPAD gunner, equipped with individual automation kit

RADIOZAVOD

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RUSSIA READY TO HELP

Rostec is ready to expand its cooperation with Turkey in creating and developing the republic's space agency. Earlier, the Turkish satellite Turksat-4A was launched in cooperation with Rosoboronexport (part of Rostec).

Rostec is actively developing the space industry and introducing advanced technologies in various areas of space exploration. The engines manufactured by UEC put Soyuz carrier rockets into orbit. Technodinamika produces life support systems for

pilots and astronauts, including the Orlan-MKS space suit and the latest 'space' parachute system. Optical devices designed by Shvabe sense the earth's surface from satellites and are also used in the largest observatories in the world. RT-Chemcomposite creates unique composite materials that can withstand ultra-high temperatures and heavy loads.

'Rostec and its Turkish partners have had a mutually beneficial relationship in various industries for a long time. We certainly welcome our partners' intent to develop the space industry,' said Viktor Kladov, Director for International Cooperation and Regional Policy Department of the State Corporation. 'Rostec has a wide range of competences and extensive expertise in developing the space industry, and we are ready to expand and strengthen cooperation in this sphere.'

In addition, through Rosoboronexport and in the interests of foreign customers, Russian aerospace

industry enterprises create and launch spacecraft for various purposes, make ground control complexes, complexes for receiving and processing data from satellites, and provide foreign partners with maps created based on space images. Specialists from partner countries learn how to carry out thematic processing and analysis of data obtained by remote sensing of Earth, with support from Rosoboronexport.

Rosoboronexport may suggest unique comprehensive projects to partners, as in the case when the first Malaysian astronaut Sheikh Muszaphar Shukor was sent to the ISS as part of an offset agreement to the contract for supplying Su-30MKM fighters.

Overall, Rosoboronexport has assisted in putting over 30 spacecraft from 14 countries into relevant orbits, including in the interests of the UK, Germany, Italy, China, Norway, Sweden, and the European Space Agency.

/RA&MG/



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FOR ARMED FORCES AND SPECIAL UNITS

Rosoboronexport (part of the Rostec State Corporation) took part in the 22th International State Security Exhibition, Interpolitex 2018 (VDNKh, Moscow). During Interpolitex 2018, Rosoboronexport undertook aggressive marketing efforts to promote the entire range of security products for security agencies and private partners of foreign countries. The Company has invited over 80 delegations from more than 60 countries of the world to the exhibition.

Promotion of state and infrastructure security tools and services to the world market has been chosen as one of the drivers of achieving Rosoboronexport's strategic objectives. An unprecedented rise in terrorist and extremist threats in almost all regions of the world reinforces the urgency of this area of activities. The Russian industry has a high level of competence in these matters, while the practicality and a wide range of use of weapons, military and special equipment produced in our country have been repeatedly proved in actual combat conditions,' said Rosoboronexport's Director General Alexander Mikheev.

The exhibition was held in three halls of Pavilion No. 75 and in an open area totaling over 25,000 square meters. Rosoboronexport's exhibit comprised more than 100 models of weapons and military equipment developed and produced by Russian

defense enterprises. At the Company's stand, experts tested skills in shooting the Kalashnikov MMG-AK-101 assault rifle and MP-446 Viking self-loading pistol mockups on the SKAT small arms trainer.

At Interpolitex 2018, Rosoboronexport also showcases a wide range of means of ensuring law and order, combating terrorism, protecting high-priority and critical infrastructure facilities, extended borders, as well as anti-UAV systems, electronic warfare capabilities and confidential communication facilities.

Equipment offered by Rosoboronexport for the armed forces and special units for combating terrorism and organized crime were presented at a static display. It is very popular in many regions of the world and includes the KAMAZ-53949 mine-resistant vehicle of the Typhoon-K family, the Tigr special wheeled armored vehicle, and also special vehicles on the Ural chassis.

