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Take-off

july 2014 • Special edition for Farnborough International Airshow 2014



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Dear reader,

You are holding an issue of the Take-off magazine, a special supplement to the Russian national aerospace monthly VZLET dedicated this time to Farnborough International Airshow 2014. This show has always been highly regarded by aerospace companies from Russia and the CIS as a major international aerospace event. It is Farnborough where Russia quarter century ago, in 1988, unveiled its fourth-generation combat aircraft, the MiG-29 fighters, for the very first time. Four years later, in 1992, it was Farnborough that hosted the debut of the Russian Generation 4+ fighters, the MiG-29M and Su-35. In 1996, it was Farnborough where the Su-37 super-maneuvrable fighter won the hearts of the public with its unrivalled flight performance.

Our country famous for its world-class fighter aircraft now seeks to regain its positions in the global market also as a manufacturer of commercial airliners. Russia's Sukhoi Civil Aircraft Company is going to present in Farnborough its Sukhoi SuperJet 100 regional airliner in a new LR version. For three years SSJ100 aircraft are being in service with air carriers which gives an occasion to summarise some results of their commercial operations. Since last autumn SSJ100 are flying with Mexico's Interjet – the first airline from the West. SuperJets operation in Mexico shows the high quality of the new Russian regional airliner putting it on par with the best foreign counterparts. SSJ100 featuring a bright example of growing international cooperation between Russian aerospace industry and leading Western companies. The next step of such cooperation is being implemented in development of Irkut MC-21 prospective medium and short haul airliner which is designed to become a serious rival to Boeing 737MAX and Airbus A320neo jets at domestic and international markets. A full-scale mockup of the MC-21's cockpit and passenger cabin will be among this Farnborough main attractions.

As usual, Take-off is offering a digest of other key events in the Russian and CIS aerospace industry over the past several months. I hope that the issue will help you to get a better grasp of the Russian displays in Farnborough and be abreast of the latest developments in aerospace industry of our country.

On behalf of Take-off's staff, I wish Farnborough 2014's participants and visitors interesting meetings, useful contacts and lucrative contracts as well as enjoying unforgettable flight demonstration of planes and helicopters from all over the world!

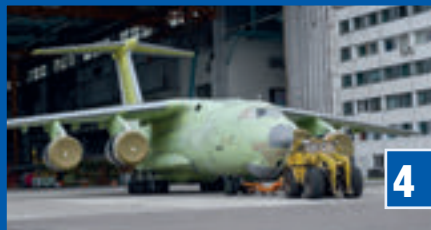
Sincerely,

Andrey Fomin,
Editor-in-Chief,
Take-off magazine



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First production-standard Il-76MD-90A rolled out

The first production-standard Ilyushin Il-76MD-90A (c/n 01-03) airlifter was rolled out of the final assembly shop of the Aviastar-SP close corporation in Ulyanovsk on 17 June 2014. It was brought to the Spektr-Avia company in Ulyanovsk for painting, after which it will start its ground and then flight trials. Aviastar Director General Sergei Dementyev said: "Having pooled their efforts, the United Aircraft Corporation, UAC – Transport Aircraft JSC and the developer, Ilyushin, have completed the key stage of the production of the first production-standard Il-76MD-90A under the deal clinched with the Russian Defence Ministry. The aircraft shall be delivered as soon as this year".

Before the plane's roll-out, the installation of the powerplant, systems and avionics had been completed and the fuel system leak proofness had been tested.

As is known, UAC's strategic objective is to turn Aviastar into its main transport aircraft production facility. The first step towards the objective has been the production-ising of the Il-76MD-90A upgraded airlifter (Programme 476), on which Aviastar's efforts are focused now.

The Russian government released a directive on the devel-

opment and productionising of the upgraded Il-76 in Ulyanovsk on 20 December 2006. The first two Il-76MD-90As – the endurance test example (c/n 01-01) and the flying prototype (c/n 01-02) – were laid down by Aviastar in 2009. A set of assemblies of the endurance test prototype was brought to Zhukovsky, Moscow Region, in autumn 2011 for static tests in TsAGI, and a flying prototype of the Il-76MD-90A commenced its trials a year later. It conducted its maiden flight in Ulyanovsk on 22 September 2012, launched its tests in Zhukovsky in late January 2013, completed there the first phase of its official test programme that kicked off in July 2013 (38 flights) and was returned to the manufacturer on 4 December 2013 for debugging based on the tests and the customer's requirements specified more accurately. The new requirements called for advanced communications gear and a defence aids suite in the first place.

In the course of the development tests and the first phase of the official tests, the Il-76MD-90A (c/n 01-02) logged around 60 flights, with the Kupol-III-76M(A) flight navigation suite and its subsystems tested alongside with the fuel and

automatic control systems and radio communications equipment. The maximum speed structural endurance modes and limit g-load were tested, flights with the 210-tonne maximum takeoff weight and 170-tonne maximum landing weight were performed and the missed approach procedure with simulated failure of one engine and two engines was tested. Based on the results produced by the first stage of the official trials, a preliminary report was released, giving the nod to the manufacture of the Il-76MD-90A low-rate initial production batch by Aviastar plant.

In the near future, the Il-76MD-90A (c/n 01-02) shall commence the second phase of its official tests, during which its sophisticated communications and defence aids suites are to be tested, as are airdrops of combat gear and cargo.

The Russian Defence Ministry is the launch customer for the Il-76MD-90A. On 4 October 2012, it awarded a contract for 39 aircraft with the delivery from 2014 throughout 2020. According to the 2013–25 Aircraft Industry Development Federal Programme at the website of the Russian government, Aviastar-SP is to make a total of 90 aircraft of

the type prior to 2020, including 31 Il-78M-90A air tankers and 18 aircraft designed for subsequent conversion to various dedicated applications by Beriev company, with about 45 more to be built in the subsequent five years. In addition, about 15 aircraft in the Il-76TD-90A commercial freighter version are supposed to be manufactured for domestic commercial users and about 40 for foreign ones before 2025. Thus, the Industry and Trade Ministry estimates the overall output under Programme 476 prior to 2025 at 190 aircraft.

The first three LRIP planes were laid down by Aviastar-SP under a contract with UAC – Transport Aircraft in 2010. Following in the footsteps of c/n 01-03 rolled out in June this year, the second production-standard Il-76MD-90A, c/n 01-04, is to be completed come autumn. The final assembly and systems installation of the third production-standard aircraft's (c/n 01-05) are in full swing. Production of parts and units for the ten subsequent aircraft and first Il-78M-90A tanker plane is under way.

Nikolai Talikov, chief of the design bureau and deputy Director General / deputy Designer General, Ilyushin JSC, told Take-off that the Il-78M-90A tanker plane is heavily commonised with the Il-76MD-90A, particularly in terms of the wing design. However, its takeoff weight grew up from 210 t to 220 t, which enables it to haul more fuel and refuel more aircraft in flight compared with the Il-78 and Il-78M air tankers used to be built in Tashkent. "In addition, while the Il-78M was a pure tanker aircraft, the advanced Il-78M-90A is being developed as a convertible variant capable of operating as an ordinary transport once it has been stripped of its fuselage fuel cells, if need be, for it will retain the cargo ramp", says Nikolai Talikov. "The first Il-78M-90A is set to kick off its tests in late 2015. A contract with the Defence Ministry for 31 tanker aircraft is being in the pipeline".



MC-21: prototypes manufacturing begins

The key advanced mid-term airliner programme being pursued by Russia's aircraft industry is the development of the MC-21 new-generation narrow-body short/medium-range airliner family designed to compete the best Western airliners in the class, the Airbus A320neo and Boeing 737MAX. Under the Russian President's directive dated 6 June 2010, Irkut Corp. became the prime contractor for the development and production of the MC-21. Prototypes and production-standard aircraft of the MC-21 family will be built by the Irkutsk Aviation Plant, a subsidiary of the Irkut Corp.

The plant has been tasked with the manufacture of the fuselage and final assembly of the aircraft. The fuselage metal panels, tail section and composite empennage will be supplied by the Ulyanovsk-based Aviastar-SP close corporation, composite fuselage mid-section panels, spars and integral wing panels by the AeroComposit-Ulyanovsk close corporation, composite leading and trailing edges, wing high-lift devices and elevators by the KAPO-Composit close corporation, the latter two companies being the AeroComposit close corporation's Ulyanovsk- and Kazan-based production facilities respectively.

In August 2011, Irkut and Germany's Durr made a contract for a complete set of the MC-21 aircraft automated assembly line using up-to-date digital technologies. The latest equipment and the Irkutsk Aviation Plant's pre-



Andrey Fomin

ises allow the production of up to 70 MC-21s a year further down the road. The installation of the assembly line is in full swing now.

Last year, Irkut completed the devising of the MC-21 airframe design documentation and started the construction of the first four aircraft examples – three for flight tests and one for static trials. In addition, numerous structural elements (panels, joints, bays, etc.) were manufactured for static and endurance tests. The company assembled an airframe barrel section prototype and shipped it to TsAGI for endurance tests in February.

The airliner's baseline model is the 180-seat MC-21-300 that can seat 160 to 212 passengers depending on a layout of the cabin. Concurrently, the shorter 130–165-seat MC-21-200 version is in development, with the MC-21-400 stretch being a possibility.

The maiden flight of the MC-21-300 prototype is slated for later 2015, and the completion of its certification tests and the beginning of its deliveries for 2017.

The MC-21's firm order book had included 175 aircraft by early 2014. 50 of them had been ordered by the Aviacapital-Service leasing company (a Rostec government-

owned corporation subsidiary) for Aeroflot and 35, powered by PD-14 engines, for governmental agencies. 50 aircraft had been ordered by the Ilyushin Finance leasing company, of which at least six can start flying with Transaero and 10 with Red Wings under current agreements. 30 airliners more are due to VEB-Leasing, of which 10 can go to UTair and six to Transaero. In addition, Irkut has had a direct contract with the IrAero airline for 10 aircraft. An agreement with Sberbank-Leasing for 20 aircraft can be thrown in for good measure. During 2013, the MC-21 firm order book swelled by 62 aircraft.



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VASO carries on Il-96 widebody construction

VASO, a subsidiary of the United Aircraft Corporation (UAC), retains its Ilyushin Il-96 widebody competence despite Aeroflot having decommissioned its six Il-96-300 long-range airliners this spring and the lack of commercial orders for the type.

Last year, the plant built a new Il-96-300PU(M1) (RA-96021) VIP aircraft and delivered it to the Rossiya special air detachment. The plane became the other of the two latest presidential aircraft built under the contract between the Presidential Property Management Department and UAC in May 2010 (the first one was made and commissioned in 2012). Now, the presidential air detach-

ment operates as many as eight aircraft of the Il-96 family, which number is to increase further in several years. In April 2013, UAC snagged an order for two more Ilyushin planes before year-end 2015 – an Il-96-300 VIP plane and a presidential Il-96-300PU(M1). VASO is planned to manufacture two more Il-96s for the Rossiya special air detachment during 2017–18.

In addition, an Il-96-400 derivative for the Defence Ministry is being mulled over to oust the in-service Il-80 airborne command posts (based on Il-86 widebody airliners) in due time. According to VASO's corporate paper Voronezh Wings (Issue 19, 2013), the first

Il-96-400 is slated for delivery to RusAF in 2017. Recently, Russian Air Force Commander-in-Chief Victor Bondarev confirmed in an interview the service's intent to buy at least 10 Ilyushin Il-96s in various variants, including the defence minister's VIP version, during the coming decade.

The four built Il-96-400T freighters will not sit idly either. As is known, the fourth aircraft of the type (RA-96104) made by order of the Ilyushin Finance Co. for the Polyot airline as far back as 2011 did not enter operation then. In late 2012, Ilyushin Finance took delivery of the aircraft and contracted the manufacturer to convert it to Il-96-400VPU VIP

passenger aircraft standard in the interest of Neftepromizing LLC, a subsidiary of Rosneft company. The conversion is due for completion by VASO before year-end.

Last year, the fluid state of the freight traffic market made Polyot suspend the operation of its three Il-96-400T freighters (RA-96101, RA-96103, RA-96013) supplied by Ilyushin Finance in 2009. Since last summer, the aircraft have been stored by the manufacturer, with provision made for their conversion to dedicated versions. According to the aforesaid Voronezh Wings article, their commencement of the operation in a new capacity is planned for 2016–17.

Beriev to deliver first Taganrog-built Be-200ChS before year-end

The Beriev company is productionising the Be-200 amphibian aircraft that used to be in production by the Irkut corporation's aircraft plant in Irkutsk. Previously, two prototype and seven production-standard amphibians of the type have been manufactured in Irkutsk, of which six are in service with the air arm of the Russian Emergencies Ministry (the two latest were fitted with relevant gear and delivered in November 2011 by Beriev) and one was delivered to the Azeri Emergencies Ministry's air branch in 2008.

In May 2011, the Russian government ordered six Be-200ChS amphibians from Beriev for the Emergencies Ministry and in May 2013 – six more for the Defence Ministry (two Be-200ChS's and four Be-200PS search-and-rescue amphibians)

As of early last year, the first Beriev-built Be-200ChS (c/n 303) was to be delivered to the Emergencies Ministry in late 2013, with the remaining five to follow during 2014–15. However, the assembly of the first amphibian is still under way. The plan, adjusted in line with the Defence Ministry's order, stipulates the construction and delivery of two

Be-200ChS aircraft this year – one for the Emergencies Ministry's air branch (c/n 303) and the first Be-200ChS for the Russian Navy's air arm (c/n 309). Next year, Beriev plans to deliver one more aircraft to the Emergencies Ministry and two more (including the first Be-200PS) to the military.

Following the examination of Beriev's shops in June 2014, UAC President Mikhail Pogosyan told the media: "The first Be-200 air-

craft built all in Taganrog is to be delivered to the Emergencies Ministry in November this year".

"Here, one can see the second aircraft being assembled, with the third and fourth ones being in the form of parts and units so far", the UAC head emphasised. The manufacturer maintain that the current orders for 12 amphibians for the Emergencies Ministry and Defence Ministry will keep Beriev's production facilities busy

for the coming three to four years at an output rate of three to four aircraft a year.

The company is hopeful of export contracts as well. For instance, Beriev is promoting the EASA-certificated Be-200ES-E amphibian on foreign markets, the European and Southeast Asian ones in the first place, concurrently with fulfilling the orders placed by the Emergencies Ministry and the military.



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Mi-38: delivery to start in 18 months

One of the main novelties displayed by the Russian Helicopters holding company at the 7th HeliRussia international helicopter industry show (HeliRussia 2014) held in the Crocus Expo international exhibition centre in Moscow on the 22–24 May 2014 was the upgraded prototype of the Mi-38-2 advanced medium transport helicopter, OP-1, fitted with an advanced powerplant made up of a pair of Klimov TV7-117V turboshaft engines. Painted in a new livery in the run-up to the show, the helicopter landed in front of Crocus Expo, having flown from the National Helicopter Industry Centre's facility in Tomilino where it had been in trials.

During the first phase of the flight test programme, which had been under way since 2003 in Kazan and then in the Moscow Region, the OP-1 prototype was powered by Pratt & Whitney Canada XPW127/5 experimental engines. The prototype's conversion to the domestic powerplant and upgraded powertrain and their debugging on board the helicopter kicked off in 2011. At the same time, Kazan Helicopters manufactured the third Mi-38 prototype – the Mi-38-2 (OP-3)



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powered by a pair of TV7-117Vs too. Its flight tests in Tomilino commenced in November 2013, and the upgraded Mi-38-2 (OP-1) flew there in April this year. Mention should be made that the second Mi-38 prototype, the XPW127/5-powered OP-2, is airworthy now too.

The TV7-117V-powered Mi-38-2 and PW127TS-powered Mi-38-1 have a maximum takeoff weight of 15,600 kg (16,200 kg with under-slung cargo) and haul 6 t of cargo in the cabin or 7 t slung under belly at a cruising speed of 285 km/h. The

cabin can seat 30 passengers. The helicopter also is offered in the search-and-rescue, medevac, offshore and VIP versions, while surpassing other machines in the class in terms of the carrying and seating capacities.

Now, there is the fourth flying prototype (OP-4) in the final stage of assembly at the helicopter plant in Kazan. It will serve the yardstick for future production-standard Mi-38-2s.

Details on the plans under the Mi-38 programme were unveiled during the show. The type certificate for the TV7-117V engine is supposed to

be obtained in November 2014. The Mi-38-2's factory certification tests are to be completed in June 2015 and its second stage certification tests in November 2015. The certification is being performed in compliance with the AP-29 air rules harmonised with the European CS-29 and US FAR-29 regulations. The cargo version of the Mi-38-2 is to be issued its type certificate by the IAC's Aircraft Register in December 2015. By then, Kazan Helicopters should launch the helicopter's series production and deliveries may start.

Ka-62 gearing up for maiden flight

The kickoff of the flight tests of the advanced Kamov Ka-62 medium multirole helicopter will become an event of the year. The helicopter is being developed by Kamov and manufactured by the Arsenyev-based Progress aircraft company named after N.I. Sazykin (both companies are Russian Helicopters subsidiaries).

Two first examples of the future aircraft were made in Arsenyev in 2013 – the so called 'iron bird' for ground tests of the powerplant, powertrain, rotor system and other equipment and the example bearing c/n 01-02 (reg. RA-62002), which was unveiled at the static display ground during the MAKS 2013 air show in late August 2013. The machine was supposed to become the first flying prototype of the Ka-62, and its flight tests were expected to begin before the end of last year. However, it looks like

the need of extra ground testing of the radically advanced systems being developed in cooperation with numerous foreign partners necessitated an adjustment of the plan, with the Ka-62 to make its maiden flight later this year. Meanwhile, the assembly of two more prototypes is in full swing at Progress.

The Ka-62 has a takeoff weight of 6.5 t and is designed to haul 15 passengers or 2,000 kg of cargo (2,500 kg on the external sling). In addition, it is to be able to operate as a search-and-rescue, medevac, patrol and trainer aircraft, etc.

The Ka-62 development programme is being implemented by the Russian Helicopters holding company within the framework of its cooperation with European partners. The machine is fitted with advanced Ardiden 3G engines from French company Turbomeca, the powertrain from Austrian company Zoerkler and

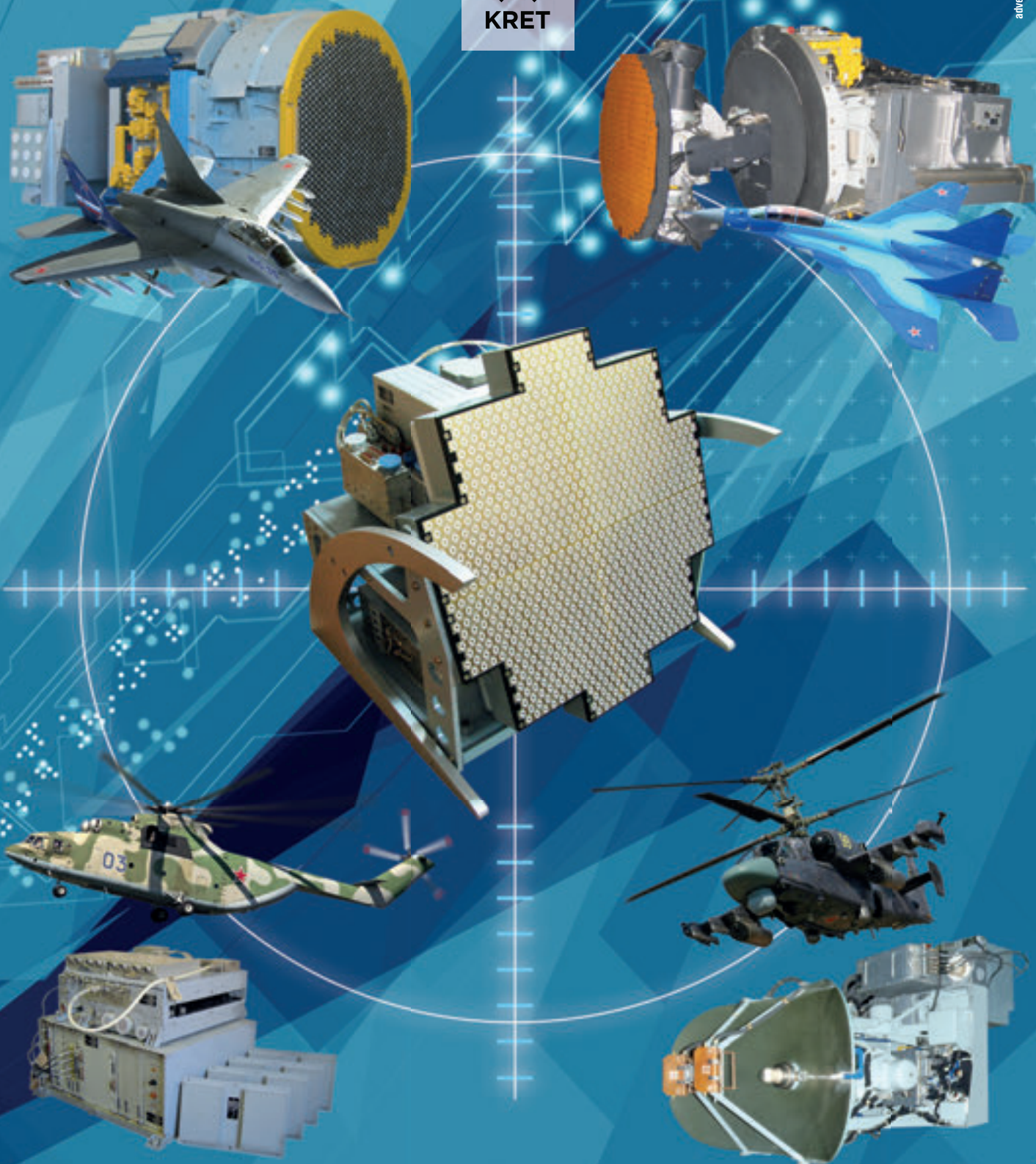
the fuel system from France's Zodiac Aerospace. It has an up-to-date avionics suite, including the glass cockpit from Russian company Transas and a GPS/GLONASS-capable navigation system.

