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RUSSIA'S NATIONAL AEROSPACE MAGAZINE

Take-off

february 2011 • *Special edition for Aero India 2011*

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Dear reader,

You are holding a new issue of the Take-Off magazine, a supplement to Russian national monthly aerospace magazine VZLET. This issue has been timed with Aero India 2011 air show to be held in the "capital city" of India's aviation – Bangalore.

By tradition, the aerospace show in Bangalore has been attended by numerous Russian participants and businessmen. Small wonder, since India has long been among the main partners of our country in the field of arms trade, specifically, in aerospace sphere.

Russian aircraft have been delivered to India for almost half a century. Since the 1960s, the bulk of the Indian Air Force's fighter and fighter-bomber fleets has been made up by MiG and Sukhoi aircraft, with a large number of the MiG-21 fighters and MiG-27M fighter-bombers were made by India and a licence production of one of the world's best fighters, the Su-30MKI, here in India is now underway and growing up.

Licence production of the Russian combat aircraft is only one of the signs of the surging cooperation between the two countries. In late 1990s Indo-Russian joint venture BrahMos Aerospace, a developer and manufacturer of cutting-edge BrahMos supersonic cruise missile system, launched its operations. Later on, a range of other important agreements concerning joint aerospace programmes have been signed with the recent contracts on co-development and co-production of the fifth-generation Prospective Multirole Fighter (PMF) and Multirol Transport Aircraft (MTA) by Russian companies and India's HAL corporation became the most important among them.

At present, Russia's MiG Corp. is fulfilling the contract on delivering a batch of MiG-29K/KUB carrierborne fighters to the Indian Navy to equip the air wing of the Vikramaditya carrier now under repair and modernisation in Russia also. MiG Corp. is now upgrading the entire fleet of IAF MiG-29 fighters and participating in IAF's MMRCA tender for 126 medium multirole combat aircraft with its advanced MiG-35 Generation 4++ fighter.

Rosoboronexport and Russian Helicopters JSC joined three major tenders issued by Indian Defence Ministry recently for combat, heavy-lifter and light multipurpose rotorcraft with Mil Mi-28NE, Mi-26T2 and Kamov Ka-226T proposals respectively. All these and some other programmes of Russian-Indian aerospace cooperation became the main topics of this issue. By tradition, you can find also here a brief rundown on some other recent news and achievements of the Russian aerospace industry over past several months.

I wish all the exhibitors and visitors of Aero India 2011 interesting meetings, useful contacts and lucrative contracts! See you again at next air shows!

Sincerely,

Andrey Fomin,
Editor-in-chief,.
Take-Off magazine

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Take-off
February 2011

CONTRACTS AND DELIVERIES

MILITARY AVIATION

INDUSTRY

COMMERCIAL AVIATION

ROSTVERTOL

RUSSIAN HELICOPTERS

Mi-28NE
Man-made defence

Himalayas
Natural defence

ENHANCING

Russian-Indian fifth-generation fighter deal clinched

On 21 December 2010, during Russian President Dmitry Medvedev's visit to India, Rosoboronexport and HAL made a contract for development of the preliminary design of a fifth-generation Prospective Multirole Fighter (PMF). The contract was signed by Rosoboronexport Director General Anatoly Isaykin and Sukhoi Director General Mikhail Pogosyan, on the one hand, and by HAL Chairman Ashok Nayak and HAL Director (D&D) N.C. Agarwal.

An official Rosoboronexport news release has stressed that the parties will co-develop the fifth-generation fighter under the current intergovernmental agreement. "The contract paves the way to the development of the Russian-Indian fighter", reads the Rosoboronexport news release.

As is known, the Russian-Indian PMF fighter development will build upon the lessons learnt by Sukhoi from its development of the PAK FA Future Tactical Fighter. The first prototype of the aircraft first flew on 29 January 2010 and has been undergoing its flight tests in the Moscow Region. The second PAK FA flying prototype is expected to join it in the trials in the nearest future. The third fighter prototype is due to be completed in Komsomolsk-on-Amur by year-end. It will be the first prototype packing the organic avionics suite, including an active electronically-scanned array radar from Tikhomirov-NIIP.

HAL

Alexey Mikheyev

As was repeatedly stated in Russia, the production-standard PAK FA fighters are to enter service with the Russian Air Force in 2015. According to the Indian media, the Russian-Indian PMF fifth-generation fighter is due to be developed by 2017. According to IAF Chief of Staff Chief Air Marshal Pradeep Naik, the Indian Defence Ministry is going to order "up to 250 fifth-generation fighters".

Indian MiG-29 upgrade

The Indian Air Force (IAF) is to receive its first upgraded MiG-29UPG fighters soon. The upgrade is being handled by the MiG corporation under the contract awarded in March 2008. The contract stipulates integrated upgrade of the whole MiG-29 fleet in service with IAF. Overall, 62 aircraft will be upgraded, including several two-seat combat trainers. They will be given the latest avionics and advanced weapons. In addition, airframe and powerplant improvements will extend their service life considerably, with the planes transitioning to on-condition maintenance.

The IAF MiG-29 upgrade concept complies with the one adopted by the Russian Air Force to its MiG-29SMTs that have been in service since 2009 and well-mastered by Russian military pilots. At the same time, the composition of the avionics and weapon suites of the upgraded IAF MiG-29s will have a high degree of commonality with the carrierborne MiG-29K/KUB fighters that have entered service with Indian Navy on 19 February 2010. Foreign-made avionics was integrated with the avionics suite of the MiG-29UPG at the customer's request (the so-called 'international avionics suite'). The manufacturer has already got such an experience that has proven itself under Russo-Indian contracts for upgrade of the MiG-21UPG Bison fighters as well as development and manufacture of the Su-30MKI and MiG-29K/KUB fighters.

The fire control system of the MiG-29UPG is wrapped around the advanced slotted-array Zhuk-M2E radar from Phazotron-NIIR Corp. and OLS-UEM IRST sensor with the laser, thermal-imaging and television capabilities from NIIPP (similar radar and IRST are used in the MiG-29K/KUB). The cockpit management system is based on full-colour multifunction liquid-crystal displays. The international segment of the avionics suite comprises a Thales helmet-mounted target designator, a Sagem inertial/satellite navigation system, an Indian EW system and an Israeli ECM station, with the same system installed in the MiG-29K/KUB.

The basic weapons suite of the MiG-29UPG is the same as that of the MiG-29SMT and MiG-29K/KUB. Unlike the weapons suite of the standard MiG-29, it has RVV-AE air-to-air active radar homing missiles and air-to-surface precision-guided munitions, such as Kh-29T general-purpose TV-homing missiles, Kh-31A antiship active radar-homing missiles, Kh-31P antiradiation missiles, KAB-500Kr TV-homing smart bombs, etc.

The first six IAF MiG-29s are completing their upgrade and tests in Russia and will be back with IAF in the near future. The rest 56 aircraft will be upgraded on the premises of the IAF 11th Repair Base with the use of equipment kits supplied by Russia.

MiG-35 passes all tests under MMRCA tender

Victor Drushlyakov

Sergey Lysenko

As was repeatedly stated by ranking officials of the Indian Defence Ministry and Air Force, this year is to see the winner of the tender under the MMRCA programme providing for acquisition of 126 medium multirole fighters by IAF. Russia's MiG-35 fighter – a heavily upgraded derivative of the MiG-29 family – has passed all of the phases of the evaluation trials, stipulated by the customer.

In October 2009, two MiG-35 prototypes (a singleseater serialled 961 and a twinseater serialled 967) passed a series of tests in India, including hot-and-high trials. The two MiG-35s kicked off their tests in India with demonstration flights by MiG Corp. pilots and familiarisation flights by IAF aircrews at HAL-owned air base in Bangalore. Then, there were field tests in Jaisalmer, the Rajasthan desert (hot temperature tests) and at Leh air base in a mountainous area of the Himalayas (Jammu and Kashmir), where the contenders have to prove the feasibility of fully-laden takeoff and landing in high-altitude mountainous environment (altitude above sea level about 3,500 m). According to the Indian media, the ability of the fully-fuelled aircraft hauling a standard combat load to operate from mountainous-area airfields is among IAF's key requirements to all of the contenders.

Another stage of the trials, the tender organisers report, took place in the contender's country. In April 2010, MiG-35 sorties were flown in the test base in Zhukovsky and the Russian Defence Ministry's test centre in Akhtubinsk and included participation of IAF pilots, demonstration of the operation of the Zhuk-AE AESA radar and all combat load variants possible, to include live fires of RVV-AE active radar homing air-to-air missiles and smart bombs. All targets were destroyed. The Indian pilots gave raving reports to the operation of all of the fighter's systems, particularly, the AESA radar tested in various operating modes. Mention should be made that the MiG-35 demonstrator fitted with a real Zhuk-AE AESA radar has taken part in the Aero India air show in Bangalore twice, in 2007 and 2009, of which the rest of the contenders could only dream then.

In design terms, the MiG-35 is a derivative of the MiG-29K/KUB multirole carrierborne fighter already in service with the Indian Navy. This allows commonality of air and ground crew training as well as establishment of an efficient after-sales support system. At the same time, the MiG-35 features a drastically more advanced avionics suite comprising cutting-edge electro-optical sighting and navigation systems, sophisticated comms gear and electronic warfare equipment in addition to the AESA radar. The MiG-35 is commonised with the MiG-29K/KUB and IAF-ordered upgraded MiG-29UPG in terms of weapons including a wide range of air-to-air and air-to-surface precision-guided munitions, but it boasts a heavier combat load, with integration of future weapons being a possibility.

According to experts, the obvious advantages of the Russian contender include Russia's demonstrated willingness to transfer technologies and to team up with leading Indian high-tech companies, which ensures steady development of the Indian aircraft and electronic industries. To cap it all, the Russian-Indian aviation cooperation has never been hindered by political pressure or groundless embargoes, the two countries have refined mechanisms of resolving key military-technical cooperation problems and there is the atmosphere of trust on all levels – from top leaders to technicians.

As is known, the MMRCA programme provides for IAF's acquisition of 86 single-seat and 40 two-seat medium multirole fighters, of which 18 are to be delivered by the manufacturer, with the rest 108 to be assembled by HAL in country. The delivery should begin within three years after the signature of the contract with the winner in the tender and be complete inside four years.

Indian Air Force to order more Su-30MKI

Andrey Fomin

Today, the Su-30MKI two-seat supermanoeuvrable multirole fighter fleet is the trademark of the Indian Air Force and its most sophisticated combat planes in service. To date, the Russia's Irkut corporation has supplied IAF with over 50 fly-away aircraft of the type and India's HAL corporation has been licence-producing the Su-30MKI since 2004, with the licence production to last until 2014 at the least.

Irkut delivered the first 32 Su-30MKIs under the 1996 contract to IAF during 2002–2004. Later on, 18 more fighters of the type arrived in 2008–2009 under a "trade-in" deal clinched in 2007 as a replacement of 18 Su-30Ks delivered in late 1990s.

The contract with India on licence production of 140 Sukhoi Su-30MKIs, NPO Saturn AL-31FP thrust vector control engines and avionics, including the Tikhomirov-NIIP Bars phased-array radars, was signed on 28 December 2000. It became the major deal in the Russian-Indian cooperation, valued at $3 billion-plus. The first HAL-assembled Su-30MKI was accepted by IAF on 28 November 2004.

In 2007, Rosoboronexport and Irkut, on the one hand, and the Indian Defence Ministry, on the other, made a deal for 40 Su-30MKIs more, which boosted the number of HAL-produced fighters up to 180. Irkut started the delivery of the knockdown kits under the new contract in 2008. HAL's boss Ashok Nayak has said recently that his corporation had delivered "about 105 Su-30MKI planes" to IAF, with the Indian Defence Ministry expected to order 42 fighters more, driving the total number of HAL-assembled Su-30MKIs up to 222 units. Thus, IAF might get as many as 272 planes of the type by the mid-decade, including the Su-30MKIs supplied by Irkut in fly-away condition.

Meanwhile, the Su-30MKI programme has not been sitting on its hands, and the fighter being delivered to India these days differ from those supplied earlier in the decade in greater capabilities of the fire control system owing to latest operating modes and enhanced characteristics of the avionics suite. Since the Su-30MKI production and deliveries will have continued for at least four to five years more while their service life will last at least 25 years, further improvement of the aircraft by means of even more sophisticated avionics and weapons comes to the fore. Such priorities now include the arming of the Indian Su-30MKI fleet with the cutting-edge BrahMos-A long-range precision-guided multirole air-to-surface missiles that is under development by BrahMos Russian-Indian joint venture, which has already delivered missile's ship-based and land-based versions to the Indian Navy and Army.

In addition, the upgrade will apply to the fighter's avionics suite. The current preliminary agreements stipulate phased upgrade of the Tikhomirov-NIIP's Bars phased-array radar. The first phase of the upgrade is supposed to boost the radar's performance through introduction of additional operating modes as well as more-capable computers and software. This is to maximise the reliance on the solutions of the existing phased-array radar already productionised by India under Russian license. Phase two of the upgrade is to see the Bars's passive phased array replaced with an active electronically-scanned array (AESA).

Vladimir Karnozov

MTA joint venture set up

The long-awaited signature of an agreement on the establishment of Russian-Indian joint venture to develop the Multirole Transport Aircraft (MTA) took place in India on 9 September 2010. The Russian participants in the venture are the United Aircraft Corporation (UAC) and Rosoboronexport government-owned corporation while their Indian counterpart is Hindustan Aeronautics Ltd. (HAL). The signatories have a fifty-fifty ownership of the stock, with the joint venture being headquartered in Bangalore.

The intergovernmental agreement on co-development and construction of the MTA was signed as far back as 2007. It makes provision for the production of 205 aircraft in Russia and India. The overall cost of the development is set at $600.7 million and will be shouldered by the parties equally.

According to an official Indian Ministry of Defence news release circulated due to the establishing of the joint venture, the MTA will have a lifting capacity of 15–20 t to meet the concurrent requirements of the Indian and Russian air forces. Its maximum takeoff weight will stand at 65 t, cruising speed will be 800 km/h, range will account for 2,500–2,700 km and service ceiling will equal 12,000 m. The MTA will be powered by two turbofan engines. An MTA prototype may complete its maiden flight in 2016.

HAL

Andrey Fomin

Beriev delivered third A-50EI

The third A-50EI airborne warning and control aircraft serialled KW3553 built by Beriev company for the Indian Air Force (IAF) under a trilateral contract was ferried from Taganrog to Israel on 8 October 2010 for ELTA to fit it with the MSA radar system.

The first two production A-50EIs were delivered to the customer in 2009–2010. They are in service with IAF now.

The A-50EI airborne warning and control system aircraft was developed under the 2004 Russo-Indian-Israeli contract. It is based on the airframe of the Ilyushin Il-76TD airlifter produced by TAPC and fitted by Beriev with PS-90A-76 engines, and Israeli radar system MSA (Phalcon) mounted on the aircraft by Israeli company ELTA. In addition, the aircraft is equipped with a datalink from Russian radio corporation Vega.

The first Il-76TD (c/n 94-02), earmarked for conversion into the lead A-50EI plane, was flown from the manufacturer plant in Tashkent to Taganrog in April 2005. Fitting the first aircraft with PS-90A-76 engines, radar fairings and the in-flight refueling system as well as other airframe modifications under the A-50EI programme was complete in autumn 2007. The aircraft performed its maiden flight from Beriev's airfield in Taganrog on 29 November 2007. On 20 January 2008, it was ferried to Israel for assembly of the radar system and conduct of the full set of improvements and tests. The first flight of the radar-equipped aircraft took place in Tel Aviv on 5 June 2008. The plane had been tested in Israel until last spring, after which it flew to India on 25 May 2009 for its IAF in-service ceremony at Palam air base near New Delhi on 28 May. The aircraft was serialled KW3551.

The second A-50EI aircraft under that contract, which was based on the Il-76TD airframe (c/n 94-03) delivered to Beriev in June 2005, first flew in Taganrog on 11 January 2009 and went to Israel for its radar system installation on 24 June 2009, following the completion of its factory tests. Outfitting the plane with the radar system had taken about nine months, and on 25 March 2010 the plane was ferried to the customer and entered service with IAF, serialled KW3552.

The third A-50EI wrapped around the airframe of the Il-76TD (c/n 94-04) completed its first flight in Taganrog on 9 June 2010 and then had spent four months being painted in Ulyanovsk and tested and debugged in Taganrog. Once it has been equipped with the radar system, cleared by the acceptance tests and delivered to IAF, the contract for the three AWACS aircraft will be fulfilled. Nevertheless, the customer is not about to limit itself to three aircraft only. Negotiations are under way on delivery of several more aircraft of the type.

Beriev

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Ka-226T becomes a favourite of Indian tender

Due to some experts, Kamov Ka-226T light multipurpose helicopter became one of the main favourites in Indian tender for replacing obsolete HAL Cheetah and Chetak helicopters in the Indian Army Aviation's and Air Force's inventories. Kamov company, a subsidiary of the Russian Helicopters holding, has been participating in the tender since 2008.

Indian Defence Ministry officially stated its decision on issue a new helicopter tender in April 2008, several months after the $600 million programme on buying and licence-producing 197 Eurocopter AS550C3 helicopters for the Indian Army Aviation had been cancelled in December 2007 (60 machines were to be imported, with the rest to be licence-produced by India's HAL corporation). The Indian military's requirements for advanced light helicopters have now been estimated at 384 units, of which 259 are to be received by the Army Aviation and 125 top go to IAF, with the offsets hiking to 50 per cent. A considerable part of the helicopters is to be licence-produced by HAL. Requests for proposals for this tender were issued to Eurocopter, Bell Textron, MD Helicopters, AgustaWestland and Kamov who offered their AS550, Bell 407, MD520N, A109 (A119) and Ka-226T models respectively. The final decision on the winner is slated to be taken this year after comparison tests of all the helicopters offered for the tender.

