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One of the areas of high-tech cooperation between Russia and China is the delivery of Russian helicopter equipment. In this regard, starting from the beginning of 2020 "Russian Helicopters" may start deliveries to China of the medium-sized transport helicopter Mi-171 powered by the Russian VK-2500 engine. The scope of supply is ten aircraft.



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目前，世界上只有两个国家拥有生产重型运输直升机的能力 - 俄罗斯和美国。然而，近几年来，中国对它们很感兴趣，虽然航空业还没有这种技术，但在未来几年可以通过与俄罗斯联合实施 AHL项目来实现这些技术。(Advanced Heavy Lift).

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中国成为2019年俄罗斯中部战略军事演习的最大外国参与者，1600名士兵和330件装备。演习于9月16日至21日进行，来自八个国家的特遣队参加了这次活动，从达吉斯坦到克麦罗沃地区，共有八个训练场。参加俄罗斯年度性指挥和参谋演习和来自集体安全条约组织以外国家的外国部队已成为一种传统：从2018年的第一次开始。



Unique competence
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Russian helicopter-building enterprises uphold the well-established traditions of the top domestic firms and still bear the palm in production of heavyweight aircraft. It concerns not just specific technology, but actually the whole line of aircraft covering the entire range of load-lifting capacity values. Most notably, the Mi-26 and Mi-38.

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Important area of high-tech cooperation between Russia and China is a delivery and a production of helicopter equipment



Facets of Helicopter Cooperation

The Premier of the State Council of the People's Republic of China Li Keqiang sets the goal of bringing bilateral trade between Russia and China up to \$200 billion and calls for new steps to be taken to achieve this.

"We need to bring our trade turnover up to \$200 billion, but we need new steps to achieve this goal," he said at the beginning of a conversation with Russian Prime Minister Dmitry Medvedev featuring a narrow circle of participants during a meeting of leaders in St. Petersburg on September 17. Li Keqiang stated that today, 70% of the commodity exchange accrues for the energy sector, mainly oil and gas.

He reminded that already during the last meeting he spoke about the need for a breakthrough in the search for a new comprehensive cooperation format in this area.

"We have achieved certain results, but it's time for us to rise to a new height because the situation in China has changed," Li Keqiang said, adding that he meant the country's innovative development. The Chinese Prime Minister stressed that his country is open to cooperation, and cited Germany as an example, which has located its oil refineries in China.

According to Li Keqiang, Russia and China are at one in thinking that, amid growing factors of uncertainty, it is especially important to maintain a strategic partnership.

One of the areas of high-tech cooperation between Russia and China is the delivery of Russian helicopter equipment. In this regard, starting from the beginning of 2020 "Russian Helicopters" may start deliveries to China of the medium-sized transport

helicopter Mi-171 powered by the Russian VK-2500 engine. The scope of supply is ten aircraft. The transaction may be financed by the State Transport Leasing Company (STLC), which is considered by the parties as a potential lessor. Russian Helicopters Holding Company (part of Rostec) is currently in talks with the Chinese operator Qindao Helicopter to supply ten Mi-171 helicopters.

Negotiations are ongoing to discuss the supply to China of the first series of aircraft powered by the Russian VK-2500 engines. Previously, the helicopter was equipped with the TV3-117 engine manufactured by the Ukrainian Motor Sich, but today the Ukrainian manufacturer refuses to supply its engine directly. A source in the aviation industry notes that the Russian engine is 16 million

roubles more expensive than the Ukrainian counterpart, although it does not differ from it in technical terms. The VK-2500 engine was certified in China in April. Rostec stressed that the VK-2500 is the first Russian engine certified by the Chinese Civil Aviation Administration over the past 19 years.

The Russian Helicopters Holding Company also expects to receive another \$120 million for direct sale of twenty Ansat helicopters to the Association of Emergency Medicine of China. The company is negotiating the supply of another fifty aircraft to state and private customers in Asia, with total sales probably reaching \$500 million.

The contract for the supply of twenty Ansat helicopters with the Association of Emergency Medicine of China was signed in November 2018 at the Airshow China Exhibition.

Development of ambulance aviation in Russia have already led to an increase in the production of helicopters in Russia. Russian Helicopters Holding Company (part of Rostec) plans to produce about 250 rotorcraft in 2019 both for domestic and foreign customers, compared to 200 made last year. This was announced by the General Director of the Holding Andrey Boginsky in an interview with the newspaper Vedomosti, published on Wednesday.

In 2017, Russian Helicopters delivered 221 helicopters; a year later this figure dropped down to 200 units. "The 2017 figure takes into account the modernized aircraft: they need experimental development work; therefore, they are included in the statistics of supplies. For new aircraft, the indicators for 2018 are approximately comparable to 2017," Boginsky commented on previous years. "In the future, we plan to grow as well.

People's Republic of China.

Russian Helicopters Holding Company plans to launch four service centres for the repair of Russian-made helicopters in China. "In the near future, approximately before 2021, there will be at least four centres in China, and afterwards everything will depend on the fleet and wishes of the customer," said Igor Chechikov, Deputy General Director of the Holding.

According to him, China is currently operating the Mi-8/17 and Ka-32 military-transport helicopters, as well as the civilian Mi-8/17 and heavy Mi-26TS helicopters. In the future, the Russian Mi-171A2 and Ansats will be delivered to the country, the contract for which was concluded in early 2019.

The first centres in China might be opened in the cities of Chengdu and Hain. The Holding also announced the launch of maintenance centres in India and Peru.

Ansat is a light twin-engine multi-purpose helicopter which is mass-produced at the Kazan Helicopter Plant. According to its certificate, the helicopter design allows it to be quickly transformed into both cargo and passenger versions with the possibility of transporting up to seven people.

The Mi-171A2 is the latest modification of the Mi-8/17/171 helicopters. The helicopter is equipped with the VK-2500PS-03 engines with a digital control system as well as a more efficient X-shaped tail rotor and a new rotor with composite blades and an improved aerodynamic contour. The helicopter can be effectively used day and night, in high altitude conditions, at low and high temperatures, high humidity and above the water surface.

Last year, the Mi-171A2 and Ansat helicopters took part in a demo tour of countries in Southeast Asia after participating in the international Airshow China in Chinese Zhuhai. This almost 5-thousand-kilometers route runs through Vietnam, Cambodia, Thailand, and Malaysia.



Premier of the State Council of the PRC Li Keqiang and Russian Prime Minister Dmitry Medvedev

Ansats, when equipped with a medical module, can be used for first aid treatment, emergency evacuation of patients, including in areas with challenging terrain.

New export contracts and the further devel-

opment of ambulance aviation in Russia. In particular, in 2019, we expect to reach the figure of about 250 aircraft," added the Head of the Holding.

Another critical area of cooperation in the helicopter sector is the after-sales service of Russian equipment on the territory of the

The PRC has become a partner country of MAKS-2019 this year

MAKS: Theory and Practice of Russian-Chinese Cooperation

More than 800 companies participated in the MAKS-2019 international air show, twenty of them were from China.

The first thing that struck visitors to the aviation show was the incredible number of exhibits from China. This is not surprising, as the PRC has become a partner country of MAKS-2019 this year. According to the Minister of Industry and Trade of the Russian Federation Denis Manturov, "for the first time ever, we are about to change the format of the International Aviation and Space Salon MAKS. We have invited China to become a partner country." And China accepted this proposal, while showcasing a relatively wide range of modern aircraft engines, space rockets, and space technology as well as the broadest range of drones - from toy copters to military vehicles. Moreover, as reported by the Xinhua News Agency, the PRC showcased its latest developments.

Drones, a Chinese shtick

China, which made a quantum leap towards design and construction of unmanned aerial vehicles, was the first to demonstrate a whole series of drones for various missions. Undoubtedly, combat drones attracted much attention. For example, Ziyang, the developer of multifunctional helicopter-type aerial vehicles, brought its bomber drones to the aviation forum. One of them is Ziyang Blowfish, which was previously shown to the visitors at the 15th International Maritime and Aerospace Exhibition in Langkawi (Malaysia). The unmanned aerial vehicle completed its first flight in 2016, and due to the fact that the tests were very successful, the mass production was launched within the project. The cost of the aerial vehicle was minimal, which in turn provided attractiveness to potential operators.

The drone is able to fly at a speed of 80-90



The Minister of Industry and Information Technology of the PRC Miao Wei and the Minister of Industry and Trade of the RF Denis Manturov

km/h (maximum - 145 km/h) for 45 minutes and climb to a height of up to five thousand meters. The standard load in the military version is 7 kilograms; the maximum is 28. Ziyang developed Blowfish as a multi-vector drone to support platoon-squadron units. It features a modular design; the sling can carry different types of camera sensors for reconnaissance; EW systems; engineering equipment; shipping containers; bomb-mines. As far as we know, the tactics of using a drone have not yet been practiced to perfection. Although the initial analysis points to the operation of drones in the second echelon, after harassing mortar fire at enemy shelters. Blowfish can perfectly reveal its abilities, hitting the enemy's technique from low altitudes.

As stated by the Ziyang representatives, the concept and control of a group of ten drones-bombers have already been successfully implemented. As reported, the following tasks have been successfully practiced: air build-up and the creation of a multi-purpose group, the

formation of the environment, cluster operations and other activities, which increases reliability of the reconnaissance-targeting system or attack by increasing the number of drones engaged in reconnaissance, targeting or attacking the target.

Responding to global challenges

One of the critical topics of MAKS-2019 is international cooperation. According to the head of the Chinese delegation, the Minister of Industry and Information Technology of the People's Republic of China Miao Wei, the interaction between China and Russia in the aerospace field is strategic in nature, can effectively counter global challenges and is beneficial to the peoples of the two countries.

"In recent years, the Russian-Chinese cooperation in aviation and astronautics has been of great strategic importance and allows our countries to respond to global challenges effectively," Miao Wei said at the opening ceremony of the Chinese pavilion.

In his turn, the Minister of Industry and Trade of the Russian Federation Denis Manturov thanked China for the accepted invitation to become a partner country of MAKS-2019. "This once again underlines our joint strategic focus on the development of aviation projects," he said.

According to Manturov, the full-scale model of the Russian-Chinese long-range CR929 aircraft will be in the spotlight. "This is certainly a bright, ambitious project, our joint project with China, which, I hope, will be implemented in the coming years," he said, adding that Russia and China have good examples of joint projects in the field of aircraft manufacturing. For example, the creation of a heavy-lift civil helicopter AHL (Advanced Heavy Lifter).

The AHL commercial contract has been approved.