The Ka-62's launch customer proved to be Brazilian company Atlas Taxi Aero. The company in December 2012 ordered seven helicopters that it is going to use on offshore opera-

tions in support of Brazilian national oil company Petrobras. The delivery is slated for as soon as 2015. In addition, Russian Helicopters landed an order from Columbian company Vertical de Aviacion in last August for five Ka-62s, with the delivery to start in 2016. Once the machine has been developed and certificated, the Russian Defence Ministry is going to order a military version of the Ka-62.



Yevgeny Yarovkin



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Mi-26T2 in full-rate production

The Russian Helicopters holding company's subsidiary Rostvertol, which marked its 75th anniversary on 1 July this year, continues full-rate production of the world's most capable heavy-lift helicopters – the Mi-26 and Mi-26T/TC – and shall launch deliveries of the upgraded Mi-26T2 later this year.

A strong impetus to ramping up the output of machines of the type was given by the governmental order for 22 Mi-26s for the Russian Defence Ministry, which was awarded in 2010. The first two aircraft under the contract were delivered in October 2011 and two more followed suit late in the same year. During 2012, as many as six Mi-26s were made under the governmental defence acquisition programme. Four more were fielded with a combat units last year. Another two have been manufactured and already tested this year. Russian Army Aviation units in the Russian Far East, Urals and Rostov and Pskov regions operate brand-new Mi-26s.

Early last year, a brand-new Mi-26T was delivered to a Russian commercial operator. The machine (RA-06255) was made in late 2012 and delivered to the Rostvertol-Avia airline that had operated three aircraft of the type.



Alexey Mikhayev

In addition to the domestic market, Rostvertol-built heavylifters have been exported of late. For instance, three Mi-26TC helicopters were shipped to China during 2007–10, and three Mi-26Ts entered service with the Venezuelan Army Aviation in 2007–08.

According to Rostvertol's 2013 annual report, the company's upgraded Mi-26T2 foreign-market promotion efforts came to fruition when the first export deal was clinched on 26 June 2013 for six machines for Algeria. The construction of the first two production-standard Mi-26T2s is in full swing in Rostov-on-Don, and the aircraft may be shipped to the customer before year-end.

The key difference setting the Mi-26T2 from the production-standard Mi-26 and Mi-26T/TC is its sophisticated digital avionics suite that has allowed slashing the flying crew from four to two (from five to three, if the external cargo sling is used) and simultaneously improved reliability, flight safety, helicopter's stability, controllability and hover precision, which is especially important when using the external sling.

The BREO-26 avionics suite of the upgraded Mi-26T2 is based on the NPK-90-2 flight navigation system comprising the digital display system, control panels, airborne computer, satellite navigation system and digital flight system. In addition, the Mi-26T2's avionics incorporates an

up-to-date communications system and an airborne flight recorder system.

Just like its baseline model, the Mi-26T2 can haul outside cargo and vehicle weighing a total of 20 t in the cargo hold or at the external sling. Its military version carries 82 troops and casevac variant airlifts 60 casualties. The machine can perform installation and construction work of varying degrees of complexity, fire-fighting missions, quick fuel delivery, self-contained refuelling of vehicles on the ground, etc.

A Mi-26T2 prototype (tail number 901) was made by Rostvertol and submitted for its flight trials early in 2011. To date, it has passed all of the key phases of the trials and Mi-26T2 entered full-rate production.

Ansats for military and commercial customers

The Ansats light multirole helicopter powered by Pratt & Whitney Canada PW207K turboshafts has been in full-rate production by Kazan Helicopters since 2004. The first six machines were exported to South Korea, with five more to Russian customers.

The Ansats-U trainer version with the twin controls and wheeled landing gear, which development had been ordered by the Russian Air Force, entered production in 2009, having passed its official trials in November 2008. The first six trainers were delivered in December 2009. Next year, Ansats-U trainers were fielded with the Syzran affiliate of the Air Force Military Training

and Scientific Centre being based at Sokol Air Force Base in the Saratov Region. Kazan Helicopters shipped six more machines there in 2013, having driven the number of Ansats in the flying school up to 24.

During 2007–10, Kazan Helicopters had done a lot to modify Ansats's fly-by-wire control system-equipped baseline model to meet the refined certification requirements. Its efforts resulted in the Ansats-K version that was issued a limited operation certificate in March 2010. At the same time, Kazan Helicopters launched the efforts to fit the baseline Ansats with the hydro-mechanical control system. Two prototypes (PT-07

and PT-08) were manufactured and submitted for trials in 2011. The certification of the hydro-mechanically controlled Ansats version was

crowned on 22 August 2013 with the supplementary type certificate making the machine accessible to customers.



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Agustas from Moscow Region

The assembly plant of Russo-Italian joint venture HeliVert in Tomilino, Moscow Region, carries on manufacturing AW139 multirole medium helicopters.

AgustaWestland and Russian Helicopters announced their preliminary AW139 helicopter production joint venture establishment agreement at the Farnborough air show in July 2008. The framework agreement on the joint venture was signed in Moscow on 6 November 2008, with the HeliVert close corporation itself set up in September 2009. The construction of the plant in Tomilino began in June 2010 and ended in May 2012. By then, in June 2011, the parties had struck a licence agreement and a general agreement on supply of relevant parts. HeliVert personnel had been trained in Italy, at AgustaWestland's training centre, in January throughout March 2012, the supply of AW139 parts and units to the plant started in June 2012, and the assembly of the first two aircraft commenced.

HeliVert's Tomilino plant is a most advanced helicopter assembling facility in Russia, featuring cutting-edge helicopter production technolo-



Alexey Mikhayev

gies. Counter to what sceptics maintain, the plant does not just screw on rotor blades and install passenger seats into complete Italian helicopters. Only individual airframe and powertrain units, engines and kits for airborne systems are supplied to the plant. AW139 are assembled in the same manner at AgustaWestland's facilities in Vergiate near Milan and in Philadelphia in the United States.

The first Russian-made AW139 (c/n 60001) first flew on 19 December 2012. Having been painted and fitted with the VIP cabin interior in April

last year, it made its debut at the HeliRussia 2013 air show and was shown as a static display at MAKS 2013 in the late summer of the same year. Then, it was delivered to the customer and given its Russian registration number RA-01996.

The second AW139 (c/n 60002) was built in Tomilino last spring and has been already delivered too. The third HeliVert-made AW139 (c/n 60003) flew for the first time in November 2013. Now, there are four next aircraft, c/n 60004 through 60008, in various stages of completion in Tomilino.

The programme on AW139 production by HeliVert in the Moscow Region is designed to meet the growing demand for the type on the market of Russia and other CIS countries for use by commercial operators as corporate VIP transport in the first place.

HeliVert and the Exclases Russia company, AgustaWestland's official distributor in Russia and other CIS nations, signed the first contract for five Russian-made AW139s in the passenger and VIP variants in the course of last year's HeliRussia air show, on 16 May 2013.

SaM146 output increasing

NPO Saturn scientific and production association – the major subsidiary of the commercial engine division of the United Engine Corporation (UEC, a subsidiary of Oboronprom of the Rostec government-owned corporation) – continues to ramp up the annual production output of the SaM146 engine, developed by Russo-French joint venture PowerJet and certificated by EASA for the Sukhoi Superjet 100 regional airliners, as part of fulfilling the current orders placed by the airliner's manufacturer.

The first six production-standard SaM146s were made in the city of Rybinsk in 2010. The output accounted for 15 engines in 2011, about 25 in 2012 and around 50 in 2013. In February this year, the manufacturer has shipped its 100th production-standard SaM146 engine to Sukhoi Civil Aircraft Company (SCAC). According

to NPO Saturn, by then, a total of 64 production-standard engines had been delivered to Russian and foreign customers as part of SSJ100 airliners, the SaM146s had accumulated a total of more than 78,000 hours and over 51,000 cycles, while the engine's flight schedule inviolability rate had reached 99.94%. Given SCAC's plans to make 40 production-standard SSJ100s this year, NPO Saturn is to supply it with at least 80 brand-new SaM146s in addition to spare ones. The company hopes to ramp its annual SaM146 production up to 150 units by 2016.

By July this year, Russian, Mexican, Indonesian and Laotian air carriers have operated 72 SaM146 engines powering 36 SSJ100 aircraft flying with Aeroflot (10 aircraft), Yakutia (2), Gazprom Avia (5), Moskovia (3), Center-South (2), UTair-Express (1), Interjet (8), Sky Aviation (3), Lao

Central Airlines (1) and the Russian Ministry of the Interior (1).

The SaM146's 1S17 version was certificated by EASA and the IAC Aircraft Register in summer 2010 and has been in revenue operation as part of the in-service SSJ100 fleet for over three years. The 1S18 version, featuring a 5% thrust increase and designed to power the SSJ100-95LR, was certificated by EASA on 17 January 2012.

NPO Saturn's SaM146 production facility was issued a certificate by the IAC Aircraft Registry in January 2011 and by EASA in April 2012.

SaM146 maintenance training centres have been set up and certificated in Russia and France in the interest of the customers and after-sales support, spare parts depots have been established and a certificated repair facility has been opened.



NPO Saturn

OUT OF MANY, ONE



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PD-14: testing goes on



Alexey Mikhayev

The mainstay of the United Engine Corporation's (UEC) commercial aircraft engine development programme is the development of the 12,500–15,600-kgf PD-14 new-generation turbofan engine – the first one in the advanced 9–18 tonne engine family being developed by a large team of UEC's subsidiaries led by Aviadvigatel JSC. The PD-14 is a two-shaft separate-flow engine with the gearless fan drive. All engines of the family have a common core with the eight-stage high-pressure compressor, low-emission annular combustor and two-stage high-pressure compressor. The baseline PD-14 will be equipped with a 1,900-mm single-stage fan retaining the diameter of the fan used in the PS-90A engine, a three-stage low-pressure compressor and a six-stage low-pressure turbine.

The baseline 14,000-kgf PD-14 is designed to power the Irkut MC-21-300 short/medium-haul airliner. The shortened variant of the airliner, the MC-21-200, is supposed to be fitted with 12,500-kgf PD-14A engines, while the stretch is to be furnished with the enhanced-thrust PD-14M version capable of 15,600 kgf. According to the design data, the PD-14 is on a par with its foreign rivals (PW1400G, LEAP-X) in terms of specific fuel consumption, while having a somewhat lower bypass ratio.

The zest of the MFD 2014 international engine industry forum held in Moscow in April 2014 was the second PD-14 prototype engine (c/n 100-03) displayed by UEC. The engine has

been in trials in the city of Perm since early this year. For its display during the forum, it was taken off the test bench and brought to Moscow and returned to Perm for continued tests right after MFD 2014 had been over.

Aviadvigatel Designer General Alexander Inozemtsev delivered a detailed report on the status of the PD-14 programme at the plenary session of the forum. He gave a recap, inter alia, on the milestones of the designing and testing prototype cores and engine demonstrators.

The trials of the first engine core demonstrator (100GG-01) under the PD-14 programme were launched in Perm in November 2010. A year later, in December 2011, the second core (100GG-02) entered the trials and was used for testing an

alternative combustor from Ivchenko-Progress in June 2013. According to Mr. Inozemtsev, the combustor has demonstrated somewhat higher performance than the one developed by Aviadvigatel itself – probably, owing to Ivchenko-Progress's wealth of experience in the development of annular combustors for gas turbine engines. The Aviadvigatel head remarked, however, that a choice has not been made, for everything depends on the outcome of the tests and, which is more, a political decision against the backdrop of the current turmoil in the Russian-Ukrainian relations.

In October 2013, the third PD-14 core (100GG-03) joined the tests. It is intended for enhancing the effectiveness of the high-pressure compressor. As of April 2014, the PD-14 core prototypes logged a total of about 120 operating hours.

Aviadvigatel started the rig tests of the first full-scale PD-14 engine demonstrator (c/n 100-01) in June 2012. By August of the same year, the first stage of the indoor test rig trials, during which the engine was tested in the basic operating modes, had been complete. A month later, in September 2012, the demonstrator passed the outdoor rig test stage, when its acoustic characteristics were gauged.

In February 2013, the 100-01 engine demonstrator tests of its ther-

modynamic parameters were completed, and in July, the third test stage took place, which included, among other things, the engine's first burn in the takeoff mode.

By early this year, the second engine demonstrator (c/n 100-03) had been prepared for trials. Its rig test kicked off in January 2014. By the MFD 2014 forum, the third engine (c/n 100-04) had been in the final stages of assembly and preparations for tests, with the two engine demonstrators having logged a total of around 100 hours.

Later this year, Aviadvigatel will assemble and furnish for testing at least two more PD-14 prototypes – 100-05 (the first one with the fixed design) and 100-06. Both will be used as part of the certification tests. Overall, 22 prototypes, including four flying ones for MC-21 planes, are planned for manufacture.

The PD-14 is slated to begin its flight tests on the Il-76LL flying test-bed in February 2015. The aircraft will carry the engine c/n 100-07.

The engine's certification under the Russian standards is supposed to be complete by April 2017, when Aviadvigatel expects the IAC Aircraft Register to issue the type certificate. The flight tests of two PD-14s as part of the powerplant of the MC-21-300 prototype are slated for July 2017, while EASA is expected to issue its type certificate in April 2018.



Andrey Fomin



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Victor ANDREYEV

Mi-171A2

FULL-RATE PRODUCTION WITHIN A YEAR

The Russian helicopters of the Mil Mi-8/17 family are among the most numerous and popular ones in the world. Although next year will mark the 50th anniversary of the manufacture of the first production-standard Mi-8, the up-to-date variants of the machine – the Mi-17V-1, Mi-17V-5, Mi-171E/A1/Sh and Mi-172 – remain in high demand on the global market, with domestic customers buying Mi-8MTV-5 and Mi-8AMTSh versions actively. Suffice it to say that 2013 alone saw two subsidiaries of the Russian Helicopters holding company, Kazan Helicopters and the Ulan-Ude Aviation Plant (UUAP), made and delivered about 200 helicopters of the family. Overall, the two manufacturers have made in excess of 12,000 Mi-8/17 helicopters – a kind of world record as far as twin-engined helicopters are concerned. The aircraft of the type are in service in more than 100 countries on all continents, with their total flying time having exceeded 100 million flying hours.

The Mi-8/17 orderbook of Russian Helicopters as well as the holding company's marketing research indicate that the helicopters will remain in demand for years to come. Against the backdrop of Western rivals' development of more sophisticated models and to retain its market positions, however, the company took a decision several years ago to implement a heavy upgrade of the baseline Mi-171, with the upgrade intended to both improve the machine's flight performance and boost its operating parameters. The upgraded helicopter was dubbed Mi-171A2. To date, the first prototype, designated as OP-1, and a flying testbed derived from the production-standard Mi-171 have been in trials. The flying testbed has produced compelling results pertaining to performance improvement through the introduction of an advanced powerplant and a sophisticated rotor system.

The Russian Helicopters management approved the Mi-8/17 heavy upgrade programme, initially dubbed Mi-171M, in March 2011. The new machine was derived from the Ulan-Ude Aviation Plant-made Mi-171A1 multipurpose medium transport/passenger helicopter certificated by the Aviation Registry of the Interstate Aviation Committee (IAC) and the Brazilian aviation authorities. Hence, the upgrade was designated as Mi-171A2. The upgrade programme's key objectives are a sharp improvement in operating characteristics and a reduction in its maintenance and flying cost per hour. The Mi-171A2 is expected to become the baseline production-standard commercial model of the most popular helicopter family further down the line.

Several components of the helicopter were upgraded at the same time. Firstly, the machine was given an advanced powerplant, rotor system and powertrain. The Mi-171A2 will be fitted with latest VK-2500PS-03 turboshaft engines from Klimov JSC in St. Petersburg (a subsidiary of the United Engine Corporation, itself a subsidiary of Oboronprom JSC that is part of the Rostec corporation). The VK-2500PS-03 features an emergency power rating of 2,400 hp for 30 min and 2,700 hp for 2.5 min, as well as an extended service life.

The advanced rotor system of the Mi-171A2 includes an upgraded composite-blade main rotor, rotor hub and swash plate.

The helicopter is furnished with a beefed-up powertrain and an X-shaped tail rotor. The novelties have increased the machine's cruising and maximum flight speed, improved its operability and extended the service lives of its units. In addition, provision has been made for the introduction of the up-to-date Safir 5K/G auxiliary power unit.

Another key line of the upgrade is a drastic reshuffle of the avionics suite. The Mi-171A2 will be equipped with the up-to-date KBO-17 avionics suite co-developed by the Ulyanovsk Instrument Manufacturing Design Bureau (UIMDB) and other subsidiaries of the Radio-Electronic Technologies Concern – itself a subsidiary of Rostec. This will expand the helicopter's operating envelope on scheduled long-distance and commuter passenger operations, with the machine complying with the airport arrival and departure standing operating procedures and present-day and future reduced vertical and lateral separation minimum requirements. In addition, this will enable the helicopter to perform aerial work, including hovering and flying on special flight paths, and will ensure a fuel consumption reduction by means of the optimal navigation calculations and adherence to the flight plan.

The KBO-17 will allow a reduction in the flying cost per hour through reducing the crew from three to two, slashing the weight of the airborne equipment, simplifying the pre-flight and post-flight checks and enhancing the diagnostic equipment effectiveness owing to the KBO-17 itself including the SUOVO-V1 general aircraft equipment control system and KSEIS-V1 integrated electronic display and warning system.

Finally, the helicopter operation system will be changed much too. The assigned life and time between overhauls of both the helicopter and its key systems are to be extended by far, with on-condition operation further down the road being an objective.

The Mi-171A2's maximum takeoff and landing weight is 13,000 kg and that with under-slung cargo stands at 13,500 kg. The weight of cabin cargo accounts for 4,000 kg and that of under-slung one equals 5,000 kg. The passenger version of the Mi-171A2 is equipped with 26 standard-issue or 18 shock-absorbing seats.


The maximal speed will increase from 250 km/h to 280 km/h, the cruising speed from 230 km/h to 260 km/h and the range on internal fuel from 715 km to 850 km. The directional control will improve much, and the permissible hover crosswind velocity will increase. The helicopter will be able to operate within the -50/+50°C temperature bracket in all climes.