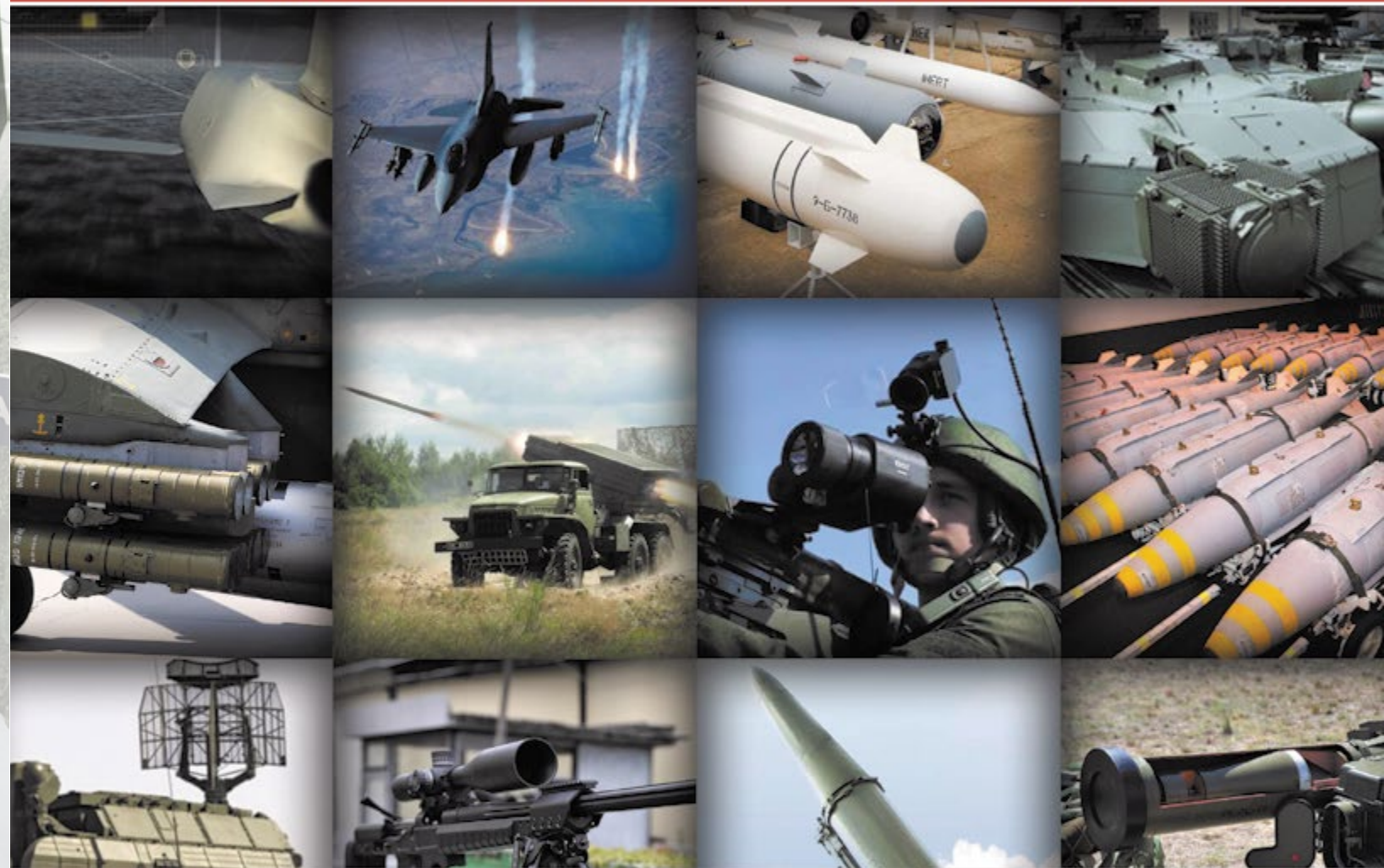
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HIGH-PRECISION WEAPONS IN RUSSIA AND IN THE WORLD

ВЫСОКОТОЧНОЕ ОРУЖИЕ в России и в мире

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"United Industrial Edition" preparing to publish a new quarterly international research project dedicated to the development, creation, production, delivery, maintenance and use in the armed forces of various types of precision weapons. The publication of the bilingual (Russian and English), addressed to professionals, creators and operators of high-precision weapons. Distribution is by subscription.

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01 (01) 2019 – February 2019

02 (02) – May 2019

03 (03) – August 2019

04 (04) – November 2019

The volume of each room – from 120 p.

FROM 1950s TO FUTURE COOPERATION

Russia offers several variants of submarines to its foreign partners. Among them, Kilo class is highly recognised. Around 70 ships have already been constructed to the Kilo class basic design and its upgraded versions. They were inducted into the Russian Navy and navies of friendly countries. Kilo class boats and most other Russian conventional submarines as well were designed by Rubin Design Bureau. It was founded in 1901 and since that time, nearly 1000 submarines have been built to its designs. Rubin has been engaged into international defence cooperation for 60 years: 112 submarines designed by Rubin were delivered to 15 countries. Indonesia holds the record in receiving the largest ever batch of Russian-built single-type submarines, namely twelve Whiskey-class boats (Project 613). Some of them were in service until 1990.

Historical Background

Russia and Indonesia began their submarine cooperation in the late 1950s.

In 1959, Soviet naval ships approached the coast of Indonesia for the first time. Cruiser *Admiral Senyavin*, flying the flag of the Soviet Pacific Fleet Commander and escorted by two destroyers, visited Surabaya. Around the same time, two diesel-electric submarines of Project 611 (Zulu class) accomplished 150-day semi-circumnavigation cruise from the Russian North to the city of Vladivostok around Africa,

Australia and New Zealand. As soon as nuclear submarines became available, the Soviet Navy established its permanent presence in the Pacific Ocean.

As is known, the Soviet Union offered unqualified support to the announcement of independence by Indonesia in 1945-1950 including support in the UN Security Council. Moscow declared its 'full support to the righteous struggle of the people of Indonesia against colonialism.' All this was backed up by presence of Soviet military specialists who helped the locals to operate Soviet

military equipment that was arriving aplenty.

Totally, Moscow handed over to Jakarta a cruiser of Project 68-bis (cruiser *Irian* served in the Indonesian Navy in 1962-1972), ten destroyers of Project 30-bis and 12 submarines of Project 613 (Whiskey class). 'The Soviet underwater force in the 1950s was mainly based on the Whiskey-class submarines that were later upgraded and rearmed many times. They served for many years and some of them even outlasted the collapse of the Soviet Union. That was a reliable and robust submarine

and veteran submariners recall them with warmth,' writes Captain Sergei Titushkin in his memoirs. Over two hundred Whiskey-class submarines were constructed. They were simple by design and reliable in operation, which contributed to their quick mastering by the crew. These boats were being built at several shipyards simultaneously with construction rate being very high, up to 73 units a year.