Alexey Mikheyev

Alexey Mikheyev

Kamov joins the tender as a division of the Russian Helicopters holding company, pitching its upgraded Ka-226T helicopter that differs from the earlier Ka-226 model in being powered by Turbomeca Arrius 2G1 engines. The engines boost the machine's performance, especially when operating in the 'high and hot' environment. A prototype Ka-226T was re-engined with Turbomeca Arrius as far back as late 2004. The prototype's tests have displayed a considerable improvement in its flight characteristics. In 2009–2010 several more prototypes were built, one of which took place in special tests in India early last year.

To implement the programme, Russian Helicopters is launching the Ka-226T large-series production on the premises of another of its subsidiaries, the Kumertau Aircraft Production Plant (KumAPP). To this end, Vnesheconombank in September 2008 issued it a $95 million loan. The measures being taken may result already by late 2011 in KumAPP churning out up to 70 Ka-226s annually, including at least 50 Ka-226Ts.

More Mi-17s for India

Late last year, the Kazan Helicopters plant, a subsidiary of the Russian Helicopters JSC, launched deliveries of new Mil Mi-17-V5 helicopters to India under a large contract for 80 machines, signed by the Indian Defence Ministry's Acquisition Department and Rosoboronexport state corporation in December 2008, during Russian President Dmitry Medvedev's visit to New Delhi. The contract became the major recent export deal on the helicopters of the Mi-17 family made in the city of Kazan. The media reported in the wake of the contract's signature that the aircraft were to be delivered during 2010–2014.

The Mi-8 and Mi-17 helicopters have long been in service with the Indian Air Force and several other Indian users. The first Kazan Helicopters-built Mi-8Ts showed up in India more than three decades ago and have become very popular in the course of daily operation and during several armed conflicts. India started taking delivery from Kazan of more efficient Mi-17s powered by TV3-117MT engines in 1986, with 53 aircraft of the type ordered then. In 2000, the Indian Defence Ministry ordered another batch comprising 40 modified Mi-17-1Vs. More than 150 Mi-8Ts and Mi-17s were operated in the country early in the last decade as a result.

Andrey Fomin

According to the Flight International magazine, IAF had maintained a fleet of 112 Mi-8 and Mi-17 helicopters by year-end 2010 and the delivery of new Mi-17-V5s had begun. It became known last year that IAF was intent on beefing up its Mi-17 fleet even more. According to IAF Chief of Air Staff Air Chief Marshal P.V. Naik, the Indian Defence Ministry is pondering the placement of an order for 59 more helicopters of the type.

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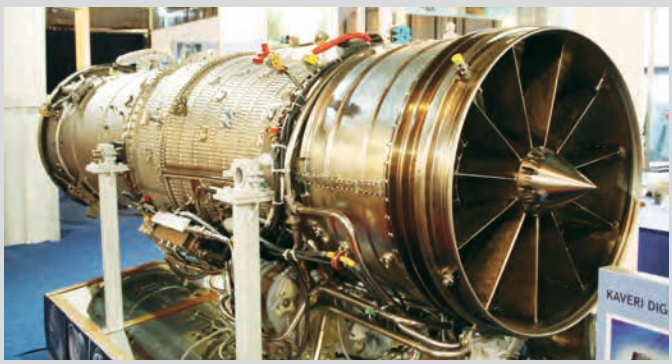
Kaveri tests kicked off in Russia

Nick Belyayev

On 3 November 2010, the Gromov Flight Research Institute (LII) saw the first test flight of the Il-76LL flying testbed (side number 76492) carrying on the left inner engine station an advanced Kaveri afterburning turbofan under development by the GTRE gas turbine laboratory of the Indian Defence Research and Development Organisation (DRDO) to power the LCA Tejas fighter. The advanced engine was tested in all regimes of the flight that exceeded an hour – from takeoff to landing, including Mach 0.6 cruising flight at an altitude of 6,000 m.

The flight trials of the Kaveri's example K-9 on board Russian flying testbed are under a Russian-Indian deal clinched several years ago. GTRE has been developing the engine over 20 years and has run into a number of difficulties. This led to prototype Tejas fighters having been fitted with US-made General Electric F404-F2J3 engines. The pre-production planes are equipped with F404-GE-IN20 engines that also are going to equip the first 20 production-standard Tejas Mk I fighters slated for service entry with the Indian Air Force in 2011.

Last October, the Indian MoD decided, based on the tender's outcome, that the upgraded Tejas Mk II, whose trials are to kick off in 2014 and the production and deliveries in 2016, would be powered by US-made General Electric F414-GE-INS6 turbofan. In this connection, the future of the indigenous Kaveri engine, whose development has cost more than 20 years (since 1989) and upwards of 28 billion rupees (in excess of $600 million), remains uncertain. Nonetheless, completion of its development is of important to India in political terms.



Andrey Fomin

An important milestone towards the objective sought should be the Kaveri's tests by Gromov LII on board Russia's Il-76LL. According to DRDO's official news release, 50–60 flights more are scheduled for the flying testbed in the coming several months, with the flights designed to prove the basic characteristics of the engine and its reliability and safety as well. This done, the Kaveri's flight tests could continue on board the Tejas fighter.

Mention should be made that the Il-76LL flying testbed (No. 76492), a 1986 LII-made conversion of the 1984 production-standard Il-76TD c/n 39-08, had been used for a long time for testing the Solovyev D-90A (PS-90A) turbofan. Then, it was mothballed in 1994 and de-mothballed in 2006 for the flight trials of the Kuznetsov NK-93 propfan prototype. However, the flying testbed had performed only few missions with an NK-93 on board before the prototype was dismounted in May 2009 and the plane's conversion under the Indian contract began.

DRDO

Russian AL-55I tested on two HJT-36s

Andrey Fomin

Russian companies NPO Saturn and UMPO continue to fulfil a contract on the HAL-ordered AL-55I engines designed to power the future HAL HJT-36 Sitara intermediate jet trainer (IJT). AL-55I prototypes have been mounted on both HJT-36 prototypes that had previously been powered by SNECMA Larzac 04H20 engines producing less thrust (the first of the prototypes, PT-1 serialled S-3466, conducted its first Larzac-powered flight on 7 March 2003, and the other (PT-2, S-3474) followed on 26 March 2004).

The first three AL-55I turbofans fully rig-tested by NPO Saturn were shipped to India in December 2008. By then, the one AL-55I prototype had passed the first stage of its flight tests in Russia onboard the MiG-AT (serial 823) flying testbed that first flew with it on 28 July 2008. In addition, an AL-55I was integrated with an HJT-36 prototype in Bangalore in July 2008. The engine's operation as part of the powerplant was tested and early taxi runs at the airfield were performed.

The AL-55I-powered HJT-36 flew its maiden mission in Bangalore on 9 May 2009. Indian test pilot Baldev Singh, being HAL's chief pilot (fixed aircraft) and HAL's executive director for flight operations said, "The powerplant proved itself". The flight kicked off the phase of certification test flights of the AL-55I onboard the HJT-36.

To continue the testing of the HJT-36s, NPO Saturn made a batch of six more AL-55I prototypes under the October 2008 contract and shipped them to HAL during 2009–2010. The acceptance tests of the first three of them at NPO Saturn's test rigs were completed on 28 August 2009 and those of the remaining three on 12 February 2010.

The AL-55I's certification flight tests on the two HJT-36s were wrapped up successfully in February 2010. Overall, 31 sorties were logged, after which the planes were headed to Jaisalmer in Rajasthan for hot-climate tests in April 2010. 13 sorties were performed there within 10 days at an ambient temperature of +44 deg. C. The sorties proved the compliance of the HJT-36 trainer and its AL-55I engine with all of the IAF requirements to the operation under such climatic conditions.

With the high-temperature trials over, the AL-55I-powered HJT-36s started their stall and spin tests. Upwards of 70 flights had been logged by the two HJT-36s powered by AL-55I turbpofans by August 2010. NPO Saturn expected to deliver four next AL-55Is to HAL before year-end and six more during 2011. Now, under a HAL-awarded contract, Saturn is running developmental work to extend the engine's service life up to 300 flying hours, with the work to be complete in November this year.

As is known, the AL-55I two-shaft turbofan rated at 1,760 kgf is being developed by NPO Saturn on order from HAL under a contract that came into force on 1 August 2005. The work on productionising a prototype engine batch in Russia, as well as certification and licence production support in India is being done by NPO Saturn and UMPO on a 50:50 basis. The contract stipulates licence production of at least 250 AL-55I engines by HAL's plant in Koraput, with producing more engines being an option.

The AL-55I-powered HJT-36 Sitara is expected to oust IAF's obsolete HJT-16 Kiran trainers. IAF has ordered a low-rate initial production 12-ship batch, and India's Cabinet Committee on Security gave the green light to the Defence Ministry's request for acquisition of the first 73 production-standard aircraft last year. IAF has plans to buy at least 70 HJT-36 more further down the line, with the service's overall HJT requirement estimated at 200–250 aircraft.

NPO Saturn

Jordanian Il-76MF's tests in Zhukovsky

Alexey Mikheyev

The first production Ilyushin Il-76MF airlifter built for Jordan by Tashkent Aircraft Production Corp. (TAPC) under the contract landed by Rosoboronexport on 17 August 2005, during the visit of the MAKS 2005 air show by the Jordan King and Supreme Commander-in-Chief of the Jordanian Armed Forces, His Majesty Adballah ben Al-Hussein II, has been undergoing flight tests at Ilyushin's facility in Zhukovsky, Moscow Region, since November 2010.

As is known, the first Jordan-ordered aircraft (c/n 96-03 issued with temporary registration number 76954 for the duration of the tests) performed its first flight in Tashkent on 30 September last year and then, following several test flights more and painting, was ferried to Zhukovsky on 29 October for installation of additional avionics and extra tests prior to the delivery.

Alexey Mikheyev

Meanwhile, TAPC is assembling the second plane under the contract (c/n 94-01). In early November 2010, the Perm Engine Company shipped to Tashkent a set of four engines to power the plane, according to a Perm Engine Company spokesperson. The second Jordan-ordered Il-76MF is expected to conduct its maiden flight in Tashkent early this year.

"Both planes are expected to be delivered by mid-2011, following the completion of all of the tests", the Perm Engine Company news release reads.

Third An-74T-200A delivered to Egypt

The third Antonov An-74T-200A airlifter ordered by Egypt set off for long a road to the customer from the airfield of the Kharkov State Aircraft Manufacturing Company (KSAMC) on 24 November 2010. The plane was built under the contract made as far back as the earlier half of the 2000s. The first An-74T-200A (SU-BPM, c/n 19-04) was manufactured for Egypt in Kharkov six years ago and ferried to the customer in September 2005. The customer had had to wait for the second aircraft for as long as four years, because KSAMC managed to resume its construction only in 2009, after the stabilisation of the company's financial standing. The second airlifter (c/n 19-05) completed its maiden flight in Kharkov on 27 November 2009 and, following its acceptance tests, flew to Egypt very late in the same year to receive registration number SU-BPN.

The final, third, An-74T-200A (c/n 19-06) designed for Egypt was to be completed early last year. However, the completion of the aircraft took much more time than expected. As a result, the plane first flew on 30 October 2010, got Egyptian registration number SU-BPO and left Kharkov for Egypt early in the morning on 24 November 2010.

KSAMC is completing two more An-74 family planes – An-74TK-200S medevac transports c/n 19-01 and 19-03 designed for Libya.

In addition, five more An-74TK-200 and An-74T-200A fuselages and airframes as well as at least three An-74TK-300 airframes sit in the Kharkov-based plant's shops. In addition to the second of Egypt's An-74T-200A, the plant managed in 2009 to deliver two An-74TK-300Ds – one (c/n 22-03, reg. 5A-CAA) went to Libya and the other (c/n 19-08, reg. RDPL-34020) to Laos.

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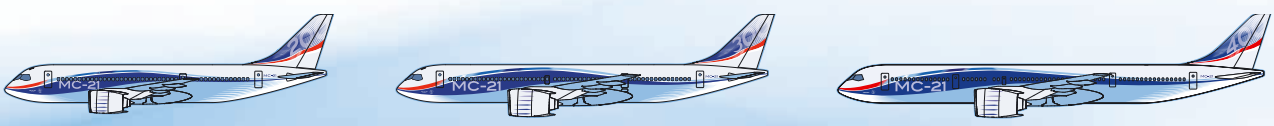

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Vladimir SHCHERBAKOV

Mi-26T2 versus CHINOOK

Which will become India's future heavylifter?

Russian heavylift helicopter Mi-26, developed by the Mil design bureau and produced by the Rostvertol company in Rostov-on-Don for as long as three decades now (the developer and manufacturer are both now members of the Russian Helicopters holding company), remains the most capable transport helicopter in the world. Over 300 such helicopters have been rolled out and operated in Russia and abroad by both armed services and commercial air companies. For instance, Venezuela bought three new Mi-26Ts several years ago, and China took delivery of its third Mi-26TC of the type last autumn. By the way it was India that became the foreign launch customer for Mi-26 heavylifters, having acquired four aircraft during 1986–1989. Recently, the Indian Defence Ministry has issued a tender for 15 advanced heavylift helicopters. Only three types of aircraft in the class are made in the world today, they being Russia's Mi-26TC and US CH-47F Chinook and CH-53E Super Stallion, with the US machines lagging well behind the Russian helicopter in terms of carrying capacity. Rosoboronexport and Russian Helicopters brought a heavily upgraded version, the Mi-26T2, to India to bid in the tender. Its rival is the upgraded CH-47F Chinook that entered service with the US military in 2007.

Mi-26 in India

The first two Mi-26 heavylifters were bought by Indian Air Force in May 1986, serialled Z2897 and Z2898 and fielded with the IAF's 126th helicopter flight activated at the same time. Two more Mi-26s serialled Z3075 and Z3076 were fielded with the same unit in February 1989. The four Mi-26s have been used by India proactively for over two decades to haul heavy cargo and conduct unique transport operations. For instance, the unique haulage of an externally-slung pontoon bridge took place in February 1989. Mi-26s airlifted MiG-21 fighters from air accident sites to their air bases at least twice, in 1999 and 2002. A Mi-26 hauled away a Beechcraft commercial plane from its incident site at the Kangra airfield, with the operation being unique from the underslung cargo haulage duration (3.25 hrs) as well. At least twice, in February 2006 and September 2007, Mi-26s airlifted crash-landed Mi-17 helicopters. Last year, the Indian Mi-26s were used widely to airlift heavy equipment to the railway construction site in the Srinagar valley.

Given the Mi-26's positive decades-long operational record in India, small wonder that its makers receive an invitation to bid in the tender for a new batch of heavylift helicopters needed by the Indian Defence Ministry. A production-standard Mi-26T (RA-06293) of the Rostvertol-Avia company was flown to India in November last year, where it conducted a series of demonstration flights, some of which took place in mountainous terrain.

A new version of the machine, the Mi-26T2, has been offered to India. It is an upgrade featuring a latest avionics suite allowing its round-the-clock operation by a crew of two (a flight operator is included in the crew in case the helicopter is fitted with an external cargo sling).

Mi-26T2 prototype's forward fuselage section with TSL-1600 floodlight (top) and new "glass" cockpit for two pilots only (bottom)

Rostvertol

Rostvertol

The Mi-26T2 hauls up to 20 t of cargo in the cabin or slung under belly. This distinguishes it favourably from its rival, the US-made Chinook capable of 11–13 t of cargo. The Mi-26T2 prototype meeting the requirements of the Indian Defence Ministry has already been rolled out to Rostvertol's flight test facility and is due to take to the air in the nearest future.

Mi-26T2 new capabilities

Russian Mi-26 heavy-lift helicopter, which first flew on 14 December 1977, revolutionised rotorcraft industry in its day by setting new heavy-lift helicopter standards. It was able to carry up to 80 troops in combat gear or 60 casualties on stretchers, or cargo weighing up to 20 t in its cargo cabin or on the external sling. Its US rivals have been unable to beat it at this yet.

A graphic proof of the superiority of the Russian machine over its US competitor is the widely known facts of history of the combat operations in Afghanistan, when the Mi-26 was used to evacuate US Chinooks downed in mountainous areas for several times. Isn't this the best advertisement for the aircraft developed by the Mil design bureau?

However, to remain on the cutting edge of technological progress and meet the requirements of potential customer in a better manner, Mil kicked off heavy upgrade of the Mi-26 six years ago, paying for it out of pocket. The upgraded helicopter was designated as Mi-26T2. Its key features will include the round-the-clock operation capability, advanced digital avionics allowing a crew reduction down to two pilots, and uprated engines.

The BREO-26 avionics suite of the Mi-26T2 upgrade is wrapped around the NPK-90-2 flight navigation system comprising a digital display system with five colour multifunction LCDs, control consoles, a digital computer, a GLONASS/NAVSTAR satellite navigation system and a digital flight control system. In

Two of four Mi-26 heavy-lift helicopters in service with Indian Air Force since late 1980s

Take-off's archive

US Army's CH-47 Chinook recovery operation by Russia's Mi-26T in Afghanistan, October 2009

militaryphotos.net

addition, the Mi-26T2's avionics suite could include a GOES day/night gyro-stabilised surveillance optronic system under the customer's request. Night-vision goggles are also available as an option.