Under the Mi-171A2 upgrade programme, prototype work involves three aircraft – the flying testbed derived from Mi-171 side number 987 and the OP-1 and OP-2 prototypes. The flight tests of the flying testbed fitted with the new rotor system including the upgraded composite-blade main rotor, upgraded hub, beefed-up powertrain and X-shaped tail rotor kicked off at the flight test facility of the National Helicopter Industry Centre in Tomilino (Moscow Region) in autumn 2012. The tests demonstrated a main rotor vibration reduction and a 700-kgf increase in the main rotor thrust with a simultaneous directional control stability increase owing to the advanced X-shaped tail rotor. During the trials, the flying testbed produced a maximum speed of 300 km/h (the max speed of the production-standard Mi-171 is 250 km/h).

Early in 2012, the prototype-making facility of the National Helicopter Industry Centre in Tomilino started manufactur-

ing the first Mi-171A2 prototype (OP-1), using the airframe shipped by the Ulan-Ude Aviation Plant. The OP-1 made its debut in public in late August 2013 during the MAKS 2013 air show in Zhukovsky. Now, the aircraft is used in the ground tests of the KBO-17 avionics suite (by mid-2013, UIMDB had made four KBO-17-1 suits for the preliminary and integrated bench tests and for two Mi-171A2 prototypes).

The assembly of the second Mi-171A2 prototype, the OP-2, with the use of another UUAP-supplied airframe is nearing its end in Tomilino. The OP-2 is expected to commence its flight tests in mid-2014.

The Mi-171A2 certification test programme completion and IAC Aviation Registry type certificate release are slated for the second quarter of 2015. Then, UUAP is to launch Mi-171A2 full-rate production and delivery. Even now, major helicopter operators – both domestic and foreign – have displayed interest in the Mi-171A2. 



New glass cockpit of the Mi-171A2



Mi-171 flying testbed used for Mi-171A2's new rotor system and X-shaped tail rotor tests



YURI GUSKOV:

Phazotron-NIIR offers radars to fit any carriers

The Phazotron-NIIR corporation is known worldwide for its fire control radars designed to fit MiG fighters. Now, its radars equip MiG-29 aircraft in service with a quarter of a hundred air forces all over the world. The full-rate production of the Zhuk-ME radar is under way, with the radar fitting the advanced MiG-29SMT, MiG-29K/KUB and MiG-29M/M2 fighters and the MiG-29UPG fleet being upgraded for the Indian Air Force. The first Russian AESA radar, the Zhuk-AE, has been developed and tested to equip the MiG-35, and a sophisticated AESA radar is being developed with the use of 3D technology. Recently, helicopter radars have climbed higher on Phazotron-NIIR's priority list. The corporation has wrapped up the tests and been running mass deliveries of radars to fit the Army's Ka-52 combat helicopters and is gearing up for the delivery of the advanced radar in support of the upgrade of the Navy's Ka-27 helicopter fleet. In the run-up to the Farnborough air show, we had met Phazotron-NIIR Designer General Yuri Guskov and asked him for a rundown on the key current airborne radar programmes.

Mr. Guskov, would you please tell us about Phazotron-NIIR's key novelty — the AESA radar reliant on 3D technology?

For starters, I would like to remind you that as far back as 2010, Phazotron-NIIR developed an AESA radar for the MiG-35 multirole fighters, a contestant of the competition for supplying the Indian Air Force with 126 aircraft under the MMRCA programme. The AESA radar developed in cooperation with the Micran company was multifunctional and multimode and capable, inter alia, of the air-to-air and air-to-surface modes needed by the MiG-35 to accomplish its missions. The radar was praised by Indians, and its characteristics were proven in the tender's qualification tests that culminated in the launch of an RVV-AE missile at an aerial target.

The original solutions embodied in the Phazotron-NIIR Zhuk-AE AESA radar were

recognised worldwide, a case in point being their use as part of radar development abroad.

Phazotron-NIIR's AESA design technology ensured good progress in the development of airborne, ground-based and shipborne radars.

Truth be told, the customer is at times apprehensive of the high initial cost of AESA radars. Owing to the high reliability of AESA radars, however, the drawback is heavily offset by their low operating costs compared with traditional radars comprising an antenna, a separate transmitter and receiver, etc. Overall, a comparison of all life-cycle costs incurred, AESA radars are far less expensive.

Lately, Phazotron-NIIR has been developing a whole range of advanced radars. In cooperation with the NIIPPP Semiconductor Instrument Research Institute in the city of Tomsk, we have developed a 3D monolith

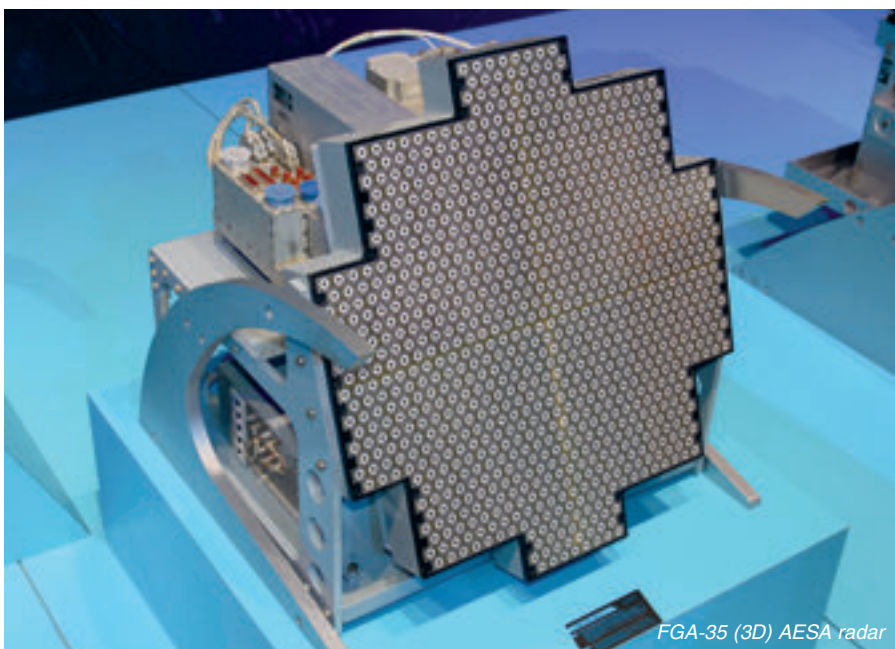
transmit-receive (T-R) module based on low-temperature co-fired ceramics (LTCC). The scientific and technical progress made allows transition to design work on a whole range of AESA radars with 3D technology-based T-R modules. At the MAKS 2013 air show last year, Phazotron-NIIR unveiled its FGA-35 (3D) radar slated for flight tests in the near future.

Does the development of the Zhuk-ME slot array radar family carry on?

Our baseline Zhuk-ME radar has undergone several upgrades aimed at enhancing its tactical capabilities, introducing advanced operating modes, refining its electronic countermeasures (ECM) immunity, etc.

The first version of the radar, the FGM29, equips the MiG-29SMT fighter that is in service with several air forces. Its variants, the FGM129 and FGM229 that are more sophisticated, are in full-rate production by Phazotron-NIIR and the Ryazan State Instrument-making Enterprise (GRPZ). The former fits the MiG-29K/KUB fighters produced by the MiG corporation for the Indian Navy (to date, almost 30 aircraft furnished with our Zhuk-ME radars have been delivered, with a total of 45 aircraft having been ordered). The FGM229 is used for upgrading the Indian Air Force's MiG-29 fighter fleet under the MiG-29UPG programme. The customer has received the first six upgraded fighters, including four FGM229-equipped MiG-29UPG singleseaters upgraded in Russia. Last year, we started supplying knockdown kits for the upgrade of MiG-29s in India. 16 kits have been shipped to the customer that is poised to upgrade upwards of 60 MiG-29s.

A variant of the Zhuk-ME (FGM229) is the radars that Phazotron-NIIR is supplying to fit the MiG-29K/KUB and MiG-29SMT fighters ordered by the Russian Defence Ministry. Last year, the customer took delivery of the first four MiG-29K/KUBs. They are being



FGA-35 (3D) AESA radar

tested now. This year, we are to provide the MiG corporation with 10 more radar kits to equip such aircraft intended for Russia's Naval Aviation. In addition, the fulfilment of the 16 MiG-29SMTs order for the Russian Air Force is beginning, and we are preparing for shipping radars made for these fighters. At the same time, we are drawing a plan of the modernisation of the Zhuk-ME radars mounted on RusAF's in-service re-exported MiG-29SMTs.

A decision is being made as to the configuration of the MiG-35S fighter to be ordered by the Russian Defence Ministry. Possibly, the customer may opt for a radar of the proven — and less expensive — Zhuk-ME family. In such a case, the work on enhancing their performance will continue. I would like to emphasise, however, that we, at Phazotron-NIIR, are certain that the future belongs to AESA radars and hopeful that MiG-35s carrying our FGA-35 radars, including those based on the 3D technology, will make it to combat units sooner or later.

Recently, Phazotron-NIIR has explored the helicopter radar field that is new to it...

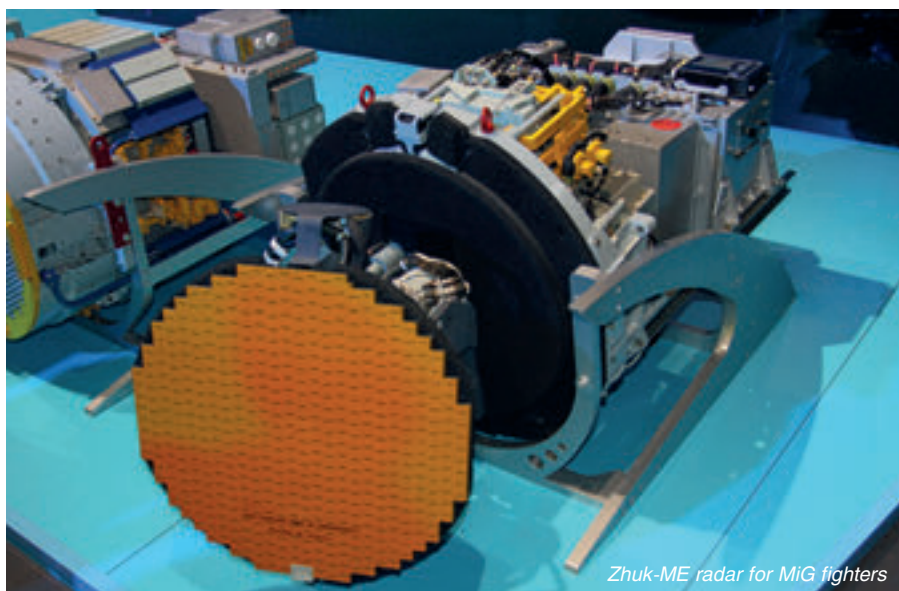
Indeed, Phazotron-NIIR has made good progress in the helicopter radars equipping the helicopter of Kamov company, which has been proved by their overcoming of unavoidable teething troubles.

The Arbalet-52 (FH01) radar is being fielded as part of the Ka-52 helicopter and has proven itself as part of the machine's avionics suite.

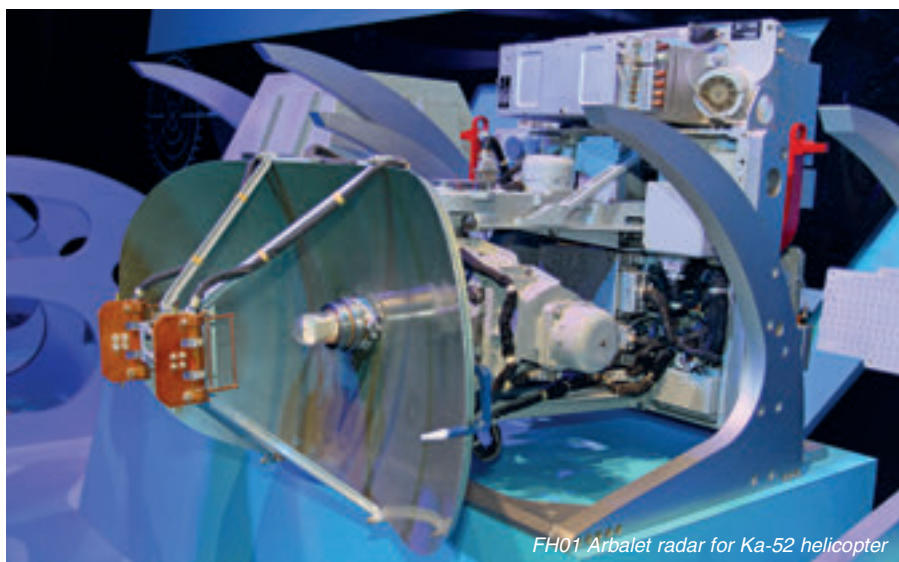
The official trials of the radar as part of the Ka-52 were completed in 2011, and its full-scale production is under way now. Arbalet-52s are assembled at our Ryazan-based facility — the Rassvet research institute. The growth of the facility enables us to fulfil our share of the Governmental Defence Acquisition Programme, which accounts for 20 radars a year or more. Today, around 60 Ka-52s are used by the military — all carrying our Arbalets.

At present, we are conducting a feasibility study for beefing up the functions and characteristics of the radar that we have offered for installation in the Ka-52's shipborne derivative, the Ka-52K, designed for operations off Mistral-class amphibious assault ships. The Arbalet's derivative dubbed FH02 is to be given the X-band capability in addition to the Ka-band. This will step up the radar's effectiveness against surface targets. Whether AESA technologies will be introduced to heliborne radars or not remains to be seen. Mention should be made, however, that we have a number of attractive offers as for heliborne AESA radars featuring affordable prices.

The second major helicopter-related programme of ours is the development of the FHA (Kopyo-A) airborne radar intended for Ka-27 helicopter family upgrade. The upgraded machine will get not only our radar but also an advanced radar command tactical system comprising, in addition to the FHA radar, a



Zhuk-ME radar for MiG fighters



FH01 Arbalet radar for Ka-52 helicopter

whole range of advanced subsystems, e.g. the hydro-acoustic, magnetic anomaly detection and electronic intelligence ones, etc. Under the programme, Phazotron-NIIR is dual-hatted as both the radar developer and integrator of the whole radar command tactical system, for which it supplies a digital computer and the navigator's display.

Having passed all bench tests, the Kopyo-A omnirange radar with the reflector antenna was subjected to flight tests on board two upgraded prototype helicopters in summer 2012. The official trials were complete in late 2013. I hope the upgraded Ka-27's service entry will start soon. As is known, about 50 Ka-27s operated by the Russian Navy are slated for upgrade in this manner.

Overhauled and upgraded using our advanced radar command tactical system, the Ka-27 will be able to remain in service with the Navy until the end of the decade at the least, with their operating effectiveness to be stepped up by far.

Further, we hope Phazotron-NIIR will be contracted to take part in the development of the future naval helicopter, for which we will be able to offer a cutting-edge avionics suite that we are prepared to develop based on our expertise in the Ka-52K's two-band radar and the upgraded Ka-27's radar command tactical system.

Mind you, based on the scientific and technical solutions available, Phazotron-NIIR offers heliborne radars featuring a wide range of characteristics — from omnidirectional long-range ones to compact radars for search-and-rescue, transport and other helicopters.

In conclusion, I would like to stress yet again that the Phazotron-NIIR corporation has gained a wealth of experience in designing top-notch radars or various application, and we are ready to meet virtually any customer request in terms of development of advanced radars in various classes for virtually any platforms.



*High-ergonomic cockpit
of Tu-204SM airliner
with UIMDB JSC equipment*

INNOVATION PRODUCTS OF ULYANOVSK INSTRUMENT MANUFACTURING DESIGN BUREAU JSC

In May 2014 Ulyanovsk Instrument Manufacturing Design Bureau JSC, a member of the largest concern Radio-Electronic Technologies of Rostech state corporation, celebrated the 60th anniversary of its establishment.

The company started its activity with development and production of electrical-mechanical airborne instruments: sensors, annunciators, altitude/airspeed indicators, magnetic compasses, astrocompasses and cockpit lighting fixtures, and then owing to the intensive research and development activity as well as permanent improvement

of the technological processes it commenced manufacture of electronic complexes and high precision measuring systems for aircraft and helicopters.

Nowadays UIMDB JSC provides development, production and after-sale service of airborne products, ground military equipment and industrial equipment. The company implements in the interests of the Russian aerospace industry a number of significant prospective projects including development and production of avionics for Tu-204SM, Sukhoi Superjet 100, MC-21 as well as for helicopters Ka-226, Mi-171A2, etc., par-

ticipates in development and production of automatic control systems for hydro power stations, ground and medical equipment.

Among UIMDB innovation developments is creation of the system of an essentially new class — aircraft and helicopter equipment control systems. The use of such systems made it possible to significantly decrease the pilot load, increase flight safety, and in projects Tu-204SM and Mi-171A2 to change over to two-pilot aircrew. Aircraft equipment control system (AECS) is designed in such a way that the functions of the aircrew, performed by a flight engineer on the previous

modifications, are performed by AECS. It has been integrated almost in all main aircraft systems (hydraulic, landing gear, power supply, etc.). AECS provides control, warning and monitoring of the technical state of aircraft systems.

Besides onboard maintenance system (OMS) has been developed for Tu-204SM aircraft. The use of OMS allowed to reduce the time and financial expenditure for aircraft maintenance.

High-ergonomic cockpit is equipped with new complex electronic display and warning system KSEIS-204E, developed by UIMDB, with displays of larger diagonal and trackball control devices. Trackball control device made it possible to implement interactive control of information display on the screens of the display units, to use different menus, windows and cursor. The pilots can easily and quickly fetch the required information and remove unnecessary information.

The aircraft equipment also included updated digital air data measuring system of high efficiency and reliability, new onboard reference information system.

Tu-204SM passenger aircraft with equipment developed by UIMDB, was certified by Interstate Aviation Committee Aviation Register in late May 2013.

The use of UIMDB innovation products as a part of Tu-204SM aircraft onboard electronic equipment ensured:

- increase of flight safety owing to aircrew load reduction;
- reduction of onboard equipment mass by 2.5 times as compared with the previous modification;
- increase of test coverage;
- reduction of the time for preflight maintenance and scheduled maintenance.

It is a substantial fact that all UIMDB design departments made a considerable contribution in the development of onboard systems of MC-21 long-haul aircraft of 21st century. SUOSO-MC-21 aircraft equipment control system, SIVD-21 air data measuring system, display units and control panels included in the integrated onboard equipment complex designed to create a unified cockpit information-control area are under development in UIMDB.

Among new directions of activity there can be marked the functions of Competence Centre appointed to UIMDB on development and production of onboard equipment complexes for transport helicopters. By the decision of Russian Helicopters holding company council of experts the company was assigned to be the leading executor on development of onboard equipment complex for Mi-171A2 helicopter. KBO-17 onboard equipment complex is designed to provide

reliable and efficient solution of the helicopter flight management tasks, regular and safe performing of flights in the daytime and at night under simple and adverse weather conditions; to transport passengers and cargo in different physical-geographical and climatic conditions both by instrument flight rules and visual flight rules. Safety of performing flights is mainly ensured by KBO-17 systems, which provide warning about critical conditions of piloting, determining airspeed and wind direction during take-off and landing, warning and avoidance of external obstacles collision, as well as by 24-hour surveillance system of outside cockpit area of forward, backward and down-look semispheres. Mi-171A2 helicopter aircrew consists of two pilots as opposed to three-pilot aircrew of the Mi-8/17 helicopters. This was the result of one of the innovation technical solutions – the use of SUOVO-V1 helicopter equipment control system in KBO-17 complex. Owing to high level of helicopter equipment control procedures automation the overhead panel composition was simplified and the pilots could perform helicopter equipment control functions, thus it allowed excluding the flight engineer from the aircrew. New capabilities of the equipment and reduction of the number of the aircrew significantly decreases the helicopter operation cost. Besides within the frame of onboard equipment complex UIMDB developed KSEIS-V1 integrated display and warning system for Mi-171A2 helicopter. The new directions of activity also include development of environmental control systems for passenger and transport aircraft, integrated complexes of onboard equipment for small aircraft and strapdown integrated systems for determining spatial orientation and navigation parameters for aircraft and ground equipment. At present UIMDB is engaged in creating of environmental control systems control means for MC-21 aircraft and integrated complexes of onboard equipment for DA-42 aircraft.

The company has positive experience in development of integrated standby instrument systems with application of MEMS sensors. Owing to this the company managed to implement up-to-date technologies of development and production of smart inertial systems of middle class accuracy based on advanced functional electronics: MEMS-technologies of micro system equipment and fiber-optic equipment. This has become the basis for creation of price and performance characteristics competitive systems of orientation and navigation of domestic production intended for the equipment of aircraft of new generation (mainly for helicopter complexes) and ground equipment of special purpose.