In 1961, in the city of Vladivostok, the training of Indonesian crews was under way. The major focus was made on the technical aspects: operation of weapons and technical facilities, detailed study of materiel, correct actions during weapon inspections and checks. At the same time, Indonesian submariners had a basic course of the Russian language and, according to one of the eyewitnesses, 'their talents for languages, as well as for many other things, exceeded all expectations and so, the further training continued in Russian.' One may say that Indonesian and Soviet sailors trained together: the first two submarines sailed to Indonesia in 1959 and that was 'the first sailing experience of diesel Whiskey-class submarines in equatorial waters and that experience was invaluable,' recollect participants of the cruise.

The Soviet Union sent a large squadron of ships (a cruiser, seven destroyers and six submarines) to the Indonesian shores during a heated dispute about the future of West Irian (Eastern part of New

Guinea). In June 1962, they arrived to Surabaya but did not have to take part in the conflict, as it was resolved politically. Yet, submarine crews had gone through intensive training and went to sea for reconnaissance and

probable combat engagement but then were withdrawn to the base. Thereafter preparation for transfer of ships to Indonesia continued. While submarines were being refitted in dock, the Indonesian crews

Russia and Indonesia began their submarine cooperation in the late 1950s. In 1961, in the city of Vladivostok, the training of Indonesian crews was under way. The major focus was made on the technical aspects: operation of weapons and technical facilities, detailed study of materiel, correct actions during weapon inspections and checks.



At the same time, Indonesian submariners had a basic course of the Russian language and, according to one of the eyewitnesses, 'their talents for languages, as well as for many other things, exceeded all expectations and so, the further training continued in Russian.' One may say that Indonesian and Soviet sailors trained together: the first two submarines sailed to Indonesia in 1959 and that was 'the first sailing experience of diesel Whiskey-class submarines in equatorial waters and that experience was invaluable,' recollect participants of the cruise.

went on with their training. The sailors successfully passed the exams and the submarines went to a test range to the north of the Bawean Island for manoeuvring trials. In February 1963, Indonesian submariners practised combat skills and then performed three-stage torpedo firing, each stage becoming more and more sophisticated. Simulated attack against escorted target moving by altering course was the most difficult stage. All exercises were successfully completed.

Though Indonesia resumed procurement of Russian weapons only in 2003, it had acquired a few naval ships of Soviet projects ten years before. In 1993, Jakarta purchased dozens of ships of former German Democratic Republic's Navy including 14 amphibious ships and 10 minesweepers. Sixteen ASW ships of Project 1331M, built in the late 1980s, feature good manoeuvrability in rough sea in spite of their relatively small size. Presently they are mainly used to patrol territorial

waters. These procurements demonstrated Indonesia's adherence to Soviet ships, which are still being operated along with the ships built in UK, the Netherlands, South Korea and Germany.

Present-Day Capabilities

Contemporary market of weapons is oriented to partnership and transfer of technologies. It has become a practice to select a foreign partner based on competition. Procurement of new military equipment (including submarines) is associated with the transfer of technological know-how, which contributes to the indigenous submarine-building capability.

Obviously, capability to design conventional submarines requires a systematic approach, i.e. setting up a design agency, refurbishing of shipyard and construction of infrastructure. Russia is one of the few countries that has all the technologies required for design of various ships. Joint design of a ship might be a possible variant of cooperation with a friendly nation. In case of joint design works, the requirements of the Navy could be the cornerstone of new project as well as training of designers could be envisaged, i.e. transfer of technologies to the maximum extent possible can be realised.

Rubin Design Bureau is an integrated supplier that ensures the entire cycle of works: research and development, detailed design, procurement of components, construction, trials and commissioning of the ship and its subsequent operation including refits and upgrade. Rubin is in constant interaction with various shipyards and wide range of equipment manufacturers.

Now, two series of conventional submarines – improved Kilo class and Lada class – are being constructed at the Admiralty Shipyards in St. Petersburg. The Admiralty Shipyards is a state-of-the-art centre of Russian non-nuclear shipbuilding and the oldest shipyard in Russia. It was founded by Peter the Great in 1704 and since that time over three thousand ships, including hundreds of submarines, have slid down its ways. Dozens of those submarines are still

being operated by the Russian Navy and navies of friendly nations.

Russia is striving for quickest renewal of its Navy including the non-nuclear fleet. It takes three years to build the Project 636 submarine (Kilo class), including trials. Construction time of Lada-class submarine is now from three to four years, though, as the number of ships in the series increases, the time required to build one submarine decreases.

The improved Kilo class submarines commissioned by the Russian Navy in 2014-2016 operate in the Black Sea Fleet now. Deployment of those ships showed their high efficiency and that of the missile complex, in particular. Russian non-nuclear submarines are the only ones in the world that have performed salvo firing in combat conditions.

Admiralty Shipyards continues to build Kilo class sisterships.