Visual monitoring of externally-slung cargo in daytime is performed by means of the BTU-3 integral TV device generating colour imagery on the multifunction display in the cockpit. The optional TSL-1600 floodlight facilitates visual monitoring at night. The floodlight has the standard illumination mode and infrared illumination mode designed for use with night vision goggles.

According to expert estimates, the BREO-26 avionics suite will boost the Mi-26T2's reliability, flight safety, stability, controllability and hovering precision, the latter being especially important when using the external sling.

Owing to its advanced avionics suite, the Mi-26T2 can fly round the clock in any weather and above sea surface. Another advantage of the machine is a reduction in mission planning time and in-flight workload on the crew owing, among other things, to automatic onboard systems health monitoring.

The Mi-26T2 carries outsize cargo and vehicle weighing a total of 20 t both in its cargo cabin and on the external sling. Its military variant hauls 82 troops while its casevac version 60 casualties. The machine also can handle construction and erection work of various degrees of complexity, fire fighting, quick fuel delivery with on-the-ground refuelling of vehicles, etc.

Mi-26T2 and CH-47F heavy-lift helicopters comparison

	Mi-26T2	CH-47F
Max takeoff weight, t	56.0	22.7
Max cargo weight, t:		
- in the cabin	20.0	10.9
- on the external sling	20.0	12.7
Max speed, km/h	270	315
Cruising speed, km/h	255	220
Service ceiling, m	4,600	5,640
Operational range, km	800	740
Ferry range with additional fuel tanks	1,900	2,250
Engines	AI-136T	T55-GA-714A
Takeoff power, hp	2x11,400	2x4,730

Rostvertol Avia Mi-26T heavy-lifter during a capabilities demonstration programme in India, November 2010

Rostvertol

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Eduard Chalenko / MiG Corp.

MiG-29K

IN SERVICE WITH INDIAN NAVY

The MiG-29K/KUB multirole carrierborne fighters already in the Indian Navy's inventory are to be unveiled during the current Aero India 2011 air show. The ceremony of the official commissioning of the first batch into service with Indian Navy took place at Hansa air base in the state of Goa a year ago, on 19 February 2010. Then, Indian Defence Minister Arackaparambil Kurian Antony said: "The service entry of the MiG-29K/KUB with the Indian Navy will enhance the defence capability of India and further strengthen the strategic partnership between our nations". MiG Corp. Director General Mikhail Pogosyan noted that new fighters service entry "is an important event in the implementation of the long-term MiG-29K/KUB programme. The MiG Corp. continues the fulfilment of the contract for delivery of such aircraft to India in schedule approved by the customer".

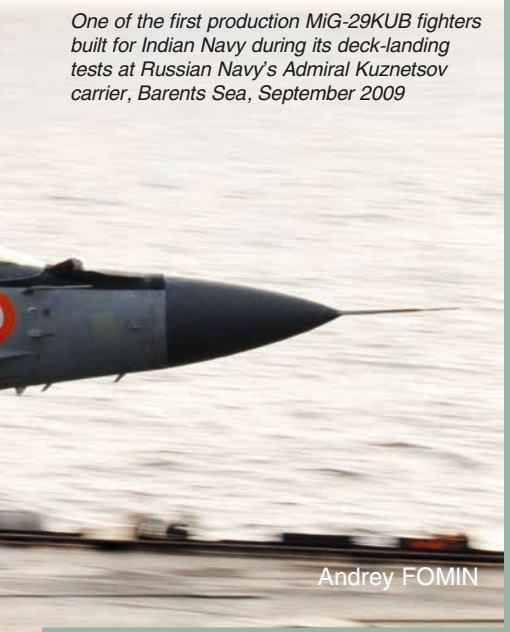
Old friend with new traits

The airframe of the Indian Navy's MiG-29K/KUB fighters features a high degree of commonality with that of the production MiG-29 that has been operated by the Indian Air Force for almost a quarter of the century and used three dozen other countries as well. However, the new aircraft features a number of considerable differences as well. The wing, wing high-lift devices, takeoff/landing devices and fuselage nose section have been modified most heavily. A drastically advanced KSU-941 digital quadruple-redundant fly-by-wire control system made by MNPK Avionika company is used for controlling the plane in all three axes. It has increased flight safety by far. Unlike the production MiG-29, the design of the MiG-29K carrierborne fighter intended for the Indian Navy also embodies a set of solutions aimed at increasing corrosion resistance and radar signature reduction.

The fuselage nose section of the MiG-29K/KUB is commonised and furnished with the common two-seat cockpit canopy offering the crew good visibility in all directions, with the front-seat pilot's angle of view having been increased up to 16 deg. The rear seat of the MiG-29K is occupied with an extra fuel tank. The crew uses the modified Zvezda K-36D-3.5 Class 0-0 ejection seats. The seat is an improved variant of the production K-36DM seat equipping most of today's Russian warplanes and featuring the highest ejection reliability.

In terms of the general shape, span, profile, folding system, fuel cell configuration and number of hardpoints, the wing of the Indian Navy MiG-29K/KUB is similar to that of the MiG-29K prototype (Aircraft 9-31) tested on board the Admiral Kuznetsov carrier during 1989–1991. Most of its peculiarities are due to the modifications to the design and area of the flaps and leading-edge slats and to the introduction of moving vortex plates on the leading edge of the LERX.

The MiG-29K's two-slot flaps have an increased chord and area. The two-section slats have their deflection angle beefed up from 20 deg. to 30 deg. with continuous automatic in-flight slat control introduced (the slats are controlled together with the flaps and stabilisers depending on the angle of attack and Mach number). The LERXs vortex plates are being extended only during landing. In flight, they are retracted, making up the lower surface of the LERXs, but on landing they are extended virtually parallel to the airflow and generate vortexes that enhance lift and reduce the plane's



One of the first production MiG-29KUB fighters built for Indian Navy during its deck-landing tests at Russian Navy's Admiral Kuznetsov carrier, Barents Sea, September 2009

Andrey FOMIN

The RD-33MK is a derivative of the RD-33 Series 3 afterburning turbofan featuring a sophisticated FADEC system and the redesigned fan, high-pressure compressor, combustor as well as high-pressure and low-pressure turbines. The improvements have resulted in a compressor airflow increase of 6.5% and a turbine inlet temperature increase of 40K. As a result, the full afterburner thrust has grown by 8% to 9,000 kgf and the full-power thrust has hiked by 7% to 5,400 kgf. The smoke emission has dropped considerably owing to the introduction of an advanced smokeless combustor. To cap it all, the RD-33MK's assigned life has surged form 2,000 flying hours to 4,000 flying hours.

Klimov has also developed the radically novel KSA-33M aircraft accessory gearbox specifically for the Indian Navy's MiG-29K/KUB. Unlike the previous KSA-2 and KSA-3 gearboxes fitting the rest of the MiG-29 family fighters, the KSA-33M comprises two independent segments, each mounting its own set of generators, hydraulic and fuel pumps and its own starter, having each segment driven by the engine it is intended for. The solution has boosted the reliability of the accessory gearbox and its effectiveness under adverse climatic conditions, facilitating the maximising of the twin-engined aircraft's advantage in reliability. The advanced Klimov VK-100 turbine starter is a derivative of the GTDE-117 starter used on the previous MiG-29 versions differing in enhanced shaft power. The turbine starters' exhausts are ejected upwards, this has enhanced fire safety of the ship-based fighter and has allowed it to carry a larger-size belly-mounted drop tank.

The MiG-29K has a 50%-plus increase in the internal fuel capacity over the production-standard MiG-29. This has been achieved through designing new fuel cells in the fuselage and LERXs and introducing a 500-litre conformal dorsal fuel tank in the fuselage midsection aft the cockpit and an extra 630-litre fuel tank at the rear combat station in the cockpit (the MiG-29KUB two-seater lacks the rear-seat fuel tank).

To extend the range even farther, the MiG-29K/KUB are furnished with the mid-air refuelling system comprising a retractable versatile-tip boom in the fuselage nose section on the port side fore of the cockpit. The versatile tip of the boom allows refuelling from both Russian-built and foreign-made tanker planes.

The capacity of the underbelly drop tank has grown from 1,520 litres to 2,150 litres, and the MiG-29K's under-wing hardpoints can mount four 1,150-litre drop tanks, rather than two previously. With four drop tanks attached under wing and the belly-mounted drop tank replaced with the PAZ-1MK detachable fuelling unit, the MiG-29K/KUB itself turns into a tanker plane capable of mid-air refuelling of other fighters.

Indian Navy's MiG-29KUB in a test flight, May 2009

MiG Corp.

oscillation on the glide path. The modified wing high-lift devices has led to enhanced controllability and flight safety on landing approach towards the carrier.

The MiG-29K/KUB's engine air intakes are fitted with protective grills preventing FOD on takeoff and landing. Unlike the land-based production MiG-29, these aircraft lack the air intake axial inlet blocks and upper air louvers on top the LERXs. Scrapping the air louvers has allowed using the freed-up room in the LERXs to house extra fuel.

More powerful engine and more fuel

The powerplant of the Indian Navy's MiG-29K is wrapped around a pair of RD-33MK engines developed by St.Petersburg-based Klimov company and manufactured by Chernyshev Moscow Machine-building Enterprise.

Modern avionics

The avionics suite of the MiG-29K/KUB has open architecture based on the MIL-STD-1553B standard and features a clearly international composition. Its core is a Russian-made PrNK-29K attack and navigation digital computer system from Ramenskoye Design Company. The three basic target designation systems – the Zhuk-ME radar, OLS-UEM IRST and target designation system for passive seekers of antiradiation missiles – are made in Russia too. At the same time, the MiG-29K/KUB are equipped with the French-made Thales Topsight helmet-mounted target designating and indication system. Another French-made system in the MiG-29K's avionics suite is the

Sagem Sigma-95 INS/GPS navigation system, the same that is mounted on the Su-30MKI and MiG-29SMT.

The Indian-made avionics include UHF/VHF radio communication system, TACAN short-range radio navigation system, VOR/ILS/MKR navigation system, radio altimeter, IFF and Tarang RWR (ELINT) station. A self protection jammer (SPJ) is made by Israeli IAI/Elta.

The other communication radio (R-800L2) in the MiG-29K is made by Russian Polyot company. The same company delivers a datalink gear enabling fighters to operate in a group.

The Russian-made passive countermeasures system, reliant on chaff and flares, includes two dispensers each packing 16 cartridges of 50-mm calibre mounted in the fuselage tail section on the engine nacelles under the empennage, with the countermeasures deployed downwards.

The cockpit display system of the MiG-29K has been developed by the Ramenskoye Design Company in Russia. It comprises a large monochrome HUD and three full-colour 6x8-inch push-button multifunction liquid-crystal displays (the MiG-29KUB has seven MFDs in all). The displays show all relevant targeting, flight and navigation information and aircraft systems status information as well.

The Phazotron-NIIR Zhuk-ME radar is the core of the MiG-29K/KUB's fire control system. Compared with the N019 radar on the production MiG-29, it features a 50% increase in the fighter-sized target acquisition range (to 120 km), the multiple-target engagement capability increased to 2–4 and air-to-surface operating modes, including the high-resolution terrain mapping mode. The Zhuk-ME's maximal acquisition range for a cruiser-sized naval target is 300 km.

NIIPP-designed OLS-UEM forward-looking IRST is capable of scanning airspace, acquiring and tracking aerial targets within the ±90 deg. bracket in azimuth and within –15...+60 deg. bracket in elevation. The IRST comprises the infrared, TV and laser capabilities. The rear-hemisphere aerial target acquisition range is 45 km, while the front-hemisphere one stands at 15 km, with the laser rangefinder ranges threats out to 15 km.

More weapons

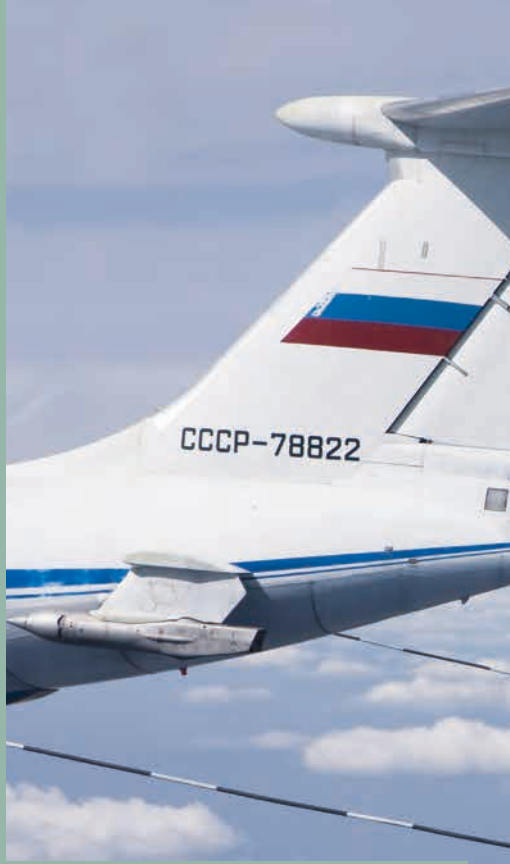
The MiG-29K/KUB's weapons suite comprises the 30-mm GSh-301 integral automatic cannon in the left LERX (ammo load – 150 rounds) and various guided and non-guided weapons mounted on eight under-wing weapons stations. Bombs can be also attached to the centreline weapons station. Two pairs of inner under-wing hardpoints can be fitted with tandem bomb racks driving the actual number of hardpoints to 13.

Air-to-air guided weapons includes RVV-AE medium-range active radar-homing missiles and R-73E dogfight missiles. To kill waterborne threats, Kh-31A and Kh-35E active radar-homing antiship missiles are used, while elimination of emitting targets is achieved by means of Kh-31P antiradiation missiles. Pinpoint elimination of ground threats is done by Kh-29T television-homing missiles and KAB-500Kr (KAB-500-OD) TV-correlation smart bombs. The plane carried up to eight air-to-air missiles, up to four air-to-surface missiles or up to six smart bombs.

The unguided weapons of the MiG-29K/KUB includes gravity bombs and cluster bomb units up to 500 kg in calibre and various rockets. The maximal combat load of the MiG-29K/KUB is 5,500 kg.

Better servicing

The MiG-29K/KUB differ from the previous versions of the MiG-29 fighters in an extended



Pilot's cockpit of the MiG-29K fighter

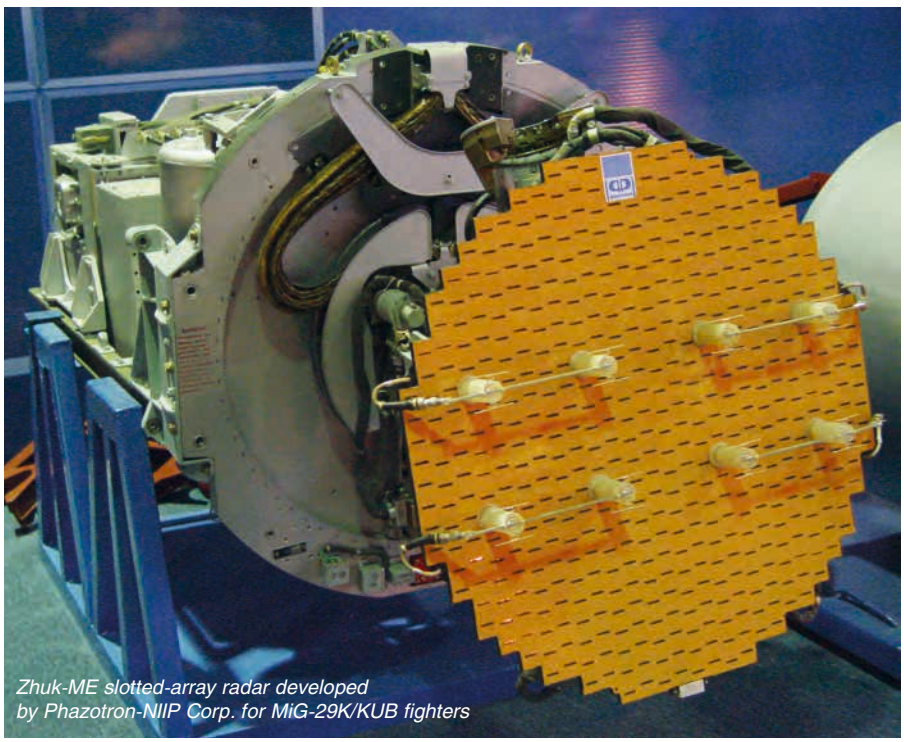
Alexey Mikheyev

MiG-29K first prototype and production MiG-29KUB onboard Russian Navy's Admiral Kuznetsov carrier, September 2009

Eduard Chalenko / MiG Corp.

Two first production MiG-29KUBs during in-flight refuelling tests with Russia's Ilyushin Il-78 tanker plane, May 2009

MiG Corp.