Mi-171A2 helicopter cockpit equipped with KBO-17 onboard equipment complex

UIMDB innovation developments meet the requirements of international standards ARP4754, ARP4761, DO-160G, DO-178C, DO-254, etc.

All the above UIMDB achievements would not be possible without cardinal retooling the company. Nowadays the up-to-date equipment for surface mounting with application of vapor-phase soldering is used in the assembling process. There was implemented the mechanical production retrofit program, there were purchased and put into operation more than 20 pcs. of equipment. There was arranged the bay of automatic painting and laser treatment of the front panels with LEDs for control panels designed for aircraft cockpit equipment as well as of adjustment of backlight lighting parameters, and coating the products with protective varnish. The check-out test centre has been completely retrofitted and the unique equipment for electromagnetic compatibility and lighting induced process resistance testing has been also installed there. To check the parameters of the air data measuring instruments the calibration laboratory is equipped with the advanced checkout equipment, and the aerodynamic laboratory is equipped with a new wind tunnel – airspeed reference, and aerorefrigeration tube. All the equipment of the check-out test centre was qualified at VNIIFTRI, accredited in IAC Aviation Register and a license for conducting tests of airborne equipment is obtained. Thus the designers of UIMDB and other Russian companies have the possibility of conducting research and tests to meet DO-160G and airworthiness requirements.

Sixty years of successful development is the result of qualitative management and conscientious work of the employees striving for prospects. The reliable characteristics of UIMDB products regularly get high assessment of aircraft and helicopter construction enterprises as well as Russian airlines.

Nikolay Makarov,
Director General, UIMDB JSC,
Andrey Yukov,
Chief Designer, UIMDB JSC

Voronezh-built An-148s for governmental customers

According to the official governmental acquisition website (zakupki.gov.ru), the United Aircraft Corporation (UAC) and Federal Security Service made a governmental contract for three An-148-100EA airliners on 24 April 2014 based on the outcome of a tender. Under the tender's terms published at the website, two planes are to have the 49-seat two-class layout, while the third one is to have a 35-seat three-class layout. The former two aircraft are to be delivered prior to late December 2014 and late March 2015 respectively, with the third one, the three-class aircraft, before late 2015.

The An-148-100EAs are to be made by UAC's subsidiary VASO in Voronezh, with UAC and VASO having signed a contract to this effect on 19 May 2014.

Owing to the deal, VASO has finally found a buyer for the two An-148-100Es with the 'English-language' cockpits, sitting idly at its plant. The planes were built for the Myanmar Defence Ministry in 2010–11. As is known, the first of them (c/n 41-01, tail number 61707) first flew in Voronezh on 2 November 2010. The other Myanmar-intended An-148 was to be the aircraft c/n 41-03 (61708) that made its first flight on 3 January 2011. However, the aircraft crashed on 5 March of the same year on a training flight, with the customer's representatives on board.

According to the crash probe report released by the Industry and Trade Ministry and UAC, the crash was caused by "an unintended assuming of the speed exceeding the maximal IAS by 110 km/h (which is

higher than the limit rated speed) during the urgent descent. This resulted in the deformation of the aircraft, low-frequency oscillation of the aircraft along all axes, and an increase of alternating loads exceeding the aircraft reserve factor. As a result, the aircraft disintegrated in mid-air with the subsequent collision with the ground".

VASO made another An-148-100E with the same layout (c/n 41-09, 61712) in the same year as a replacement to the aircraft lost. The replacement first flew on 21 November 2011. However, the customer was in no rush to collect its planes. The delivery of the two An-148s to Myanmar had been in suspense for a long time, until a final solution was made to terminate the contract. Seeking after new customers for aircraft 61707 and 61712, the manufacturer had kept them in store. At last, their fate has been sealed.

Prior to delivery to the Federal Security Service, the aircraft will be given relevant improvements resulting in the 49-seat two-class passenger cabin and will be tailored to the requirements specification issued

by the customer. One of the planes is to enter operation before year-end, with the other to follow suit three months later.

The third aircraft with a 35-seat three-class cabin will have been made by VASO from scratch before end of next year.

After receiving the three planes, the air branch of Federal Security Service will have a fleet of four An-148s. As is known, the first An-148-100EA (RA-61719) designed for the service was made by VASO last year under the contract dated 29 April 2013. It has a three-class 39-seat layout ('key passenger' cabin with two seats and a sofa, business class with 12 seats and economy class with 25 seats) and is generally similar to the two An-148-100EAs ordered by the Presidential Property Management Department and delivered to the Rossiya special air detachment during 2012–13. The plane conducted its maiden flight on 30 November 2013 and was accepted by the customer on 23 January 2014. On the next day, the aircraft departed for the Moscow's Vnukovo airport, where it has been based side

by side with other aircraft of the type in service with Rossiya special air detachment.

An-148 deliveries to governmental customers make up the mainstay of VASO's An-148 production programme. The first two contracts – for a pair of An-148-100EM convertible passenger/medevac planes for the Russian Emergencies Ministry and two An-148-100EAs with the separate comfortable main cabin and a total of 39 seats, including 12 in business class and 25 in economy class, for the Rossiya special air detachment – were awarded in 2010–11. The first An-148-100EA (RA-61716) was made and delivered to the customer in late 2012. The contracts were fulfilled last year, with the presidential air detachment having received its second An-148-100EA (RA-61720) and the Emergencies Ministry's air arm its both An-148-100EM convertibles (RA-61715, RA-61717). The former are based in Vnukovo and the latter in Ramenskoye, all being operated pretty heavily in accordance with their purpose.

In May last year, UAC and the Russian Defence Ministry made a major deal for 15 An-148-100Es to be delivered during 2013 through 2017. The first aircraft under the contract (RA-61718), which had the standard 68-seat cabin layout, was delivered to RusAF in December 2013. The manufacturer submitted the second aircraft (RA-61721) for testing in December last year – ahead of schedule. This year, VASO is going to manufacture four more aircraft for the Russian military. One of them, RA-61722, was flight-tested in March, with the next one, RA-61723, to be tested in flight in July.



Alexey Mikheyev



Alexey Boyarin

Cubana gets fourth An-158

Vyacheslav Smigunov



c/n 201-05 is expected to be headed to the Island of freedom this summer, with the sixth one (c/n 201-06) in autumn, unless, of course, the contract is not hampered by external circumstances stemming from the ongoing politico-economic crisis in Ukraine.

It is worth mentioning that Ilyushin Finance Co. who organise An-158 export deliveries to Cuba has a good experience of cooperation with this country. In 2005–08 it delivered seven Russian-made planes to Cuba, three of them being Ilyushin Il-96-300 wide-bodies (the third one can have its cabin convert-

The handover of another An-158 regional aircraft built by the Antonov aircraft plant this spring for Cuban airline Cubana de Aviacion took place in a ceremony on the premises of the Antonov state company in Kiev on 30 April 2014. That was the fourth An-158 supplied to Cuba. The first three aircraft were delivered to Cubana de Aviacion in April, July and August 2013 under the July 2012 trilateral contract signed by Antonov, Russia's Ilyushin Finance Co. and Cubana de Aviacion.

At the same time with the handover of the third An-158, another firm contract was made during the MAKS 2013 air show, on 28 August 2013, for delivery of three more An-158s to the Cuban carrier in 2014.

The first plane under the new contract (c/n 201-04) first flew in Kiev on 4 April 2014, controlled by the crew of Antonov test pilots Vladimir Mosin and Bogdan Zagorulko as well as test engineer Sergei Darich. On its maiden flight, the aircraft already sported Cubana's livery and Cuban registration number CU-T1714. Following brief pre-delivery and acceptance tests, the aircraft had been ready for the flight to Cuba by late April.

Addressing the fourth An-158's handover ceremony, Antonov vice-president and plant director Nikolai Podgrebelny said: "Today, we are handing the fourth An-158 aircraft over to the Cuban operator. We plan to deliver two more aircraft of the



Vasily Koba

type and another An-148 VIP plane before year-end. Thus, we are making another step towards ramping up the full-rate production of the type in Ukraine".

The symbolic key to the aircraft was given to Cubana de Aviacion pilot Orlando Fernandez Cid. Sharing his impression of the An-158, the Cuban pilot said: "We are very pleased with the quality of the plane. It has been successfully adapted with our company. Today, An-158s fly both in Cuba and to Santo Domingo, Venezuela, Costa Rica, Nicaragua and the Bahamas. We plan to launch services to Canada, Columbia and Mexico".

During the handover ceremony, the airline's representatives also were given a copy of the An-158 supplementary type certificate allowing the type's operation in mountainous terrain from airfields situated at

4,100 m above sea level. This will expand the operating envelope of the type in Latin America by far.

The fourth An-158 set off for Cuba on the same day and arrived in Havana on 1 May 2014.

The Antonov plant carries on the assembly of two more An-158s for the Cuban carrier. The fifth airliner

ed to the VIP standard for national leaders), two medium-haul Tupolev Tu-204-100Es and two Tu-204CE freighters. During Russian Premier Dmitry Medvedev's visit to Cuba in February 2013, the Cubans said they intended to buy several Il-96 wide-body airliners more and two Tu-204SMS in Russia.



Antonov



SSJ100

THREE YEARS IN SERVICE

Andrey FOMIN

June 2014 marked three years since advanced Sukhoi Superjet 100 regional airliners launched commercial operations in Russia, with the first revenue flight of Aeroflot's SSJ100 taking place on 16 June 2011. The three years since then have provided a lot of experience in passenger traffic on the new type and allowed removal of many of the teething troubles that hampered the early stage of the operation. Today, Aeroflot operates 10 Superjets, which number in the flag carrier's fleet is to grow up to 30 in the future. In addition, two SSJ100s has been flown on scheduled passenger services since early last year by the Yakutia airline, and two have been operated since August 2013 by Moskovia. March this year saw the beginning of the operation of an extended-range SSJ100-95LR by Gazpromavia and chartered flights by the Center-South air carrier, with the kick-off of the operation of SSJ100-95LRs by UTair-Express to become the key event of this summer. Special hopes are pinned on this air company, for it is believed to be able to make the airliner do its best and display the highest operating parameters in Russia. For a number of objective and subjective reasons, the indices of the domestic carriers are yet no match to those displayed by the Superjets operated by Mexican airline InterJet. Therefore, those concerned are looking forward to the SSJ100's debut with the UTair group.

Superjets in service with Aeroflot

The first 10 SSJ100-95Bs in the so called light version were delivered to Aeroflot between June 2011 and September 2012. In May last year, the contract-stipulated

gradual replacement of the aircraft with those in the full version began. Nine units had replaced within a year (the ninth aircraft in the full configuration, RA-89026, c/n 95051, was delivered on 14 May 2014). The

10th SSJ100-95B in the full configuration (RA-89027, c/n 95053) was being accepted by the customer at the Zhukovsky facility of the Sukhoi Civil Aircraft company (SCAC) in early June after its customisation. After that, Aeroflot's Superjet aircraft fleet, totalling 10 aircraft throughout a year and nine months, will start growing gradually to the 30 units provided for by the contract. As of late June, the 11th aircraft designed for the flag carrier (RA-89028, c/n 95059) had been customised and the customer was accepting it. The 12th aircraft (RA-89041, c/n 95063) was being customised in Ulyanovsk, and another one (c/n 95068) was in the final assembly shop of the Komsomolsk-on-Amur affiliate of SCAC.

All Superjets designed for Aeroflot have the two-class 87-seat layout, with 12 seats in business class and 75 in economy class. The full configuration airliners feature



The operation of SSJ100s by UTair, which is to begin this summer, is expected to produce the results that other Russian air carriers have not attained yet. Photo: the roll-out of the freshly-painted SSJ100-95LR for UTair-Express airline. Ulyanovsk, 29 May 2014

modified avionics suite and higher comfort. In particular, they carry an improved flight control system, a wind shear measurement-capable weather radar, an extra flight attendant seat, the third lavatory and the fourth galley. Individual fanning over every passenger seat has been introduced.

Ten light-version aircraft earlier delivered to Aeroflot have been already returned to the manufacturer by late June 2014, with four of them having found new operators (two had been sold to Center-South, one to Moskovia and another one to the Special Air Detachment of the Russian Ministry of the Interior). Prior to the return to the manufacturer, Aeroflot's RA-89008 (c/n 95016) had logged the longest flight time – 3,464 flight hours on 2,245 services, while the shortest time – 1,631 h on 1,081 operations – had been logged by RA-89006 (c/n 95014).

By May this year, Aeroflot's SSJ100s had conducted 19,900 revenue flights, having logged a total of 29,900 hours. A flight had averaged 1.5 h, and an average monthly flight time logged per aircraft during the aforesaid period had equalled around 113 h. The highest monthly flight time had been logged by RA-89008, when this parameter accounted for almost 260 h in October 2013.

No doubt, Aeroflot should be given its due for its having become the SSJ100's Russian launch customer that ensured the introduction of a radically new aircraft type having unavoidable teething troubles. That was no small beer, but the flag carrier handled it well.

The routes serviced by Aeroflot's SSJ100s include about 50 destinations in Russia, other former Soviet countries and EU states. In May and June this year, the Aeroflot's Superjets flew from Sheremetyevo to Kazan, Magnitogorsk, Naberezhnye Chelny, Nizhnevartovsk, Nizhny Novgorod, Orenburg, Perm, Samara, Tyumen and Ufa as well as Dnepropetrovsk, Donetsk, Kharkov, Minsk, and Odessa. The European destinations included Bucharest, Dresden, Krakow, Oslo and Warsaw.

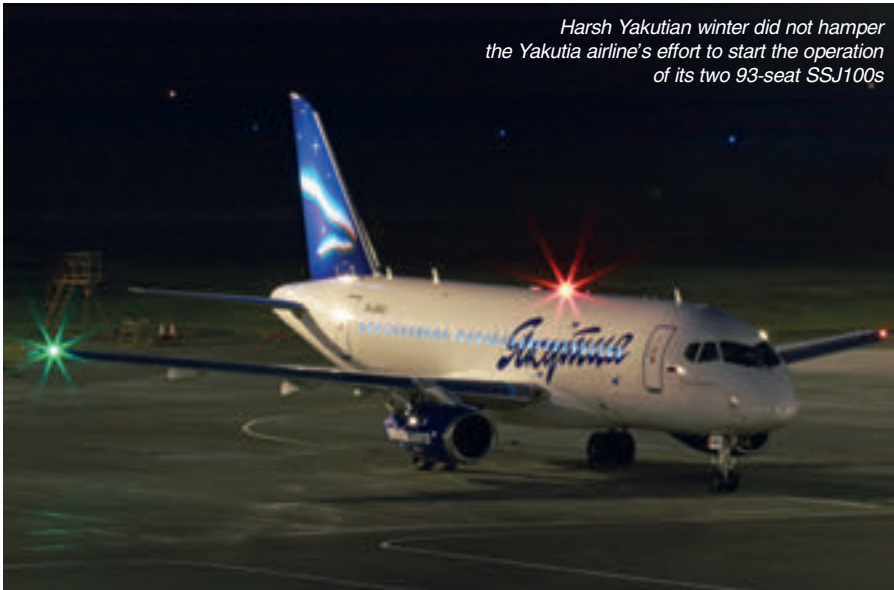
In frosty Yakutia

The second Russian carrier to operate the SSJ100 was the Yakutia airline that ordered two planes in 2013. The order was fulfilled under the Republic of Sakha (Yakutia) 2012–16 Transport System Development governmental programme. Both aircraft have the identical 93-seat configuration, with eight business-class seats with the 36-inch (965-mm) pitch and 85 economy-class seats pitched at 31 inches (787 mm).

For almost two years, Aeroflot's aircraft fleet has been made up of ten SSJ100-95Bs, but now it will begin to increase to the contract-stipulated 30 aircraft, once the final 10th aircraft in the 'light' variant has been replaced with one in the 'full' version



Harsh Yakutian winter did not hamper the Yakutia airline's effort to start the operation of its two 93-seat SSJ100s



Andrey Chursin

The first scheduled passenger flight on the Yakutsk–Khabarovsk line was conducted by Yakutia's SSJ100 on 23 January 2013. At the initial stage of SSJ100 operations by Yakutia, the air company devised an individual set of destinations throughout Siberia and the Russian Far East as well as some Chinese and Japanese cities. By August 2013, Yakutia's SSJ100 had flown to 13 destinations, operating from Yakutsk, Irkutsk, Khabarovsk, Neryungri, Novosibirsk and Magadan. Since July 2013, Yakutia has been implementing a charter flight programme from Vladivostok and Khabarovsk to Osaka and Niigata in Japan.

As of 1 May 2014, the two Yakutia's SSJ100s logged a total of 3,693 flying hours on 1,565 flights, with a flight averaging

2 h 30 min. The monthly time logged per plane during the first year of the operation of Yakutia's SSJ100s accounted for about 120 h. RA-89011 logged the greatest monthly flight time per plane in July 2013 – 171 h.

Apprehensions of possible problems with operating the SSJ100s under harsh Siberian winter condition have proven to be wrong. As far back as the planes' service entry with the airline, ambient temperature in Yakutsk had been -47°C for a month and the airliners were not housed in a warm hangar.

The 2014 summer schedule of the Yakutia carrier includes scheduled flights of its SSJ100s from Yakutsk to Vladivostok, Novosibirsk, Khabarovsk and Harbin, from Khabarovsk to Magadan and from Novosibirsk to Yekaterinburg and Neryungri.

Moskovia as third Russian SSJ100 user

The Sukhoi Superjet 100 (RA-89021) of the Moskovia airline performed its first revenue operation from Domodedovo (Moscow) to Montenegrin airport Tivat on 11 August 2013. This was the kickoff of the operation of Superjets by the third air carrier in Russia.

The contract for two SSJ100-95Bs was made by the SCAC and Moskovia airline on 28 December 2012, having stemmed from the August 2011 letter of intent stipulating the delivery of three SSJ100-95Bs starting from 2013 with two options.

RA-89021 (c/n 95021), which started flying for Moskovia, had been made in 2012 and had been initially intended for Armenian carrier Armavia. However, the delivery did not take place due to the carrier's difficult circumstances. Then, Moskovia received another SSJ100-95B (c/n 95008, RA-89001) – the former first SSJ100 of Aeroflot, which had been returned to the manufacturer in April 2013 as part of the replacement of the first 10 light-configuration aircraft with brand-new full-configuration ones. RA-89001 had logged slightly more than 2,200 h on 1,600 flights for Aeroflot. Prior to the delivery to Moskovia, the aircraft had been repainted and its cabin had been given a new layout in a manner similar to RA-89021 – eight seats in business class and 85 in economy class. RA-89001 in the Moskovia livery flew its first revenue service on the Moscow–Yerevan line on 23 August 2013.

Last year, Moskovia's Superjets operated from Moscow's Domodedovo on the services to Tivat, Gyanja, Yerevan and Stavropol and from Surgut to Anapa and Gelendzhik.

The Gazpromavia has taken delivery of five 90-seat extended-range SSJ100-95LRs, but it is starting their operation in an unhurried fashion: only the first three aircraft have been flying revenue services by July 2014



Mikhail Polyakov

Quite a hurdle to RA-89021 was the two-week intensive operation programme in support of Moroccan air company Royal Air Maroc from 21 December 2013 to 5 January 2014, when the airliner conducted scheduled operations from Casablanca to Berlin, Munich, Copenhagen, Torino, Tunis and Banjul (The Gambia), with the lines varying in length from 2,200 km to 2,900 km. The Superjet performed well on those flights.

Over the first nine months of their service with Moskovia, the SSJ100s paved the way to three dozen Russian and foreign airports, including Anapa, Astrakhan, Belgorod, Chelyabinsk, Gelendzik, Kaliningrad, Nizhny Novgorod, Rostov-on-Don, St. Petersburg, Stavropol, Sochi, Surgut and Yekaterinburg as well as Gyanja, Yerevan, Karshi, Navoi, Namangan and Samarkand in CIS countries and Antalya, Munich, Podgorica, Prague, Sarajevo and Tivat in Europe.

As of 1 May 2014, Moskovia's Superjets logged 1,258 h on 513 flight (an average flight lasted 2.3 h) with an average monthly flight time per plane equalling about 93 h. The two SSJ100s accumulated their maximum flight time – 210 h – in October 2013.