Multi-purpose diesel-electric Kilo class submarine is designed for anti-submarine and anti-surface warfare, protection of naval bases, coastal areas and sea communications as well as for reconnaissance and other missions. It is a double-hull submarine with improved hull lines, large reserve of buoyancy and high floodability. Its compartments are divided by waterproof bulkheads. This design helps the boat to remain afloat during emergency flooding of one compartment and retain combat availability. The submarine is equipped with state-of-the-art means for reducing the self-noise down to natural noise of the ocean, which allows it to detect targets in advance, attack enemy ships with anti-ship missiles from the distance that exceeds its detection by the enemy, and evade in time from enemy's attacks.

Major systems of Kilo class including combat system, navigation and sonar complexes, radio communication system have been upgraded. Some changes have been made to improve habitability. Improved Kilo class submarine features advanced on-board systems designed by Russian manufacturers in the 21st century. This class of submarines has a significant modernization margin that makes it possible to provide



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a tailor-made design. Due to well-proven building technologies, refit/modernization and well-established cooperation with equipment suppliers, boats can be built in the shortest possible time. Post-sales support including supply of spares is also well organized.

These boats carry exceptionally powerful weapons as compared to similar submarines of other countries. The Kilo class submarines are armed with versatile weapons, as they are capable of fighting against

surface ships and submarines as well as attacking land targets. Nowadays, none of the European countries is offering an export submarine with the missile complex capable of engaging land-based targets. Russian submarines with missile complex, capable of powerful strikes both against surface and shore targets located at a considerable distance, in our opinion, are very attractive for the country that is selecting an optimum proposal for the development of the state-of-the-art submarine. /RA&MG/



RUSSIAN WEAPONS at BIAS 2018

Rosoboronexport had set up a joint Russian exposition at Bahrain International Airshow 2018 (BIAS), a fifth iteration of an international exhibition took place at Sakhir AFB in the Kingdom of Bahrain on November.



Rosoboronexport deems Bahrain International Airshow as a perfect opportunity to bring Russia's most advanced systems and equipment to the attention of the Gulf states and let them know their unique features. Lots of the exhibited air force and air defense platforms are either second to none in the world or at least unmatched by their foreign counterparts in key characteristics,' says Director General Alexander Mikheev of Rosoboronexport.

Gulf states are particularly interested in AD systems of various range, aircraft, helicopters and drones. Numbering 250-plus pieces of military equipment, Rosoboronexport's booth had numerous combat proven



systems, which confirmed their characteristics in Syria.

The Su-35 multirole supermaneuverable fighter, MiG-29M/M2 multirole tactical fighter and Yak-130 combat-trainer had everything there was to gather crowds at the event. Rosoboronexport also had on display the IL-78MD-90A tanker plane and IL-76MD-90A(E) transport, both being recent additions to its portfolio.

BIAS's guests and participants were witness outstanding airmanship of the aces of the renowned Russian Knights aerobatic display team demonstrating unsurpassed capabilities of Russian aviation equipment on Su-30SM fighters. Wherever they go, Russian Knights pull standing ovations.

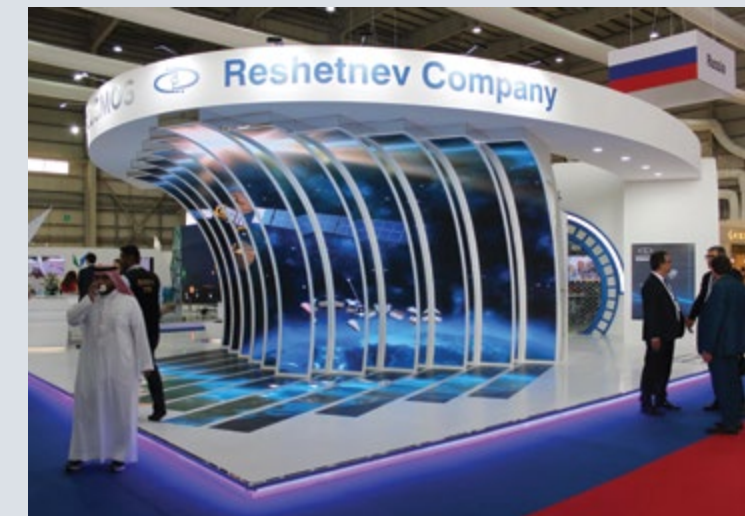
In the RW aircraft segment, the interest of foreign Customers is traditionally piqued by the Mi-28NE attack helicopter, Ka-52 reconnaissance and attack helicopter, Mi-35M gunship with transport carrying capacity, and Ka-226T light multi-purpose helicopter. Other platforms coming to Bahrain's event are the Ansat light multi-purpose and Mi-26T2 heavy transport helicopters, both are very much popular.

For partners the company was make available at its booth information on Russian UAVs to include Takhion and Orlan-10E small short-range drones and Orion-E long endurance reconnaissance platform.

Expectations are also high in the AD sector. Rosoboronexport believes that a rather bright export future faces the S-400 Triumph SAM system, Tor M2E and Buk-M2E SAM systems, Pantsir-S1 gun-missile system, and Verba MANPADS. Besides, the com-

pany made some room in its booth for a variety of EW systems, including the Repellent EW system complete with small drones.