Zhuk-ME slotted-array radar developed by Phazotron-NIIP Corp. for MiG-29K/KUB fighters

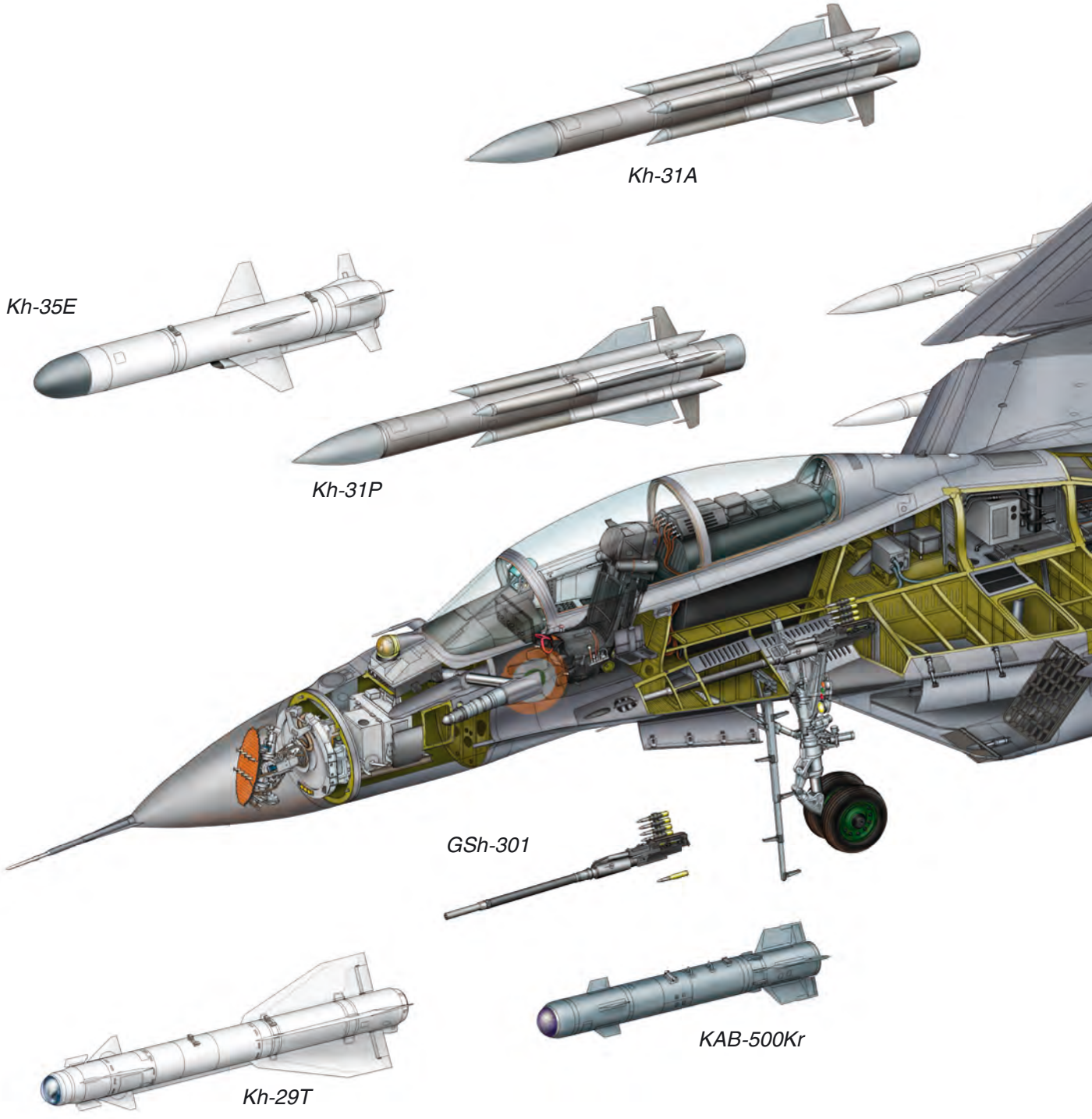
Andrey Fomin

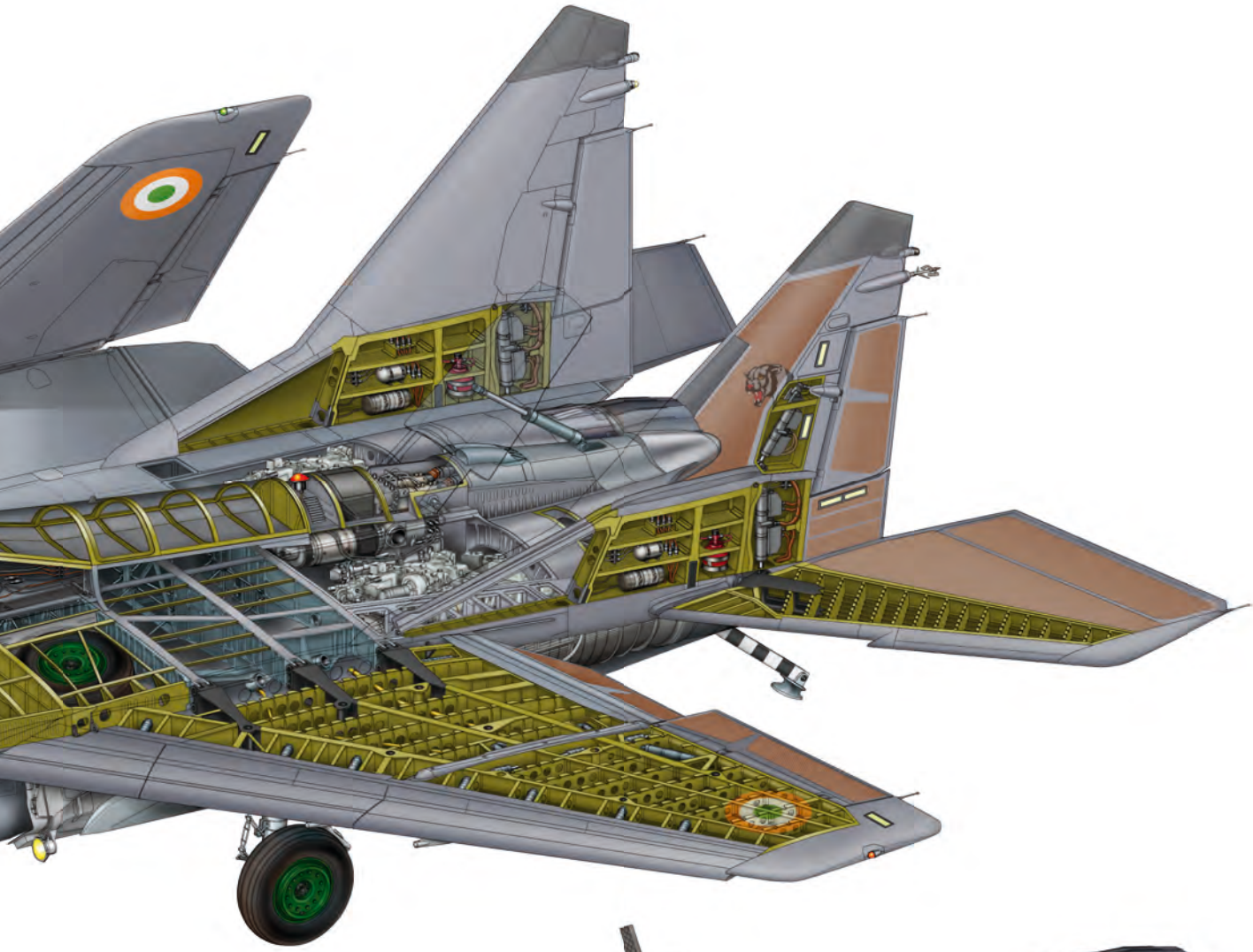
service life and reduced operating costs, which has been achieved by switching to on-condition maintenance. The assigned life of the aircraft has been extended to 4,000 flying hours or 40 years (the baseline MiG-29 has those of 2,500 hours and 20 years respectively).

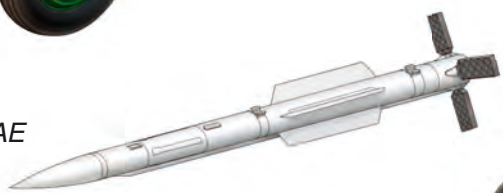
All maintenance of the MiG-29K/KUB is performed on base. Their on-condition maintenance schedule includes scheduled maintenance every 300 flying hours (30 months) and a technical assessment every 1,000 flying hours (10 years), i.e. only three times until the expiry of the service life. For the sake of comparison, the planned preventive maintenance of the earlier-made MiG-29 planes calls for scheduled maintenance very 100 hours (12 months), routine maintenance every 200 hours (24 months) and overhaul every 800 and 1,500 hours (9 and 17 years, respectively). The on-condition maintenance per-flying hour cost reduction stands at 40%. To support the operations of the MiG-29K/KUB fighters in India, a consignment depot is being set up, which is to enhance the state of readi-

MiG-29K
carrier-borne multirole fighter

Drawing by Alexey Mikheyev







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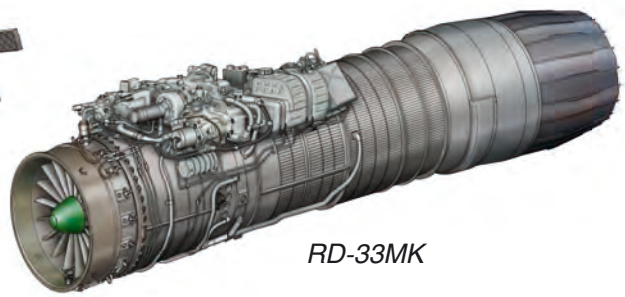

RD-33MK

R-73E

Alexey Mikheyev

MiG-29KUB first flying prototype fitted with S-8 rockets, R-73E air-to-air missiles and underbelly drop fuel tank during external stores tests

ness of the aircraft fleet up to 80–90% by speeding up spare parts supply (spares are to be supplied within 72 hours).

It also is important that the avionics and weapons suites of the Indian Navy MiG-29K/KUB fighters are heavily commonised with those of the MiG-29UPG, which upgrade is being performed by the MiG Corp. under the Indian Air Force order. A commonised aircraft fleet ensures interoperability and enables the Indian Air Force and Navy to form integrated combat systems and facilitates the development of a common after-sales support infrastructure for the aircraft of the MiG-29 family in service with the Indian Armed Forces.

Deliveries and prospects

The integrated contract for development and delivery of 16 carrierborne fighters (12 MiG-29K singleseaters and four MiG-29KUB twinseaters) to the Indian Navy, estimated at over $700 million, was signed by the Indian Defence Ministry and MiG Corp. on 20 January 2004. It stipulated not only the development and delivery of the planes, but also air and ground crew training, supply of PTS-29K full-mission simulators as well as spares and maintenance in country. The fighters will enter service with the carrier air group on board the INS Vikramaditya, whose conversion from the Admiral Gorshkov carrier is being performed by the Sevmash company in Russia under a contract signed on 20 January 2004 too. The Vikramaditya is expected to carry up to 24 MiG-29K/KUB fighters. The future indigenous aircraft carrier Vikrant being built by India may well carry these aircraft.

The first prototype, built in the MiG-29KUB two-seat version (side number 947) under the 2004 contract, first flew on 25 January 2007. A MiG-29K single-seat prototype (side number 941) performed its maiden flight on 25 June 2007. Parallel to the test programme, the MiG Corp. and Sokol aircraft plant in Nizhny Novgorod launched production of the new fighters. The lead production-standard MiG-29KUB took to the skies for the first time on 18 March 2008. Not long before the delivery of the first MiG-29K/KUB batch to the customer in late September 2009, MiG Corp. test pilots tried the advanced fighters on board the Russian Northern Fleet's Admiral Kuznetsov carrier in the Barents Sea. The prototype MiG-29K (side number 941) and a production MiG-29KUB (side number 672) performed several successful deck landings and takeoffs that proved the feasibility of safe operation of the advanced fighters on ski-jump ramp-fitted carriers equipped with arrestor gear.

The first batch of six production MiG-29K/KUBs was delivered in December 2009. The fighters were fielded with INAS 303 Black Panthers squadron. Prior to the delivery, a group of Indian Navy pilots and technicians had been trained in Russia in operating the MiG-29K/KUBs. The delivery of the 16 aircraft under the 2004 contract is due to be completed this year.

In addition, during Russian Premier Vladimir Putin's official visit to India in March 2010, the 29 options for MiG-29K/KUBs under 2004 contract turned into firm orders. According to MiG Corp. Director General Mikhail Pogosyan, deliveries under the new contract shall commence in 2012. With the contract fulfilled, the Indian Navy will have had as many as 45 MiG-29K/KUB fighters by 2015.

During the same visit of the Russian Premier, an agreement was finalised for completing the upgrade of the Admiral Gorshkov carrier. The INS Vikramaditya is due to enter trials this year. She could be commissioned with the Indian Navy before the end of 2012. In the future, the advanced carrierborne MiG jets may be carried by domestically-built Indian carriers as well.

In conclusion mention should be made that a decision on principle has been made to field the MiG-29K/KUB fighters with the air arm of the Russian Navy as well. The Russian Defence Ministry is supposed to order at least 30 aircraft of the type in the near future to deploy them as part of CAG of the Admiral Kuznetsov carrier and those of future carriers of the Russian Navy.

Alexey Mikheyev

MiG-29K first prototype fitted with Kh-35E antiship missiles and R-73E air-to-air missiles on approach after another test flight

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Mi-28NE

RIGHT CHOICE FOR INDIAN AIR FORCE

Andrey FOMIN

Alexey Mikheyev

The Rosoboronexport government-owned company and Russian Helicopters joint stock company have furnished Mil Mi-28NE combat helicopter capable of 24-hour operations to compete in the Indian Defence Ministry tender for 22 advanced combat helicopters for its Army Aviation. The US-made AH-64D Apache Longbow has become the main rival of the Russian machine in the Indian tender. Last year, the contenders completed evaluation in India, including high-and-hot tests, which highlighted the top-notch performance of the Russian helicopter in adverse operating conditions.
Following the completion of its official test programme, the Mi-28N has been for almost two years in service with line units of the Russian Air Force that has ordered about a hundred of aircraft of the type and is intent on driving the strength of its Mi-28N fleet up to about 300 aircraft. The Rostvertol PLC is running the Mi-28N's production in Rostov-on-Don. The manufacturer has produced about 40 machines to date.

Cutting-edge avionics and formidable weaponry

The two-seat armoured Mi-28N night operations-capable combat helicopter was selected in 2003 by the Russian Air Force as the primary Army Aviation helicopter designed to replace the Mi-24 family of helicopters in service since the earlier 1970s. Soon after the decision had been taken, the Rostvertol company in Rostov-on-Don stepped up the productionising of the machine. Its efforts resulted in the first Rostvertol-built Mi-28N (side number 02, later 024) – the second prototype of the type (the first Mi-28N prototype with side number 014 made by the Mil Moscow Helicopter Plant conducted its maiden flight as far back as 14 November 1996).

The Mi-28N is a derivative of the Mi-28 combat helicopter (four machines were built in 1982–1991, including two in the improved Mi-28A version), featuring a radically advanced integrated avionics suite ensuring round-the-clock operating capability. For this purpose, the Mi-28N's avionics suite includes an IRST from Krasnogorsk plant. The IRST comprises TV and thermal-imaging channels with the wide and narrow gyro-stabilised fields of view and is combined with a laser rangefinder and the antitank guided-missile control system. The IRST is designed for acquiring and track ground threats, targeting and guiding the weapons towards a target.

To make it easier for the pilot to fly the machine, the latter mounts a turreted electro-optical system with the TV and thermal-imaging capabilities from UOMZ plant. Both subsystems are mounted in the nose section, with the former in a swivelling cylindrical pod with wide flat windows and the latter in a small rotating ball turret. The command datalink of the Ataka ATGM system is housed under a radioparent fairing in the nose section too.

To enhance the effectiveness of the Mi-28N's 24-hour all-weather operating capability, the helicopter also is to be equipped with a mast-mounted radar from State Ryazan Instrument Plant. The radar is in the debugging and test stages now; hence, the early production Mi-28Ns do not carry it yet. The flight trials of the experimental radar on the prototype Mi-28N began on 16 February 2007. Using the radar, the crew will be able to spot and position static and mobile threats, perform terrain mapping, detect aerial targets, hazardous weather phenomena and such low-level obstacles as high-power lines and posts, etc.

The integrated avionics suite of the Mi-28N is wrapped around up-to-date digital computers. All targeting, flight, navigation and other relevant data are shown on four colour multifunction liquid-crystal displays, with the pilot and weapons systems officer (WSO) each having two such MFDs at their combat stations and the pilot also having the data displayed on the HUD. Each combat station also has a multifunction LCD-based control panel. The crew has helmet-mounted target designators and night vision goggles to boot. Both crewmembers are seated in the armoured cockpit in seats ensuring their survival in high-g crash landings.

The Mi-28N's integrated avionics suite also includes an up-to-date navigation system and a high-performance communications system ensuring, in particular, digital secure data exchange with ground-based and airborne command posts, other aircraft, combat systems of other branches, etc. To enhance its survivability, the Mi-28N is furnished with a self-defence suite including a laser illumination warning station and thermal decoy dispensers housed by detachable wingtip-mounted pods.

The Mi-28N's weapons suite comprises the NPPU-28 swivelling gun mount with the 30-mm 2A42 automatic gun (the same is mounted on infantry fighting vehicles as well as the Ka-50 and Ka-52 helicopters) housed along with two ammo boxes (total ammo load – 250 rounds) by the chin-mounted turret that swivels within 110 deg. in azimuth and within +13...-40 deg, in elevation. The weapons suite also includes missiles, rockets, bombs and additional podded guns, all mounted on four under-wing hardpoints. Up to 16 Ataka-V semiautomatic radiofrequency-command guidance ATGMs can be hauled under wing, with missile having a range of 6 km. The ATGM system is well known to the troops, because similar Shturm-V missiles have been used on the Mi-24V (VP), Mi-24P and Mi-35 attack helicopters for a long time. Also under wing are carried 80-mm and 122-mm rocket pods, 100-, 250- and 500-kg bombs, UPK-23-250 gun pods housing 23-mm GSh-23 automatic cannon as well as Igla-V air-to-air missiles.