According to the intergovernmental agreement signed in 2016, the Russian Helicopters Holding Company and the Chinese Avicopter will jointly develop the advanced heavy helicopter AC332 AHL to launch its mass production in China and meet the Chinese market's demand. The Chinese side is expected to organize the program of the heavy helicopter as a whole, including design, construction of prototypes, testing, certification, training and mass production as well as market promotion and general coordination of work. The Russian holding will, in turn, provide technology as well as develop a technical offer and specific systems of the vehicle on a contractual basis. Russian Prime Minister Dmitry Medvedev approved an intergovernmental agreement on the joint development of this helicopter in February 2017.

The maximum take-off mass of the helicopter will be 38.2 tons; the service ceiling is 5.7 thousand meters. The flight range will reach 630 kilometres, the maximum speed - 300 kilometres per hour. The AHL weight-lift capacity when the cargo is located inside the fuselage will be 10 tons, and when placed on an external sling - up to 15 tons.

Then, in 2016, a military expert Cao Weidong, in his interview given to CCTV Asia Today, said that if China and Russia engaged in the joint development of heavy-lift helicopters, both sides would be able to borrow strengths from each other and make up for their defi-

At the same time, Miao did not reveal any details of the contract, including with regard to the number and place of future helicopter production. However, it is expected that a heavy-lift helicopter will be delivered by 2032.



Chinese combat drone Wing Loong

ciencies. This means that both parties will be able to not only release a new model but also upgrade the old one. For China, in the context of civil aviation, a heavy-lift helicopter can play an important role in rescue missions and disaster clean-up operations. There is a great need for heavy helicopters in the military field, including for crane helicopters, or transportation helicopters.

As it became known during MAKS-2019, China and Russia wholeheartedly agreed upon and signed a commercial contract for a joint project for the development of a heavy-lift helicopter. The Minister of Industry and Information Technology of China Miao Wei confirmed this fact.

"For the next step, the Chinese government will accelerate the process of agreeing on the project and complete it as soon as possible so that the project can officially start," he said at a press conference with Russian Minister of Industry and Trade Denis Manturov.

For military use, a heavy-lift helicopter can transport troops, armoured vehicles, artillery, and missiles. For civilian use, it can lift heavy engineering equipment to places where conventional transport routes could not have reached in the event of a natural disaster, military observers said.

Admittedly, MAKS 2019 was marked by the strengthening of cooperation between the Russian and Chinese aircraft industries. The same trend was observed at the international air show - China Airshow, held in 2018 in Zhuhai. According to the General Director of Rosoboronprom Alexander Mikheev, the Russian exhibit display became one of the most representative and large-scale of all international exhibitions with Russian participation. All these as well as practical cooperation in the field of helicopter engineering, demonstrate the growing potential of Russian-Chinese cooperation, allowing countries to respond to various global challenges effectively.

For the first time, the Helicopter Industry Association from Russia will be represented at the China Helicopter Exposition

Helicopter Industry Association at China Helicopter Exposition

From October 10 to 13, 2019, the Helicopter Industry Association (HIA) is planning to showcase for the first time the equipment made by the Russian helicopter companies at a joint exhibition in China. The 5th International Exhibition China Helicopter Exposition (CHE) which is held once every two years and rapidly gaining in popularity has been selected as a debut site. The event was organized by the Aviation Industry Corporation of China (AVIC) supported by the Chinese Government.

The China Helicopter Exposition is the largest exhibition of helicopters in Asia. Unlike most of the world's helicopter shows, the visitors to Tianjin will not only enjoy the static display of technology but also witness a spectacular demo flight schedule involving more than two dozen Chinese-made helicopters. Two years ago, the visitors witnessed an acrobatic air show performed by the "Thunder storm" helicopter group of People's Liberation Army Air Force.

Of course, this site attracts the world's leading helicopter manufacturers, including Airbus Helicopters, Bell Helicopter, Sikorsky, Leonardo, Russian Helicopters that bring their innovations to China every two years, hold bright presentations and actively participate in the business program of the exhibition. But the prom king is, of course, the Aviation Industry Corporation of China (AVIC). This year the viewers will be able to get a closer look at the AC311, AC312, AC313 helicopters, the new-generation AC352 helicopter and other innovations. All visitors will also be lucky enough to examine a full-scale model of the Chinese heavy helicopter, which is currently

under joint development with the participation of the Russian Helicopters Holding.



It is expected that the exhibition will attract in 2019 about 450 companies from more than 20 countries and more than 100 exhibits and full-scale samples of helicopters will be presented on the area of 30,000 sq.m. The China Helicopter Exposition expects more than 30,000 people, including a high proportion of industry professionals, customers of aviation services and helicopters. The exhibition's schedule includes demo flights, contact exchanges, extensive business program including various thematic conferences and seminars.

Today, China is open to the implementation of international projects, and the Russian helicopters catch permanent attention there. China is one of the major buyers of Russian helicopter technology. Considering the development of Russian-Chinese joint projects in the field of aerospace technology, the Russian companies gain opportunities to access the markets of China, the Far East and Southeast Asia during participation in the exhibition. Therefore, the HIA decided to create a unique exhibition with favorable conditions to enable the representatives of the Russian companies to present their products, capabilities and potential in the best possible way, as stated by the HIA.

Not only HIA's members were invited to the joint stand, but also Association's partners. They are ready to showcase new helicopters and aircraft equipment, provide pilot training, operation support, maintenance and upgrade services for Russian helicopters in the helicopter service market of the Far East and South-East Asia in order to fulfil a variety of missions - emergency medical evacuation, police work, fire-fighting, regional transportation as well as timber procurement and oil and gas sector.

The HIA stand is run by the Russian exhibition systems, which boasts an extensive experience in holding helicopter-related events. The Company portfolio includes HIA projects, such as the HeliRussia International Helicopter Industry Exhibition and Helicopter forum.

It is worth saying a few words about the participants of the HIA joint stand. First of all, this is the Helicopter Industry Association itself, established in 2006 and gathered more than 60 companies in its ranks. Among them: companies developing and producing helicopters, components, equipment; airline operators of helicopter services; companies supplying aviation equipment, overhauling and upgrading helicopters and companies from related industries engaged in design and production of ground support equipment, providing insurance, leasing and helipad construction services, and others.

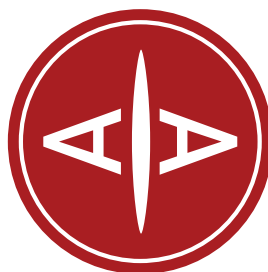
Another co-exhibitor and member of HIA was the Russian Helicopter Systems. This company operates more than 10 years in the Russian market and provides a wide range of aviation services, including: medical evacuation, passenger transport, training of flight and technical personnel, aircraft and equipment maintenance, development and construction of ground support infrastructure.



The Russian Helicopter Systems offers a full range of air ambulance services. The company's helicopter fleet consists of modern aircraft equipped with all necessary facilities to carry out both planned and emergency transportation of patients.

The company provides air ambulance services in the Central, Volga, Ural, Southern, North Caucasus and Far Eastern federal districts, and is continuously expanding its geographic footprint.

The Russian Helicopter Systems became the first company to operate private helipads in the City of Moscow. One of them is the Moscow City helipad on the dock at the business center skyscraper of Russia's capital.



There is also a transport airline among the stand participants. Abakan Air based in the Republic of Khakassia carries out orders of both governmental and commercial enterprises, and offers a wide range of aviation services in Russia and abroad. It is an officially registered supplier in the market of aviation services of the United Nations and the World Food Program. Airlines helicopters, Mi-8 and Mi-26, deliver humanitarian cargo and passengers to different locations of the planet.

Besides, the Abakan Air helicopters are used in the completion of tasks of the oil and gas complex in the Yamal Nenets Autonomous District and Krasnoyarsk Krai, search and rescue and emergency rescue operations in the Republic of Khakassia.

There is also a Russian contractor representing consumable market which became the participant of the joint exhibition. The STAND company was established in 1992 and specializes in supplies of aviation oils, lubricants and hydraulic fluids of Russian and foreign production. STAND is the official distributor of market-leading manufacturers of aviation oils, hydraulic fluids and greases of brands: Mobil Jet Oil, Mobil

AGL, Mobilgrease, Turbonoycoil, Hydraunoycoil, Nycolube, Nyco Grease, Nycoprotec and Russian aviation lubricants.

STAND holds leading positions thanks to its extensive experience in successful cooperation with partners, participation in the development and implementation of advanced aviation products. A special advantage of our company is participation in programs promoting new Russian-made oils and hydraulic fluids.

The company's assets include highly qualified specialists engaged in logistics services and consulting in the field of cost-effective solutions in the application of lubricants on the customer's helicopters fleet.

The STAND's mission is to deliver products and provide integrated services to airlines preferring guaranteed quality, operational efficiency, widespread availability of aviation oils, lubricants and hydraulic fluids.



The International Exhibition "China Helicopter Exposition" is becoming more and more popular among the representatives of the Russian aviation business and related industries. Apart from the large state-owned contractors and holding companies, even mid-sized and small companies travel to Tianjin to find partners in the People's Republic of China.

Contributed by Nikolay Korobov

俄罗斯的靶场成了中国的演习训练场





士兵，7000多种武器和军事装备以及170架飞机和20艘军舰。

除中国外，来自印度，巴基斯坦，哈萨克斯坦，吉尔

吉斯斯坦，塔吉克斯坦和乌兹别克斯坦的演习人员也参加了演习；中国演习人员在应邀参加演习的2250名外国士兵和军官中占71%以上。

俄罗斯国防部还指出，演习战略指挥的主要目标是测试俄罗斯武装部队及其国际伙伴的战斗准备水平。正式地演习旨在发展“反恐斗争”，据俄罗斯

中国成为2019年俄罗斯中部战略军事演习的最大外国参与者，1600名士兵和330件装备。演习于9月16日至21日进行，来自八个国家的特遣队参加了这次活动，从达吉斯坦到克麦罗沃地区，共有八个训练场。参加俄罗斯年度性指挥和参谋演习和来自集体安全条约组织以外国家的外国部队已成为一种传统：从2018年的第一次开始。实际上，它们正在变成上海合作组织（SCO），甚至是印度和巴基斯坦敌对方也并肩站在同一个平台。

中国已连续第二年成为俄罗斯最大指挥和参谋演习的主要外国参与者，这次演习在中央军区举行，被称为《2019年中心演习》。中国人民解放军派出1.6万人，300地面作战设备以及30架飞机和直升机参加演习。这些部队部署在中国领土面积最大的西部军区，直接与中亚和印度国家接壤。

在俄罗斯方面，演习涉及12.8万部队，超过2万件装备，包括15艘军舰，600架飞机，250辆坦克，约450辆步兵战车和装甲运兵车，以及多达200枚火炮系统和多发火箭系统。有关人员和设备的数量官方编号通常偏高。俄罗斯武装部队的训练系统规定了每四年演习一次（根据规定，进行突击演习毫无预警）-依次在四个军事区中的每个地区：西部，东部，高加索（南部）和中部。俄罗斯每年的战略演习通常在一个军事区举行。在《2015年中心演习》中，正式涉及95000名