'Lack of stability in the international situation prompts the growth of arms trade worldwide. This has also gone a long way in stoking the Gulf states' interest in getting the most advanced and effective military equipment. Under the circumstances, everything labeled Made in Russia enjoys a keen demand, for Russian equipment has been proven in complex combat and climatic environs at sea, in the air, and on the land. And the trend is on the rise. Recently Rosoboronexport's backlog breached the record \$50 bln barrier. Contributing to the achievement are contracts signed with Arab nations,' notes Alexander Mikheev. **/RA&MG/**



INDO DEFENCE 2018

Rosoboronexport presented products of seven Russian defense companies

Tatiana Valeeva

INDO DEFENCE 2018 Expo & Forum – The Indonesia's Tri-Service Defence event was held at Jakarta International Expo Kemayoran, Indonesia on November. Hosted by the Ministry of Defence, INDO DEFENCE is recognized as the indispensable place to be, learn, network and do business. Held concurrently with the 5th INDO MARINE 2018 Expo & Forum, the expo was the biggest Indonesian's No.1 Tri-Service Defence Industry Event. For 4 action-packed days, guests and participants had the opportunity to attend the international conference, free technical product presentation, live product demonstration and network with industry experts. Russia presented in Jakarta a sufficiently capacious exposition of its defense solutions for Indonesia and the ASEAN countries as a whole.

Russia and Indonesia are conducting quite active military-technical cooperation on a wide range of weapons and military equipment. It is enough to remember that the Indonesian air force only this year signing a contract

to receive 11 Sukhoi Su-35 fighters from Russia. The air force of this country operates a mixed fleet including Su-27 and Su-30, and the experience that Jakarta had in operating the older Sukhoi designs was touted as one of the reasoning for selecting the Su-35.

The eighth edition of Indo Defence was officially opened by Indonesian vice president Jusuf Kalla, welcoming and inviting domestic and foreign delegations and industry to work together to develop partnerships that will prove fruitful for international defence relations. The deputy premier welcomed Indonesia's partners to the show, which will see 193 official delegations from 33 countries visit Indo Defence.

Official representatives from a number of nations were welcomed to stand by Kalla as the show was opened, namely from Australia, Brazil, Brunei, Czech Republic, Denmark, Fiji, Iran, Russia, Singapore, Thailand, Turkey and Vietnam. In a multi-agency effort, the army, the police and members of parliament are joining forces to represent the show, which has increased in size with the addition of two extra halls at this year's iteration of the exhibition. The show has grown by some 15 per cent this year since 2016, the organisers say, and there is an increase in the number of participants that took part in the show. A total of 867 exhibitors from 60 countries were there, with 30 dedicated pavilions having been set up.

Local and international companies, plus the government, media outlets and academia, are all encouraged worked together during the exhibition, co-operating to

'Arms market in South-East Asia is top on the priority list of Rosoboronexport. Most of the countries in the region are our long-standing partners. They know Russian weapons perfectly well, have trust in them and always keep their eyes open for development of more advanced systems, which we make sure to bring to every exhibition in Indonesia. This year we are going to put on display a number of new but already popular in the world systems catering to the needs of all services: BT-3F armored personnel carrier, IL-78MK-90A tanker aircraft, Pantsir-ME ship-based AD system, Karakurt-E and Sarsar ships, as well as other military equipment,'

Alexander Mikheev

Olga Tyurina,

Project manager at 'IVA Technologies':

'At INDO DEFENCE, our company is representing a few solutions, which, we are sure, will be sought-after on the market of ASEAN countries. Among them is a mobile radio station for underwater communications – 'IVA S/W', which ensures reliable and secure data and voice transmission under water among scuba divers and, most importantly, from under water to the surface.

Expo visitors showed great interest to the video conference system adaptable to the specifics of the local market, which has been represented by us at Indo Defence. In particular, we are already preparing proposals for potential local partners regarding both joint sales of the VCaaS (Video Conferencing as a Service), and personal use within the company.

In Jakarta, we have represented a facial recognition intellectual system equipped with a powerful computational rescue platform, which provides recognition of human faces in the online mode, searching for faces in a group of people, looking for a face in archived video recordings at 20-fold speed. This system is in demand for ensuring safety of the city environment and strategically important facilities.'





**Boris Romanenko,
Head of foreign economic relations department, 'Radiozavod', JSC, Penza:**

'We are participating in INDO DEFENCE expo for the second time. First time we were here in 2014. At INDO DEFENCE-2018 we represented practically all the spectrum of production of our enterprise, which we offer to potential partners at international markets. These are systems and complexes for automated management of armament of the air defense and missile troops and artillery (MT & A). The market of South-East Asia is attractive for us, the production of 'Radiozavod' is just at the start of the road to recognition in this region.

A special attention of potential partners was focused on the new look of the automated air defense system 'Polyana-D4M1' which is the core element of a modern air defense system, as well as a complex of automated management of artillery units – 83t888-1.7, which ensures automation of processes of management by any system of artillery and mortar armament, including foreign-manufactured system. We believe that the work at the expo allowed us to achieve the set goals.

ensure that the most effective technologies and relationships are developed. Over the four days of the show, some 2,500 visitors were, and official delegations from Indonesia are to include the ministry of business and finance, education, foreign relations, research and testing, and communications.

The government claimed that Indo Defence is effectively utilised when it takes place every two years to strengthen product offerings, as well as to bolster the relationships between the Indonesian military and foreign delegations. Indo Defence is now considered the biggest defence show in Asia as a result of this growth, Menurut



Menhan, Indonesia's defence minister says, adding that it is also in the top 10 worldwide.