In service with RusAF

The Mi-28N's official acceptance tests using the first prototype commenced in 2002, with the second prototype joining the tests in June 2005. The first stage of the official acceptance trials was complete on 4 March 2006, when the governmental commission chaired by the RusAF commander issued the preliminary report clearing the manufacture of the low-rate initial production (LRIP) batch for further tests and operational evaluation. The first machine of the batch (side number 32) made its first flight in Rostov on 27 December 2005 and joined the official acceptance tests in May of the next year. The manufacturer in Rostov had produced six more Mi-28Ns by mid-2007 and then switched to the full-rate production following an updating of the design documentations.

Two first production-standard Mi-28Ns serialled 41 and 42 were handed over to the Russian Air Force in a ceremony on 22 January 2008 and were fielded with the Army Aviation

The first Rostvertol-produced Mi-28N in a test flight, August 2005

Rostvertol

Mil Moscow Helicopter Plant

Two production Mi-28Ns delivered to Russian Air Force in 2010

Combat and Conversion Training Centre (CCTC) in the town of Torzhok for opeval. In the same year, Rostvertol completed two more machines (No. 43 and 44) and shipped them to Torzhok too.

In summer 2009, two of the Torzhok-based Mi-28Ns took part in large-scale combined-arms combined exercise Zapad 2009 in Belarus. The missions flown during the exercise, including live fires, proved the effectiveness of the Mi-28N.

The Mi-28N's official acceptance tests using two prototypes and seven LRIP machines had been complete by late 2008. 26 December of the same year saw the issuance of the acceptance report recommending the helicopter's service entry and production launch. The Mi-28N combat helicopter entered service with RusAF on 15 October 2009 under a directive by the Russian President.

The "New Russian Army" almanac edited by Mikhail Barabanov and published by the Centre for Analysis of Strategies and Technologies late in 2010 reported: "The Russian Defence Ministry is going to buy 10–15 Mi-28N helicopters annually. Overall, the Russian Defence Ministry has contracted Rostvertol to deliver 97 Mi-28Ns throughout 2015". RusAF's overall Mi-28N requirement is estimated at about 300 machines.

In spring 2009, Rostvertol delivered the first six Mi-28Ns to the air base in Budyonnovsk in the North Caucasus Military District (now Southern Military District). Several of them soon were used in the Victory Day Parade in Moscow on 9 May 2009. Four aircraft more had joined the six before year-end 2009. An air squadron at the air base in Budyonnovsk had fully converted to the Mi-28N by summer 2010 when it participated virtually at full strength in the large-scale exercise at a military training range 70 km away from Budyonnovsk, Stavropol Region, from 30 June to 3 July 2010.

The public relations office of the manufacturer, the Mil Moscow Helicopter Plant, reported: "The Mi-28N crews performed range practice, destroying ground targets with gunfire and rockets. Each crew was tasked with attacking a target en route to the gunnery range in real time by datalink. All of the targets were hit". The news release stressed that as many as 10 Mi-28N helicopters had been used on an exercise for the very first time in RusAF's recent history.

Not long before that, from 18 to 22 June 2010, Budyonnovsk-based aircrews honed their Ataka ATGM firing skills at a missile range vic. Primorsk-Akhtarsk. "All of the crews performed well in a complicated situation, which realism was maximised. The air squadron learnt good practical skills in making split-second decisions. By the way, so many Night Hunters have participated in an exercise for the first time", reported the Red Star daily.

As many as six Mi-28Ns from the air base in Budyonnovsk flew over Red Square in Moscow on 9 May 2010 during the parade commemorating the 65th anniversary of the Victory Day.

In October last year, another air base in the Southern Military District – that in Korenovsk – received its first five brand-new Mi-28Ns. Conversion of RusAF helicopter air squadrons to the Mi-28N is in full swing. If the tempo is maintained (and there is no reason to think otherwise so far), RusAF will have had about 100 helicopters of the type by the middle of the current decade.

Mil Moscow Helicopter Plant

Testing in the Caucasus Mountains, August 2010

…and for foreign customers

With the completion of the official acceptance tests and service entry by the Mi-28N, the machine is facing bright export vistas as well. The export version dubbed Mi-28NE has already been offered to foreign customers. According to the Russian and foreign media, Venezuela and Algeria have long displayed their interest in buying the Mi-28NE. For instance, keen interest in the Mi-28NE was shown by Venezuelan President Hugo Chavez during his July 2007 visit to Rostvertol, who had already bought a batch of upgraded Mi-35M attack helicopters and Mi-26T heavylifters there.

In July 2007, a Mi-28N conducted a series of demonstration flights in Algeria. Andrey Shibitov, the then Director General of the Mil Moscow Helicopter Plant and current deputy Director General for scientific and technical policy and production of the Russian Helicopters joint stock company, told our magazine at the time: "The request for the demo flights implied

test flights under difficult climatic and mountainous terrain conditions.

The Mi-28NE started flying in India in September 2010. Prior to that, a LRIP Mi-28NE (side number 38) passed special tests on the outskirts of Mount Elbrus in the Caucasus, being Russia's and Europe's highest mountain (5,642 m). Here it displayed top-notch flight performance and manoeuvrability in the mountainous terrain. The potential customer was quite satisfied with the results produced by the Mi-28NE's demo flights in India.

In late December 2010, the Pentagon was reported to have asked US Congress for permission to supply to India – in case of the victory in the Indian tender – 22 AH-64D helicopters, engines, equipment and weapons for them and to provide logistic support.

Mi-28N from a LRIP batch during high-altitude tests in the Caucasus Mountains, August 2010

Mil Moscow Helicopter Plant

an exhaustive programme. We were to perform tactical and flight tests, using missiles, rockets and automatic cannon against real targets and to demonstrate the communications suite as well. This is close enough to what is normally performed during the official acceptance trials, but it had to be done in a desert in summer – the hottest season. It was hard, but we cut the mustard".

Andrey Shibitov mentioned at the time that preliminary requests for the Mi-28NE had been submitted by several Middle East, North African and Latin American countries and "there is a high probability of first contracts to be awarded in the near future".

Today, the Mi-28NE is competing in the tender launched by the Indian Defence Ministry. In its day, India bought from the Soviet Union several dozen Mi-25 and Mi-35 helicopters formed into two IAF helicopter air squadrons in 1983 and 1990 respectively. However, time flies, and the machines built 20–25 years ago have become pretty long in the tooth. According to Flight International, IAF had operated 20 Mi-35s by early 2011, with part of the machine being upgraded – not by Russian specialists, however.

The Indian Defence Ministry issued RFP for 22 advanced combat helicopters to Boeing, Bell, Sikorsky, Eurocopter, AgustaWestland and Rosoboronexport in 2009. However, two US companies with their Black Hawk and Super Cobra as well as Europeans with their Tiger and Mangusta recused themselves, leaving the Russian Mi-28NE and US AH-64D Apache Longbow locking horns over a lucrative deal. Last year, both helicopters came to India at the request of the Indian Defence Ministry and performed a series of demonstration and The permission is expected to be granted in advance, which will enable the Americans to reduce the time required for being cleared by its government and thus expedite the delivery, should the customer prefer their helicopter. This made a number of observers to draw hasty conclusions about the preferences of the Indian Defence Ministry. However, the organiser of the tender as well as the Indian government has not issued any statement. Hence, Russia's Mi-28NE still has good chances for coming out on top, all the more so that Russian aircraft have been in service with the Indian military for quite a while and has become popular with Indian personnel, while the growing bilateral military technical cooperation, which is devoid of technology transfer problems typical of the United States, contributes to quick and effective tackling of any possible issues.

Four new Su-34s arrived to Lipetsk

Sukhoi

Four new Sukhoi Su-34 multi-role tactical bombers arrived at the Lipetsk-based Air Force Combat and Conversion Training Centre (CCTC) from the Novosibirsk Aircraft Production Association (NAPO) on 28 December 2010. The aircraft were serialled 06, 07, 08 and 09 and became the first batch delivered under the five-year contract made in late 2008 by the Sukhoi company and Russian Defence Ministry for 32 aircraft of the type.

The first of the four Su-34s was assembled and test-flown by NAPO late in August 2010, with the rest following suit during the autumn. The acceptance took place at the manufacturer plant in December, after which, once weather conditions had improved, all of them were ferried from Novosibirsk to Lipetsk on 28 December 2010, having covered about 3,000 km within about 3.5 hours.

Earlier, the Russian Defence Ministry has taken delivery of five production Su-34s. Three of them (serials 02, 04 and 05) are undergoing opeval at CCTC in Lipetsk, while two (01 and 03), along with several LRIP aircraft, were used in the final stages of the official test programme at the Chkalov State Flight Research Centre (GLITs) in Akhtubinsk. Last summer, the Lipetsk-based Su-34s crossed the country to participate in large-scale Exercise Vostok 2010.

RusAF Commander-in-Chief Col.-Gen. Alexander Zelin said during his visit to the city of Voronezh on 1 September 2010 that the new aircraft would be fielded with the Voronezh air base operating previous-generation Su-24M tactical bombers at present. As part of the Air Force reorganisation, the axing of the air regiments stationed at Shatalovo and Buturlinovka air bases in the Smolensk and Voronezh regions respectively will result in activating in Voronezh one of the largest air bases in the country. It is supposed to operate Su-24MR and MiG-25RB reconnaissance planes as well as Su-25 attack aircraft in addition to the Su-34 and Su-24M bombers – about 100 warplanes in all.

The ferrying of the four new Su-34s from Lipetsk to Voronezh is slated for 2011 when the overhaul of the airfield has been complete and the Su-34 acceptance report has been signed.

Akhtubinsk-based GLITs is to complete the Su-34 acceptance trials early in 2011. NAPO is going to ramp up the Su-34 output rate later on. Sukhoi Director General Mikhail Pogosyan said at the Farnborough air show last year that the output rate was to grow up to 12–20 unit a year.

Sukhoi

First batch of production Ka-52s delivered to RusAF

A ceremony was conducted at the Russian Army Aviation Combat and Conversion Training Centre (CCTC) in Torzhok to hand three advanced Kamov Ka-52 multirole combat helicopters to the branch on 28 December 2010.

The helicopters were manufactured by the Progress company in Arsenyev in 2010. Progress is a subsidiary of the Russian Helicopters holding company. In late 2009, Progress handed over to the Russian Defence Ministry three pre-production Ka-52s serialled 51, 52 and 53 for the final stages of the official acceptance tests. New helicopters also participated in the flypast during the V-Day Parade in Moscow on 9 May 2010. The official acceptance trials involve also three helicopters (serials 061, 062, 063), of which the latter two were competed by Progress in 2008.

Alexey Mikheyev

Alexey Mikheyev

Last year, Progress made four production Ka-52s earmarked for delivery to CCTC in Torzhok for opeval by flying and ground crews. Late in December, three of them were airlifted by Il-76MD transports from the Far East, where Arsenyev is situated, to Migalovo Air Force Base near the city of Tver in the European part of Russia and then hauled by Mi-26 heavylift helicopters to Torzhok. Following the assembly of the new machines in CCTC, the handover ceremony took place on 28 December. It was attended by CCTC command, pilots participating in the redeployment of the new machines and representatives of the manufacturer. The CCTC personnel were lined up, the colours were trooped and the symbolic ignition keys of the new helicopters were handed over.

121 ARP ramps up Su-25SM production

The Kubinka-based 121st Aircraft Repair Plant, known by its Russian acronym 121 ARP, turned 70 last November. The company dates back to Stationary Aircraft Repair Workshop No. 55 established in Kaunas, Lithuania, on 11 November 1940. The eldest company of the kind has fixed about 4,000 aircraft of 30 types and over 15,000 aircraft engines of 40 types.

Now, the company offers integrated overhaul of a whole range of aircraft and engine types and their components as well. The 121 ARP-maintained and overhauled materiel includes the MiG-23, MiG-29UB and Su-27 fighters, Su-25, Su-25T and Su-25UB attack aircraft, R29-300, R-27F2M-300, RD-33, AL-31F, M-14P and M-14X aircraft engines, GTDE-117, AI-9 and AI-9V auxiliary power units, etc. In addition, the company maintains and overhauls the KSA-2, KSA-3 and VKA-99 accessory gearboxes and has learnt to overhaul the components of the Su-27UB and Su-30MKI aircraft. 121 ARP has been certified for upgrading the baseline MiG-29 into the MiG-29SMT model.

Probably, the key pride and joy of the plant is the programme on upgrading the Sukhoi Su-25 attack aircraft into the Su-25SM, which was launched in 2002. Today, 121 ARP is Russia's only plant handling such a work. As is known, the first six Su-25SMs were accepted by the Russian Air Force in December 2006. The operation of the plant has been far more transparent since it was privatised in May 2007, and its production dynamics can be traced by means of its annual reports. According to the reports, the company rolled out six Su-25SMs more in 2007, eight more in 2008 and 13 more in 2009. In his speech at the celebration on 12 November 2010, Director General Yakov Kazhdan said: "121 ARP has overhauled and upgraded a total of 39 in-service Su-25 planes since 2006". More Su-25s from line units are being converted to Su-25SM standard in the shops of the company.

Dwelling on other results produced by the plant, the Director General said: "369 aircraft engines have been overhauled over the past five years, of them 110 were those fitting Su-27 and MiG-29 planes". According to annual reports, the company overhauls up to 10 RD-33 and up to 18 AL-31F turbofans a year.

Yakov Kazhdan said he was certain that the company would overhaul and upgrade more hardware and increase the number of its types the next year. For instance, while the plant has overhauled three to four in-service Su-25UBs yearly, it is slated to begin to upgrade Su-25UB twinseaters to Su-25UBM standard starting from 2011.

In recent years, the company has done a lot to renovate its production facilities in terms of boosting its technological capabilities and enhancing quality. In particular, it has launched a laser cutout system, a gas-thermal coating system, an automated aircraft engine test system and an ultrasonic aircraft parts cleaning bay.

Yevgeny Yerokhin

Yevgeny Volkov

SEA DRAGON over indian Ocean

All five Il-38SDs enter service with Indian Navy

A year ago, on 16 February 2010, fifth and final Ilyushin Il-38SD multirole naval patrol aircraft, upgraded in Russia under the September 2001 contract between Rosoboronexport and the Indian Ministry of Defence, flew in to Hansa air base in the state of Goa. The news was reported by Rosoboronexport Deputy Director General Victor Komardin, who led the company's delegation at the DEFEXPO 2010 arms show in New Delhi in mid-February 2010. "Today, the last of the upgraded Il-38SD planes will land at Goa. Thus, the contract on these aircraft is complete, in fact", Mr. Komardin said then.

The Il-38s had been in service with the Indian Navy's air arm since 1977 and their modernisation had come to the fore by the early new millennium. Russia offered fitting the aircraft with the drastically advanced Sea Dragon multirole surveillance and targeting system developed by the Systems Engineering Research Institute of the Leninetz holding company in St. Petersburg.

Overall, the September 2001 contract between Rosoboronexport and the Indian Ministry of Defence, worth $205 million according to the Interfax-AVN news agency, stipulated upgrade of all of the five Il-38s in service with the 315th air squadron of the Indian Navy (INAS 315). India bought three of them in the Soviet Union in 1977 and the other two in 1983. The first of them, serialled IN305, was ferried to Russia on 29 March 2002. The first set of improvements was applied at the prototype manufacture facility of the Ilyushin company in Moscow, and 3 July 2003 saw the first flight of the lead upgraded Indian Il-38SD piloted by test pilot Vladimir Irinarkhov's crew from the Moscow Central Airfield (Khodynka) virtually in the centre of Moscow.

The rest of the improvements and tests took place at Ilyushin's base in Zhukovsky out of Moscow and then at the Leninets holding company's base and the 20th Aircraft Repair Plant's Pushkin airfield near St. Petersburg. Tests of the tactical use of advanced weapons by the upgraded aircraft were conducted at missile ranges of the Russian Defence Ministry. The Tactical Missiles corporation's spokesperson reported, in particular, that special flight trials of the Kh-35E antiship missile on the Il-38SD were completed with success on 14 November 2005. "The trials crowned the programme on adapting the weapon to the aircraft", a Tactical Missiles Corp. news release read at the time.

Sergey Lysenko

Following the completion of the upgrade in December 2005, the lead Il-38SD was accepted by the customer and prepared for return to India. The aircraft set off for long a road on 11 January 2006 from Moscow Domodedovo airport and arrived at its naval air station in Goa on 15 January.

The next Il-38, serialled IN303, flew to Russia for upgrade in late 2003. Its upgrade and testing were completed during 2005, with the plane headed for India in 2006. The third aircraft (IN301) came to Russia for upgrade in June 2005, but it had been quite a while before it returned home, because the customer presented a number of claims to the performance of the systems installed and demanded extra tests, which, however, proved the hardware's compliance with all of the requirements. The aircraft was handed over to the customer in 2008 as a result.

Unfortunately, two remaining Il-38s with INAS 315 (serialled IN302 and IN304) were lost to a mid-air collision during a demonstration sortie near their naval air station in Goa on 1 October 2002. To fulfil the contract in full, Russia in late 2005 agreed to India's proposal to replace the lost aircraft with two

Mikhail SUNTSOV

target out to 350 km. The thermal-imaging/television system, whose 3D-stabilised ball turret with five optical ports is situated under the chin of the Il-38, ensures precise acquisition, tracking and identification of surface targets, including their auto-tracking with the use of radar-fed target designation. The ELINT system, housed by a container fixed to the upper fuselage above the cockpit on special supports, detects emitting targets in a wide waveband 360 deg. in azimuth, analyse the emission detected and match it against the ID library containing up to 2,000 types of radio-electronic systems.