吉斯斯坦，塔吉克斯坦和乌兹别克斯坦的演习人员也参加了演习；中国演习人员在应邀参加演习的2250名外国士兵和军官中占71%以上。

在阿达纳克，阿列斯基，多努兹，托茨基，切巴尔库尔斯基和尤金斯基，阿舒鲁克和萨法库列沃的训练场进行演习，共有来自8个国家的13万名士兵和军官参加了演习。演习的主要目的是针对中亚出现安全威



胁时采取行动，包括抵制恐怖分子的威胁，以及抵制位于俄罗斯西南部的有条件恐怖分子国家的军事攻击。《将根据单独计划在伙伴国的训练场制定打击非法武装团体的战斗计划》，-俄罗斯国防部在一份声明中提出。

俄罗斯国防部还指出，演习战略指挥的主要目标是测试俄罗斯武装部队及其国际伙伴的战斗准备水平。正式地演习旨在发展“反恐斗争”，据俄罗斯

国防部称，该演习还将弄清敌人空袭的反映以及联合进攻性空中和地面行动。换句话说，《2019年中心演习》涉及国际军事。

中央电视台引述参加演习的中国人民解放军部队指挥官马其贤说：《演习将进一步加强和深化全面的战略伙伴关系与协调，中俄关系进入新阶段。它们对于提高我们的军队与其他国家的军队一起抵抗一切安全威胁的能力也非常重要》。

据俄罗斯国防部称，去年的《东方-2018年演习》成为近四十年来俄罗斯武装部队最大的军事演习。中国解放军北方联合司令部与俄罗斯军队一起参加了演习，共有3500名士兵，900架重型武器和30架飞机的飞行，这表明两国之间军事关系在扩大。

《IFES RAS高级研究员瓦西里·卡辛提醒说，直到2018年，俄



特别是该出版物指出，该国指挥所面临的挑战是沿俄罗斯铁路的部队转移：在之前的《东方-2018年演习》中，

和人员演习准备工作的一部分，举行了75次指挥人员和单独的人员训练演习，其中包括战斗准备，训练营和其他作战训练活动。为了提高2018年各区领导机构的个人水平，举行了64次业务培训活动。准备工作分军事指挥和控制部队以及Okrug部队到《2019年中心演习》军事指挥四个阶段依次进行。在第一阶段，主要努力旨在为军事指挥和控制机构做好准备，以执行和平时期和战时转移任务以及解决危机的任务。



罗斯从未邀请外国人参加其演习，但去年首次邀请中国和蒙古参加《东方-2018年演习》。—因此，首先，可以肯定的是，中国人每年都将参加，其次，这些活动正在变得更加国际化和“政治化”，成为上海合作组织国家的项目»。

也有很多设备，但必须将其携带到距离中国边境仅300公里的地方（演习是在赤塔东南部的Tsugol训练场进行的）。«确实，在国外通过铁路进行过境运输需要认真的组织准备，—瓦西里·卡辛指出，—有必要确保供应和后勤，以确保部队到达该地点后随时准备战斗»。

指挥和参谋大规模的演习专门用于指挥和控制整体的培训，在国际参与的情况下，专门用于制定不同国家总部的联合行动。根据9月17日开始的演习部分的情况，设想一个独立国家突然出现在俄罗斯西南部，其领导层«自称是假伊斯兰恐怖主义»。演习对参加演习的国家突然造成打击，发射了巡航导弹和弹道导弹以及武装无人机，然后进行了进攻。参加国的部队必须使用整个地面，地面和空中技术手段来击退它。

中央军委区（CVO）《2019年中心演习》战略指挥

俄罗斯联邦国防部副部长亚历山大·福明上将说，演习不是针对任何第三国的，其设想是完全虚构的。然而，他们的阴谋至少呼应了两个现实事件和过程：与经常从中亚发动袭击的伊斯兰激进分子的斗争，以及也门叛军武装无人机于9月14日对沙特阿拉伯的石油分离基地的袭击，这导致了该国生产的石油暂时下跌了近一半。

中国官方军事门户网站81.cn指出，解放军带来了96型主战坦克，04A型IFV步兵战车，07 122毫米榴弹炮，J-10，J-11，J-16，Su-30飞机，JH-7前线轰炸机，KJ-500远程雷达侦察机，工程车辆，流动医院等等。



从8月12日至8月31日，在俄罗斯联邦武装部队举行了一系列特别演习，内容涉及对部队的支持类型，以及关于使用无人驾驶飞机和警察部队的演习。这些演习是筹备阶段，并完成了一系列措施，以准备军事指挥与控制单位，编队和军事单位，以供《2019年中心演习》战略指挥和参谋人员训练使用。

在训练场上，俄罗斯联邦武装部队的物资和技术支持，工程和铁路部队的编队和军事部队制定了行动，以修建铁路和公路桥梁，在水障上组织桥梁和浮桥穿越，恢复飞机场基础设施和组织飞机场支持，以及维修武器和军事装备，以及确保野战部队的国内需求。

演习的重要组成部分是RCB部队完成保护任务，消除有

条件使用生化武器的后果以及辐射和化学危险设施事故的后果。

《2019年中心演习》印度（140人）和巴基斯坦（90人）参加人员指挥联合参加创新演习。

这是印度飞机于今年2月因应其边防警卫的暗杀而袭击巴基斯坦巴拉科特地区的设施发生之后，两国首次联合行动。从那以后，两国之间的冲突只会加深，特别是在两国之间的争端中取消了特殊地位并由印度政府于8月由德里查谟和克什米尔控制之后。昨天，尽管两国都参加了俄罗斯演习，但巴基斯坦拒绝《通过考虑到被占领的克什米尔》局势，通过印度领空与印度总理纳伦德拉·莫迪一起乘坐飞机。

中华人民共和国中央军事委员会副主席张又侠和俄罗斯国防部长谢尔盖·绍伊古签署了协议，以深化军事合作。值得注意，在7月23日中国解放军空军和俄罗斯空军还对日本海域和中国东海域进行了首次远程飞机联合空中巡逻。

《2019年中心演习》军事演习战略的价值

美国及其北大西洋联盟国领导层对俄罗斯联合其它国家的军队进行大规模军事演习十分关注。

首先，军事演习形成规模-涉及地面部队和航空，海军和防空。参加演习的军人人数也令人印象深刻值得注意。俄罗斯向西方表明，拥有强大的军事力量，并且能够进行涉及多军种的大规模行动。

其次，西方担心北极地区和中亚地区演习-众所周知，这些地区最近已成为美国军事分析家关注的焦点。美国将在北极与俄罗斯竞争，从破坏苏联后期的共和国政治局势稳定的角度来看，中亚被视为活跃的恐怖组织，其中包括在邻国阿富汗领土上活动的恐怖组织。

第三，西方非常担心国际联盟演习。当然，美国人担心吉尔吉斯斯坦或塔吉克斯坦军人的参与-他们已经知道俄罗斯在训练苏维埃后期中亚共和国的军事人员方面起着关键作用。更有趣的是中国，印度和巴基斯坦参加了军事演习。

对于西方而言，俄罗斯和中国的军事同盟是一场真正的噩梦。印度与巴基斯坦的军事伙伴关系同样是一场噩梦。确实，规模最大，军事实力最强的亚洲国家的合作，给美国在亚太和中亚地区实施的统治计划创造了巨大的障碍。

当然，美国人习惯于将巴基斯坦视为其永久和忠实的盟友，现在伊斯兰堡越来越多地向中国和俄罗斯转移，这不得不引起美国军事和政治领导人的关注。当然，将巴基斯坦变成俄罗斯的盟友是不可能的，但是联合军事演习是一个相当令人震惊的信号。

军事演习使俄罗斯军队能够在多样化的气候和地理条件下制定合理的行动。我们的军队将获得了宝贵的经验。例如，伞兵直到最后都不会知道他们必须降落的地方。将提高俄罗斯军队在陌生地区无法预料情况下行动的适应能力。

此外，与其它国家的武装部队共同采取行动奠定了基础。例如，这对于采取针对恐怖组织的行动非常重要。中亚和中东恐怖分子的活跃引起了中亚各州的高度关注，但是由于吉尔吉斯斯坦，塔吉克斯坦以及乌兹别克斯坦和哈萨克斯坦不太可能独自应对大规模挑战，因此他们的武装部队正在学习与俄罗斯和中国军队一起采取行动。

俄罗斯军队在北高加索地区的反恐行动，与格鲁吉亚的武装冲突以及最重要的是长期的叙利亚内战期间，在当地战争中的实际敌对行动方面拥有丰富的经验。对于外国军队来说，这种经历可能会非常有价值。另一方面，人们不应该忘记巴基斯坦和印度军队在反恐斗争中的具体经验，他们也可以将某些知识转移给参加军事演习的其他国家军队的官兵。

值得注意的是，现代俄罗斯的军事演习不仅实用，而且具有象征意义。莫斯科同样有意向西方展示实力，并与亚洲三个核大国建立关系。

俄罗斯通过联合演习表明，哈萨克斯坦和巴基斯坦，印度和中国可以准备共同采取行动。这是对西方的一种警告-在东方也可以进行全面的军事合作，他们真的想与俄罗斯合作。



Mi-171A2 is a long-awaited innovation of the Russian helicopter industry

A new chapter in the history of the Russian helicopter brand

The last ten months have become a period of milestone events for the Russian helicopter industry. At the same time, all of these matters are undoubtedly stages of scheduled, future-oriented efforts.

The campaign launched last year to push the export of the latest Russian technology was ended by the most promising breakthrough in the spring of 2019. Let's start with the VK-2500 helicopter engine designed and produced by UEC-Klimov JSC in Saint Petersburg, which has passed a certification test in China. It is critical to understand that the Civil Aviation Administration of China has certified the Russian helicopter engine for the first time in 19 years. And now it is admitted for use with the Russian civil rotorcraft in China, thus allowing to commence a program for upgrade of Russian helicopters in China.

As an inevitable consequence of this success, the VK-2500PS-03 engine passed certification in China, this time already as part of the Mi-171A2 helicopter and a validated type certificate was issued for this engine in India, South Korea, Brazil and Mexico.

A new image of the Russian helicopter industry

Mi-171A2 is a long-awaited innovation of the Russian helicopter industry, which was developed as part of the full-scale program for upgrade of the legendary Mi-8, launched in 2009. Just five years later the holding proceeded to flight tests of Mi-171A2 pilot model. The aircraft successfully passed all independent factory and certification flight tests in 2014-2017. Afterwards, the Federal Air Transport Agency (Rosaviatsiya) granted a reissued type certificate for the Mi-171A

helicopter to the Mil Moscow Helicopter Plant which included a new Mi-171A2 model.