The third SSJ100 (RA-89002, c/n 95010) has started commercial operations with Moskovia on 3 July 2014. Previously, it flew for Aeroflot, having logged over 2,300 h on 1,625 flights.

Gazprom and UTair opt for extended range

A new Russian user of the SSJ100 – Gazpromavia – received its first aircraft of the type in a ceremony during the MAKSS 2013 air show in late August 2013. The plane with c/n 95033 is the first production-standard extended-range SSJ100-95LR. Overall, Gazpromavia shall take delivery of 10 airliners of the type under the August 2011 contract.

The modified SSJ100 in the LR variant seats the same number of passengers out to 4,580 km (the baseline model – SSJ100-95B – carries them at a distance of 3,050 km). The extended range is owing to the maximum takeoff weight increase from 45,880 kg to 49,450 kg with minor structural modifications. The LR version is powered by SaM146-1S18 engines that feature a 5% increase in thrust.

Gazpromavia's aircraft have the 90-seat economy-class layout, with the two front seat rows (10 seats) have a pitch of 34 inches (864 mm) and the rest 16 rows separated by a curtain have a tighter pitch of 30 inches (762 mm).

The first SSJ100-95LR for Gazpromavia (c/n 95033, RA-89018) was ferried to the carrier's base in Ostafyevo, Moscow Region,

SSJ100 airliners in commercial service, June 2014					
Airline	Reg.number	c/n	First flight date	Delivery date	Start of operations
Aeroflot	RA-89014	95025	22.02.2013	31.05.2013	June 2013
	RA-89015	95029	02.07.2013	28.08.2013	Sept 2013
	RA-89017	95035	15.09.2013	16.12.2013	Dec 2013
	RA-89022	95039	18.10.2013	27.12.2013	Jan 2014
	RA-89023	95041	21.11.2013	29.01.2014	Jan 2014
	RA-89032	95043	01.12.2013	30.01.2014	Jan 2014
	RA-89024	95044	23.01.2014	28.03.2014	Apr 2014
	RA-89025	95047	19.02.2014	30.04.2014	May 2014
	RA-89026	95051	05.03.2014	14.05.2014	May 2014
Yakutia	RA-89011	95019	13.08.2012	18.12.2012	Jan 2013
	RA-89012	95020	25.11.2012	31.01.2013	Feb 2013
Moskovia	RA-89021	95021	03.06.2012	09.08.2013	Aug 2013
	RA-89001*	95008	31.01.2011	23.08.2013	Aug 2013
Gazprom Avia	RA-89018	95033	09.08.2013	17.10.2013	March 2014
	RA-89020	95055	09.12.2013	28.01.2014	May 2014
	RA-89019	95056	14.12.2013	29.01.2014	June 2014
	RA-89029	95057	10.03.2014	19.05.2014	**
	RA-89030	95058	31.03.2014	30.05.2014	**
Centre-South	RA-89004*	95012	07.11.2011	20.03.2014	March 2014
	RA-89007*	95015	10.12.2011	02.04.2014	June 2014
Sky Aviation	PK-ECL	95022	20.10.2012	29.12.2012	March 2013***
	PK-ECM	95027	27.04.2013	20.08.2013	Sept 2013***
	PK-ECN	95031	03.06.2013	18.12.2013	Dec 2013***
Lao Central	RDPL-34195	95026	12.12.2012	15.02.2013	March 2013****
Interjet	XA-JLG	95023	12.09.2012	18.06.2013	Sept 2013
	XA-JJR	95024	16.12.2012	02.08.2013	Sept 2013
	XA-JLV	95028	24.03.2013	05.11.2013	Nov 2013
	XA-ABM	95036	19.06.2013	21.12.2013	Jan 2014
	XA-NSG	95034	28.08.2013	01.02.2014	Feb 2014
	XA-OAA	95038	06.10.2013	14.03.2014	March 2014
	XA-PBA	95040	02.11.2013	25.04.2014	May 2014
	XA-JLP	95042	12.11.2013	07.06.2014	June 2014
* second-hand aircraft			*** airline suspended its flight operations on 19 March 2014		
** operations haven't started by June 2014			**** airline suspended its flight operations on 24 December 2013		

SSJ100 commercial service statistics by 1 May 2014							
Airline	First commercial service	Aircraft number *	Flights number	Flight hours	Average statistics per aircraft		
					Monthly flight hours	Flights per day	Flight duration, h
Armavia**	21.04.2011	–	956	2,284	122	1,7	2,4
Aeroflot	16.06.2011	10	19,859	29,897	113	2,5	1,5
Yakutia	23.01.2013	2	1,465	3,693	120	1,6	2,5
Moskovia	11.08.2013	2	513	1,258	93	1,6	2,3
Gazprom Avia	04.03.2014	1 (5)	n/a	n/a	n/a	n/a	n/a
Centre-South	22.03.2014	1 (2)	29	79	59	0,7	2,7
Sky Aviation***	23.03.2013	3	2,262	2,340	111	3,6	1,0
Lao Central****	24.03.2013	1	493	317	28	1,4	0,6
Interjet	18.09.2013	6 (8)	4,616	5,089	166	5,1	1,1
* number of aircraft in commercial service by 1 May 2014 (number of aircraft delivered to the airline by June 2014)				** airline ceased operations in October 2012			
				*** airline suspended its flight operations in March 2014			
				**** airline suspended its flight operations in December 2013			

on 17 October 2013. However, due to the need of processing a lot of documentation of the first Russian LR-version aircraft, Gazpromavia launched its revenue operations only in spring this year. The first flight from Vnukovo (Moscow) to Sovetsky (Khanty-Mansi Autonomous District) took place on 4 March 2014. During its first month in operation, RA-89018 paid visits to Belgorod, Yekaterinburg, Nadym, Nizhnekamsk, Novy Urengoi, Surgut, Chelyabinsk and Nukus (Uzbekistan),

having completed about 30 flights and logged about 70 flight hours.

Mention should be made that Gazpromavia has been introducing Superjets to its aircraft fleet without haste. The next two airliners of the type for the carrier (RA-89020 and RA-89019, c/n 95055 and 95056 respectively) were complete as far back as last December and were brought to the Ostafyevo airport late in January 2014, but RA-89020 made its first revenue flight from Vnukovo to Sovetsky on 20 May only, with

RA-89019 had its first commercial service on 18 June. In later May, two more new SSJ100-95LRs (RA-89029 and RA-89030, c/n 95057 and 95058 respectively) were delivered to Gazprom's Ostafyevo homebase. Meanwhile, the sixth Superjet designed for Gazpromavia (RA-89031, c/n 95064) first flew in Komsomolsk-on-Amur on 23 June 2014. According to the current plans, all 10 SSJ100-95LRs are to be delivered to the airline before year-end.

During the first three months of operations, the Gazpromavia's SSJ100s flew to Anapa, Arkhangelsk, Belgorod, Chelyabinsk, Gelendzhik, Krasnodar, Nady, Naberezhnye Chelny, Novy Urengoi, Nukus, Rostov-on-Don, Sovetsky, Surgut and Yekaterinburg. However, it is too early to draw conclusions, for Gazpromavia is clearly in no rush to use its SSJ100s to capacity.

In this connection, experts are looking forward to the commencement of SSJ100-95LR operations by another Russian user, UTair-Express that is going to receive 24 aircraft of the type in a tighter single-class cabin for 103 seats. A trilateral contract for the first six of the 24 SSJ100-95LRs, provided for by the 2011 contract, was made in late August 2013. The six aircraft are supposed to start their revenue operations before year-end. All of them will be entered into the Air Operator Certificate of a subsidiary of the UTair Group – UTair-Express LLC – and will be based in Ufa. The Ufa-based SSJ100s are planned for services to Surgut, Nizhnevartovsk, Novy Urengoi, Krasnodar, Sochi, Anapa, St. Petersburg and Moscow.

The first SSJ100-95LR designed for UTair-Express (RA-89033, c/n 95060) conducted its maiden flight in Komsomolsk-on-Amur on 26 April 2014 and a month later, on 29 May, was rolled out of the painting shop in Ulyanovsk and brought to the Aviastar close corporation for the cabin interior assembly. Interestingly, the UTair-Express airline has used the Superjet 100 to introduce a new, brighter livery for its planes. The first UTair-Express Superjet 100 is expected to start flying for the company in July. Meanwhile, the second SSJ100-95LR designed for the customer (RA-89034, c/n 95062) took to the air in Komsomolsk-on-Amur on 7 June 2014, with two more airliners (c/n 95067 and 95070) being assembled now.

Superjets in Southeast Asia

Last year's spring saw SSJ100s begin to fly in two Southeast Asian nations – Indonesia and Laos. Unfortunately, they do not fly now due to the difficult circumstances of their operators – Sky Aviation and Lao Central,

but the aircraft are in serviceable condition and ready for the resumption of operations as soon as the carriers are able to settle their economic issues.

The SSJ100's launch customer from the 'far abroad' was Indonesia's Sky Aviation that ordered 12 airliners from the SCAC. The first Superjet for Sky Aviation (c/n 95022, local reg. PK-ECL) was delivered on 27 February 2013, and its first revenue flight between Indonesian cities Makassar and Sorong took place just less than a month later, on 23 March. In August and December 2013, two more Superjets were delivered to the Indonesian customer. The three airliners have the 87-seat layout (12 seats in business class and 75 in economy class).



Indonesian air carrier Sky Aviation, which has three 87-seat SSJ100-95Bs, displayed good results during the first year of their service, but had to suspend its operations in March 2014 and has been seeking a new investor

Mikhail Polyakov

During the first year of operation, the Indonesian Superjets flew among 18 airports of the island state, having logged 2,262 h on 2,340 flights (a flight averaged not more than 1 hour). The average monthly flight time per plane totalled 111 h, and the maximal monthly flight time of individual aircraft stood at 171 h (December 2013, PK-ECL).

Alas, the carrier announced the suspension of its flight operations on 19 March 2014 and started seeking partners interested in investing in its business. Once its financial problems are resolved, Sky Aviation will be able to resume its revenues services. Then, it will be possible for the seller to deliver the next nine aircraft that Sky Aviation wanted to have a tighter seating arrangement – 98 seats, with eight in business class and 90 in economy class.

Less optimistic is the situation the other SSJ100 Southeast Asian operator, Laotian Lao Central Airlines, has found itself in. In May 2011, it ordered from SCAC three 93-seat airliners (eight business-class seats

and 85 in economy class). The first of the three (c/n 95026, local reg. RDPL-34195) was flown to Laos on 15 February 2013, and its first revenue flight from the capital city of Vientiane to the second-largest Laotian city of Luang Prabang was conducted on 24 March 2013. Soon afterwards, Lao Central started flying the Superjet on the scheduled international service from Vientiane to the capital of Thailand, Bangkok.

Before the end of the year, the airliner had performed 493 flights with a total flight time of 317 h. Its average monthly flight time had accounted for only 28 h (maximum monthly flight time – 60 h – was logged in August 2013). However, the reason for that was not the technical state of the aircraft,



Mexican air company Interjet, the Western hemisphere's SSJ100 launch customer operating as many as eight aircraft of the type, has produced very good results of the Superjets revenue operation from the very beginning

but rather the organisation of the business of the carrier. Due to economic difficulties, Lao Central has not received the two more Superjets (c/n 95030 and c/n 95037) made for it last year and kept by SCAC so far. Most probably, they will be sold to a new customer in due time. The latest flight of RDPL-34195 was performed on 24 December 2013. Lao Central has not performed flight operations since then, but the situation may change for the better, and Superjets may well fly in Laos in the future.

Mexico: SSJ launch customer in the West

The first firm order for the Sukhoi Superjet 100, awarded by a Western country was that by Interjet – Mexico's second-largest air carrier. The order was snagged in January 2011. It stipulated the delivery of 15 airliners of the type, but later increased to 20 units with 10 options. The supplier of the Superjets for Interjet is Russian-Italian joint venture SuperJet International, which Venice facility is used for installation of the cabin interior from Italian designer Pininfarina, aircraft painting as well as flying and ground crew training. The Mexican Superjets have a single-class cabin with 93 seats, which, however, has an unusually wide pitch – 34 inches (864 mm) – owing to thinner seats and is equipped with a passenger entertainment system.

The first two Superjets (c/n 95023 and 95024) arrived in Mexico last summer and flew their first revenue services on 18 September 2013 following the relevant commissioning procedures. Interjet took delivery of two more aircraft – c/n 95028

and 95036 – in November and December last year, respectively.


From the very outset, the airline attained very high results owing to SuperJet International's efficient after-sales support and Interjet's wealth of experience in minimising downtime at airports. Suffice it to say that during the SSJ100s' first four months in Mexico, the average monthly flight time per aircraft totalled 210 h (6.9 h a day), and each aircraft performed an average of 194 flight a month (6.4 flights a day), with an average flight duration of about 1 hour. The maximal monthly flight time of XA-JLG in December 2013 totalled almost 242 h, and the maximal daily flight time per aircraft in November equalled 7.6 h. During the first six months of operations, the average monthly serviceability rate of Interjet's Superjets had never dropped below 80%, at times reaching almost 100% (the six-months average – at least 90%) – the result that has not been beaten by any other SSJ100 operator yet.

According to the airline, the SSJ100s' average daily flight time per plane is less than that of its A320 so far – 5.87 h versus 7.8 h. Interjet attributes that to its SSJ100s being used on shorter lines with lower passenger traffic, in which the A320 is inefficient in economic terms. Last year, the SSJ100s' average daily per-aircraft flight number accounted for 5.31 – a slight increase over that of the A320s (5.28). In terms of readiness for flight, the SSJ100s was virtually on a par with the A320s long used by the carrier (99.06% versus 99.75%), with the carrier noting a steady growth of the index. For instance, it equalled as much

as 99.46% in March 2014 and 99.7% in early June.

By May 2014, revenue services in Mexico had been flown by six Superjets that had logged 5,089 h on 4,516 flights by then. The flights had been to 24 destinations throughout the country, including airports sitting at more than 2,200 m above sea level. The Superjets are to launch operations from Mexico City and Guadalajara to the United States in the near future.

Interjet's seventh SSJ100 (XA-PBA, c/n 95040) carried its first passengers on 8 May 2014, and the eighth airliner (XA-JLP, c/n 95042) arrived in Mexico from Venice on 7 June and made its first commercial service on 19 June. Meanwhile, SuperJet International was customising and grooming for delivery three more airliners built late last year (c/n 95045, 95046 and 95048). Two more aircraft (c/n 95050 and c/n 95052), flight-tested this year, were waiting for their turn to go from Zhukovsky to Venice, with next two ones (c/n 95065 and c/n 95066) being assembled in Komsomolsk-on-Amur.

The Interjet airline is the first Western customer for the SSJ100, which order has reached the phase of actual delivery and revenue operation. The SSJ100's prospects on the Western market depend heavily on the success of the deal and the results of the Superjet operations in Mexico. The results produced by the Mexican Superjets on revenue services in the first nine months are quite impressive. Hopefully, the Mexican experience will both pave the way for the SSJ100 to new foreign customers and set a good example for the type's Russian users. 





Center-South airline became the next operator of the two former Aeroflot's SSJ100s this spring. The second Superjet in service with this carrier holds a special livery dedicated to the 75th jubilee of the Sukhoi design bureau

SUPERJETS

Andrey FOMIN

ENTERING SECOND-HAND AIRCRAFT MARKET

In 2013, concurrently with the growing deliveries of brand-new Sukhoi Superjet 100 regional airliners, the first aircraft of the type appeared on the second-hand aircraft market as well. This is due to the gradual shedding of the launch SSJ100 batch received by Aeroflot in 2011–12, in the first place. The first 'second-hand' Superjet entered service with Moskovia airline last summer. In December 2013 one more ex-Aeroflot's SSJ100 was handed over to Russian Ministry of the Interior special air detachment. This spring saw that the Center-South airline became an operator of another two SSJ100 airliners earlier flew with Aeroflot.

As is known, the contract made by Aeroflot – Russian Airlines JSC and the Sukhoi Civil Aircraft Company (SCAC) on 7 December 2005 for 30 SSJ100s provided for the manufacture of standard layout aircraft with 98 single-class seats. Later, the airline decided to adjust the aircraft configuration in terms of layout, cabin equipment and avionics composition. Some of the Aeroflot-requested modifications called for additional research work. To avoid considerable slippage behind schedule, the parties agreed on delivery of the first 10 out of the 30 aircraft in the variant required (87 seats – 12 in business class and 75 in economy class), albeit with the simplified 'light' layout, i.e. without the individual gasper fans, extra third lavatory, etc. Under the agreement, the light-layout aircraft are to be replaced with the full contract specification ones.

The SSJ100 delivery to Aeroflot started in June 2011, with the final, 10th, light-layout airliner supplied in September 2012. The first full-version airliner (RA-89014, c/n 95025) for the flag carrier was ready for delivery last spring. In accordance with the earlier agreement, the deliv-

ery of each of 10 full-layout SSJ100s to Aeroflot was to be preceded by the return of another light-layout airliner. The first of the latter (RA-89001) returned from the Sheremetyevo airport to SCAC's facility in Zhukovsky in April 2013. Prior to year-end 2013, it had been followed by three aircraft more, with the remaining six were re-delivered from January through June this year. The last of Aeroflot's 'light' SSJ100s (RA-89010) was ferried from Sheremetyevo to Zhukovsky on 20 June 2014.

Five of the 10 former Aeroflot-owned SSJ100s have been sold on already. The Moskovia airline has acquired the airliners with c/n 95008 and 95010 (RA-89001 and RA-89002 respectively), having also bought RA-89021 (c/n 95021) built for – but never delivered to – Armavia in 2012. In October 2013, the three aircraft were procured from SCAC by Sberbank Leasing for almost \$92 million (i.e. an average of \$30.6 million per unit) and leased to Moskovia. Actually, RA-89021 and RA-89001 had flown under the flag of the air carrier since August 2013, while RA-89002 has begun its revenue operations with Moskovia in early July 2014.

Earlier, in May 2013, Armavia's first SSJ100 (c/n 95007) got Moskovia's livery too, but it has been stored in Zhukovsky due to legal complications pertinent to its return to the manufacturer by the Armenian air company that had gone bankrupt.

Aeroflot's third SSJ100 (c/n 95011) was acquired by the Russian Ministry of the Interior last year. It was fielded with the Yastreb special air detachment of the Special Purpose Centre of the Ministry of the Interior's Quick Reaction and Aviation Forces to replace an obsolescent Yak-40. The United Aircraft Corporation and Ministry of the Interior signed the contract on the aircraft worth approx. \$24.3 million on 19 December 2013, and the customer accepted the plane as soon as 23 December. The aircraft required no revamping of its cabin. Only its paintjob was modified and the new registration number, RF-89151, was stencilled on.

Two more former Aeroflot SSJ100s (RA-89004 and RA-89007) started their operations with the Center-South airline this spring, with the latter of them having been given a special 'anniversary' livery in honour of the 75th anniversary of the Sukhoi design bureau and named after an outstanding Sukhoi test pilot, Honoured Test Pilot, Hero of Russia Sergei Melnikov (1959–2010), who contributed greatly to the testing of the Su-33 carrierborne fighters on board the Admiral Kuznetsov aircraft cruiser and many other Sukhoi warplanes as well. Center-South's first SSJ100 bears

the name of Oleg Kuprikov, a leader of the RusAir airline, the predecessor of the Atlas Jet close corporation being positioned as the Moscow affiliate of the Center-South carrier, specialising in chartered passenger flights (VIP, corporate and sports ones, etc.).

Both aircraft operate out of Moscow's Sheremetyevo airport. They have retained their initial 87-seat cabin layout (12 seats in business class and 75 in economy class) and have been flying on chartered services and may go on scheduled revenue operations after having ousted the company's current Tu-134 fleet. Center-South's RA-89004 conducted its first chartered revenue flight from Sheremetyevo to Baikonur (about 2,000 km) on 22 March 2014, having brought a NASA delegation to Russia's space launch facility. Its first international flight to the Iraqi city of Basra took place less than a week later, on 28 March. The company launched the revenue services on RA-89007 on 15 June 2014, when its first Moscow – Vienna flight was performed.