The magnetometric system, housed by a fairing in the tail section of the Il-38 fuselage, detects magnetic anomalies at a range of 900 km. The radiohydroacoustic system spots the noise of submarines by means of a directional and omnidirectional RGB-48E and RGB-41E buoys as well as GB-58E and RTB-93 active and radiotechnical buoys. Each of the two workstations has two 15-inch colour displays and a sensor-type control panel.

Sergey Lysenko

Russian Il-38s operated by the air arm of the Russian Navy. The maritime patrol aircraft were upgraded to Il-38SD standard during 2007 through 2009. The final tests of the two planes serialled IN306 and IN307 took place in late 2009, after which IN306 and then IN307 flew to India, which Rosoboronexport Deputy Director General Victor Komardin reported on 16 February last year.

What are the Il-38SD's capabilities and how does it differ from the ordinary Il-38 in service with the Pacific and Northern fleets of the Russian Navy? Detailed enough information on the Sea Dragon surveillance and targeting system was unveiled by the developer, the Systems Engineering Research Institute of the Leninetz holding company, during the IMDS 2005 international naval show in St. Petersburg in late June and early July 2005.

According to the information presented at the show, the Sea Dragon system features a wide range of informational surveillance systems, including a radar, an electronic intelligence station, a thermal-imaging/television system, a magnetometric system and a radiohydroacoustic system, as well as two commonised workstations with up-to-date displays and a distributed computing environment, the latter featuring multilevel data processing and automated target acquisition, data transmission and target engagement.

The slotted-array radar of the Sea Dragon system is housed by a chin-mounted ball fairing of the Il-38 aircraft and acquires surface targets out to the radar horizon and aerial

In addition to the advanced surveillance and targeting system, the Il-38SD has received additional advanced torpedoes and missiles, including the Kh-35E subsonic anti-ship guided missile.

The upgrade of the Il-38 will enable the type to remain in the Indian Navy's inventory for many years to come despite the service's adoption of the advanced US-made P-8I Poseidon maritime patrol aircraft ordered in early 2009. However, the Indian Ministry of Defence rejected the Russian proposal for a similar upgrade of other Soviet-built ASW aircraft, the eight Tu-142MEs operated by the Indian Navy since the late 1980s. Their service life is unlikely to be extended, and the planes are likely to be discarded form service following the delivery of Poseidons.

Piotr Butowski

Andrey FOMIN

CHINESE TRAINERS WITH RUSSIAN PEDIGREE

The Chinese military pilot training programme was high on the agenda of Airshow China 2010 held in the southern Chinese city of Zhuhai in November 2010. The historic context of the matter was represented by a rare Hongdu CJ-5 piston-engined trainer aircraft (a licence-produced copy of Yakovlev Yak-18 developed in the Soviet Union in the early 1950s) and a Chengdu JJ-5 jet trainer (Chinese two-seat variant of Soviet fighter MiG-17 manufactured in China as J-5). The present was demonstrated by Hongdu K-8 basic trainers of the Pakistani aerobatic team Sherdils (PLAAF designation JL-8) and the future by the advanced Hongdu L-15 supersonic combat trainer and Hongdu L-7 piston-engined initial training plane. The development of the former two was heavily facilitated by the Yakovlev design bureau specialists from Russia that consulted its Chinese partners. That's why the L-15 looks like the Russian combat trainer Yak-130 so much and the L-7 is indistinguishable from the yet-unrealised Yak-152 design.

L-15: Yak-130's analogue passes sonic barrier

Developed by Chinese company Hongdu, the L-15 subsonic two-seat advanced trainer is familiar from previous Airshow China events. Four years ago, the first prototype was unveiled in Zhuhai, having flown for the first time on 13 March 2006. Prototype 01 was powered by two Slovak-made DV-2 engines. Participating in Airshow China 2008's flight programme, the next prototype< No. 03, which conducted its maiden flight on 10 May 2008, was equipped with a pair of AI-222K-25 non-afterburning turbofans rated 2,500 kgf each – virtually the same type fitting Russia's Yak-130. The third flying prototype, No. 05, mounting the same powerplant took to the sky on 8 June 2009.

The head-turner of the latest show was the sixth prototype of the L-15, No. 06, that is capable of supersonic flights owing to its 4,200-kgf AI-222K-25F afterburner turbofans. Owing to the new powerplant, the engine nacelles were modified accordingly. In addition, modifications were applied to the fuselage nose section that, according to the developer, can house a radar and other targeting gear for the future combat version of the plane.

L-15 No. 06 was rolled out of Hongdu's assembly shop on 15 August last year and had completed its maiden flight less than a month before the kick-off of Airshow China 2010 – on 26 October. This did not, however, prevent it from taking part in the air show's flight programme and demonstrating aerobatics. It was reported during the show that the L-15 fitted with AI-222K-25F afterburner turbofans can go supersonic at Mach 1.4 and handle up to 8 g at 30-deg. alpha. Compared with earlier-made subsonic prototypes, the latest one differs in avionics as well, in particularly, the number of multifunction liquid crystal displays increased from two to three at both front and rear seats. This ensured virtually complete simulation of the cockpit management system of advanced fighters.

Having launched tests of the L-15's supersonic variant, China is not going to abandon the cheaper version powered by non-afterburning engines. It was announced in Zhuhai that the bulk of the AI-222K-25-powered L-15 tests had been complete, the plane would be certificated soon and Hongdu would begin the construction of the low-rate initial production (LRIP) batch of advanced trainers.

Certification of the AI-222K-25F-powered supersonic combat trainer variant of the L-15 is due in 2012, after which the aircraft will be able to enter full-scale production too. Thus, it will be possible that both versions

Andrey Fomin

Piotr Butowski

Piotr Butowski

will be made and fielded with PLAAF's flying schools at the same time, which – given their high degree of commonality – will boost military pilot training capabilities while slashing the costs. China is open about its intention to promote the L-15 on the global market, and the availability of two variants will enable potential customers to have their requirements met in a most efficient manner.

L-7: Yak-152 with Chinese accent

While the advanced Yakovlev Yak-152 piston-engined initial trainer is yet to land orders (even though it came up on top in the competition announced by the Russian Air Force and was to become part of a integrated training complex, the other part being the Yak-130 combat trainer ordered by RusAF), Chinese company Hongdu built last year an analogue of its own, designated as L-7. Yakovlev had been its co-developer since 2006; hence, small wonder that the aircraft is a deadringer for the Yak-152.

The plane packs a 360-hp piston engine and has retractable tricycle landing gear. With its maximum takeoff weight of 1,430 kg, the small plane measuring 7.272 m in length and 8.82 m in wingspan is capable of the 360-km/h maximum speed and pull off aerobatics at 9 g and 7 g (aerobatic and trainer variants respectively).

The L-7 was conceived as a replacement for the obsolescent Hongdu CJ-6 (PT-6), the Chinese derivative of the CJ-5 (PT-5) – the licence-produced version of the Soviet-made Yak-18. The first L-7 prototype displayed at Airshow China 2010 was rolled out by Hongdu last autumn. Its maiden flight was scheduled for December 2010. The company expects an order for at least 300 aircraft of the type (possible PLAAF designation CJ-7), once its trials have been complete.

Andrey Fomin

Prospect of Russian Helicopters

The Russian Helicopters joint stock company is working on honing the competitive edge and appeal of its products, offering an innovative helicopter industry development and intensified international cooperation programme. This was reported by Andrey Shibitov, the company's deputy Director General, scientific-technical policy and production, during the mid-November 2010 Forum of the Helicopter Industry Association, dedicated to Russian helicopter innovations.

Mr. Shibitov said the programme was planned to be run in two phases. At Phase I designed for 2011–2015, "the scope of work for the technological groundwork should be determined, R&D on advanced competitive programmes and technologies, on developing innovative cutting-edge products should be performed and the production facilities should be renovated". At Phase II in 2014–2020, "a technological groundwork should be laid for future helicopters, a transition to a higher technological level should take place, a competitive integrated logistic support system should be established and a groundbreaking product should be brought to the market".

Going into detail, Andrey Shibitov said there were plans for four key advanced programmes on a high-speed helicopter, a heavy helicopter, an unmanned system and a light helicopter. According to the speaker, the second stage of the high-speed helicopter marketing research is to be completed before the end of 2011, and a decision on a basic machine for full-rate pre-design research should be taken, probably, by the second quarter of 2012. However, even such a basic parameter as speed has not been decided on yet. According to Shibitov, expert estimates put the optimal cruising speed at about 350 km/h so far, but it can change in the future depending on the optimal efficiency and users' requirements. As is known, high-speed helicopter research in Russia has been pursued under two preliminary programmes – the Mi-X1 by Mil and the Ka-92 by Kamov.

A heavy helicopter programme run in cooperation with Chinese partners is in early stages too. Under the programme, three helicopter designs have been outlined, with their takeoff weight to range from 26 t to 38 t. According to Andrey Shibitov, Russian Helicopters and its Chinese partners have no common understanding of the prospect of the programme yet. If the parties come to agreement in the near future, full-scale development of such a helicopter could kick off next year.

Despite all the advertising at air shows and the discussions of concepts, the unmanned helicopter development programme remains in its infancy so far, according to Mr. Shibitov. At present, pre-design research in under way and, in particular, "two programmes have been supported by the Russian Defence Ministry and included into the Governmental Armament Procurement Programme".

As was reported earlier, the development of a light helicopter follows two tracks. The near future promises the completion of the active phase of the piston-engined Mi-34S1 upgrade and production resumption programme, and plans provide for designing an advanced machine with a takeoff weight of 2.5 t in a longer term.

Second Mi-38 has flown

The first pattern flight of the second prototype of the Mil Mi-38 medium transport helicopter (Prototype OP-2, RA-38012) took place in the city of Kazan on 22 November 2010. The machine was flown by the crew consisting of Mil test pilots Vladimir Kutanin and Salavat Sadriyev as well as Chief Flight Test Engineer Igor Klevantsev. The helicopter was made by Kazan Helicopters in August 2010 and rolled out for ground tests and debugging. Kutanin's crew conducted the first hover test on 30 October. In all, the second Mi-38 prototype had logged seven hover and low-speed flights over the runway before the end of November.

The second Mi-38 prototype is powered by Canadian-made Pratt & Whitney Canada PW127TS turboshafts, just as the first Mi-38 prototype (OP-1, RA-38011) was. At the same time, unlike the first prototype, the OP-2 embodies several design modifications, e.g. the improved hydraulic and fuel systems, modified main rotor blades and the helicopter control system fitted with standard-design feel-spring mechanisms. This resulted in enhanced controllability and stability of the helicopter. In addition, the second Mi-38 prototype is equipped with the advanced Transas IBKV-38 avionics suite wrapped around the 'glass cockpit'.

Russian Helicopters

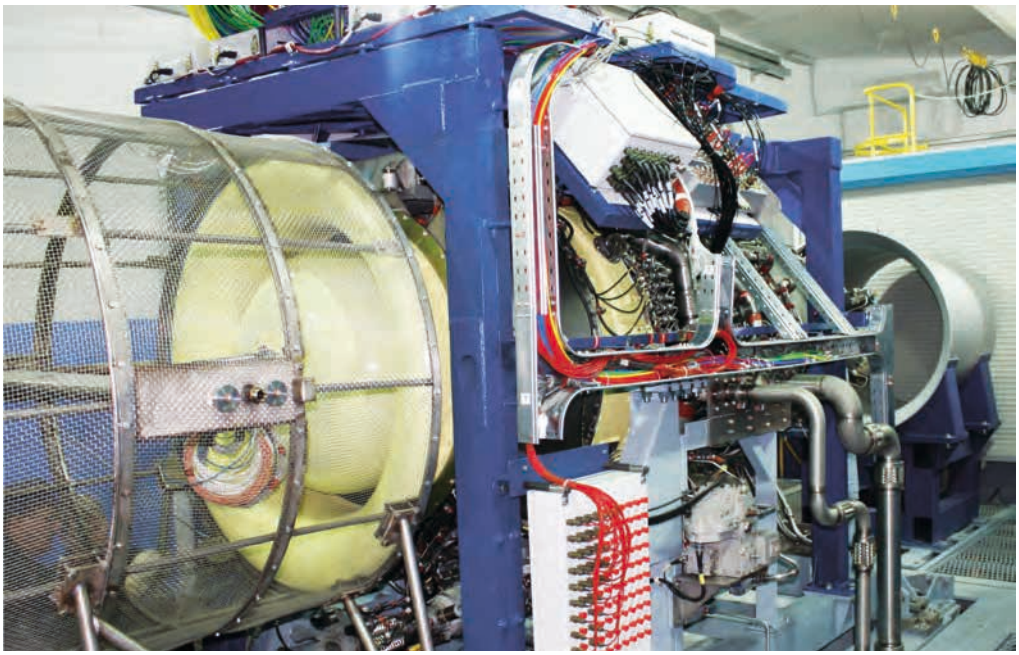
Russian Helicopters

In December, the OP-2 was handed over to the Mil Moscow Helicopter Plant for the full-scale flight test programme, to which end it ferried from Kazan to the Moscow Region.

Kazan Helicopters is assembling the third Mi-38 prototype (OP-3) to be powered by advanced Russian engine TV7-117V (VK-3000) that the Klimov company is developing and the Chernyshev Machine-building company is productionising. The helicopter can start its tests in 2011, and the very first prototype can resume flights at the same time, once it has been debugged.

According to a news release by the Russian Helicopters joint stock company, the Mi-38 is planned for full-rate production by Kazan Helicopters in 2013.

PD-14: core engine tests launched



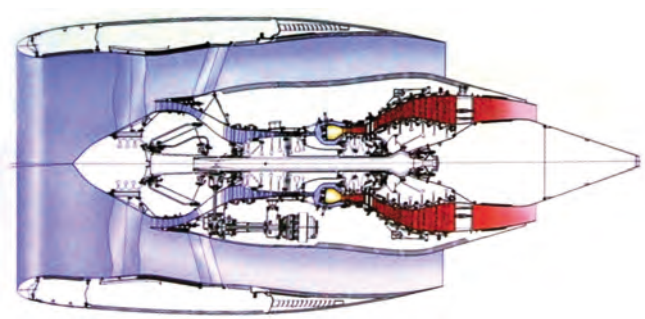
Aviadvigatel JSC

The programme on development of the advanced PD-14 family of engines designed to power future passenger and transport aircraft passed an important milestone when the first start of a PD-14 core engine demonstrator took place at a stand of the Aviadvigatel company in Perm on 26 November 2010. The programme's priority is to develop an engine to be used as part of the powerplant of the future Russian short-to-medium-range airliner MC-21 under development by the Irkut corporation now. In this connection, the PD-14 programme is of key importance to the United Aircraft Corporation (UAC) in terms of commercial aircraft engine development.

The Engines for the MC-21 Programme has been run by Aviadvigatel and the Perm Engine Company since 2000 in cooperation with the TsIAM institute and other Russian aircraft manufacturers. The engine is expected to hit the market in 2015–2016. The programme is being run in a phased manner. The tests of the core engine demonstrator assembled by Aviadvigatel on 28 October last year will have lasted until 2011. At the same time, manufacture and assembly of the full-scale engine demonstrator has been under way since 2009. The full-scale engine demonstrator is to be ready for testing by mid-2012 and is slated for flight tests in 2013. The PD-14 baseline model's certification is planned for 2014.

The certification trials will be conducted on an open-air test bench of NPO Saturn in Poluyevo near the city of Rybinsk. The Perm Engine Company has launched preparations for production of the advanced engine, having renovated its shops and started construction of the building of a new thermal-resistant coating shop. Aviadvigatel has developed a cutting-edge test bench to test core engines.

The PD-14 is a two-shaft turbofan with separate fan and core flows and direct fan drive. All engines in the family have the same core engine with an eight-stage high-pressure compressor, an annular low-emission combustor and a two-stage high-pressure turbine, and other common units. This ensures their commonality. In particular, the MC-21-300 will be powered by the baseline 14,000-kgf PD-14 turbofan, the MC-21-200 is to be fitted with the 12,500-kgf PD-14A version operating under reduced power conditions, while the MC-21-400 stretch is going to be equipped with the PD-14M variant, with the thrust enhanced to 15,600 kgf by means of a turbine inlet temperature increase and an extra add stage.



The development of the PD-14 engine family for short/medium airliners and freighters was among the issues discussed at the Aircraft Engines of the 21st Century 3rd international scientific and technical conference in Moscow in late November and early December. The conference was dedicated to the 80th anniversary of the TsIAM Central Aircraft Engine Institute. Leaders of UAC, Aviadvigatel and TsIAM delivered a number of reports on the programme.

Mention was made that the modular design allows the baseline PD-14 to spawn a whole family of engines to fit regional and long-range airliners with a seating capacity from 70 to 350 passengers and transport aircraft with a carrying capacity of 10–60 t. The deputy Director General of the UEC joint stock company Alexander Ivakh said at the conference in TsIAM that talks with Sukhoi were under way on the feasibility of using the engine as part of the future 130-seat SSJ-130 derivative and plans were made to discuss with foreign partners proposals for using the PD-14 under the MTA programme. It was said during the conference that the engine family also could include the lower-thrust 7,900-kgf PD-7 and 9,900-kgf PD-9 turbofans as well as more powerfull 18,000-kgf PD-18R gear drive turbofan and even the PD-12V turboshaft engine rated at 10,000 hp.