In total, Rosaviatsiya certified dozens of modifications in the standard helicopter design. The major changes included in particular an increased helicopter take-off weight of 13 tons in "A" category. Integrated flight navigation system designed by KRET enabled to reduce crew complement from 3 to 2.

The Mi-171A2 helicopter is designed to accomplish a wide range of tasks: it can be configured in transport, passenger, fire-fighting, search-and-rescue, medical evacuation, and VIP versions. According to experts, this aircraft has an enormous potential both in the Russian market and abroad.

According to international practices

Obtaining the type certificate for Mi-171 helicopter with VK-2500PS-03 engines in China needs to be discussed separately. The thing is that this decision taken by the Chinese authorities enables the Russian Helicopters to pave the way for supplies of these aircraft to China.

The Russian company was able to reach such a milestone not because of its excellent product quality but also due to the implementation of a whole range of activities in line with long-standing international marketing traditions. In late 2018, for example, the Russian Helicopters Holding Company performed a series of demonstration flights of the Mi-171 powered by VK-2500-03 engines in China, at which the heads of the Chinese Ministry of Emergency Management and the





The Mi-171A2 helicopter became a member of the South-East Asia Demonstration Tour

Civil Aviation Administration of China witnessed the flexible capabilities of the helicopter exhibiting a range of functions including cargo transportation on an external sling, fire-fighting in high mountain areas and flights with a helicopter bucket.

The VK-2500-03 engine has clearly demonstrated its key advantages in fire-fighting and cargo transportation missions from altitudes of up to 3,300 meters. During the demonstration, the helicopter carried three tonnes of cargo and nine passengers from an altitude of 2,600 to 3,300 meters. The aircraft also showed how it is able to ferry 3.5 tonnes of water in the helicopter bucket at an altitude of 3,000 meters before dumping it into the body of fire. In addition, the viewers were shown unique capabilities of the Mi-171 in terms of rapid deployment and

boarding of rescuers and firefighters as part of a strategic presentation. Thus, the Russian helicopter designers made the best of it which resulted in a predictable outcome.

“The China aviation fleet includes about 20 civilian Mi-8/17 helicopters, and we had previously noted that national operators had shown interest in the latest versions of this type. Joint efforts by Rostec holdings has made Mi-171 more attractive for business as the operating costs were cut through the application of new technologies,” said Andrey Boginsky, Russian Helicopters’ chief executive.

India, Brazil, Kazakhstan...

Another huge market is the Indian market which can open its doors to Mi-171A2 as well. Russia expects to validate in India the

certificate for its helicopter in the first half of 2019 and therefore is now actively cooperating with the Indian aviation authorities.

“This year we are going to supply our first Mi-171A2 to an Indian customer. Under this contract, we are planning to train one more team of foreign specialists. We expect that the Indian pilots and technicians will be trained this summer, and afterwards will be able to operate the helicopter,” said Boginsky.

The peculiarity of this situation is that Russia has never supplied civil helicopters to India before.

Mi-171A2 might also have good prospects in Brazil. The Russian Helicopters holding company has delivered operational and maintenance documentation for the Mi-171A2

helicopter to the Brazilian National Civil Aviation Agency (ANAC). Based on received application, the Brazilian aviation authorities will decide on the certification of the helicopter for the local market based on its application.

“Brazil is our long-standing partner and one of the key countries in South America to promote Russian helicopter technologies. Mi-171A1 helicopters have been successfully used in this country for more than 10 years, and I’m sure that the new helicopter will soon also have the opportunity to earn a positive reputation. Brazil’s certification authority is now processing the documentation

In spring 2019 the training center of the U-UAZ completed training of the first team of foreign experts in piloting and maintenance of Mi-171A2 helicopters

received on the Mi-171A2. Considering the experience in certifying the Mi-171A1 helicopters, I believe that this issue will be resolved in a short time,” pointed out Andrey Boginsky.

In 2010, the Mi-171A1 helicopter, presented by the operating company Alas Taxi Aereo, won a Brazilian state oil and gas company Petrobras tender to carry out aerial work in the Amazon basin due to its excellent performance and price/quality ratio. The T-HUMS system (onboard monitoring diagnostics system) was installed installed in the new Mi-171A1 for the first time by



RH will develop the design docs for Mi-171A2 helicopter in “offshore” modification

order of a Brazilian company. It provides automatic real-time monitoring of a large range of nodes, significantly improving flight safety. The use of the T-HUMS system also makes it possible to switch to “on-condition” maintenance, which can significantly reduce the operator’s financial costs and increase the efficiency of the helicopter business.

“In light of Brazil’s high demand for mid-class multipurpose helicopters, we are bringing a new aircraft to the local market — state-of-the-art, roomy and reliable. We intend to develop an after-sales service as part of international partnership efforts to ensure the longest service life and necessary flight safety,” said Anatoliy Serdyukov, Director of the Rostec Aviation Cluster.

It is worth noting that in spring 2019 the training center of the Ulan-Ude Aviation Plant (U-UAZ) owned by the Russian Helicopter Holding Company of the Rostec State Corporation completed training of the first team of foreign experts in piloting and maintenance of Mi-171A2 helicopters. According to the helicopter supply agreement signed in late 2017, training was given to pilots and technicians of the Civil Aviation Authority of Kazakhstan.

Mi-171A2 is a source of industry’s pride

As for the use of Mi-171A2 in Russia, the commercial operation of the aircraft was launched in Tyumen in 2018 — a solemn event was held in honor of the first commercial flight of the Mi-171A2 owned by UTair-Helicopter Services and produced at the Ulan-Ude Aviation Plant of Russian Helicopters Holding Company. Mi-171A2 helicopter was delivered to the operator in May 2018 during HeliRussia-2018. Immediately afterwards the specialists of the holding and UTair - Helicopter Services proceeded to efforts aimed at mastering the aircraft. Based on these results, the “UTair — Helicopter Services” airline was granted the required permission for commercial operation of the Mi-171A2 helicopters by the Federal Air Transport Agency (Rosaviatsiya).

Moreover, Russian Helicopters and Gazprom have signed an agreement of intent to build an offshore version of the Mi-171A2. The new aircraft would be used for the development of continental shelf for the benefit of Gazprom PJSC. The signed letter of agreement, in particular, provides that Russian Helicopters will develop the design documentation for Mi-171A2 helicopter in “offshore” modification as well as establish a production facility for assembly, testing and maintenance of these aircraft.

Gazprom PJSC, in return, confirmed its intention to purchase the Mi-171A2 helicopters in offshore modification under the agreement signed and to place orders for all types of maintenance, repair and overhaul (MRO) services with the plants of the Russian Helicopters Holding Company.

High quality and on time

When talking about the engines for Mi-171, it is enough to recall the nomination in which UEC-UMPO PJSC from Ufa was awarded a diploma based on the results of its work in 2018 — Delivery on time. Not only did the company provide delivery of 180 engine kits in a year, but the new engine featuring competitive advantages was ready for mass production within a specified deadline. As part of import substitution ef-

orts, the United Engine Corporation ensured adequate delivery of the helicopter VK-2500 engine designed for most Mi and Ka aircraft for production in Russia already in the first supply cycle.

The Russian helicopter industry has made another important step forward in the framework of import substitution measures. “Salyut” Production Company, for example, a member of the UEC (United Engine Corporation), has become a certified supplier of components (axial compressors) for VK-2500. Moreover, such factories as “Pribor” Plant and Omsk-based Baranov Engine-Building Enterprise are collaborating with the “Salyut” Production Company as well.

The VK-2500 engine was developed to replace the TV3-117 helicopter engine. It is designed in three versions with a take-off power ranging from 2000 to 2400 h.p. The power unit has a built-in digital automatic control system instead of an analog one, the latest sensors, the operating time and control counter, the aircraft is made of latest construction materials. All these features enhance its operational performance: improve power in emergency mode, ensure a wider range of outdoor temperatures and extended service life in different operation modes. Thanks to VK-2500 engines, the aircraft gain fundamentally new qualities for operation in the mountains and in areas with a hot climate. Only Russian-made components are used for the assembly of engines.

Experts at UEC point out that a crucial factor for VK-2500PS operators is the ability to control the engine life depending on the specific operating conditions instead of the previously existed average life evaluation approach. “This allows you to avoid unnecessary expenses for life-related maintenance if the engine was operated sparingly, and, on the contrary, will make it possible to obtain early service if the operating conditions were close to extreme,” said the representatives of the corporation.

The VK-2500 engine was developed to replace the TV3-117 helicopter engine. It is designed in three versions from 2000 to 2400 h.p.

By Nikolay Korobov



**ВЕРТОЛЕТНАЯ
ИНДУСТРИЯ**



Ansat

The project of the Russian-Chinese helicopter reached the starting line



中国重型直升机

期待了很久的新型俄中重型直升机AHL

目前，世界上只有两个国家拥有生产重型运输直升机的能力 - 俄罗斯和美国。然而，近几年来，中国对它们很感兴趣，虽然航空业还没有这种技术，但在未来几年可以通过与俄罗斯联合实施AHL项目来实现这些技术。(Advanced Heavy Lift).