When Aeroflot turned in its light-layout airliners to the manufacturer, they had used

The very first Aeroflot's SSJ100 (RA-89001) is flying under the flag of Moskovia airline since August 2013



Sergey Sergeyev

not more than 35–40% of their service lives at the most, which allows their long effective operation by their operators. The aircraft had logged not more than 3,500 flight hours on 1,500–2,000 flights and had an age not older than three years. Under the ST322-RRJ-95/D12 supplementary type certificate issued by the IAC Aircraft Register on 29 April 2013, the SSJ100 has an assigned life of 9,000 h, 6,000 flights and a service life of 10 years, with the indices to increase steadily.

In addition to the former Aeroflot aircraft sitting in store at SCAC's facility in Zhukovsky, new buyers also are being sought for the second and third SSJ100s built last year for Lao Central (c/n 95030 and 95037). The company suspended its operations in late 2013 and, hence, has not taken delivery of the planes. Unlike Aeroflot's light-layout SSJ100s, however, their remaining service life is close to 100%. Thus, it is possible that the number of SSJ100 users will increase in the near future.



Ex-Aeroflot's RA-89003 turned into RF-89151 being in service with the Ministry of the Interior special air detachment since December 2013



Sergey Lysenko

Second-hand SSJ100 market

c/n	Maiden flight	First user	Reg. number	Delivery date	Latest flight date	Flight hours	Number of flights	SCAC return date	New user	Reg. number	Delivery date
95007	04.11.2010	Armavia	EK95015	12.04.2011	22.10.2012	2,284	956	01.11.2012	Moskovia	—	*
95009	29.06.2013	Armavia**	—	—	—	—	—	—	Rosoboronexport	(97009)	*
95008	30.01.2011	Aeroflot	RA-89001	06.06.2011	14.01.2013	2,224	1,624	21.04.2013	Moskovia	RA-89001	23.08.2013
95010	11.07.2011		RA-89002	17.08.2011	11.08.2013	2,344	1,625	21.08.2013	Moskovia	RA-89002	02.07.2014
95011	11.09.2011		RA-89003	01.11.2011	07.07.2013	3,029	2,033	29.10.2013	Ministry of the Interior	RF-89151	23.12.2013
95012	07.11.2011		RA-89004	22.12.2011	13.12.2013	2,671	1,753	26.12.2013	Center-South	RA-89004	20.03.2014
95013	15.01.2012		RA-89005	05.03.2012	16.01.2014	2,197	1,471	22.01.2014	n/a	n/a	*
95014	04.04.2012		RA-89006	27.05.2012	08.09.2013	1,631	1,081	22.04.2014	n/a	n/a	*
95015	10.12.2011		RA-89007	22.01.2012	12.01.2014	2,981	1,959	17.01.2014	Center-South	RA-89007	02.04.2014
95016	02.03.2012		RA-89008	03.04.2012	11.03.2014	3,464	2,245	20.03.2014	n/a	n/a	*
95017	29.04.2012		RA-89009	28.07.2012	29.03.2014	2,783	1,803	19.05.2014	n/a	n/a	*
95018	12.07.2012		RA-89010	15.09.2012	16.06.2014	~2,500	~1,650	20.06.2014	n/a	n/a	*
95021	03.06.2012	Armavia***	EK95016	—	—	—	—	—	Moskovia	RA-89021	09.08.2013
95030	20.05.2013	Lao Central***	RDPL-34196	—	—	—	—	—	n/a	n/a	*
95037	26.09.2013	Lao Central***	RDPL-34197	—	—	—	—	—	n/a	n/a	*

* stored by the SCAC; may be delivered in 2014 ** mothballed at the construction stage; completed to meet the requirements of another customer *** built and customised for the first customer but has never been delivered to him



T-50

Mikhail SUNTSOV

KICKS OFF ITS OFFICIAL TESTS

Sukhoi T-50 also known as PAK FA (Future Tactical Aircraft) – the Russian fifth-generation fighter being developed by the Sukhoi company, United Aircraft Corp. subsidiary, – started its official trials this year. For this purpose, one of the five T-50 flying prototypes was ferried from Zhukovsky, Moscow Region, to the Defence Ministry State Flight Test Centre's base in Akhtubinsk. The rest of the PAK FA prototypes are to follow it soon. Two T-50 prototypes have been unveiled with weapons on their underwing stations at the flight demonstration within the framework of a Aviadarts 2014 Russian Air Force combat skills competition held in the Voronezh Region recently, in late May.

Russia is to become the second country operating a fifth-generation fighter, the United States being the first one. United Aircraft Corporation President Mikhail Pogozyan has said recently that the delivery of production-standard T-50s to the Russian Air Force for operational evaluation is poised to begin as soon as 2016.

The PAK FA has all basic characteristics inherent in fifth-generation fighters, namely, low observability in the radio-frequency band and other wavebands of the electromagnetic spectrum in the first place; secondly, supersonic cruising capability; thirdly, supermanoeuvrability; and, fourthly, a cutting-edge highly automated avionics suite comprising innovative active and passive radar and electro-optical systems designed to spot aerial and surface targets, cue a wide range of air-launched weap-

ons, ensure flight, navigation, radio communications, and protect from incoming enemy weapons.

The PAK FA's stealth is owing to a special shape of its airframe, the extensive use of composite materials and radar-absorbent coatings, and internal weapon bays. The aircraft owes its supersonic cruising capability to its engines capable of high thrust in non-afterburning mode. The fighter's supermanoeuvrability is owing to a combination of special algorithms of its integrated flight control system, on the one hand, and its thrust vector control engines.

The PAK FA's avionics suite is based on a cutting-edge information management system with multiple-redundant computers and data buses monitoring and controlling the onboard systems and weapons. Sukhoi has implemented this information management system philoso-



Aviadarts 2014 Russian Air Force combat skills competition held in late May 2014 became the occasion for public debut of two Sukhoi T-50 prototypes in configuration with external weapon stores. The photo shows T-50-4 aircraft carrying a pair of air-to-air medium range missiles and two high-speed ASMs

phy in the Gen. 4++ Su-35S fighter, which delivery to the Russian Air Force has been under way since earlier this year.

The multifunction integrated active electronically scanned array (AESA) radar system

being developed by Tikhomirov-NIIP and the integrated electro-optical system being developed by UOMZ (a subsidiary of the Schwabe corporation that itself is a subsidiary of Rostec corp.) are the PAK FA's basic target designation, weapon employment, navigation and self-defence assets. The fighter's weapons suite will comprise both upgraded production-standard weapons and a considerable number of advanced types of air-to-air and air-to-surface missiles and smart bombs being developed by the Tactical Missiles corporation, including those developed for internal carriage.


As many as five PAK FA prototypes have been undergoing the flight tests by this summer. The first of them took to the air in Komsomolsk-on-Amur on 29 January 2010 and has been tested in Zhukovsky, Moscow Region, since April of the same year. In addition, two more examples are being used in ground experiments – one for integrated full-scale bench tests and the other for static tests.

The second T-50 flying prototype has been in trials since 2011. It has been ferried to the Defence Ministry State Flight Test Centre's airfield in Akhtubinsk for the official tests on 21 February this year. Its first flight in Akhtubinsk took place late in February with Sukhoi's chief test pilot Hero of Russia Sergei Bogdan, PAK FA programme lead pilot. Military test pilots will soon join their Sukhoi design bureau colleagues flying PAK FA test missions. The first military pilot flew the T-50 in Zhukovsky more than a year ago, on 25 April 2013. He was Col. Rafael Suleimanov, a test pilot with the State Flight Test Centre.

The third and fourth flying prototypes are designed for testing the avionics and weapons suites in the first place. It is the third T-50 that was used for starting the flight trials of the fighter's AESA radar. Last October saw the maiden flight of the fifth PAK FA flying prototype in Komsomolsk-on-Amur, which departed for Zhukovsky in November.

According to UAC President Mikhail Pogosyan, the PAK FA passed the factory test phase in 2013. This year, the aircraft is to begin its official tests, which first phase is slated for completion by December 2015. The delivery of opeval-intended production-standard planes to RusAF is supposed to commence in 2016. According to Mikhail Pogosyan, the PAK FA prototypes have displayed “a good dovetailing of the development and bench tests, including the tests of the AESA radar”. According to Mr. Pogosyan, this applies to the engine, “which thrust is 15% higher than that of the AL-31FP and is considerably higher in non-afterburning modes, which allows supercruise”. The tests of mid-air refuelling techniques, supermanoeuvrability, etc., began as part of the development trials too.

Late in May 2014, the third and fourth T-50 flying prototypes were demonstrated in flight as part of the nationwide final stage of the Aviadarts 2014 combat skills competition staged by the Russian Air Force. Sukhoi test pilots Sergei Bogdan and Roman Kondratyev performed a breathtaking terrain-hugging aerobatics set with attached underwing weapons at the Pogonovo testing ground in the Voronezh Region. Their aerobatics included simulated ground target attacks. One of the fighters carried a couple of medium-range and dogfight missiles under wing, and the other packed two high-speed precision-guided air-to-surface missiles in addition to two air-to-air ones.

Equally important is that a decision has been taken to use the PAK FA as the mainstay of a promising Russian-Indian joint aircraft development programme on development and production of the fifth-generation Future Multirole Fighter (Russian acronym PMI) earlier known in India under the abbreviated designation FGFA (Fifth Generation Fighter Aircraft). Russian and Indian engineers are deriving the aircraft on a parity basis from the Russian-built PAK FA with due account of additional Indian requirements. 



T-50-2 became the first PAK FA prototype to be ferried for official tests to Akhtubinsk earlier this year

Alexey Mikhayev



YURI BELY:

“70% of the Russian-made fighters are fitted with our radars”

Interview of Tikhomirov-NIIP Director General

February this year saw the conversion of the first Russian Air Force combat unit to the Sukhoi Su-35S advanced supermanoeuvrable multirole fighters. A key component of the comprehensive tactical performance of the fighter is its unique-range Tikhomirov-NIIP Irbis phased-array radar control system. Somewhat earlier, in November 2013, the military started taking delivery of Su-30SM two-seat supermanoeuvrable multirole fighters fitted with another of the Tikhomirov-NIIP phased-array radars, the Bars-R. MiG-31BM interceptors equipped with Tikhomirov-NIIP Zaslon-AM phased-array radars are returning to service with RusAF following their upgrade. The company successfully completed another phase of the trials under the three programmes last year. Throw in for a good measure a large number of flight and lab tests of the cutting-edge active electronically scanned array (AESA) radar designed for the PAK FA fifth-generation fighter and you can imagine the scale of the efforts made by Tikhomirov-NIIP. The results produced are a cause of rightful pride for the leading Russian developer of phased-array radars intended for fighter jets. The Take-off magazine has asked Tikhomirov-NIIP Director General Yuri Bely for his view of the efforts and plans.

What are your institute's most important aircraft-related achievements over the past year?

Tikhomirov-NIIP is a specialist in airborne electronically scanned array radars. About 80% of our military programmes fall to this field. We are proud that around 70% of the Russian-made fighters supplied to both the Russian Air Force and foreign militaries are equipped with our radars.

Over the past year, we brought as many as three of our advanced airborne radars to the final stages of the trials. Firstly, the Bars-R designed for the Su-30SM fighter has passed its special joint flight tests. In November, production-standard Su-30SMs began to field the RusAF combat unit. Secondly, the Irbis electronically scanned radar intended for the Su-35S was cleaned of the bugs revealed during Phase I of the Su-35S official trials. This allowed the manufacture of the first Irbis-carrying Su-35S batch in 2013 and their fielding in February this year with the fighter air regiment garrisoned in the Khabarovsk Territory (the manufacturer of the Tikhomirov-NIIP Irbis and Bars radars is the Ryazan State Instrument-making Enterprise). Thirdly, the upgraded MiG-31BM interceptor fitted with our Zaslon-AM fire control radar and advanced missiles wrapped up its official trials. The MiG-31BM's fielding with combat units is in full swing now, with several units throughout the country converting to them.

In addition, many test sorties were flown by two Sukhoi PAK FA fifth-generation fighter prototypes as part of the preliminary trials of our latest AESA radar. As is known, a T-50 prototype has flown in February this year to Akhtubinsk, where the bulk of the official tests

will be conducted. Other prototypes shall join it there soon.

Could we start with the latter point? How is the PAK FA AESA radar system development and test programme doing?

To date, we have made six sets of the forward-looking AESA radars intended for the PAK FA. The first two radars are being used by Sukhoi and us for bench tests to test advanced operating modes. Three more have been shipped to the customer to equip the third, fourth and fifth flying PAK FA prototypes. We kicked off the AESA activation test flights on the third prototype (T-50-3) in summer 2012. The aircraft has fulfilled the bulk of the flight tests of the AESA radar. In addition, the fourth flying example has been flying in Zhukovsky since last spring, having completed, inter alia, a number of tests of our system. The third PAK FA prototype furnished with our radar, T-50-5, ferried to Zhukovsky from the manufacturer plant, started flight tests recently. Thus, there are three Tikhomirov-NIIP radar-equipped T-50s undergoing trials now, with the number of activated AESA radar flights logged being close enough to a hundred.

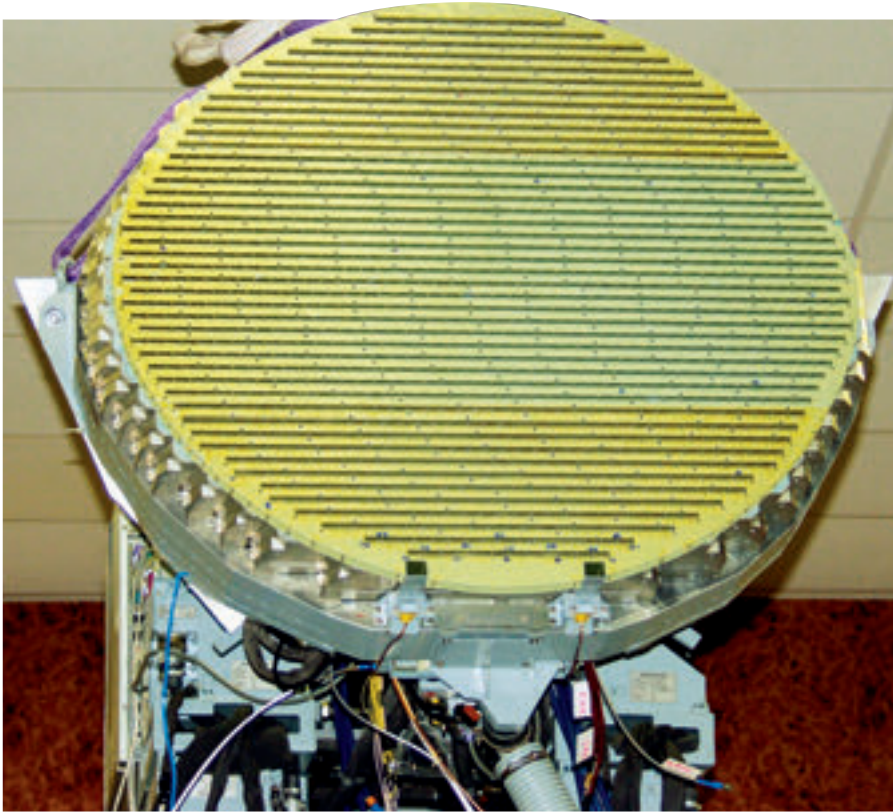
Most of the flights conducted have been successful. The main result is the stable enough operation of the forward-looking AESA radar in the air-to-air and air-to-surface modes from the very beginning. Having seized the opportunity, we dismounted the radars from the PAK FA prototypes undergoing planned debugging and bench-tested them. The AESAs' characteristics did not change and no modifications were required, so the radar were mounted back on the planes for continued flight tests.

The PAK FA kicks off its official tests in Akhtubinsk this year. In the near future, the aircraft fitted with our AESA radars will be ferried there. There will be an opportunity to try them under proving ground conditions as well. As is known, the schedule of the PAK FA test programme is pretty tight. The programme's Phase I must be complete by late 2015, so that the manufacture and operational evaluation of early production-standard aircraft can begin as soon as 2016. We cannot see a reason to derail the plan as far as we are concerned.

How many AESA radars more are planned to be made for the tests, and when their production could commence?

Within two years, we will supply the customer with four more AESA radar sets to fit four PAK FA flying prototypes. In addition, a set is due for interdepartmental tests. The AESA radar production is to be launched by the Ryazan State Instrument-making Enterprise in 2016. Mind you, the plant has taken part in making our AESA radars starting from the earliest prototypes, supplying us with individual mechanical and electronic parts and units. For now, we handle the final assembly, debugging and calibration of AESA radars, but the plant in Ryazan will productionise the radar in due time.

To fit the PAK FA, Tikhomirov-NIIP is developing both the main forward-looking AESA radar, which has been installed into three fighter prototypes, and a number of other subsystems. For instance, we unveiled a side-looking AESA for the PAK FA at last year's MAKS 2013 air show. There will be two SLARs like that onboard the fighter. In addition, the fighter's leading-edge slats will house L-band



AESAs too, which we have displayed at MAKS air shows. Another four PAK FA flying prototypes will carry the complete integrated multirole radar system, including forward- and side-looking AESAs and L-band AESAs.

It is an open secret that the AESA radar we are developing to fit the PAK FA is to serve the basis for deriving a radar system for the Russian-Indian fifth-generation Prospective Multirole Fighter (Russian acronym PMI), or the FGFA, as it is known in India. Tikhomirov-NIIP has been selected as prime contractor to develop the radar to equip the PMI, but Indian engineers will participate in the development too. The Indians are supposed to develop and manufacture some of the subsystems of the radar system, with the precise number of those being discussed now.

Finally, I cannot but mention that the experience we have gained from the development of the AESA radar for the PAK FA can come in handy in developing an AESA multirole radar intended to equip the Future Long-Range Bomber (Russian acronym PAK DA). We have completed its preliminary design. If we are awarded the development order, our institute, which has been a fighter and interceptor radar specialist, will expand its envelope and start developing radars for long-range bombers as well.


Do you continue your work on passive phased-array radars?

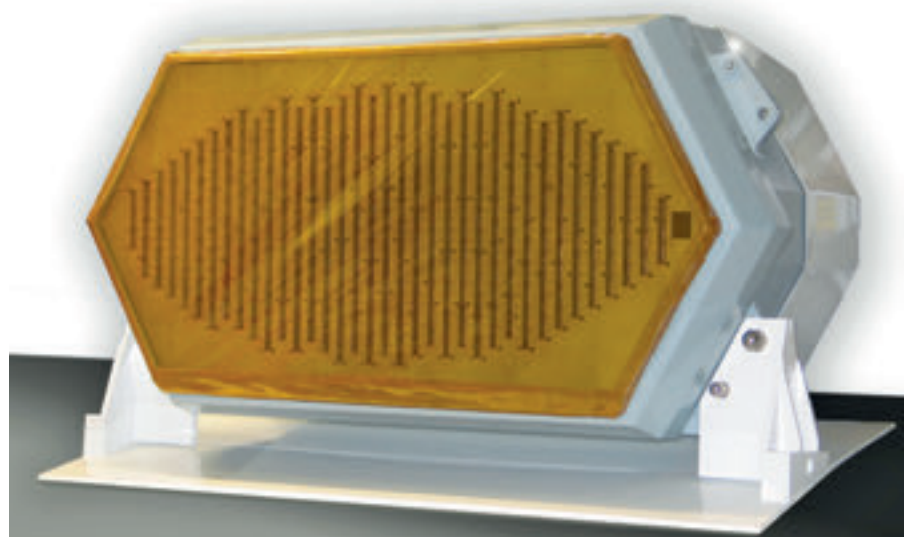
Our Irbis passed-array radar is second to none in the world, as its characteristics demonstrated in the trials have shown. Its

flight tests on the Su-35 fighter have produced unique results in terms of target acquisition range far exceeding 400 km. Thus, the Su-35 equipped with our Irbis can see farther than any other fighter in the world.

GRPZ is running full-rate production of the Irbis. About 20 production-standard Su-35S fighters delivered to the Russian Defence Ministry under a contract for 48 fighters of the type carry Irbis radars. Last year, we successfully completed the tests designed as part of the debugging resultant from Stage I of the official trials that led in 2012 to the issue of the preliminary report clearing the productionising of the aircraft.