Rosoboronexport, a member of Rostec, was setting up a joint Russian exposition at Indo Defence 2018. 'Arms market in South-East Asia is top on the priority list of Rosoboronexport. Most of the countries in the region are our long-standing partners. They know Russian weapons perfectly well, have trust in them and always keep their eyes open for development of more advanced systems, which we make sure to bring to every exhibition in Indonesia. This year we are going to put on display a number of new but already popular in the world systems catering to the needs of all services: BT-3F armored personnel carrier, IL-78MK-90A tanker aircraft, Pantsir-ME ship-based AD system, Karakurt-E and Sarsar ships, as well as other military equipment,' says Rosoboronexport's CEO Alexander Mikheev.

Rosoboronexport presented products of seven Russian defense companies, including the United Aircraft Corp., Tecmash, Institute of Applied Physics, and High-Precision Systems. At own Booth Rosoboronexport showed 200-plus pieces of military equipment for all military services.

In the air force sector things look particularly good for the Su-35 multirole super-maneuverable fighter, Yak-130 combat-trainer, MiG-29M/M2 multirole frontline fighter, Be-200



amphibious aircraft, and scores of UAV systems, including the Orion-E recently added to the portfolio of the company. Other platforms facing bright future in the region are the Mi-17 military transport helicopters, Mi-35M attack helicopter with troop-carrying capacity, as well as Mi-28NE and Ka-52 gunships.

Army personnel could see the booth for the T-90MS tanks, BMP-3M and BMP-3F fighting vehicles, BTR-82A and BT-3F personnel carriers, BMPT tank support vehicle, and Kornet-EM and Khirzantema-S AT systems.

There were also equipment suitable for other security agencies contributing to the state security and war on terror and organized crime. Rosoboronexport's display was packed with small arms to include Kalashnikov AK-100 family assault rifles, various machine-guns and close-combat weapons, as well as VPK-233136 Tigr special-purpose vehicle, Ansat light multi-purpose helicopter, and Mi-26T2 heavy transport helicopter.

The location of the South-East Asian nations and numerous sea borders pave the way for soaring demand for naval equipment. Here, Rosoboronexport had a few very special items, some of them com-

bat-proven. Much interest was to go to the Project 11356 guard ship, Project 20382 Tigr small guard ship, Gepard 3.9 frigate equipped with the Club-S integrated missile system, Project 22160 patrol ship, 03160E Raptor patrol craft, and Project 636 submarine.

Navy weapons, as well as defense systems for ships, submarines, and shore-based installations were in high interest. These include the Kalibr-PL (Club-S) and Kalibr-NKE (Club-N) integrated missile systems,

The location of the South-East Asian nations and numerous sea borders pave the way for soaring demand for naval equipment. Here, Rosoboronexport had a few very special items, some of them combat-proven. Much interest was to go to the Project 11356 guard ship, Project 20382 Tigr small guard ship, Gepard 3.9 frigate equipped with the Club-S integrated missile system, Project 22160 patrol ship, 03160E Raptor patrol craft, and Project 636 submarine.

Bastion and Bal-E shore-based systems complete with the Yakhont anti-ship cruise missile and Kh-35E anti-ship missile respectively, as well as underwater weapons, namely UGST torpedoes and bottom mines.

Besides, Rosobornexport was bring Russian AD systems, those which are particularly popular all over the world, South-East Asia included. On the company's bestseller list are the S-400 Triumph and Buk-M2E SAM systems, Pantsir S1 gun and missile AD system, and Verba

**Denis Kuzmin,
First Deputy Director General – Deputy Director General on Economics & Finance, Shipbuilding & Shiprepair Technology Center6, JSC:**

'At the 8th Tri-Service International Event INDO DEFENCE 2018 'Shipbuilding & Shiprepair Technology Center' (JSC SSTC) presented all its main activities in the area of shipbuilding and ship repair, including designs for shipyard facilities creation and modernization as well as for creation of on-shore infrastructure for ships and vessels stationing-at-base, recent developments in the field of laser and robotic technologies for ship machine-building, designing of vessels, etc.

Abilities of JSC SSTC in establishing and modernization of shipbuilding production facilities aroused the largest interest in the Indonesian market. Taking into account the island location of the state and also rich resources of oil and gas in the shelf sea, the issues of building passenger vessels, ferries and oil tankers are of current importance. The interest in fleet replenishment necessitates creation of new state-of-art production facilities, complex modernization of existing facilities and renovation of metal-processing and assembly-welding equipment and machinery. At present, the issues of expansion and modernization of the existing production facilities are on the agenda of large national and private shipyards and dockyards alike, with representatives of which experts from JSC SSTC had a chance to meet and negotiate during the exhibition. JSC SSTC is highly interested in further development of contacts established during the exhibition.'