在不久的将来，中国可能会动摇俄罗斯和美国垄断的地位，生产自己的重型运输直升机。确实，并非没有俄罗斯技术支持。中国很想生产有前景的AHL直升机，直升机的载重量为15吨，行驶距离为630公里，时速可达300公里/小时。AHL的技术特点可以与俄罗斯重量级Mi-26T和美国 Sikorsky CH-53竞争。

2015年5月，《俄罗斯直升机公司》与中国飞机制造商中航集团公司AVIC就建立AHL直升机的合作达成了框架协议。项目总合同双方计划在当年签署，但谈判拖延，最终的合同一再被推迟。据报道去年秋天，《俄罗斯直升机》控股公司的总裁安德烈博金斯基，已经同意了所有的技术问题，但《仍然是财务和组织问题》。现在该项目正处于两国最终协调阶段，合同可以在今年签署。

直升机的主要开发商和制造商将是中国，俄罗斯将作为分包商，用于开发单个结构元件，特别是主变速箱，尾桨和传动系统。独立军事专家安东拉夫罗夫表示，所有细节和直升机的实际设计尚未开始，距离第一架原型机的飞行仍然很遥远。

根据他的估计，正式开发最短期限为五到七年，完成系列生产至少十年。

«主要问题是发动机。使用尚不存在的俄罗斯PD-12V发动机改型将延长该系列直升机的开发和生产»，-拉夫罗夫先生认为。中国第一架重型直升机的推进系统是基于乌克兰«Motor Sich»工厂的D-136发动机升级版本。去年11月，乌克兰公司与中国公司Skyrizon Aviation一起宣布可能将在2020年在中国建造飞机发动机工厂。大规模投资生产每年可达1千台发动机，估计约为200亿元人民币。

莫斯科为中国合作伙伴提供俄罗斯PD-12V发动



机，该发动机是以PD-14飞机机型的气体发生器为基础研发出来的。俄罗斯发电机将比D-136重，但在效率和功率方面将超过乌克兰发动机(1.4万马力，另一个是1.14万马力)。

«对于中国而言，比从乌克兰购买D-136的改进版要便宜一些。这是一个良好且可靠的引擎，并且可以不断得到改进提高。最终俄罗斯引擎可能会比Zaporozhye更好。与PD-12V相比，价格更高，将花费更多的时间进行生产，测试和认证。无论如何，最终的选择取决于北京，结果很难说»，-潘捷列夫说。

在过去的四年中，已经进行了20多轮合同谈判。目前，双方就直升机，变速器，尾桨和防冰系统的技术设计达成了一致。但是，在开发中一些主题问题仍然存在。

«您需要了解的是中国设定的项目基调。中国很需要这样的机型。审批过程总是很复杂，这并不奇怪。关键不仅在于许多技术方面，而且还在于平庸的官僚机构。而且将是全新的机型，而不是世界或中国市场上已有产品的复制品或外壳»，-潘捷列夫说。

如果美国不干涉乌克兰，乌克兰将越来越多地与中国合作。2018年珠海航空展的参观者了解谈判的提请注意以下事实：与以往不同，今年在珠海的«Motor Sich»展位上，该公司的产品几乎全部由中国专家展示。在五月份，«Motor Sich»公司总裁维亚切斯拉夫·布格斯拉耶夫表示，由于乌克兰对俄罗斯实施制裁，该公司的产量下降了40%，中国成为了主要合作伙伴。

在2017年9月，中国Beijing Skyrizon Aviation Industry Investment Co Ltd 投资 «Motor Sich»公司的股份之后，乌克兰安全局 (SBU) 已根据“蓄意破坏”一案提起刑事诉讼。根据相关部门的说法，与«Motor Sich»公司进行交易的外国投资者获得了企业战略的控股权。在4月23日，SBU官员对«Motor Sich»公司的办公室进行了搜查。

布格斯拉耶夫也没有对向中国投资者出售股票发表评论，并否认将生产从Zaporozhye转移到中国。「目前在工厂里我们只有26名中方员工。他们正在尝试研究MS-500引擎；他们对它非常感兴趣。布格斯拉耶夫说，对于中国人来说，发动机改装称为MS-500V-02S。-这是关于中国市场。工厂不是我们建造的，而是中国人建造的。现在他们想购买这款发动机MS-500V-02C的支架。他们为其他公司制造飞机。他们想在飞机下组装引擎»。

AHL市场

中国制造的重型直升机的最初需求问题很可能会由军方解决。「中国不仅是资金来源，而且还是新直升机的最大市场。在当前制裁的背景下，这一点尤其重要，因为没有市场前景就开始进行设计是没有意义的。主要买家是中国和俄罗斯的军事及其它政府机构»，-安东·拉夫罗夫认为。

对于中国，参与这样的项目-将来有机会获得关键技术来制造自己的重型机器-如果没有俄罗斯的帮助，这将花费更多的时间，并且需要更多的资金和资源。业内专家说，对我们国家而言，这是制造新型重型军用运输工具的唯一机会。

AHL研发人员自己承认，这种新型重型直升机主

要用于中国国内市场，但不排除将来将出口到中国飞机消费国的可能性。正如中国直升机研究与发展研究院总设计师吴思敏在3月所说的那样 (China Helicopter Research and Development Institute), 这款40吨直升机的认证大约在2032年完成。他说，未来计划生产约200架，并补充说，中国在变速箱开发方面积累的经验还不够，与俄罗斯的合作将“借用优势并弥补中国飞机工业的不足»。

值得注意，该飞机的最大起飞重量为42吨。将能够在AHL直升机 (最高空5吨) 内装载10吨，在外部吊索上装载15吨。飞行高度最高达6000米

莫斯科航空研究所 (MAI) KB-602首席设计师德米特里·达亚科诺夫指出，AHL项目是互惠互利的。据他介绍，中国将获得可靠的直升机，以便在复杂的地形中运行，俄罗斯将获得 «真金白银»，并为设计理念的发展提供额外的动力。

«鉴于大多数省份的地形艰难复杂，中国离不开起重能力约为15吨的直升机。与俄罗斯的一些地区一样，中国的直升机有时也是唯一的沟通方式。同时，由于缺乏足够的科技基础，中国人暂时无法设计自己的重型机器。俄罗斯拥有独特的设计学院和创建Mi-26的经验，对于北京来说是无与伦比的技术来源»，-达亚科诺夫说。

«与中国AHL的项目将成为我们贸易中最大的交易之一。该项目将为我国带来实实在在的利益。它不仅会赚很多钱，还能提高重型直升机的竞争力。我们将于与中国人联合生产直升机新的部件和组件。以后可能会用我们现代化的直升机机队或开发全新的旋翼机»，-达亚科诺夫总结道。

Russian heavy helicopters remain one of a kind



Unique competence

Russian helicopter-building enterprises uphold the well-established traditions of the top domestic firms and still bear the palm in production of heavyweight aircraft. It concerns not just specific technology, but actually the whole line of aircraft covering the entire range of load-lifting capacity values. Most notably, the Mi-26 and Mi-38.

In January 2019, the upgraded gigantic helicopter Mi-26T2V manufactured by Russian Helicopters, a holding company owned by Rostec, successfully completed a series of pre-flight tests for the Armed Forces. Now the helicopter is set to undergo state flight

testing before it will enter the mass production stage.

Mi-26 helicopters, which have been manufactured since 1980, continue to enjoy a steady demand both in the military and in

commercial markets as that they still remain unrivaled in terms of their lifting capacity and unique cargo transportation capabilities. This has been proven time and time again when the helicopters have been used in both military operations and for civil purposes.

Suffice it to say that they successfully carry loads weighing up to 20 tons inside the cabin or on an external sling, while the largest Western helicopters – the American Boeing CH 47F Chinook and Sikorsky CH 53K King Stallion – can only transport up to 12.7 and 15.9 tons, respectively.

The Mi-26 had its baptism of fire in Afghanistan in 1984, and the first civilian operator to fly them was the Tyumen Airline in 1986. As an impulse to the topic, the Ministry of Defence put forward a number of requirements for new modifications to the designers of the Mi-26. The helicopter had to be suitable for carrying out operations in geographically challenging regions and in harsh climatic conditions, at any time of the day, on equipped and unequipped routes as well as outside air routes and over featureless undirected terrain, and under enemy fire and information countermeasures. All of these requirements were taken into account and have been implemented in the Mi-26T2V.

There is reason to believe that the T2V helicopter versions will be manufactured in great numbers and will eventually earn a significant place in the relevant military units. As for civil aviation, a rather low-margin industry, the Mi-26 aircraft entirely meet the needs of both Russian and international customers.

Another helicopter also considered by many observers as unique is the Mi-38. However, as is the case with the Mi-26 and Mi-26T2V, we are witnessing history of how the well-proven Mi-8 platform was developed over time. However, the Mi-38 is not just a 1.25 times larger Mi-8. It offers a far greater comfort, safety, passenger capacity, lifting capacity, and comparable cost-effectiveness.

The only downside is the amount of time it took to launch operation of the Mi-38 – development of the helicopter started as early as in 1981. Unfortunately, during Gorbachev's Perestroika, with the collapse of the USSR and the subsequent confusion in the transitional economy, the project was put on hold for decades. Since then a lot of time had passed before a landmark event took

place on December 30, 2015: the Mi-38 was awarded a certificate from Russia's Federal Air Transport Agency, which cleared the way for the helicopter to take to the air.

The Mi-38 has earned its name as heavy-lift helicopter. The Mi-38 has a lifting capacity of 5,000 kg and is able to carry 6,000 kg on the external sling. Mi-38 is referred to medium-lift transport helicopter category according to the Russian classifications as there are other giants in Russia such as the Mi-26 which has a lifting capacity of 20 tons. The helicopters considered medium-lift aircraft in the West have a capacity limited to 2-3 tons. The Western companies also have heavy-lift aircraft at their disposal, for example, the Italian-British AgustaWestland AW101.

However, it needs three engines to take to the air 5,400 kg (on the external sling). The Mi-38 helicopter's only twin-engine competitor in the market today is the French Airbus Helicopters H225 with a lifting capacity of up to 5500 kg. However, the useful volume of its "hold" is only 15 m³, almost twice as less.

To put it in a nutshell, the Mi-38 is completely unrivalled. Except for the Mi-8, of course.

One of the most significant competitive advantages of the Mil Mi-8 has always been its price, starting at USD 14.75 million, while the cheapest Western counterparts could only be purchased at the price of no less than USD 20 million. The developers of the Mi-38 promise to cap the price at USD 17 million, which makes it an excellent alternative given the huge opportunities offered by the innovation. After all, according to calculations, the cost of a ton-kilometer on the Mi-38 at a 800 km range will be 7 times lower than on the Mi-8.

To achieve cost-effectiveness, the designers of the Mi-38 used the following characteristic as a reference - cost of a flight hour on the Mi-38 should be comparable to the cost of a flight hour on the Mi-8.

The next stage in upgrading the Mi-38 is adapting the helicopter for flights to and from

Mi-38 is not just a 1.25 times larger Mi-8. It offers a far greater comfort, safety, passenger capacity, lifting capacity and cost-effectiveness

the Shtokmansk field, to cover a range of 600 km without refueling able to run for another 30 minutes without gearbox oil.

At this point it is worth pausing to consider the issues which could be described just in one sentence: The Mi-26T2V and Mi-38 will surely take off, since Russian Helicopters started to actively promote them in the civil aviation market, but where will they land?

And indeed, if we are talking about offshore work, we should mention the statement delivered by the President of Utair - Helicopter Services" Alexei Vinogradov in 2016: "No Russian-made helicopter meets the OGP (International Association of Oil and Gas Producers) technical requirements, except for the latest version of the Mi-38, and even though due to its maximum take-off weight not too many oil platforms could authorize its landing. The Mi-38 weighs over 15 tons, while the other most common heavy offshore-type helicopters – the Airbus Helicopters EC225 Super Puma and Sikorsky S-92 – weigh no more than 12 tons."

IOPG 390 are the aircraft management guidelines published by the International Association of Oil and Gas Producers, with recommendations followed by the majority of market participants when choosing helicopters and operators for aviation.