The Irbis's predecessor, the Bars, fits approximately 250 Su-30MKI, Su-30MKM and Su-30MKI(A) fighters that the Indian, Malaysian and Algerian air forces have operated with success. The radar has cleared all of the phases of its trials, has been streamlined to perfection and is capable of all the tasks it was designed for. At the same time, India wants the radars equipping its Su-30MKI fighter fleet modernised as part of the fleet's upgrade, with its intent on having such an upgrade voiced several years ago. At Phase I, the Bars was supposed to be refined while retaining its passive electronically scanned array through extending its range, enhancing its resolution and ECM immunity and adapting it to advanced airborne weapons. Phase II was expected to replace the Bars's antenna with the AESA. Apparently, it makes sense to do so after the AESA radar designed for the PMI fighter has been tested, so that the lessons learnt are put to use. I presume that other operators of the fighter family – Malaysia and Algeria – will show interest in such modernisation too, just as India did.

Now, a few words on the Bars for the Russian Air Force are due. The Irkut corporation is fulfilling two contracts for 60 Su-30SM fighters for RusAF. The aircraft is a derivative of the Su-30MKI, while its radar system is a derivative of the Bars. The Russianised version, the Bars-R, embodies a number of improvements meeting the requirements of the Russian Defence Ministry and has higher performance than its export-oriented baseline model. Last year, we completed our part of the Su-30SM's special joint flight tests with success, and fighters of the type, carrying Bars-R radars, are in service with combat units now. Nonetheless, further modernisation of the system is planned. 





Su-35S

Andrey FOMIN

BEING FIELDDED WITH SUCCESS

Four Sukhoi Su-35S supermanoeuvrable multirole fighters arrived at the Russian Defence Ministry Air Crew Training and Operational Evaluation Centre in the city of Lipetsk from the manufacturing plant in Komsomolsk-on-Amur on 28 May 2014. In Lipetsk, they will be used by the centre's specialists for developing and testing the new fighter's field manual and converting the air and ground crews of Russian Air Force combat units switching to the type. As is known, the first Su-35S batch was delivered to the RusAF fighter air regiment stationed at Dzyomgi AFB in the Khabarovsk Territory on 12 February this year, with the regiment launching regular flights on its latest fighters in spring. The Su-35S arrival to Lipetsk will enable the conversion of RusAF combat units to the type to be intensified, make it more effective and allow the air crews to learn the fighter's drastically sophisticated capabilities, including supermanoeuvrable tactics, upgraded and in-development air-launched weapons and latest avionics.

The Su-35S single-seat supermanoeuvrable multirole fighter is the summit of the evolution of the Su-27 fourth-generation aircraft family. The Su-35S's development involved a wide range of solutions and technologies used under the PAK FA (T-50) fifth-generation fighter development programme. Therefore, despite its outward similarity to the ubiquitous Su-27 and Su-30, the Su-35S is rightfully regarded as an aircraft featuring radically advanced capabilities, which attributes it to Generation 4++.

The advanced fighter's features setting it apart from the rest of the Su-27 family are the latest avionics suite that is based on a digital information management system and the advanced Tikhomirov-NIIP Irbis electronically scanned radar. The latter enjoys the unique aerial target acquisition range

and a beefed-up simultaneous multiple-target tracking and engagement capability (tracking 30 and engaging eight aerial targets or tracking four and engaging two ground targets).

The flight tests have proven the basic characteristics of the latest electronically scanned radar, with most of the latter's operating modes having been tested. In particular, test sorties have proven the unique ability of the Irbis to acquire threats at a range of more than 400 km.

The avionics suite of the Su-35S also incorporates an advancedIRST from the Precision Instrument Systems scientific and production company, up-to-date navigation and communication systems and a sophisticated defensive aids suite comprising missile warning and laser warning gear in addition

to the traditional radar warning receiver and electronic countermeasures system. The cockpit management system comprises two 15-inch colour multifunction liquid-crystal displays and a large head-up display.

The fighter is powered by a pair of advanced enhanced-thrust 14,500-hp extended-life 117S thrust vector control engines developed by the Lyulka Scientific and Technical Centre and produced by UMPO JSC. This, coupled with advanced operating algorithms of the integrated aircraft control system, allows supermanoeuvrability in dogfight. Compared to the Su-27, the Su-35S features an increased internal fuel capacity, the mid-air refueling system and drop tanks.

The weapons suite is comprised of both the in-service smart and dumb air-launched weapons and their modernised variants, with drastically innovative missiles and smart bombs to be carried further down the line.

The first two Su-35 prototypes (in export version) started their flight trials in 2008, and August 2009 saw the Sukhoi company and Russian Defence Ministry clinch a long-term deal for a 48-ship Su-35S batch to be delivered prior to 2015.

The first four production-standard Su-35S fighters were made by Sukhoi's Komsomolsk-on-Amur Aircraft Plant



Sergey Chalkovsky

The welcoming ceremony for the four Su-35S fighters at the airfield of the Air Force Training and Operational Evaluation Centre in Lipetsk, 28 May 2014

(KnAAZ) and delivered between May 2011 and March 2012. They have been undergoing the official tests at the Defence Ministry State Flight Test Centre in Akhtubinsk since 2011. Then in December 2012, the Defence Ministry took delivery of six more production standard aircraft designed for the test programme and, that completed, for the conversion of the air crews of RusAF combat units at the training and operational centre in Lipetsk. The planes were ferried from Komsomolsk-on-Amur to Akhtubinsk during January through February 2013.

The Su-35S programme features the productionising and official trials of the fighter ran concurrently for the first time. Certain modifications to the early production-standard aircraft based on the results produced by the tests were the unavoidable consequence of that – sort of a payback for haste. Therefore, before fielding the aircraft, built in 2012, with the Lipetsk unit, they had had to be modified by the manufacturer using the latest documentation, under which 12 Su-35S aircraft, earmarked for delivery to an Air Force fighter air regiment, were made in Komsomolsk-on-Amur.

The 12 fighters were handed over to the Russian Defence Ministry in a ceremony held at the Komsomolsk-on-Amur Aircraft Plant of the Sukhoi company on 12 February 2014. The significance of the event was highlighted by the participation of Russian Defence Minister Sergei Shoigu, Deputy Defence Minister Yuri Borisov, Air Force

Commander-in-Chief Lt.-Gen. Victor Bondarev, Khabarovsk territory Governor Vyacheslav Shport, UAC President Mikhail Pogosyan, Sukhoi Director General Igor Ozar, KnAAZ Director General Alexander Pekarsh, etc.

10 aircraft from the batch were fielded with the 1st squadron of the 23rd Fighter Air Regiment stationed at Dzyomgi AFB in Komsomolsk-on-Amur, Khabarovsk Territory. The remaining two had flown to Akhtubinsk, where they are used in the final phase of the official test programme, with the phase focused on testing advanced weapons in the first place. Instead of the two aircraft, the air regiment at Dzyomgi AFB received two other Su-35S fighters from the batch delivered in December 2012

and modified by the manufacturer since February this year.

The squadron launched regular operation of its advanced Su-35S fighters on 24 March 2014. Prior to that, its air and ground crews had undergone a programme of conversion to the type at a Sukhoi facility, and the regiment had adapted its material and technical resources for the operation of the advanced type. According to the Sukhoi's Su-35 programme director, chief designer Igor Dyomin, the preparations had begun as far back as 18 months before the delivery of the first fighters to the unit. Special ground test equipment had been ordered and tested in Akhtubinsk. Electronic tablets with the operation support software are ready for the introduction into aircraft maintenance



One of the four Su-35S fighters during the long flight from Komsomolsk-on-Amur to Lipetsk. Shagol AFB, Chelyabinsk, 27 May 2014

Ilya Solovoy

routine in combat units. An agreement with RusAF command on the delivery of the advanced ground support system has been reached, and the afore-said systems have been ordered for several units earmarked for the Su-35S. In addition, a Su-35S integrated flight simulator has been developed to be fielded at Dzyomgi AFB and in Lipetsk in the near future.

As Igor Dyomin rightfully mentioned, however, it is always not so easy for the troops to learn the ropes on advanced aircraft both due to numerous organisational problems and to the need to ensure the reliability of the most complex avionics, which sophistication makes the Su-35S unique in the Russian Air Force so far. To resolve the problems effectively, there are a warranty repair team of the developer, maintenance kits and a technical support team at Dzyomgi AFB. The aircraft have been given a three-year warranty for the first time in this country. All of the above, coupled with the decision to field the air regiment, stationed close to the manufacturer, with Su-35S fighters, facilitates the efficiency of the combat units learning the advanced fighter. As soon as April this year, Dzyomgi pilots flew their Su-35S's "in a very intensive manner", according to Igor Dyomin.

The Su-35S faces a long service, while being at the very beginning of the same. Today, the fighters of the type operated by combat units can fight using their basic weapons suites. However, in line with the concurrent development and full-rate production concept, advanced types of air-launched weapons are being integrated with the aircraft, which will make, in the future, the aircraft more effective in battle. According to Igor Dyomin, several types of modernised and all-new missiles were integrated with the Su-35S's weapons suite during 2013, though not all of the weapons stipulated by the programme had been ready for the tests on board the fighter. Therefore, their tests will continue, with the near-term plans providing for both testing the advanced weapons and expanding the operational envelope of the integrated ones.

Late last year, when the bugs inevitable in the official tests were debugged, the customer released its relevant reports and a decision was taken to OK the operation of the Su-35S by the Air Force. Owing to that, the first batch of aircraft of the type was shipped to the fighter air regiment at Dzyomgi AFB. At the same time, the manufacturer, KnAAZ, started modifying the six aircraft, delivered in late 2012, in accordance with the design of the above-mentioned Dzyomgi-delivered fighters (so-called Layout 2013). The six warplanes were

returned to the manufacture during January and February 2014, and their modification had been complete. This made the May delivery of the four Su-35S fighters to the RusAF centre in Lipetsk feasible.

Lipetsk pilots had an opportunity to get the first impression of the sophisticated aircraft in the course of the long flight across the nation from Komsomolsk-on-Amur to Lipetsk with stopovers in Irkutsk and Chelyabinsk. The impression was very positive. However, the centre's pilots and engineers are faced with very much work on the

Su-35S. Maj.-Gen. Alexander Kharchevsky, chief of the Lipetsk centre, opines: "The first thing we will do is to perform all flights under the programme and write flight and tactics manuals for combat unit pilots to learn the Su-35S in full in a most comfortable and effective manner".

At present, KnAAZ is manufacturing more production-standard Su-35S planes. According to UAC President Mikhail Pogosyan, 12 more fighters of the type are to be delivered before year-end, while the plan for 2015 provides for construc-




Flowers and the traditional bread-and-salt welcome to the pilots who ferried the Su-35S fighters from the manufacturing plant to Lipetsk

Sergey Chaikovskiy

tion and delivery of the final 14 of the 48 Su-35S fighters ordered. According to the programme manager, Igor Dyomin, a new five-year contract for a similar Su-35S batch is supposed to be signed by Sukhoi and the Defence Ministry. In addition, a political decision is said to have been made on the feasibility of Su-35 deliveries to China, with a contract to this effect to be signed after the technical and organisational issues have been settled. Sukhoi is hopeful that this may happen as soon as this year.

The basic flight and operating characteristics proven in the official trials, ergonomic cockpit management suite, advanced avionics suite based on an open-architecture information management system, and airframe service life extended to 6,000 h (30 years of operation) will enable the Su-35S to remain in service with the Air Force virtually all the way to the middle of the century.

Mention should be made that idea of concurrent Su-35S development, testing and productionising, which was implemented in Russia for the first time, allowed the con-

struction and testing of more than 10 brand-new aircraft, thus having slashed the time of the development of key design features and technologies as well as the latest design solutions pertinent to the avionics suite wrapped around an innovative information management system. In addition, the approach like this allows the quick use of the results produced for testing the technologies and technical solutions embodied in the PAK FA. This, in turn, ensures a reduction in the time of the development of the fifth-generation fighter for the Russian Air Force. 

The first Su-35S is landing at the airfield in Lipetsk, 28 May 2014



Sergey Chaikovskiy



Examination of one of the fighters following a long ferry flight

Sergey Chaikovskiy

Su-34 officially enters service

20 March 2014 marked an event that went virtually unnoticed by the media, though its significance is hard to overestimate. By a resolution of the Russian government, the Armed Forces adopted the Sukhoi Su-34 multirole tactical fighter-bomber for use, thus having completing the protracted and complicated development and testing of the advanced aircraft that will considerably influence the future of the tactical aircraft fleet of the Russian Air Force for many years to come.

Mention should be made that the Su-34 is the first advanced warplane, which acquisition RusAF has started in the post-Soviet era. The early production-standard Su-34s were delivered to the Defence Ministry in late 2006, but the type had faced several years of the official trials yet. Now, they have been completed, having proved the full compliance of the Su-34's characteristics and combat capabilities with the customer's requirements specification.

The RusAF combat units, which had earlier operated the Su-24M tactical bombers, began to convert to the new-generation Su-34s in 2011. Under the three current government-awarded orders, RusAF shall have received almost 130 aircraft of the type until 2020, with more than 40 having been fielded to date. After the collapse of the Soviet Union, the Russian Defence Ministry has never bought so many new combat aircraft of any type. RusAF's overall Su-34 requirement is estimated at 150–200 aircraft, and, probably, their acquisition will go on past 2020. Hence, new governmental orders for

the type could be landed by the end of the decade.

The first batch of production-standard Su-34 was ordered for the Defence Ministry in February 2006. In all, Sukhoi's aircraft in Novosibirsk made five production-standard aircraft under the contract during 2006–09. The first of them was given to the State Flight Test Centre in Akhtubinsk in December 2006. The second one went to Lipetsk in August 2007, followed in December 2008 by the third aircraft that later joined the official test programme under way in Akhtubinsk. The last two aircraft of the batch were received in Lipetsk in December 2009. By then, in December 2008, the customer had signed the report on the first phase of the official trials that had proven the conformance of the Su-34's characteristics to the Air Force's requirements specification. At the same time, a five-year deal was clinched by the government and Sukhoi for a 32-ship batch of Su-34s to be delivered during 2009 through 2013.

Meanwhile, the official tests carried on. Their second phase, dedicated mostly to testing the whole weapons suite of the advanced aircraft, was to be wrapped up. The final flights under the official test programme's second phase took place in April 2011, and November of the same year saw the Su-34 development, which dated back to 1989, completed at last. The sophisticated tactical fighter-bomber was cleared for fielding with RusAF's combat units.

The first four aircraft built under the 2008 contract were delivered in December 2010. A decision was made to station them in Lipetsk until the official fulfilment of the official joint test programme. In Lipetsk, the planes were used for the conversion of the flying and ground crews of the first combat unit slated for conversion from the Su-24M to Su-34. At the same time, the advanced aircraft was subjected to the operational evaluation, and research pilots used the flights on the type to devise and test manuals on the warplane's maintenance and tactics.

The plant in Novosibirsk churned out six more production-standard Su-34s in 2011. They were delivered in December of the same year and then were ferried directly to the combat unit stationed in Voronezh. At the same time, the first four aircraft went to the unit too. Thus, there had been 10 production-standard Su-34s in Voronezh by late 2011.

Then, the Novosibirsk plant ramped up the Su-34 output, having delivered 10 units in 2012 and 14 in 2013. According to RusAF Commander-in-Chief Lt.-Gen. Victor Bondarev, the plans for 2014 stipulate the manufacture of 16 Su-34 more. The 2008 contract for 32 aircraft was fulfilled last autumn, and the plant got down to fulfilling a new order for 92 Su-34s until 2020, placed by Sukhoi in February 2012 – the deal unprecedented in terms of volume and cost.

In October 2013, the delivery of the 24th Su-34 to Voronezh finalised the activation of two air squadrons there, designed for conversion to the type. The follow-on aircraft were earmarked for a next unit, the bomber air regiment at Morozovsk AFB in the Rostov Region. The first nine Su-34s were brought there in November and December 2013, including the first two made under the new 2012 deal. Three more aircraft were ferried from the manufacturing plant to Morozovsk AFB in June 2014. The air regiment is slated to complete its conversion to the type by year-end. It will be followed by other RusAF units still flying previous-generation Su-24Ms.



Sergey Chalkovsky



Yevgeny Volkov

MiG

INTELLECT POWER SAFETY



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RusAF to receive 16 MiG-29SMT fighters more

On 14 April 2014, the Russian Defence Ministry and MiG corporation (a subsidiary of the United Aircraft Corporation) made a three-year contract for 16 MiG-29SMT multirole fighters to be delivered to the Russian Air Force prior to 2016. The contract to that effect was signed by Deputy Defence Minister Yuri Borisov and MiG Director General Sergei Korotkov.

At present, RusAF operates a fleet of 28 MiG-29SMTs and six MiG-29UB upgraded combat trainers with commonised avionics. All of them were delivered five years ago. The delivery had been the first acquisition of new MiG fighters by the Air Force in more than a decade and a half, with the preceding delivery of new MiGs having taken place in distant 1993. The first two MiG-29SMTs (type 9-19) were shipped to the Air Force centre in Lipetsk in February 2009, with other fighters of the type having been fielded with the fighter air regiment in Kursk in the same month. In summer 2009, the regiment had as many as 10 MiG-29SMTs and four upgraded MiG-29UB two-seaters (type 9-53A). The unit in Kursk launched scheduled flight operations on its MiG-29SMT fighters in July 2009. The rest of the aircraft were received during December 2009 through January 2010.

Of the 34 aircraft of the type delivered to RusAF in 2009–10, 24 single-seat MiG-29SMTs and four twinseaters are in service with the Kursk-based fighter air regiment,

with the Lipetsk-based Training and Operational Evaluation Centre and Akhtubinsk-based State Flight Test Centre each having two MiG-29SMTs and an upgraded MiG-29UB in their inventory.

The Kursk-based MiG-29SMTs are regular participants in the Victory Day parades over Red Square in Moscow. This year has been no exception: a flight of four MiG-29SMTs with the Kursk-stationed regiment flew over the Russian capital on 9 May 2014 (the photo above).

The aircraft have earned recognition by the flying and ground crews of the Russian Air Force. The sophisticated Zhuk-ME radar, which has ousted the obsolete N019 from the rest of the MiG-29 fighters in service with RusAF, has a range that is almost twice as long as that of the N019, is made of up-to-date electronic

componentry and is far lighter and more reliable than its predecessor. Pilots have praised the MiG-29SMT's up-to-date display system, effective satellite navigation gear, increased fuel load and mid-air refuelling system. The weapons suite has been expanded considerably through beefing the in-service R-27 and R-73 air-to-air missiles up with the advanced RVV-AE medium-range active radar homing missiles and an impressive set of precision-guided weapons designed to take out ground threats. To cap it all, the fighter features obvious operating advantages: the MiG-29SMT is powered by extended-life RD-33 Series 3 engines and maintained in a new manner – on condition.

The fielding of new MiG-29SMTs with RusAF combat units is likely to begin in 2015. Having fulfilled the

contract, the MiG corporation, in all probability, will exhaust the MiG-29 airframe backlog at Production Facility No. 2 in Moscow and switch to making the advanced MiG-35S fighter for the Air Force.

"The current order will enable the company to face the future with confidence and will serve a good beginning for production of advanced aircraft, e.g. the MiG-35S", said Deputy Defence Minister Yuri Borisov.

The MiG-35S is slated for delivery to the Air Force after 2016. Therefore, a decision has been made to buy a batch of MiG-29SMTs now as a quick fix to maintain the combat readiness of RusAF's light fighter fleet.

MiG Director General Sergei Korotkov reminded that the company continued the MiG-29K/KUB multirole fighter delivery to the Russian Defence Ministry. The first four aircraft of the type were manufactured and delivered last year. Now, they are being debugged and tested to prove the characteristics of their modified equipment setting them apart from the export-oriented MiG-29K/KUB. As is known, the latter use a number of foreign-made components. According to Sergei Korotkov, his corporation is to deliver the next 10 MiG-29K/KUB fighters to the air arm of the Russian Navy before year-end. In addition, six MiG-29K/KUB aircraft more will be made for the Indian Navy in 2014. The contract for 24 MiG-29K/KUB fighters intended for the Russian Navy is to be fulfilled in 2015.