As for the technical and operational characteristics of the engine family, the developer maintains the PD-14 is to ensure a 10–15% fuel consumption reduction and a 15–20% life cycle cost reduction over the current characteristics. In addition, there will be a hefty noise and emission reduction.

The baseline PD-14's fan diameter will measure 1,900 mm, bypass ratio will account for 8.5 and specific fuel burn will stand at 0.526 kg/kgf.hr. The weight of the baseline 14,000-kgf engine is estimated at 3,780 kg.

Along with the prime contractors Aviadvigatel and Perm Engine Company, other members of the United Engine Corporation are participating in the development and future full-rate production of the engines of the PD-14 family. They include UMPO, NPO Saturn and NPP Motor as well as the MMPP Salut FSUE. The number of subcontractors is going to grow further down the line. At the conference, Aviadvigatel General Designer Alexander Inozemtsev said that the PD-14 preliminary design was to be considered in April 2011, with part and component suppliers to be selected a year later.

Vyacheslav BOGUSLAYEV
Chairman of the Board,
Motor Sich JSC

MOTOR SICH ENGINES FOR INDIA

The Motor Sich JSC in Zaporozhye is one of the biggest enterprises which realizes the full cycle of modern aeroengines creation from marketing research, development and production to maintenance while operation and repair.

During the years of its activity the enterprise won respect and authority among customers and successfully cooperates with leading companies of the former Soviet republics and foreign countries.

The quality and reliability of product, which is produced by enterprise, confirmed by its successful operation in more than 120 countries of the world.

Due to objective estimation the aircraft industry of Ukraine is among the first ten world countries if taking into consideration its research-and-production potential and airplanes produced by Antonov SE as well as engines produced by Motor Sich JSC and Ivchenko-Progress SE are its visiting card at all international aerospace exhibitions.

Indian Republic with its one of the most intensively developing economy in the world is a leading partner in the counties of the Asian-Pacific region for Ukraine. Ukraine is a foreign trade partner of India in CIS and two-sided turnover between our countries has a steady growth trend. A considerable part of turnover make up aerospace deliveries and rendering services to ensure its operation.

The cooperation between Ukraine and India started in 1961 and is successfully developing at present time. In 1984 more than one hundred An-32 military-transport airplanes were supplied to Indian Republic, which were designed in Ukraine in accordance with technical requirements specified by Indian Ministry of Defence.

High performance and reliability guaranteed by An-32 aircraft and their AI-20 engines during operation in extreme conditions of mountainous regions and hot climate promoted Indian Ministry of Defence taking the decision on their upgrade in order to prolong their service with Indian Air Force.

Corresponding Ukrainian-Indian contract was signed in 2009. It presupposes sequential service life extension from 25 to 40 years as well as new navigation and radio equipment installation. With the purpose of ensuring extended service life for airplanes in the end of 2009 the procurement contract was signed with our enterprise for 100 new AI-20 engines.

It should be mentioned that besides several hundred AI-20 engines more than thousand engines of other types produced by Motor Sich JSC are now being in service with Indian armed forces powering Mil and Kamov combat and transport helicopters, Ilyushin Il-38 anti-submarine patrol aircraft as well as Uran anti-ship missile system.

With the help of Motor Sich JSC the repairing process for AI-20, TV3-117 and AI-9V engines operating in India was implemented at 3 BRD IAF in Chandigarh.

With the purpose of its further expansion in the aerospace market the enterprise is involved in new future-technology engines production startup as well as commercial engines modification. They are creating by Motor Sich JSC designers and together with its traditional partner, Ivchenko-Progress SE, the company with which in 2007 Motor Sich JSC founded joint corporation – Ivchenko Scientific Production Association. Here we mean the following engines: D-436-148, AI-450-MS, AI-450M, TV3-117VMA-SBM1V, MS-500V and AI-222-25.

D-436-148 engine is developed on the basis of the best constructive decisions for An-148 passenger airplanes family. It is produced by Motor Sich JSC in cooperation with MMPP Salut FSUE (Moscow). An-148 baseline version carries 68 to 85 passengers. Its commercial operation started in June 2009. The An-158 stretch version has a seating capacity from 85 to 99 persons. Its regular operation with airlines should be started in 2011.

Now we are involved in developing business class airplane, An-168, with the range growing up to 7,000 km as well as transport version, An-178, with a payload of 13.5–15 tons which can replace taken out of service in India An-12 airplanes.

D-436-148 turbofan and AI-450-MS auxiliary gas turbine engines were designed and now are in production at Motor Sich JSC for different versions of An-148 family. AI-450-MS APU ensures main engine start as well as provides airplane's systems with compressed air and power supply when main engines shut out.

The enterprise also pays a great attention to engine production for helicopters used with different purposes. Our engines are mounted on 95% Mil and Kamov helicopters including those, which are in service in India with Mi-26, the largest helicopters in the world, among them.

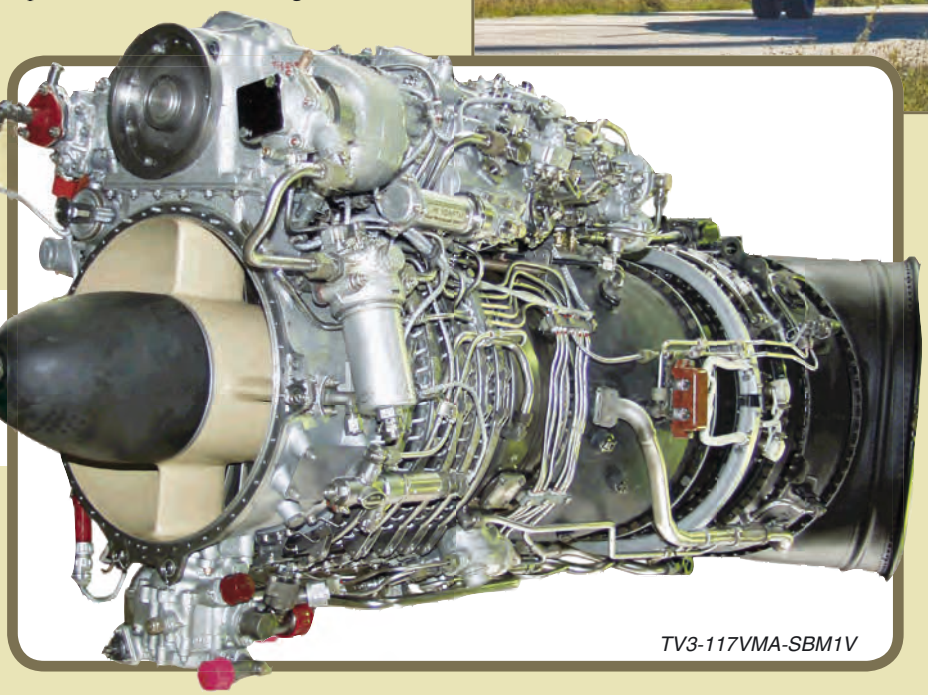
The smallest helicopter engine produced by Motor Sich JSC is AI-450, designed together with Ivchenko-Progress SE. In its' different versions it can ensure the take-off power from 370 to 600 hp. Now our enterprises focus their efforts on AI-450M version aimed for re-motorization of Mil Mi-2 earlier produced helicopters where it will replace GTD-350 engine.

To increase medium-class helicopters performance in mountainous regions and in countries with hot climate Motor Sich JSC designed new helicopter engine, TV3-117VMA-SBM1V, with increased service life up to 12,000 hours (cycles) and TBO – up to 4, 000 hours (cycles). This engine was developed by Motor Sich JSC designers on the basis of TV3-117VMA-SBM1 turboprop using its gas generator and free power turbine. Its automatic control system allows take-off power adjustment in the range from 2000 hp (supported up to 51°C) to 2500 hp (supported up to 35°C) depending on helicopter's type.

Higher characteristics of take-off power depending on outside air temperature and altitude were confirmed by carrying out a number of tests in climatic test bench at the TsIAM FSUE where engine ensured steady start-ups at an altitude up to 6,000 meters and stable operation at an altitude of 9,000 meters in the whole range of possible outside air temperatures.

TV3-117VMA-SBM1V engine has the same weight and dimensions as engines mounted on Mil and Kamov helicopters which allows its installation on all earlier produced helicopters of Mi-24 and Mi-8MT/Mi-17 families with only minimum helicopter and its systems modification is needed. Hence TV3-117VMA-SBM1V engine installation gives the possibility to increase essentially the performance of new and earlier produced helicopters as well as to increase payload at minimal costs. Due to their higher characteristics provided by TV3-117VMA-SBM1V engines Mil and Kamov helicopters will be invaluable in operation in mountainous regions of India.

Mi-24 (Mi-35)



TV3-117VMA-SBM1V

TV3-117VMA-SBM1V series 1 version fitted with new FADEC digital automatic control system is developing for new helicopter projects. Using FADEC provides for further engine and helicopter performance uprating.

The Mi-8MTV helicopter powered by TV3-117VMA-SBM1V made its maiden flight on 19 May 2010 from Konotop aircraft repair plant airfield. While testing helicopter climbed to the altitude of 8,100 meters for record 14 minutes.

Earlier the Mi-24 helicopter powered by TV3-117VMA-SBM1V engines also showed record climbing capacity – it reached the altitude of 5 kilometers for only 9 minutes. This means that rate of climb was increased by 2.5 times.

Taking into consideration high TV3-117VMA-SBM1V characteristics and the fact that Motor Sich JSC is ready for cooperation with HAL and GTRE in the sphere of creation of its own modification adapted for new multipurpose 10-t Indian helicopter which is planned for development this can become the weighty argument in favour of such Indian-Ukrainian engine.

The world helicopter market conditions are constantly changing, and our enterprise is involved in new engines creation activities. New MS-500V engine family featuring 600–1,000 hp power designed for 3,5–6 t multipurpose helicopters is now under development. The first MS-500V version with takeoff power of 630 hp is developed under performance specifications issued by Kazan Helicopters for their Ansat helicopter.

While designing MS-500V Motor Sich JSC uses the experience received during the development of its AI-450-MS auxiliary engine for An-148 airplane as well as existing advanced and proven constructive technological decisions.

Continuing eight-year traditions of engine production for trainer aircraft Motor Sich JSC in cooperation with MMPP Salut FSUE implemented series production of AI-222-25 turbofan engine with maximum thrust of 2,500 kgf for Yak-130 combat trainers being delivered to Russian Air Force pilot training centers. Their deliveries to Algerian Air Force will start soon.

AI-222-25F afterburner turbofan version providing a thrust of 4,200 kgf was developed for future Yak-130 modifications and other light supersonic aircraft in other countries on the basis of AI-222-25 engine. At present AI-222-25 and AI-222-25F engines power Chinese L-15 experimental combat trainer aicraft. In the end of October 2010 this airplane first flew with engines operating in afterburning mode.

For more than 50 years Motor Sich JSC has been producing engines for different UAVs and cruise missiles including Kh-55 strategic ALCMs. They also power Kh-35 anti-ship missiles and Kh-59M air-to-surface missiles being in service with Indian Ministry of Defence. Today we can propose several new more modern engines for such applications.

Motor Sich JSC is actively and successively looking for reliable partners, extends the existing and discovers new segments of the aeroengines world markets.

We hope that these efforts will be crystallised into quite obvious results of cooperation with aerospace industry of India, to which Motor Sich JSC can propose a wide range of modern engines for most Indian aerospace programmes.

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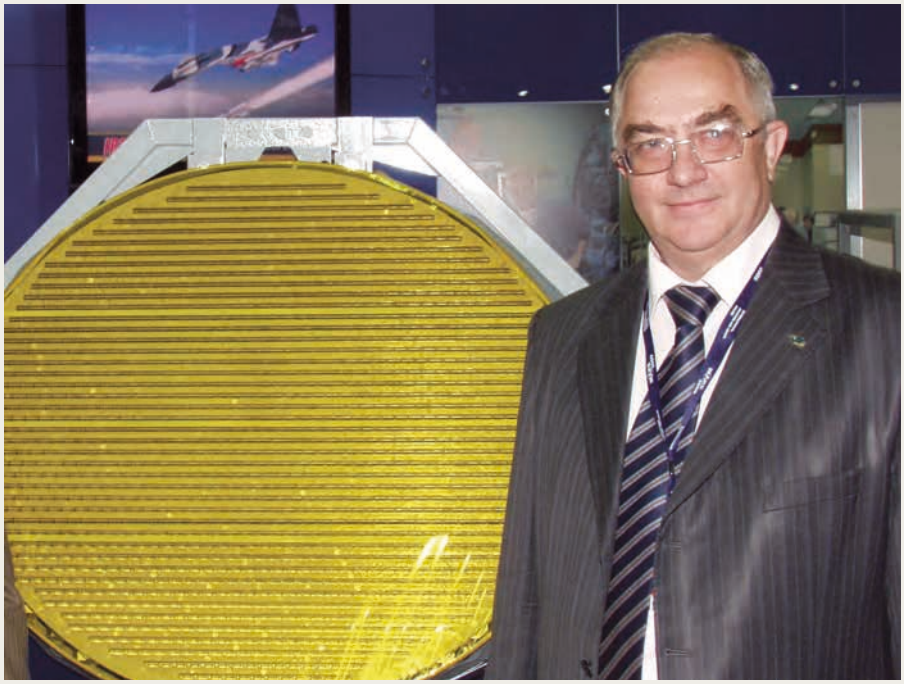


TIKHOMIROV-NIIP AESA READY FOR FLIGHT TESTS

INTERVIEW WITH TIKHOMIROV-NIIP DIRECTOR GENERAL YURY BELY

A feature of the future fifth-generation fighter is to be its highly automated multifunctional integrated active electronically scanned array (AESA) radar system. Such radar is under development by the Tikhomirov Scientific Research Institute of Instrument Design (Tikhomirov-NIIP). To date, Tikhomirov-NIIP has made three X-band AESA prototypes as well as experimental L-band AESA and conducted extensive lab tests and debugging. Tikhomirov-NIIP Director General Yury Bely told Take-off about the state of the AESA development programme and other pressing issues.

Let us start with the 'hottest' Tikhomirov-NIIP's ongoing programme – the AESA radar development to fit the fifth-generation fighter. What is the status of the programme and what results were achieved by now?

We at Tikhomirov-NIIP believe the programme has made quite an advance. We have assembled three AESA prototypes, gotten a wealth of experience and understood full well what has to be done with the transmit-receive (T-R) modules and the rest of the design of the radar. We have outlined efforts to iron out the deficiencies revealed during the bench tests and are launching the manufacture of a couple of experimental modules earmarked for testing new solutions. However, even the first three AESAs made have displayed virtually all of the design characteristics and proved their high endurance. We have completed all of the mechanical and climatic tests, with the antenna operating smoothly under all conditions. We have dealt with all of the cooling issues that are rather difficult to us because the cooling of a rather power-consuming AESA is one of the most difficult phases of its development. Our designers have come up with an ingenious solution to the cooling issues.

When is the AESA to be flight-tested?

The developer of the aircraft will set the timing. The tentative decision is that the second AESA, previously earmarked for avionics bench testing by Sukhoi, will be mounted on the third PAK FA prototype. It is quite possible that this will take place early next year. Then we will equip the fourth fighter's prototype with production-standard radar fitted with the third AESA we are testing now.

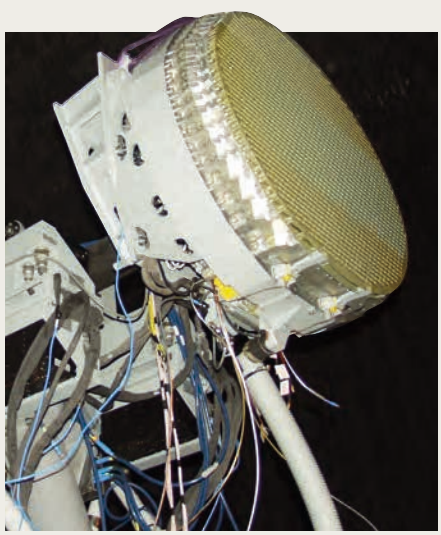
Based on the bench test results produced, is it possible to give a preliminary assessment whether your radar is a success or not and assesses its strengths and weaknesses compared with its Western analogues?

Certainly, our AESA is a success; it is as good as any foreign radar of the type. We have evaluated the transmission power and reception noise, and the results give us hope that the performance of our AESA will surpass even that of the F-22's radar. We have tested a whole range of operating modes – surveillance, lock-on, tracking, multiple-target and simultaneous beam shaping. If we had a flying testbed, we would have proved the radar's strengths on real sorties already. I hope, the decision to have the flying testbed made will be taken eventually.

Do you plan to upgrade your previous phased-array radar, the Bars?

Upgrade of the Su-30MKI fighter is a separate line of work providing for gradual upgrade of the Bars phased-array radar as well. Stage One of the upgrade is to enhance its performance through introducing advanced operating modes and more capable computers and maximising the hardware solutions of the existing phased-array radar productionised in India. Stage Two is slated for replace the passive phased array with an AESA. We have reached agreement with the customer for such work, but no contract has been signed yet. Nonetheless, we have been following this line of work already, paying for that out of pocket.

Thank you for an interesting interview and all the best in your work.