Praveen Pathak
General Manager (Mkt. Promotion & Export), BrahMos Aerospace:

'We regularly participate in the INDO DEFENCE expo and are very happy about the efficiency. At the same time, the expo demonstrates a really good growth both in quantitative and qualitative terms. This year at INDO DEFENCE, we have represented various options of the 'BrahMos' missile and the platform with which it is equipped. Represented were ship-based missiles, various options of launching facilities, in which a number of countries of this region are interested in. We are clearly demonstrating that 'BrahMos' can be installed also on ships of virtually any class and configuration – from small-scale to the largest. In Indonesia, we also represented a system for coastal defense using our famous missile, one of the most attractive exhibit at our exposition – Su-30MKI with 'BrahMos'. The aircraft with the missile has already passed a cycle of battle service tests with marine targets; with another cycle to be conducted by the end of the year, after which the weaponization of the Indian Air Forces will start.

Supersonic missile 'BrahMos' offers a great advantage. No other country in the ASEAN region has such systems. And that is the only universal missile which can be deployed both on land, on ships, and on aircraft. This missile is highly attractive in the region, and we are conducting negotiations with a number of countries, and we hope contracts will be signed in the short run. All the more so that this year we succeeded in increasing the service life of 'BrahMos' missiles, and that makes our missile even more compelling.'

In the air force sector things look particularly good for the Su-35 multirole super-maneuverable fighter, Yak-130 combat-trainer, MiG-29M/M2 multirole frontline fighter, Be-200 amphibious aircraft, and scores of UAV systems, including the Orion-E recently added to the portfolio of the company. Other platforms facing bright future in the region are the Mi-17 military transport helicopters, Mi-35M attack helicopter with troop-carrying capacity, as well as Mi-28NE and Ka-52 gunships.



MANPADS. At the INDO DEFENCE 2018 Rosoboronexport had a very rich business program, stipulating meetings with delegations representing most of the countries in the region.

It should be noted that Indonesia is going to actively increase its arms purchases. 'We link to economic growth of about 7 percent ... so by 2019, the national defense budget can increase to around \$20 billion per annum,' Luhut said. Muradi, a defense and military analyst at Padjadjaran University in Bandung, West Java, agreed with the country's plan to set such an impressive target for its defense and security sector, saying that 'our defense sector is already 10 years behind neighbor-

ing countries such as Singapore and Malaysia.'

According to Muradi, Indonesia's defense sector spending – which includes the purchase of primary weaponry defense systems, the cost of security monitoring and also stipends for military personnel – should make up at least 2 percent of the country's GDP to be considered adequate.

This year, Indonesia has allocated Rp 83 trillion (\$6.6 billion), which represents 0.8 percent of the total state

budget, Defense Minister Ryamizard Ryacudu said. 'As of now, I believe there's no other way to modernize our weaponry except for increasing the defense sector budget,' Muradi told. 'We can't let other parties help us with providing weaponry because that way they are likely to dictate to us on how to manage the country's defense and security.'

International relations experts believe Indonesia's move to beef up its security, by setting aside more money for defense in its state budget, is essentially based on its need to improve its defensive capabilities and security systems in order deter any potential aggressors.

'By beefing up security in its territory, Indonesia is sending a warning to other countries that may possibly be planning acts of aggression against it. It shows that they can no longer do whatever they like and think that we wouldn't be able take decisive action against them,' Muradi said. According to Muradi, Indonesia records some 200 violations to its airspace per year. 'For instance, just to challenge the most recent violation by three foreign aircraft, we spent some Rp 150 million, while we only fined them some Rp 60 million,' Muradi said.

'The increase is really needed, not because Indonesia is worried that there would be attacks from other countries, but more due to its inter-

Leonid Dolgov,
GAZ Export Sales Director:

'GAZ, Russia's leading manufacturer of commercial vehicles and exporter to more than 40 countries of the world, presented commercial vehicles for civil purposes at the largest regional exhibition in Indonesia. GAZ participated in Indo Defense 2018 together with its local partner, RALIKA. Being not a manufacturer of military vehicles, GAZ took part in the Indo Defense 2018 exhibition with the vehicles for civil purposes, as this exhibition is attended by potential customers from various civil industries. Indonesia is among the 20 largest economies, and in terms of population it is the 4th largest country in the world. And we see a great potential for our equipment here. Indonesia is a country with left-hand traffic, so at Indo Defense 2018, we exhibit our right-hand drive Sadko NEXT and Ural 6x6 vehicles with impressive off-road characteristics.'



nal interests,' Hikmahanto Juwana, an international relations expert from the University of Indonesia, told the Jakarta Globe. Hikmahanto says that the increase in defense spending is needed: to protect the country from illegal actions by private groups; to be a peace broker in any disputes occurring in the region; and also to boost Indonesia's participation in United Nations peace-keeping efforts.

'Indonesia also requires adequate weapons systems to protect its territory as it has the second-longest coastline in the world, which eventually is in line with Jokowi's agenda to be a Global Maritime Fulcrum,' said Djayadi Hanan, an academic in Paramadina University's department of international relations. /RA&MG/

Sergey Kulik

SECURE RESCUE AT ANY HEIGHT



Unique autonomous rescue parachuting back-pack system for emergency escape

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

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

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

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

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

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

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

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

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

case of emergencies than traditional evacuation methods are impossible.

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

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

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

absorbing systems entered into force in 2013.

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

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

New SPARS® escape solution provides the following advantages:

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

The SPARS® General Specifications

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

Actual Landing Impact Loads:

Acceleration directions:

'chest-to-back' – up to 8÷10 g

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

Acceleration Exposition Time – less than 0.5 s

Acceleration Growth Velocity – less than 500 1/s

User's age – 18÷70 years

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

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





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

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

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

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

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

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

essary intellectually property rights protected.