Alexey Mikhayev



Alexey Mikhayev

Irkut continues Su-30SM deliveries



Alexey Mkhayev

Since the Su-35S is a single-seater, an aircraft with the twin controls was required for pilots to train to fly the plane featuring supermanoeuvrability that is new to the Russian Air Force aircraft fleet. In this connection, a basic decision was made in 2011 to order from the Irkut corporation a batch of Su-30SM two-seat supermanoeuvrable multirole fighters – a version of the export-oriented Su-30MKI tailored to meet the requirements of the Russian Air Force. 30 aircraft of the type were ordered for RusAF on 20 March 2012. Later, a decision was made to buy more Su-30SMs for the Russian Defence Ministry, considering the Su-35S need of numerous enough tests and, hence, a longer time for fielding with RusAF and given the Su-30MKI being in service with several air forces as multirole fighters capable of a wide range of missions (the Indian, Algerian and Malaysian air forces have around 250 Su-30MKIs, Su-30MKI(A)s and Su-30MKMs). On 18 December 2012, a contract was signed for delivery of 30 aircraft more to RusAF until 2015. The first Su-30SM order by the Russian Navy was also announced earlier this year: five aircraft will have been made within the coming two years under the deal struck in December 2013, with the overall requirement of naval aviation estimated at more than 50 Su-30SMs.

The first two Su-30SMs (side numbers 01 and 02) took to the air in Irkutsk in September 2012 and delivered in November of the same year, having started their official flight tests at the Defence Ministry State Flight Test Centre in Akhtubinsk. Last spring, they were followed by another aircraft (No. 54), and later on three more Su-30SMs (No. 55, 56, 57) arrived at the Lipetsk-based Training and Operational Evaluation Centre, where combat unit pilots started training on them and research flights commenced to work out tactics.

At the same time, the aircraft plant in Irkutsk launched Su-30SM production under the second contract for the conversion of RusAF fighter air regiments. The first combat unit to convert to the Su-30SM was the Domna AFB vic. Chita. It received

10 aircraft of the type in November and December 2013. Unlike the first six aircraft supplied to Akhtubinsk and Lipetsk, they sport the traditional sky-blue camouflage pattern, rather than the dark grey one. The Domna AFB pilots trained in Lipetsk launched scheduled Su-30SM operations as far back as December 2013.

Overall, 16 Su-30SM fighters had been made and delivered by this year. According to Irkut's President Oleg Demchenko, the aircraft plant in Irkutsk is to build 21 Su-30SMs this year. More than half of them are planned for delivery to Domna AFB that will complete the conversion of two fighter air squadrons to the type. The rest of the aircraft will be fielded with other Air Force units. In addition, the first Su-30SMs are supposed to be given to the

Russian Navy Combat Training and Conversion Centre in Yeisk.

This year's first Su-30SM deliveries took place late in May, when two more aircraft were shipped to Domna AFB, followed by three more in June.

Mention should be made that concurrently with the delivery of Irkutsk-built Su-30SMs to RusAF, Sukhoi's plant in Komsomolsk-on-Amur continues to make Su-30M2 two-seat multirole fighters designed, in the first place, to ensure effective training of pilots with the Air Force units using Su-27SM and Su-27SM(3) fighters. The aircraft is a 'Russianised' variant of the export-oriented Su-30MK2 (165 Su-30MK2s and Su-30MK2s have been exported to China, Vietnam, Indonesia, Venezuela and Uganda). RusAF made the first order of four Su-30M2s in August 2009, and the fighters were delivered to Dzyomgi, Tsentralnaya Uglovaya and Krymsk airbases the next year. On 29 December 2012, Sukhoi snagged a new order of 16 aircraft of the type to be delivered the Defence Ministry during 2013–15. The first four of them had been completed by the KnAAZ plant in Komsomolsk-on-Amur by late last year. Two brand-new Su-30M2s (side numbers 20 and 40) were sent to the air base in Krymsk in the Southern Military District and the third one (No. 41) to Tsentralnaya Uglovaya in the Russian Far East. The fourth aircraft (No. 30) was handed over to the fighter air regiment at Dzyomgi AFB in early January 2014. Six to eight newly-built Su-30M2s more could be delivered this year.



Egor Zinoviyev

Aerobatic team on Yak-130s being activated in Borisoglebsk

According to the Russian Air Force commander-in-chief, Lt.-Gen. Victor Bondarev, a decision has been taken to activate a new Air Force aerobatic team at the training air base in Borisoglebsk. The team is supposed to fly Yak-130 combat trainers. To man the team, six candidates have been selected from the Borisoglebsk unit's instructor pilots who learnt to fly the Yak-130 to perfection.

To assist the future team in learning formation flying, four of the members of RusAF's famous Swifts aerobatic team flying MiG-29 fighters came from Kubinka AFB to Borisoglebsk AFB last autumn. The four are the Swifts' leader Sergei Osaikin and three wingmen – Denis Kuznetsov, Dmitry Zubkov and Dmitry Ryzhevolov. Early in October 2013, they started their conversion to the Yak-130 and con-

ducted their first sorties on the type as soon as 28 December.

In early February, the Swifts began to train as a Yak-130 flight in mixed crews with the Borisoglebsk pilots – the members of the future aerobatic team – to share their formation flying skills with them.

The Borisoglebsk pilots will train on the Yak-130 combat trainers available so far (the unit has over 40 aircraft of the type), but brand-new Yak-130s in a special variant will be bought for the new aerobatic team further down the line. According to Irkut President Oleg Demchenko, the corporation in December 2013 landed a Russian Defence Ministry order for additional 12 Yak-130s to be delivered to the Borisoglebsk-based aerobatic team in 2014–15, with five of them to be delivered as soon as this year.

Last year, under the 7 December 2011 contract for 55 Yak-130 combat trainers, the Irkut corporation's Irkutsk Aviation Plant supplied the Borisoglebsk Tactical Bomber and Assault Aircraft Training Centre with the 18 aircraft stipulated by the

Governmental Defence Acquisition Programme for the year and two more aircraft earmarked for 2014 but manufactured ahead of schedule. All of them were given a grey paintjob and serialised from 46 to 63. The two extra Yak-130s (serials 64 and 65) first flew in Irkutsk in December 2013 and arrived at Borisoglebsk in early February 2014. Unlike all Yak-130s built earlier for RusAF, they feature a sky-blue camouflage pattern that now will be sported by all brand-new Yak-130s designed for the Russian Defence Ministry.

Taking into consideration the first 15 production-standard Yak-130s delivered by Irkut in 2012 and the nine aircraft of the type manufactured earlier by the Sokol plant in Nizhny Novgorod, the Borisoglebsk-based unit had had as many as 44 Yak-130s by March this year. Irkut President Oleg Demchenko said during the Singapore air show in February that the plant in Irkutsk would make 22 Yak-130s more for the Russian military and deliver them before year-end.



Konstantin Katarosov

Third A-50U delivered to RusAF

On 25 March 2014, the factory airfield of Beriev company hosted the ceremony of handing over another upgraded A-50U (side number 37) airborne warning and control aircraft to the Russian Air Force. An Air Force crew accepted the aircraft and ferried it successfully from Taganrog to its permanent station – Ivanovo-Severnoy AFB. By the Defence Ministry's consent, the aircraft had been named after Sergei Atayants in memory of the aircraft's chief designer who led the development of the A-50.

Beriev's and the Vega radio engineering corporation's joint efforts to upgrade the A-50 aircraft fleet in service with RusAF to A-50U standard commenced in 2008.

Emphasis was placed upon the transition the airborne radar system to advanced electronic componentry. The workstations of the systems operators have been heavily upgraded

and a sophisticated communication suite has been installed. In addition, unlike the baseline model, the A-50U has sleeping quarters for the crew, a galley and a lavatory.

It is the aircraft bearing side number 37 that was first converted to A-50U standard in Taganrog. It was used both for the ground tests of the upgraded radar system and for the flight trials. The RusAF commander-

in-chief signed the A-50U official joint test report on 29 November 2009 and thus gave the nod to the kickoff of the upgrade of the production-standard planes.

The upgrade of RusAF's in-service A-50s to A-50U was started with the aircraft serialised 47 (it was re-delivered to RusAF in 2011). The next A-50U (serial 33) was upgraded in 2013. The first A-50U prototype

(serial 37) remained in Taganrog after its official test programme had been completed. It has been delivered to RusAF, too, following the overhaul of its radar system and the latter's modification to the production-standard configuration.

Thus, the Russian Air Force now flies as many as three A-50Us, while Beriev is awaiting another combat-unit A-50 for upgrade.



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Indian pilots learning to fly MiGs off Vikramaditya



India MoD

Indian naval aviators are learning to fly MiG-29K/KUB multirole carrierborne fighters off the Vikramaditya multirole aircraft carrier that has sailed to India's shores from Russia earlier this year. The first landing on the deck of the new Indian carrier took place here on 7 February 2014. The MiG-29KUB was controlled by the Indian Navy 303 Sqn commanding officer, Navy Capt. Ajay Theophilus, with Andrei Shishov, a test pilot with the MiG corporation, occupying the back seat in the instructor-pilot capacity. On the same day, there was another MiG-29KUB landing on the ship, with the aircraft controlled by the Indian pilot. Whose instructor pilot was MiG's chief test pilot Mikhail Belyayev.

The early landings on the Vikramaditya were preceded by a series of flights of IN pilots at the land-based training facility in Goa state, with the facility fitted with a ski-jump ramp/arrestor gear simulator. Training flights of Indian naval MiG-29 pilots, including snagging the arrestor cables, began in January this year.

The first landings of the Indian MiG-29KUBs on the Vikramaditya took place just a month after the arrival of the ship to the customer's shores. As is known, the protracted overhaul, conversion and handover of the Vikramaditya carrier (previously Soviet Navy's Admiral Gorshkov carrier) by Russian shipbuilders to the Indian Navy were completed late last year. The ship

was handed over to the customer in a ceremony hosted by Sevmash in Severodvinsk on 16 November 2013. Then, the preparations were launched for her cruise to her new station – the Indian Navy's advanced naval base Kadamba vic. Karwar in Karnataka state.

The aircraft carrier left the roadstead of Severodvinsk and headed for India on 26 November 2013. At first, she cruised around Europe, then passed the Strait of Gibraltar and the Mediterranean, having made a brief stopover in Lisbon, and then entered the Red Sea via the Suez. On the first day of a new year, the latest Indian aircraft carrier and her escort entered the Arabian Sea. There, the joy and pride of the Indian Navy was met by a large task force of nine warships of the Indian

Navy's Western Fleet, led by Rear Adm. Anil Kumar Chawla on board the Viraat aircraft carrier. Finally, the Vikramaditya arrived at her station on 7 January 2014.

In all, the first cruise of the Vikramaditya under command of Commodore Suraj Berry took 42 days, including 26 sea days, on which the ship covered 10,212 nm. During the cruise, there were 177 Russian specialists on board in addition to the Indian crew. They will have continued to assist IN personnel in learning the aircraft carrier for a year. According to Indian sources, it could take the crew several months to learn their ship and pass all relevant tests. This done, the Vikramaditya shall become a full-fledged warship of the Indian Navy.

It is worth mentioning that the work on the Vikramaditya is not the only experience in the cooperation between Russian industry and India in aircraft carrier construction. In particular, Anatoly Shlemov, chief of the Governmental Defence Acquisition Programme Department, United Shipbuilding Corporation, said at the Defexpo 2014 arms show in New Delhi in early February: "Russia has delivered the equipment designed for the Indian carrierborne aircraft simulator system and for the latest Indian Project 71 aircraft carrier". The ship, which has inherited her famous name Vikrant from her predecessor, was launched on 12 August 2013 at the Cochin Shipyard. She is slated to start her factory sea trials in 2016 and to be commissioned by the Indian Navy some time in late 2018.

Russian-made MiG-29K/KUB fighters will make up the mainstay of the new Vikrant's CAG, too. The MiG corporation has supplied the Indian Navy with the 16 aircraft under the first contract made in 2004 and at least 10 under the other one signed in 2010. Overall, the air arm of the Indian Navy is to receive 45 MiG-29K/KUB fighters under the two deals. The activation of 303 Sqn (Black Panthers) on MiG-29K/KUB aircraft by the Indian Navy took place in a ceremony at INS Hansa, Goa state, on 1 May 2013.



India MoD

Night Hunter for Russian Air Force and foreign customers

The commencement of the export of the Mil Mi-28NE Night Hunter army combat helicopter promises to become a landmark of the year for Rostvertol JSC, which marked its 75th anniversary on 1 July 2014, and for the whole Russian Helicopters holding company, which subsidiary Rostvertol is. This was officially announced by the Rosoboronexport company, during the HeliRussia 2014 helicopter industry show in Moscow in late May. A Mi-28N took part in the event, having landed on a patch of the ground in front of the Crocus Expo international exhibition centre. At present, Rostvertol is completing the manufacture of the first Mi-28NE export batch. At the same time, the company is proactive in fulfilling part of the Governmental Defence Acquisition Programme: more than 80 machines of the type have been made since the manufacture of the first Night Hunter in Rostov-on-Don a decade ago. Late last year, the Russian Defence Minister ordered the Mi-28N into service with the Air Force.

Now, the type is operated by the Army Aviation Combat Training and Conversion Centre in the town of Torzhok and by several units in the Southern and Western Military Districts. Mi-28Ns were fielded with the Army Aviation units in Budyonnovsk and Korenovsk in 2009–11, and the newly activated Army Aviation brigade in Ostrov, Pskov Region, started receiving them in 2013. At least one air base more, in the Leningrad Region,



Alexey Mikhayev

is expected to begin taking delivery of Mi-28Ns this year.

According to Rostvertol's annual reports, 14 Mi-28Ns were rolled out of the company's assembly shop in the course of 2013, and just as many had been delivered to the Defence Ministry a year before.

Overall, Rostvertol has made and delivered a prototype, seven LRIP and at least 70 production-standard Mi-28N helicopters since 2005. The deliveries to RusAF under the current long-term contracts have been steady at a rate of 12–15 machines a year over the past five years. This means that RusAF shall have operated as many as a hundred Night Hunters by late 2015.

A significant event last year was the manufacture and launch of the testing of a Mi-28N prototype fitted with the twin controls. The machine also

known as Mi-28UB was derived from the LRIP Mi-28N serialised 37 and built in 2008. Its maiden flight in Rostov-on-Don took place on 31 July 2013. The developer, the Mil Moscow Helicopter Plant, continued the upgrade of the baseline model last year to develop the more sophisticated Mi-28NM variant, which productionising is slated for the middle of the decade.

With the Night Hunter's official trials complete and its service entry with RusAF being a fact, the machine's promotion on the global market has intensified. Several Middle East, African and Latin American nations have displayed interest in the helicopter, which export version is designated as Mi-28NE.

According to the media, Iraq is to become the first foreign customer for the Mi-28NE soon. According to the official website of Rostec, which subsidiary Rosoboronexport

is, an agreement on a large batch of Russian armament for Iraq to the tune of \$4.2 billion was signed by Iraqi Premier Nouri al-Maliki during his visit to Moscow in October 2012. Rosoboronexport Director General Anatoly Isaikin confirmed to the media in February 2013 that the contract was getting the approval by the Iraqi parliament. On 27 March of the same year, the Iraqi parliament's website published the statement by Vice-Speaker Aref Teifur about the deal having come into effect. In addition to a batch of Mi-28NE combat helicopters, Iraq acquired a number of Mi-35M attack helicopters, of which the first four were delivered last autumn.

Early in May, Konstantin Biryulin, head of the Russian delegation to the SOFEX 2014 arms show in Jordan and Deputy Director of the Federal Military-Technical Cooperation Service, told the Interfax-AVN news agency that Iraq would receive the first Mi-28NE batch before year-end.

"Russia is fulfilling the contract for delivery of Mi-35 and Mi-28NE helicopters to Iraq. The Mi-35 batch has been delivered, and Iraqis are pleased with them. As for the Mi-28NEs, their first consignment shall have been delivered to Iraq before year-end", told Mr. Biryulin. He said Iraq became the launch foreign customer or the advanced Russian-built Mi-28NE helicopters.

"To date, we have had no problems with fulfilling the contract for delivering the helicopters to Iraq. The plant in Rostov-on-Don is on schedule", Konstantin Biryulin added.



Alexey Mikhayev

Ka-52: over 60 fielded with combat units



Alexey Mikheyev

Concurrently with the fielding of Mi-28N combat helicopters with the Army Aviation of the Russian Air Force the delivery of Kamov Ka-52 multirole combat helicopters to RusAF continues.

The Ka-52 passed its official joint tests in 2011, when it was recommended for service entry. The delivery of production-standard machines to the Russian Defence Ministry kicked off in December 2010 with the handing over of four production-standard Ka-52s to the Army Aviation Combat Training and Conversion Centre in Torzhok. The

delivery of production-standard Ka-52s to the first Army Aviation base in Chernigovka in the Russian Far East began in May 2011. Later on, aircraft of the type were shipped to Korenovsk air base in the Krasnodar Territory early in 2013 and to the Army Aviation brigade station near the town of Ostrov, Pskov Region, in early 2014. Interestingly, the final assembly and check flights of the 16 Korenovsk-destined machines, which had been built by Sazykin-Progress by late 2012, was handled by Rostvertol JSC in Rostov-on-Don, where they were airlifted by Il-76

transports from Arsenyev in a partially disassembled state.

In late December 2013, 14 brand-new Ka-52s were handed over to the Defence Ministry in a ceremony in Arsenyev, attended by the RusAF Commander-in-Chief Lt.-Gen. Victor Bondarev and the media. 12 of the machines were designed for the newly-activated army aviation brigade in Ostrov, with the remaining two earmarked for a unit in Khabarovsk. The helicopters were shipped from the Russian Far East to the Pskov Region earlier this year by Il-76 and An-22 airlifters, and several of the machines

flew as part of the Victory Day Parade in Moscow on 9 May 2014. In addition, three final aircraft were shipped to Chernigovka early last year. This enabled to complete conversion of an air squadron there from the Mi-24 to the Ka-52. Thus, last year's Ka-52 output equals 17.

Russian Helicopters issued an official statement in 2011 about the finalisation of a long-term contract with the Defence Ministry for "over 140" Ka-52 helicopters, with the contract to keep Sazykin-Progress plant busy virtually throughout the decade. To date, the manufacturer has made in excess of 60 production-standard helicopters of the type.

As is known, the Ka-52 was selected as the baseline attack helicopter model for the air groups to be deployed on Mistral-class amphibious assault ships being purchased by the Russian Navy. As far back as late November 2009, a Ka-52 prototype passed the basing tests on board a Mistral during the latter's port call to Russia. At present, Kamov JSC is finalising the development of a shipborne derivative designated as Ka-52K.

Demand for Mi-35M remains high

The upgraded Mil Mi-35M attack helicopter, being in production at Rostvertol JSC, a Russian Helicopters subsidiary, has been fielded with Russian Air Force units since late 2011. Earlier, it has been acquired by foreign customers only (10 Mi-35Ms were sold to Venezuela during 2006–08, and the delivery of the 12 machines ordered by Brazil commenced in December 2009), but an official statement was made in May 2010 that the Russian Defence Ministry was intent on buying Mi-35Ms too. As is known, the then latest Mi-24P and Mi-24VP helicopters entered service with the nation's military more than two decades ago.

The first four Mi-35Ms were delivered to the Russian Defence Ministry in December 2011, and 16 more in 2012, according to Rostvertol's annual report. At present, Mi-35Ms are operated by the Army Aviation Combat Training and Conversion Centre in

Torzhok and by several Army Aviation units, e.g. those in Budyonnovsk, Korenovsk, Ostrov, etc.

The Mi-35M and Mi-35P remain in high demand with foreign customers. A case in point is a major order for 24 upgraded Mi-35Ms, placed by Azerbaijan in September 2010. The first four helicopters were shipped to Baku in December 2011, with the remain-

ing eight following suit during 2012. According to the Azeri media, the contract has been fulfilled with success early this year. During 2013, Rostvertol manufactured 12 machines of the type for Azerbaijan, of which the last four had been delivered in January this year.

Autumn 2013 saw four brand-new Mi-35Ms crop up in Iraq as well, where they have seen action extensively cov-

ered by the Iraqi media. The manufacturer also has prepared the last batch of three Brazil-destined Mi-35Ms for shipping. Overall, Rostvertol made 28 Mi-35Ms last year. In spite of ramping up the output of the Mi-28N/NE combat helicopter, the Mi-35M attack helicopter will have remained an important part of Rostvertol's production programme in the coming years.



Alexey Mikheyev



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