Yes, 'a little overweight' has an adverse impact. However, the key problem faced by Russian-made helicopters can be found on the website maps.aopa.ru, where you can count the number of operating heliports in Russia – an average of 3,000.

Some people may find this funny and point out that the very concept of helicopter does not assume any prepared heliports. They might, finally, say nothing prevents the pilot from landing a helicopter at the existing airfields. However, those people would be mistaken in both cases. After all, an equipped heliport is not just a place for take-off and landing, it enhances the cost-effectiveness, inter alia of the entire Russian helicopter industry which may contribute to its development. The lack of good heliports and helipads makes it more difficult to provide quality aviation services and is a current problem experienced by many Russian aviation enterprises.

According to UTair-Helicopter services, a specific challenge about some regions in Russia is that they are sparsely populated areas with little or no transport infrastructure at all. Therefore, pilots often have to land on unprepared sites they select from the air.

Things are not better in areas with a well-developed infrastructure either. Here, in large airports, helicopters are serviced using a “leftover principle”, with few exceptions made. The helicopter transportation services stay in the sidelines of the large aircraft, are relatively rare and therefore yield a smaller revenue.

A conclusion suggests itself: For the Russian helicopter industry to develop dynamically, it needs its own ground infrastructure to be able to carry out its own operational activities. Otherwise there is a real conflict of interests, which enables to withdraw every aspect related to helicopter service tenders into the shadows. And how can the helicopter industry develop in such circumstances?

The aviation market for heavy and super heavy-lift helicopters has stalled after exhausting the reserves of extensive growth. Market equilibrium was achieved and the only way to quit it is to develop new regions, or completely rethink the approach to business. “We should focus on development of our own technical facilities, resolving labour issues and expansion eastward,” believes Andrey Kozlovsky, General Director at PANH Helicopters Research and Production Company.

Well, if we want to look at development of new regions, helipads have top priority. And these sites should not be just areas of land fenced off by a warning line.

And once again complaints will be heard, this time they will be directed towards the government. The critics will complain that it is the government's job to provide business with the conditions for the development of infrastructure. And that is true. Indeed, who else is meant to draw up new requirements for these helipads and heliports, and the requirements for how they should be constructed, for example, by foreign energy companies operating in Russia as well as a general system of standards for Russia if not the government through its authorized bodies. Apart from this, you always need to keep in mind the equipment brought to market by Russian manufacturers, which forms the industrial range of products by reaching an agreement over the tendering policy through a list of work, skills, etc. After all, this is the only comprehensive way to improve cost-effectiveness, combine the industry's technological and financial solutions which can really ensure the competitiveness of unique Russian technology.

By German Spirin

The next stage in upgrading the Mi-38 is adapting the helicopter for flights to and from the Shtokmansk field





VO-12
VNIINP-50-1-4f
TS-gip
SM-9
50/50
AMG-10
HF-12-16

CIATIM 201
CIATIM 221
SAPPHIR
ATLANTA
ERA
ST (NK-50)
AMS-3

OKB-122-7
PFMS-4s
MJO II
MJO 254
FH 51
TN 98
TN 600

STAND - is a major Russian supplier of lubricants for operation on Russian and foreign helicopters. We are able to supply aviation oils, hydraulic fluids and greases of brands: Mobil Jet Oil, Mobil AGL, Mobilgrease, Turbonycoil, Hydraunyoil, Nycolube, Nyco grease, Nycoprotect, and Russian aviation lubricants.

The company's assets include highly qualified specialists engaged in logistics services and consulting in the field of cost-effective solutions in the application of lubricants on the customer's helicopters fleet. Our company employs experts who participated in the development of promising lubricants for Russian-made helicopters.

We will be happy to contribute to the implementation of your plans for effective and reliable operation of your company's helicopter fleet.



经典预警雷达直升机

在福克兰群岛（马尔维纳斯）的英国-阿根廷武装冲突期间出现了DRLO（预警雷达）手段的需求。英国远征军没有飞机或直升机预警机，无法及时搜寻，侦查和拦截低空飞行的敌机。使用驱逐舰中队作为DRLO（预警雷达）的手段导致损失了两艘这样的驱逐舰（谢菲尔德和考文垂）。

在1985年N.I. Kamova直升机设计局收到发展任务。在开发Ka-31时，以Ka-29运输和战斗直升机的滑翔机，动力装置和支撑系统为基础。在这种情况下，最大的困难在于将功能强大的雷达站与直升机的其余飞行和导航设备配对，并使用旋转的雷达天线确保足够的直升机飞行稳定性。在1987年原型机第一次飞行。经过长时间的测试和改进，1995年这架直升机被俄罗斯海军使用。在库梅陶的直升机工厂准备的直升机的批量生产。

可以检测极低高度的远程飞机目标，例如「飞机」

—「直升机」，以及水面舰艇，对其进行跟踪并自动将数据传输到地面和舰船控制中心。Ka-31舰载直升机的设计目的是保护在沿海雷达和预警飞机的覆盖范围之外运行的军舰编队免受空袭。对Ka-29型直升机的改进，可用于侦察和保护舰艇编队免受空袭。设计用于检测机载（包括陆地或海洋背景下的低海拔地区），以及水面目标，并将有关信息自动传输到军舰或地面防御系统。

Ka-31在全球直升机行业中没有类似产品。Ka-31直升机是在Ka-29直升机的基础上研发的，可以停放在陆地和各种级别的船上。可以与Ka-27和Ka-29位于同一艘船上。也可以用于陆地方案中，以解决地面部队的防空任务。

机载综合体基于强大的固态雷达，该雷达的天线带有平面相控阵，可在飞行中查看。收起的天线位于机身底部下方。

机载电子综合系统允许直升机在任何天气和气候条件下自动沿编程路线飞行，进行检测并自动跟踪捕获20个目标。

通过电码通道在自动模式下，有关目标的信息会传输到控制点。直升机配备了由下诺夫哥罗德无线电工程研究所开发的E-801 «Око»预警飞机系统。在运输位置，天线与机身的下表面相邻，同时产生最小的空气阻力。为了平移到工作位置，天线向下倾斜90度，同时起落架升起，因此底盘不会干扰雷达。雷达（带灯罩，天线重量-200千克，天线长度-5.75 m，天线面积6平方米）可检测和跟踪多达20个目标，战斗机大小为100-150 km和250-285 km的水面目标类型«船只»。

由萨拉托夫仪器设计局开发的直升机飞行导航综合体，除了可以稳定带有旋转天线的直升机的飞行之外，还可以保持指定的航向和飞行高

度参数，沿着给定的路线飞行并自动着陆并悬停在着陆点上方25 m高度的距离。可以在一天中的任何时间在简单和困难的天气条件下运行。天线完整的旋转时间为10秒。

具有相控阵的全能雷达，可在机身下方的空闲位置收回，能够检测和跟踪在低海拔或极低海拔飞行的小物体以及小的海上目标。在自动模式下，可以检测和识别空中和海上目标，确定其运动参数，并将实时数据传输到地面或船舶控制点。

直升机起落架可部分收起（上拉），从而为机载雷达提供不带阴影的圆形视野。Ka-31飞行和导航设备能够沿给定路线执行自动飞行。在地面部使用时，Ka-31可以在机动防空导弹系统所在位置附近的小型未准备地点上部署，并为其指定目标。由于其独特性，Ka-31在世界上没有类似产品。

Ka-31的功能

海军使用直升机检测水面舰艇和空中目标，需要时也可以使用该机型。可以直接编排在船只整个舰队的作战编队中使用了防空支援。功能强大的雷达安装在固态元件上，在飞行中转弯时，它可以与前照灯一起释放天线（相控阵天线）。

有了安装在直升机上的机载电子综合系统，Ka-31可以沿着编程的路线进行自动飞行，而不受天气和气候条件的影响。预警雷达DRLO直升机能够同时检测和护送多达20个目标。

自动化模式可促进快速且最重要的是将有关找到的目标的信息自动传输到控制中心。通过电码通道进行传输。由无线电工程科学研究所（下诺夫哥罗德州）创建的«Око»或E-801系统允许人们在远程雷达频率下检测任何表面或低空目标。

天线专门安装在Ka-31的底部，以减少空气动力阻力并防止着陆时损坏。在工作状态下，天线向后倾斜90度，起落架可以升起。前灯与雷达一起重约200千克，天线旋转面积为6平方米，长度达到5.75米。检测到地面物体超过250公里的距离，而空中物体的最大距离为150公里。

针对侦察和侦察级直升机仪器设计局（萨拉托夫），特别开发了飞行导航系统（PNK）。雷达和PNK的一般操作模式很简单。雷达运行时，PNK复杂系统会设置角位置的稳定度，负责大气压力或真实飞行高度，确定典型轨迹的巡逻区中的飞行，自动将直升机带到船上或机场，还可以使用雷达着陆信号将直升机带到着陆点

通过安装在Ka-31预警机上的特殊通信系统，可

以通过封闭和开放的渠道进行信息传输。通过电码通道进行传输。直升机可以在距基地所在地150公里处传输信息，同时高度可以达到1500-3000米。使用专业的«Tester-3K»记录设备自动记录飞行参数。

除海上用途外，直升机还可以用于地面部队。Ka-31能够在未准备好的小型地点部署，这些地点位于机动防空导弹系统附近。DRLO 预警雷达提供指向目标。

但是大规模生产在真正开始之前就结束了。俄罗斯海军已开始彻底淘汰1143号以下的舰艇，这导致人们对Ka-31直升机失去兴趣。在操作中，只有两个副本。它们位于库兹涅佐夫将军塔克勒海军上将基地。他们想从法国购买米斯特拉尔（Mistral）增加特殊直升机坞站的数量，增加Ka-31的数量，但因为欧洲的制裁这并没有实施。

叙利亚«首创»«陆地» Ka-31

在俄罗斯空军参加的叙利亚军事战役中，观察家注意到，Ka-31SV（Ka-35）雷达侦察直升机参加了对地面部队的支持。在拉塔基亚地区，俄罗斯Ka-31SV直升机（也称为Ka-35，Ka-252SV，产品23D2，OKR“戈尔科夫恰宁”）的第二架原型机（尾号“232”）的飞行是由直升机综合体进行，用于对地面目标进行雷达侦察（WRCRC）1K130。

对航空航天部队和俄罗斯地面部队的利益，

«Kamov»控股公司在OKR“戈尔科夫恰宁”公司研发区主题下，很长时间以来一直在开发Ka-31SV（Ka-35、23D2）直升机，这是对雷达巡逻队的Ka-31海军直升机的进一步开发。23D2直升机是专为地面雷达侦察而设计的，与Ka-31不同，它配备了由联邦研究与生产中心下诺夫哥罗德无线电工程科学研究所（NIIRT）开发的L381无线电技术地面侦察综合体，该综合体的基础是15TS100.10雷达。配备此系统的23D2直升机是用于地面雷达侦察（WRCRC）1K130的直升机综合设施的一部分。

OKR“戈尔科夫恰宁”公司研发区的第一架23D2原型机是从Ka-31 RLD海军直升机的第一架原型机改装而来，其机尾号为“031蓝色”（已获得新的机尾号为“231”），并于2004年11月开始对该飞行进行测试。从2006年开始已经测试了尾号为“232”的特殊结构的第二个原型23D2。从2010年开始了23D2产品的国家联合测试和1K130产品综合体的国家测试。

2008年，俄罗斯国防部与«库默陶航空生产企业»控股公司签署了一份合同，制造两架实验批次为23D2直升机，但到目前为止，还没有交付。可以判断出，对OKR“戈尔科夫恰宁”公司进行的测试花费了很长时间。

在2015年8月，宣布完成国家测试，并正式采用Ka-35直升机，尽管仍缺乏有关量产制造的信息。



The moving spirit behind Russia's oil and gas fields

Researchers who study the phenomena which have changed our society have good reason to refer to the legends, fairy tales, and professional folklore in order to grasp the mysterious essence, in order to feel the culture and ideas that germinate in the soil of that phenomenon. The helicopter has long been deeply rooted in people's art - in our stories, poems and the sayings we use. And the greater our lives and fate depend on the rotorcraft, the tighter the helicopter's steel shirt seems to cling to the bodies of everyone whose work involves the integral risk of helicopter flight- the military, search and rescue, geologists, and rotational workers.