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

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

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

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

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

For a strategic industrial Partner sought who would be interested to

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

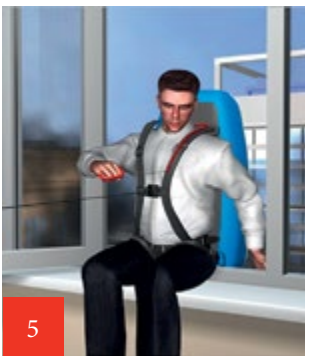
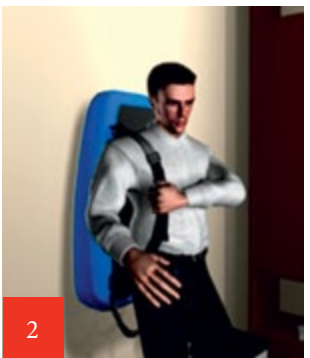
- thin coated/laminated fabric manufacturing;
- assembly from these fabrics a complex air-beam-frame air-proof inflatable structures;
- parachute canopy manufacturing;
- air-aspirator gas filling manufacturing;
- plastics (carbon) manufacturing and forming
- human field (air-borne) tests plastic forming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

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

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

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

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



There are following innovations in the proposed SPARS® technology:

1. A brand new free parachuting technology (means and escape method) was created for emergency escape from heights higher than 50 m where practical methods for safe evacuation of a person are not available on the market.
2. Sinergy solution based on specially designed and produced from film-laminated fabric a rapid inflatable air-beam single volume frame structure for:
 - Elastic catapult ejection of a human from a window of an emergency object;
 - Forced deploy of the canopy with only 3÷5 m loss of height and irrespective of air flow speed pressure for deployment (usual parachute requires of 25÷100 m free fall and/or 250÷350 km/h speed of airplane to be deployed);
 - Guaranteed safe landing with 5÷6 m/s vertical velocity on any underlying surface in urban terrain using integrated air-frame shock absorbing pneumo dumper.
3. Fully automatic mode of usage (after manual initialisation of the apparatus) and all the descend envelope accelerations bearable for an ordinary person make the escape solution available for use by untrained people from 18 till 70 years old;
4. New type of light weight air-proof film coated fabric for air-beam inflatable frame structure was created.

The Special National Standard (GOST) for shock acceleration limits for untrained human using new type of lodgment Rescue Parachuting Systems was issued.
The Crash test dummy Hybrid-III 50% percentile was instrumented, calibrated with the help of centrifuge, certified and used as anthropomorphic instrument for human acceleration checking during field tests and validation of the Autonomous Pneumo Transformable Escape Chute.



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INTERNATIONAL AEROSPACE, MILITARY, NAVY AND TECHNOLOGY GUIDES IN 2019

In 2019

ISSUE	RELEASE DATES	ADDITIONAL DISTRIBUTION
'RA&MG' №01 (32)	February 12th	IDEX 2019 / NAVDEX 2019 (17-21.02.2019, UAE, Abu Dhabi)
'RA&MG' №02 (33)	February 15th	AERO INDIA 2019 (20-24.02.2019, India, Bangalore)
'RA&MG' №03 (34)	March 24th	LIMA 2019 (26-30.03.2019, Malaysia, Langkawi)
'RA&MG' №04 (35)	April 01th	LAAD 2019 (02-05.04.2019, Brazil, Rio de Janeiro)
'RA&MG' №05 (36)	April 01th	IDEF 2019 (30.04-03.05.2019, Turkey, Istanbul)
'RA&MG' №06 (37)	May 12th	IMDEX ASIA 2019 (14-16.05.2019, Singapore)
'RA&MG' №07 (38)	May 14th	SITDEF 2019 (16-19.05.2019, Peru, Lima)
'RA&MG' №08 (39)	June 16th	Paris Air Show 2019 Le Bourget (17-23.06.2019, France, Paris)
'RA&MG' №09 (40)	June 24th	ARMY 2019 (25-30.06.2019, Russia, Moscow)
'RA&MG' №10 (41)	June 25th	IMDS-2019 (26-30.06.2019, Russia, Saint Petersburg)
'RA&MG' №11 (42)	August 27th	MAKS-2019 (27.08-01.09.2019, Russia, Moscow)
'RA&MG' №12 (43)	September 16th	AVIATION EXPO CHINA 2019 (18-20.09.2019, China, Beijing)
'RA&MG' №13 (44)	October 01th	INMEX SMM India 2019 (03-05.10.2019, India, Mumbai)
'RA&MG' №14 (45)	October 13th	SEOUL ADEX 2019 (15-20.10.2019, Korea, Seoul)
'RA&MG' №15 (46)	October 28th	BIDEC 2019 (28-30.10.2019, Bahrain, Manama)
'RA&MG' №16 (47)	November 02th	Defense & Security 2019 (04-07.11.2019, Thailand, Bangkok)
'RA&MG' №17 (48)	November 16th	Dubai Airshow 2019 (17-21.11.2019, UAE, Dubai)
'RA&MG' №18 (49)	December 08th	Gulf Defense & Aerospace 2019 (10-12.12.2019, Kuwait, Al Kuwait)

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