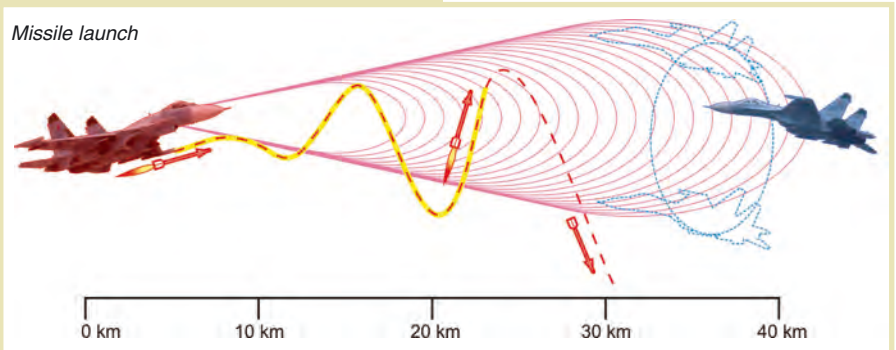
558 ARP OFFERS SATELLITE

The history of 558 Aircraft Repair Plant started on 26 June 1941 – virtually on the first days of the Great Patriotic War. Nowadays the plant is a major aircraft repair enterprise which acquired a reputation of a reliable partner owing to high quality of aircraft repairs and individual approach to each Customer. Special attention is paid to development of new models of military hardware and service equipment, as well as to introduction of new technological processes.

558 APR performs overhaul of the Su-17 (Su-22), Su-25, Su-27, MiG-29 and An-2 aircraft, Mi-8 (Mi-17) and Mi-24 (Mi-35) helicopters of all versions. The enterprise carries out full cycle of overhaul of the airframes and all component items. Besides, the plant successfully works on the upgrade of aviation materiel. Upgraded MiG-29 and Su-27 fighters acquire brand new features and combat capabilities: they received an improved cockpit display and management system, advanced navigation and radar sighting systems as well as an expanded weapon suite. Another area of aircraft upgrade is installation of SATELLITE system – an onboard equipment of individual radio engineering protection which nearly eliminate the possibility of hitting the protected object by missiles with radar guided homing heads; the jamming is created to all attacking enemy radars (fighters, interceptors, surface-to-air missiles, etc.).

Scanning mode

Lock-on and tracking of the false target



The jamming impact is formed automatically at all stages of interception enabling the pilot to carry out his combat mission without being distracted to activate jamming.

When blanketed enemy radar is in the scanning mode, the system creates masking interference in the channels of range, speed and angular data. On the enemy scanning displays numerous false target marks appear making it difficult to identify the true target amidst the false ones.

In the tracking mode, the equipment produces driven disturbances in the channels of angular data measurement. Radar aerial starts tracking the false target situated in the different direction relative to the protected aircraft. Angular position of the false target changes in the predetermined manner imitating manoeuvres of the protected aircraft.

Jamming creates a latent controllable withdrawal of goniometrical scanning systems which results in occurrence of intensive sign-alternating overload of missiles and curving their flight-path guidance thus considerably decreasing missiles flight range and increasing their current and final miss.

Owing to accumulated experience, unique qualification of personnel, advanced production facilities, high quality of service, strict and timely execution of the orders, 558 ARP earned well-deserved authority among the airmen of many countries of the world.

558 ARP is always open for cooperation.

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First production SuperJets built

When this issue has come out of press, the developer of advanced Russian regional airliner Sukhoi SuperJet 100 will, probably, hold the long-awaited document – the Type Certificate, which issuance by the Interstate Aviation Committee's Aircraft Registry is slated for early February. The SSJ100's certification tests had been complete before the New Year's Day, with the certification paperwork being handled throughout January.

The first production SuperJets are expected to be delivered to the launch customers in February or March and kick off passenger services soon afterwards.

Sergey Lysenko

The first production-standard SSJ100 (c/n 95007) earmarked for Armenian flag carrier Armavia conducted its first flight in Komsomolsk-on-Amur on 4 November last year. Following several test sorties from KnAAPO's factory airfield, it was ferried to Sukhoi Civil Aircraft Company's flight test facility in Zhukovsky, Moscow Region, for further tests on 10 November. It is this aircraft that completed the final flight test programme prior to obtaining the type certificate. The programme comprised 150 flying hours on standard routes production airliners will have to operate on. During those flights from Moscow to Ufa, Orenburg, Yekaterinburg, Chelyabinsk and Krasnodar, the reliability of all of the systems of the production-configuration airliner was assessed. Right after the New Year's Day, the aircraft was given the paintjob of its customer, Armavia, and registration number EK-95015 at the Spektr-avia factory in Ulyanovsk.

The second SSJ100 (c/n 95008) earmarked for Aeroflot was painted right in Komsomolsk-on-Amur even before its maiden flight. The rollout of the plane in Aeroflot's colours, which was given registration number RA-89001, took place on 24 December. Once the work has been complete on the interior of the cabin (at Aeroflot's request, the aircraft is made in the two-class layout, with eight seats in the business class and 75 in the economy one), the plane will enter its acceptance trials expected in February or March. This done, it will be delivered to the customer.

In all, at least 12 production SSJ100 airliners are slated for delivery in 2011, with 10 to be accepted by Aeroflot and two by Armavia.

Ivan Rogachev

SuperJet International

An important event of this year has been the deal clinched on 17 January by Russo-Italian joint venture SuperJet International and Mexican carrier InterJet. The contract stipulated firm order for 15 SSJ100s with the delivery starting from 2012 and with five options. The contract beefed up the SSJ100 orderbook up to 170 aircraft, of which 64 are designed for Russian carriers, e.g. Aeroflot, FLC, Avialeasing, and 106 for foreign customers. The latter include Armavia, Indonesian Kartika, Laotian Phongsavanh Airlines and Mexico's Interjet airlines as well as a yet-unnamed 'major European air carrier' and leasing companies Pearl Aircraft (Bermudas) and Willis Lease Finance Corp. (United States).

Tu-204SM flown!

Tupolev

29 December 2010 saw the maiden flight of an advanced Russian airliner, a prototype of the heavily upgraded Tupolev Tu-204SM medium-haul airliner, from the airfield of the Aviastar-SP close corporation in Ulyanovsk. The first 52-min. flight of the aircraft with c/n 64150 was conducted by pilot Victor Minashkin and co-pilot Denis Vyazankin with lead test engineers Vladimir Salatov and Vladimir Filimoshkin also onboard. All of the systems operated normally and reliably on the first flight.

The construction of the first Tu-204SM prototype by Aviastar kicked off in 2009. In July last year, the Perm Engine Company shipped the first set of two production-standard PS-90A2 turbofan engines that were later mounted on the Tu-204SM c/n 64150. The second prototype of the upgraded airliner (c/n 64151) is under way in Ulyanovsk, with the third example (c/n 64152) undergoing its final assembly.

The Tu-204SM upgrade differs considerably from the production Tu-204-100 earlier built by Aviastar. Firstly, it will be powered by the 16,000-kgf PS-90A2 engines developed in Perm with the assistance of US company Pratt&Whitney. New engine got IAC Aviation Registry type certificate in December 2009. Unlike the production PS-90A, the modified turbofan is equipped with an advanced high-pressure turbine, new FADEC and features several other considerable improvements, which enables it to meet present-day international airworthiness and environment protection requirements. At the same time, a considerable reduction in its life-cycle cost and an increase in its reliability have been achieved. The Tu-204SM also uses the advanced Aerosila TA18-200 auxiliary power unit (APU).

To reduce the empty weight, a number of improvements in design, advanced materials and lighter and more up-to-date avionics systems are being introduced. In particular, provision has been made for using elevators, rudders and wing high-lift devices made out of carbon-filled plastic composites, a lightweight landing gear from Aviaagregat (Samara) and a more sophisticated digital control air conditioning system.

The flying crew has been reduced from three to two by cutting the flight engineer, which became feasible owing to a substantial upgrade of the avionics. The aircraft is fitted with the advanced KSEIS-204E integrated display and warning system and VSUPT-85-204 fight management and thrust control computer system, with all control consoles on the flightdeck redesigned. The new avionics has allowed implementation of new automatic control modes, particularly, Category IIIA automatic landing approach (the Tu-204-100's avionics ensured the Category II automatic landing approach capability only), director takeoff, etc. Advanced miniyokes have been installed on the flightdeck.

Aircraft weight reduction is also facilitated by upgrade of the power supply system and lighting equipment, with glow lamps in taxi lights and landing lamps are replaced with light-emitting diodes and xenon lamps.

Owing to the modifications, the empty weight is to drop from 60 t to 58 t, while the maximum takeoff and landing weights is to increase from 103 t to 105 t and from 88 t to 89.5 t, respectively. The Tu-204SM's assigned life is to up to from 60,000 hours, 30,000 landings and 25 operating years (those of the current Tu-204-100 stand at 45,000 hours, 25,000 landings and 20 operating years, respectively).

The Tu-204SM's certification trials are slated for completion in late 2011, after which delivery of production planes will be able to commence. In December last year, an agreement was reached, which stipulated that in case of settling a price of production airliners with the manufacturer and system suppliers and in case of provision of relevant governmental loans, the launch order for 44 Tu-204SMs will be placed by the Ilyushin Finance Co. leasing company planning to lease the airliners to Russian charter carrier Red Wings during 2011–2016.

Tupolev

First export An-148s built

An advanced Antonov An-148-100E (c/n 41-01) built under the contract for two aircraft of the type for the Burmese Defence Ministry conducted its first flight from the airfield of the Voronezh-based VASO aircraft plant on 22 November 2010. The plane became the first An-148 made by VASO for export. The contract was awarded to the United Aircraft Corporation (UAC). VASO completed the assembly of the aircraft last autumn and rolled it out to the flight test facility on 11 November. The aircraft was given registration number RA-61707 for the duration of the trials. Its delivery is due early this year following a brief certification flight programme. On the eve of the new year, VASO has completed the other plane An-148 for Burma (c/n 41-03, registration number for the duration of the tests RA-61708). It was rolled out to the flight test facility for ground tests in late December and made its maiden flight in early January 2011.

At the same time with fulfilling the first An-148 export order, VASO fulfilled its launch commercial An-148 contract by delivering the sixth – final – An-148-100B (c/n 40-09, RA-61706) to the Rossiya state transport company on 29 November 2010. Its rollout took place in September. The aircraft was brought to St. Petersburg's Pulkovo airport Rossiya operates from. All six An-148s were financially leased to the carrier by the Ilyushin Finance Co. leasing company being the originator of the contract and owner of the aircraft.

Speaking at the sixth An-148's delivery ceremony, VASO Director General Vitaly Zubarev said: "It is important to us that a government-owned company has become the launch customer of four An-148. Working hand in glove with VASO personnel, Rossiya staff has learnt to operate the new plane. We expect continuation of our fruitful cooperation. According to Rossiya Director General Sergey Belov, the carrier is generally satisfied with the An-148's operation and plans to use its options for nine more aircraft of the type.

Vitaly Zubarev also said: "VASO's production plan provides for a steady growth of the An-148's output, because the list of customers is growing. Sberbank Leasing ordered 10 An-148-100Es for the Voronezh-based Polyot carrier in October 2010. The deliveries will commence in spring 2011".

In addition, VASO in November 2010 landed a contract from the Russian Emergencies Ministry's Aviation Department for construction and delivery of two An-148-100Es during 2012–2013.

Alexander Degtyarev

Second Tu-214PU built in Kazan

A new Tupolev Tu-214PU aircraft (RA-64520), ordered by the Russian President Administrative Office, first flew from the airfield of the Kazan Aircraft Production Association (KAPO) on 25 November 2010. A crew led by KAPO test pilot Alexey Ryabov flew it. It was the second aircraft of the type to be delivered to the Rossiya special flight detachment and used for travel by top governmental officials – the Russian President and Premier – on their official visits and routine trips throughout the country along with Ilyushin Il-96-300PU and Dassault Falcon 7X planes.

The first 'VIP wagon', the 40-seat Tu-214PU (RA-64517) was built by KAPO earlier in 2010 and completed its first flight on 12 May. In October, the aircraft was fielded with the Rossiya special flight detachment, and President Dmitry Medvedev tried the new presidential plane late in the same month, having used it for his trip to Kazan.

The new Tu-214PU is the fourth special aircraft derived from the Tu-214 airliner and manufactured by KAPO over the past several years under a contract awarded by the Russian President Administrative Office. Two Tu-214SR relay aircraft (RA-64515 and RA-64516) were accepted by the Rossiya special flight detachment on 1 July 2009. KAPO is to make two more aircraft under the contract before year-end, both being Tu-214SUS airborne communications centres.

In addition, the governmental procurement website (www.zakupki.gov.ru) reported last November that the Russian President Administrative Office had launched an open competition for a governmental contract for another Tu-214, with the aircraft to be delivered not later than December 2013. The plane is to be in the passenger version with a two-class 150-seat layout (12-seat business class and 138-seat economy class).

Ivan Rogachev

MC-21 got 190 orders in 2010

Andrey Fomin

Last year became an impressive milestone for Irkut MC-21 programme to develop a new-generation short/medium-haul airliner. In July, when Irkut presented for the first time a full-scale mock-up of a 20-m-long section of the fuselage with pilots cockpit and passenger cabin at Farnborough airshow, MC-21 got its first orders.

Malaysian investment company Crecom Burj Resources became the launch customer of the MC-21 and placed 50 firm orders (25 MC-21-200s and 25 MC-21-300s designed for 168 and 212 seats in the single-class tourist layout respectively). The contract is valued at $3 billion in list prices, with the delivery slated for 2016–2020. Russia's Ilyushin Finance Co. leasing company ordered 28 airliners with 22 options. Another Russian aircraft lessor, VEB-Leasing, made an agreement for 15 planes with 15 options. Two letters of intent were signed by air carriers as well: Russian tourist charter carrier Nordwind ordered five MC-21s plus two options, and a customer, who requested anonymity, ordered the same number of airliners. Overall, these deals clinched at Farnborough generated a good orderbook for the MC-21 developer, totalling 140 aircraft.

Later on, in September, an agreement on delivery of 50 airliners to the Russian Technologies state corporation that manages assets of a number of major Russian air carriers was signed. The planes are to be delivered between 2016 and 2022. So, by 2011, the MC-21 orderbook has grown up to 190 units.


Andrey Fomin

According to the developer, the MC-21 will one-up its closest foreign rival, the Airbus A320, in better efficiency, since its direct operating costs are expected to be 12–15% less, fuel efficiency 25% higher and maintenance costs 30% lower.

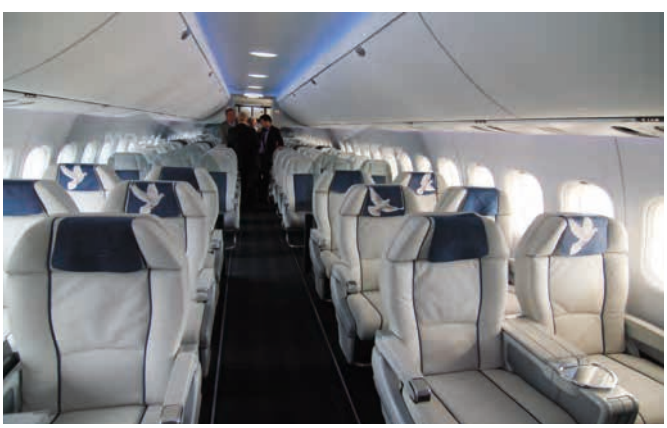
This is to be achieved through using cutting-edge equipment and systems from major foreign manufacturers and a number of ingenious design and layout solutions. For instance, a large part of the airliner's design, 35–37%, is composites, of which, in particular, the wing and empennage will be made in full.

The most important component of the MC-21's competitive edge concept is the comfort unprecedented for aircraft in the class. The MC-21's cabin is 3.65 m wide, which is 12 cm more than that of the A320 and 19 cm of the cabin of the Boeing 737. This allows either using wider and more comfortable seats or increasing the width of the aisle, which will expedite boarding and disembarkation and enable passengers to pass clearly of service trolleys easily. Like the Dreamliner, the MC-21 will have larger passenger windows.

Irkut President Oleg Demchenko estimates that the MC-21 programme can win the company up to 10% of the global 150–200-seat narrow-body airliner market. Leading Western companies, which joined the MC-21 programme, agree with him, believing the MC-21 output may exceed 1,000 aircraft.

UAC President Alexey Fyodorov said, "The MC-21 is UAC's priority as far as civil aviation programmes are concerned. The plants in Ulyanovsk and Voronezh are coming on board; they will join UAC's division being established on the basis of Irkut. The government is doing its best to facilitate the programme. Pursuing the MC-21 programme, we are developing a new-generation passenger plane and, hence, high-tech branches of Russia's economy".

There is little time left before the airliner's maiden flight. Irkut plans that the first MC-21 will take to the skies in late 2014. If all goes to plan, its certification tests will have been complete by 2016 and then deliveries of early production-standard airliners to the launch customer will kick off.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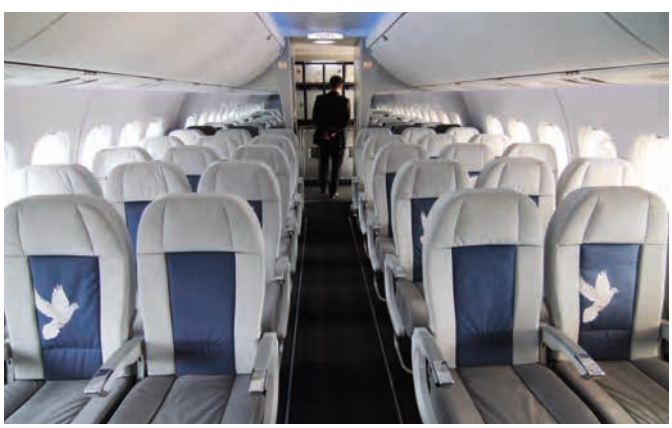
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