No two images are alike

Children who grew up in Russia will remember a little nursery rhyme they recited in kindergarten whenever they caught sight of a 'steel dragonfly' in the sky, and everyone would chant: "Helicopter, helicopter, take me to the air!" It is no wonder this aircraft has a strong association with childhood in our cultures. Disney productions are filled with friendly and recognizable animated helicopters with all the basic design features. And adults often have the same simple-minded perception of the rotorcraft. The helicopter has another side which is archaic and Gothic, and the more you look at it from this angle, the more sinister-looking and powerful the helicopter appears. What comes to mind are the black helicopters from the imagination of the Strugatsky brothers, the Soviet-Russian science fiction writers.

Mansi peoples. It sure is sacred. Some of those parts would be inaccessible without a helicopter. And this being the case, the helicopter is a true guardian, and its arrival at the camp is always a big event.

Air transport – the only option

For some professionals – the gas and oilfield workers – the helicopter is an integral part of the heavy and risky work they do, which not everyone could cope with. This is an industry that is still entirely dependent on air support. In addition to monitoring and the technical supply and maintenance of existing fields, crews of shift workers are regularly and continuously rotated on drilling sites onshore and offshore with the help of rotorcraft, which are often located tens and hundreds of kilometers off the mainland.

The 'Old Dragonfly Man', as the locals refer to the Mi-8, is seen as a metal embodiment of guardian spirit Chokhryn Oyka



Gazpromavia Mi-8T helicopter in the village of Varandey

And it is viewed in a rather different way when it comes to harsh and remote landscapes. In Ugra, where there are nomadic camps, far from civilization as we know it, the steely helicopter has starkly severe look about it. The 'Old Dragonfly Man', as the locals refer to the Mi-8, is seen as a metal embodiment of guardian spirit Chokhryn Oyka, held sacred by the indigenous Khanty and

In fact, it is virtually impossible to reach the gas fields of Norilskgazprom OJSC using conventional means of transport. The only way to get there is by air – by helicopter. When the winds, fog and frost permit, helicopters fly one after the other to the Norilskgazprom gas fields, carrying a maximum load of gas workers, contractors, maintenance engineers as well as food and urgent supplies.

The small village of Tukhard is the closest point to civilization where Norilskgazprom operates, and is 90 kilometers away from Dudinka, the administrative center of Taymyrsky Dolgano-Nenetsky District in the far northern reaches of Krasnoyarsk Krai. Administratively, Tukhard is part of the village of Karaul, which is 100 kilometers away. Around 800 people live in Tukhard. The village's first inhabitants were about fifty builders who lived in several timber structures and tents. They felt as if they were stranded on an island up there: the only means of communication they had was the radio, and the only means of transport was by air. "The helipad was built before everything else – a small one, made out of several blocks, which were just about enough to accommodate a Mi-8, and moorings on the Bolshaya Kheta River," says the Head of the Tukhard Complex Pavel Novikov.

It was only later that 15 helipads were constructed in Tukhard, and helicopter operators serving oil and gas fields received a stabled demand for a broad and at the same time specific range of services. These tasks included regular transportation (rotation of shift workers), the delivery of equipment, corporate and VIP transportation, installation and

Lukoil-Avia airline uses five Mi-8MTV helicopters to accomplish flights to platforms in the Caspian Sea, the Sea of Azov, the Barents Sea and Baltic Sea

construction work, search and rescue, emergency and firefighting operations, and many, many others.

Helicopters were ordered e.g. for transporting rigs or evacuating other helicopters stuck in a swamp

Tyumen. The Mi-6 helicopter began serving this region almost as soon as the aircraft entered serial production in 1959. The powerful heavy-lift helicopter made it possible to use new, previously unavailable technologies at these remote outposts. Perhaps the most impressive feat the Mi-6 boasted was its ability to transport rigs to regions in the taiga or tundra since land transportation would otherwise be an extremely challenging and costly and sometimes simply impossible task.

The Mi-6 also made an invaluable contribution to search and rescue operations. In summer 1965, for example, a Mi-4 helicopter had to make an emergency landing on swampy taiga soil in the Surgutsky District of the Tyumen Oblast. The Mi-4 was salvaged from the sticky slurry and the crew who were on board were transported to Khanty-Mansiysk for treatment by a Mi-6.

End of overhaul life (TBO) was reached in 12 months!

Lack of helipads with well-equipped runways has made heavy-lift helicopters truly indispensable. Given that most of the cities, towns and villages in the Tyumen Oblast are located along the banks of the rivers Ob, Irtysh, Tobol, and Tura, the pioneers extracting resources from the depths of the earth were faced with yet another problem – the problem of developing infrastructure in the new settlements which were springing up along the route of the oil and gas pipeline. The only way they could solve this problem was to use the medium-lift helicopters Mi-8T and Mi-6. Then there were the Mi-6A, Mi-10K, and later the heavy Mi-26T. Helicopters transported drilling crews, rig equipment, and spare parts, with fuel for drilling on the external sling, to sites which were sometimes located between 100 and 400 km away from the nearest roads. This has significantly reduced the cost of hydrocarbon production in remote off-road conditions. Without helicopters, much of the drilling technology that is applied would simply never have been a feasible option. A good case in point of how heavily the rotacraft were operated in these regions is that the helicopter worked through its entire specified overhaul life (TBO) of up to 1500 hours in just 11-14 months.

Another point is that currently we are forced to rely on the available Mi-8T fleet only and resolve the matter by extending the TBO of the aircraft, explains the Head of Tyumenaviatrans Department V. S. Zadykhin.

A deposit equal in size to several thousand Vaticans

The Vostochno-Messoyakhskoe deposit is the northernmost of the onshore oil and gas fields. Every day, 170 wells at the deposit extract 9.5 thousand tons of black gold each. The only way you can get there in summer is by helicopter. From December to May the deposit can also be accessed via a winter road. The helicopters set out to the gas field from the nearest base town, Novy Urengoy. From there, a total of 340 kilometers need to be covered by air. The Mi-8 can fly all the

way to the River Messoyakha without having to stop to refuel, but the helicopter often makes landing on its way to the Arctic gas field to pick up passengers or cargo in the Tazovsky rural settlement, the administrative center of Tazovsky District.

The Vostochno-Messoyakhskoe deposit covers an area comparable to the territory of a small European state. You could fit one and a half of Moscows in there, or a few thousand Vaticans. The total area of the Messoyakha licensed sites is about seven thousand square kilometers, with only about a thousand square kilometers which underwent a detailed study. The gas field's heliport is large enough to accommodate several Mi-8 and even Mi-26 helicopters at the same time.

Give it a try, go on and fly!

Offshore is another job for the helicopters. According to data given in Russia's Energy Strategy for the period up to 2030, which was approved by a governmental decree in November 2009, over 50% of Russia's oil fields have already been depleted. In this regard, the most straightforward way to meet the demand for hydrocarbons is work on offshore oil fields on Russia's continental shelf. Oil reserves are distributed over 16 large offshore oil and gas provinces and basins. Most of these reserves (over 75%) are found on the Russian continental shelf of the Kara, Barents, Pechora and East Siberian Seas, about 9% are on the Sea of Okhotsk, and 3.5% are on the Caspian Sea. Broad estimates suggest that this stock could last about 150 years.

The offshore fields of Chayvo, Odoptu and Arkutun-Dagi (included in the Sakhalin 1 project) are located in the northeastern shelf of Sakhalin Island within a 4 to 40 kilometer distance from the shore. The Prazlomnoye oil field is located 60 kilometers from the shore (with its base at the Varandey settlement). The Yuri Korchagin offshore oil field is located in the Russian sector of the North Caspian Sea, 180 kilometers from Astrakhan.



The Mi-8 MTV-1 helicopter of the Yamal Airlines based at Messoyakha

Helicopters are mainly used to transport workers and cargo offshore. To gain a sense of the amount of work this involves, it is worth taking a look at some of the statistics on the Pirazlomnaya Arctic-class ice-resistant fixed oil platform. The platform is served by a workforce of 200 people. Shift-workers need to be rotated every 15 days, and supplies need to be replenished every two months. The Naryan-Mar United Aviation division with a squadron of Mi-8 helicopters operate a service from Naryan-Mar Airport facilitate work on this platform.

The Aviashelf airline provides air support for the Sakhalin 1 and Sakhalin 2 projects. When Aviashelf was established, the airline's fleet included two helicopters which were Russia's first aircraft fully equipped for overwater flight. Currently, the airline operates about a dozen of Mi-8T and Mi-8MTV-1 helicopters.

The Lukoil-Avia corporate airline uses five Mi-8MTV helicopters to accomplish flights to platforms in the Caspian Sea, the Sea of Azov, the Barents Sea and Baltic Sea.

As the offshore fields are exploited, platforms are moving further and further away from the shore. Not so long ago, they were at a distance of 200-300 kilometers from the shore, today they are 500 km away, tomorrow they could be 800 kilometers away, and in the future they will be 1000-1200 kilometers offshore. And when you consider the harsh and treacherous offshore conditions, it is difficult to imagine how the helicopters will manage to carry on with a pioneering spirit of the phrase, "Give it a try, go on and fly!". But they do manage and continue to fly.

It's a workaholic you can rely on

"It would be tough without helicopters." This is

something you would hear people on Sakhalin Island say, and indeed many other pilots who work under challenging conditions in Russia's remote outposts and offshore. And most of the thanks need to go to the Mi-8.

"Do you know what the AK-47, the Kalashnikov assault rifle, has meant for the arms world? The Mi-8 (nods head in the direction of the helicopter) has been just as groundbreaking in the world of aviation," says Konstantin Shishkin, Senior Flight Instructor for the Sakhalin Aviashelf helicopter airline. "I have been piloting these helicopters since 1988, back when I studied in a pilot school." It's a workaholic you can rely on."

**Contributed by Nikolai Korobov,
the author of this review**

选项：海上直升机



全球拥有直升机批量生产线技术的制造商中，没有人会绕过专门的海上类直升机的开发和生产。唯一的特点是：这个地方被多种机型占据，实际上，通过商定的选件和交付设备，但总体而言，默认情况下可以完成此类订单。

在俄罗斯，这种西方主流几乎是一种排他性的做法，在全国海上部门中，几乎没有20架Mi-8直升机在海上执行任务时，对海上任务影响很小，很少满足石油和天然气行业的国际要求。

尽管有大约2,000架旋翼飞机在国内运行，但事实并非如此。也就是说，“海上直升机”比例很小。确实，计划到2025年，现有直升机将增加到151架。这很有市场前景。

关键是历史性的碰撞：西方石油工业工人需要在北海水域然后是墨西哥湾的油田中使用直升机，苏联的直升机飞行员全力以赴，帮助萨莫特洛的征服者开发了难以到达的大陆矿藏-这种差异一直持续到最近。

领先者形成标准

基于未来的挑战，海上直升机应具有更大的载荷和飞行范围，更高的可靠性和发动机功率，防冰系统，耐冲击结构，现代化的导航和导航系统，紧急降落系统，救援设备以及增加的紧急出口数量。

在海上作业领域的全球领先者是英国Bristow直升机公司，加拿大CHC直升机公司，美国ERA直升机公司，以及在危机期间增加了一些雄心勃勃的新来者，例如NHV集团。还出现了一波半破产，破产，并购的浪潮，影响了PHI Inc等大型公司，并用这些公司为BP, Shell, Chevron, ExxonMobil, ConocoPhillips, Royal Dutch Shell, Statoil, Norsk Hydro, Total.公司等海上油田提供服务。据英国BP石油公司称，公司使用的是Dauphin AS365, H175, H135直升机。挪威国家Statoil石油公司有12架Sikorsky S-76D直升机可供使用。

在考虑的适用于海上作业的外国直升机类型中，应注意EC-225 EC-175 S-92 AW-139 / 189；海上作业的适用性测试通过了H145。

空客直升机对轻型多用途双引擎直升机H145（以前称为EC145 T2）进行了为期两天的测试，以适应复杂的海上航空业务。根据空中客车直升机公司的测试，H145确认可以在海上作业。尤其要注意的是带有四轴自动驾驶仪的Helionix航空电子设备，可以确保增加的飞行安全性，同时即使在特别困难的天气条件下，也可以方便飞行员的工作。

可以改装用于海上作业的有前途的旋翼飞机，有



可能会提到转换飞机。因此，到2020年，预计将发布海上模型AgustaWestland AW-609，可容纳9名乘客。飞机的速度估计为500 km / h，飞行半径为800公里。此外，Bell-Boeing MV-22B也不会被忽略。乘客人数增加到20人，速度和航程与AW-609相同。值得一提的是，在总体尺寸方面，Mi-8符合对应倾转旋翼。

国内推广

在这种情况下，没有提到Mi-8。源自八国集团（G8）曾经在“书面”注明，1980年代的北海近海标准-«彪马»直升机。就重量和尺寸特性而言，我们的飞机非常适合海上作业，几十年来其现代化储备一直无法超越。一个简单的例子是，为“抽气”高空飞机，实践中在该家族的直升机Mi-8MTV-1上安装了额外的舷外油箱，这使飞行距离和持续时间增加了近一半。

在运营组织下，为期10天，«俄罗斯直升机»公司子公司的三名专家在直升机的侧面安装了额外的吊油箱和必要的设备，以确保通过重力产生燃料。同时，除了增加飞行距离和持续时间外，直升机还有机会利用整个货舱来运送人员和货物。

因此，使用容量略小于3.5吨的外部附加油箱可以将最大起飞重量从610公里增加到1065公里，飞行时间从3.3小时增加到5.8小时，从而增加了飞行距离。

如此近乎车库的改进，将Mi-8MTV-1变成了远程的大陆，使其可以在新的和极其遥远的矿床上工作，可以与用于地质勘探的价格明显昂贵的西方

机型比较。这里还增加了海上和陆地搜索和救援任务功能。怎么说，近海码头何时开始工作？

怎样全面改善

英国Bristow Helicopters公司于2000年开始提供海上运输服务与Mil的设计局进行互动，当时它与哈萨克斯坦的一家运营商公司组建了一家合资企业，使用Mi-8和俄罗斯船员共同建立通往黑海沿岸的管道。

参与该项目以及操作Mi-8的经验促使Bristow于2003年扩大了业务联系-这次是在萨哈林岛（运营商«Aviashef»封闭股份公司的基地）。在那里部署的俄罗斯直升机机队包括五架Mi-8MTV，两架Mi-8T和三架Dash-8飞机，在萨哈林岛和韩国以及俄罗斯大陆之间执行飞行任务。由当地航空公司租用，为岛上的石油和天然气项目提供服务，该公司与«Exxon Mobil»埃克森美孚石油公司成立了一家合资企业。

对于初学者，在驾驶室中安装了高背座椅和系留肩带，以提高安全性。「Bristow Helicopters»布里斯托直升机公司随后安装了HUMS集成机载系统。选定的系统有两个部分：莫斯科中央航空发动机研究所开发的振动控制系统，以及«Meggitt Avionics»公司的ROTAB转子跟踪和平衡系统。几年后，«Aviashef»公司首次在俄罗斯接收了由十架Mi-8直升机组成的机队，这些直升机装备齐全，可以在水面上飞行，其中两架Mi-8T和八架Mi-8MTV-1。

Mi-8MTV-1配备了紧急降落系统，系统在紧急降落时会充满氦气。还为这些机型专门设计了必要



时推出的大型舷窗。此外，这些直升机还配备了气象雷达，GPS / GLONASS全球定位系统的接收器指示器以及自动COSPAS应急信标。对六架Mi8MTV-1直升机进行了改装，以适合SX-16探照灯，即SLG-300机载绞盘，可以举升或放下两个人或最大承重量为300公斤。两种飞机都装有着陆ILS系统。

Mi-8MTV-1还配备了额外的隔热和隔音功能。

这次成功的经历没有被忘记，在2016年夏天，在«Spark»飞机维修公司的基础上，«俄罗斯天然气工业»股份公司完成了Prirazlomnoye直升机机队的现代化改造，其中包括4架Mi-8 AMT飞机。直升机进行的改进也很广泛。飞机设有带安全带的乘客座椅，用于固定货物的装置，挤压式窗户，它们在紧急情况下离开直升机时都可以满足国际安全要求；新的救援设备包括两个带应急无线电信标的筏，每组25个座位和其它创新。

«一架好飞机，舒适，公司很满意。我们每周都会向平台运送22个人。没有关于直升机操作的投诉，我们也无意将其更改为外国类似产品»，- «LUKOIL-Kaliningradmorneft»的第一副总经理，总工程师德米特里·格拉西莫夫说。

对于海上机型，只能使用配备飞行信息记录器以及自动精确着陆系统的直升机。海上直升机的紧急出口更宽，机舱内的照明设备更亮。的确，对安全的关注导致价格上涨«例如，Mi-8MTV直升机的设备成本为3-4百万美元，而直升机本身

大致相同»—直升机工业协会的副主席亚历山大·卡拉切夫解释说。然而，即使价格上涨加上直升机的成本，显然也没有超过西方用于海上作战直升机的成本。

海上武装力量

然而，«俄罗斯直升机»公司与«俄罗斯天然气工业»股份公司（Gazprom）合作，制造了Mi-8尺寸的真正海上直升机-Mi-171A2，后者于2015年10月签署了合同，供应两架Mi-171直升机和两架Mi-8AMT直升机，专门用于其海上和内陆项目的开发和维修。Mi-171-用于轮班工作人员和货物石油和天然气生产设施运输到陆地上，Mi-8AMT-用于搜寻和救援行动以及人员的紧急疏散。

«俄罗斯直升机»公司的任务艰巨-新的Mi-171A2必须符合IOGP的要求（国际油气生产商协会管理手册的技术要求）。设备应该更坚固，能够在极端困难的条件下在海上飞行。

结果，Mi-8 / 17直升机家族的最新代表机型Mi-171A2配备了KBO-17集成数字飞行和导航系统（“玻璃驾驶舱”），使直升机无需机组人员在场即可操作，人数最多为两个人，Mi-171A2由复合材料制成的轴承和X形尾桨。创新提高了直升机的可控性，减轻了支架系统的总重量，并使旋翼的推力增加了700公斤。另外，巡航和最大速度增加了20%，飞行距离也增加了。升级后的航空电子设备也扩大了直升机的范围。Mi-171A2可在高山，高温和高湿度的条件下有效使用。

选择最佳升级版

毫无疑问，制造商为新型直升机系统石油平台提供服务，而且它们也适合在北极工作。国产Mi-38飞机以及新型中型包括北极装备飞行距离达1300公里，完全满足国际油气生产商协会IOGP 390飞机管理手册的技术要求。Mi-38直升机也许是采矿业未来最佳解决方案，随着时间的推移，直升机将成为俄罗斯大陆油气，近海天然气和石油生产的新标准。尽管飞行和技术参数良好，但直升机的最大起飞质量对于大多数石油平台而言还是太大了。

«没有多少石油平台能够承受。Mi-38的重量超过15吨，而最常见空客重型海上直升机机型EC225 Super Puma和Sikorsky S-92的重量不超过12吨»，- «UTAir直升机服务»公司的负责人阿列克谢·维诺格拉多夫这样说。

反过来，Mi-8M，Mi-171A2在此参数上可与最常见的海上重型空客直升机EC225 Super Puma和Sikorsky S-92相比，后者的起飞重量不超过12吨。

当涉及到一个全新的参数时，优先考虑此类参数似乎不太正确，从而更新了海上直升机运营的观念。但是，考虑到俄罗斯为石油工业提供主要改型的旋翼机Mi-8直升机仍然存在，因此值得关注这种飞机的现代化效果。此外，庞大的现代化储备是倒数第二代的“八型机”，因此，突破性的Mi-171A2和AP生命周期的成本传统上在选择运营商方面起着重要作用。