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aerospace technologies review **AIR FLEET**



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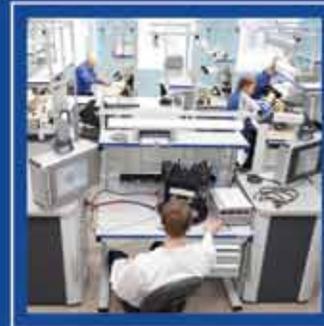
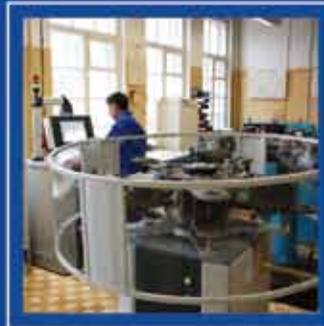
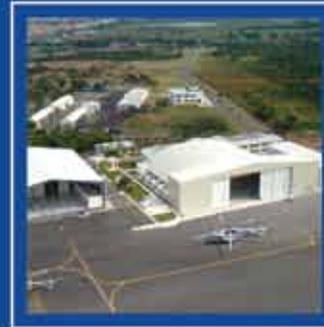
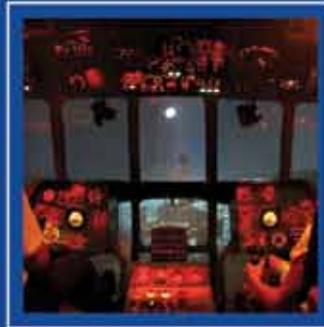
Motor Sich today 26

**ALEXANDER ROUBTSOV:
THE INTEREST IN THE "ANTONOV"
FAMILY AIRCRAFT IS KITING**

Welcome to our exposition in Hall 1, E 11
during Farnborough International Airshow-2010

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Editorial



This time, aviation experts from all over the globe have come to Farnborough again to exchange news and experience as well as to make new contracts. What will Russia present at the largest air show? It is going to demonstrate the flight of its Sukhoi Superjet 100. This aircraft is undergoing the final stage of type certificate air tests and will soon be delivered to the first consumers. Russia's aircraft makers lay great hopes on this project carried out jointly by French company Snecma and Russian engine manufacturer Saturn. Another two companies, Alenia Aeronautica of Italy and Sukhoi Civil Aircraft of Russia, which set up a joint venture of Super Jet International – are playing a big role in this project, too. They are promoting SSJ to the international market and, to this end, are expected to sign memorandums of intentions at Farnborough 2010. Boeing Commercial Aircraft provides its consultancy support for the project.

Also, the visitors will see a global campaign on promotion of another Russian project – MS-21 aircraft – to the international market. This plane is manufactured by UAC and Irkut Corporation (the latter is the leading enterprise). A full-scale mock-up of aircraft cockpit and part of its body (passenger cabin and business-class cabin) is going to be represented at the show. The MS-21 is a kind of a challenge to the world's major aircraft makers Airbus and Boeing as it will compete with their most popular Airbus A320 and Boeing 737NG.

Unfortunately, Farnborough visitors will not see Russian combat aircraft as they have a very busy testing schedule. From the other side, the main two Russian showpieces will be SSJ-100 and, perhaps, the mock-up of the cockpit and part of the fuselage of MS-21. It is one of the facts that prove Russia switched attention from military aircraft making to civilian one.

By the way, the Russian-Ukrainian programme on the development and production of An-148 and An-158 aircraft is gathering pace, too. The An-148 is already in commercial operation and An-158 has already made its first flight and will be certified soon. The cooperation between Russia and Ukraine seems to have great prospects. See the article about new An-158 below.

I am sure that the participants and visitors of Farnborough 2010 will find much specialized information at Russia's stands. Many of these visits will surely result in new promising and mutually-beneficial contracts. I wish Air Fleet readers much fruitful work and plenty of new impressions at one of the world's key air shows!

Yours faithfully,
Alexander Gudko

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ADDITION OF THE “ANTONOV” FAMILY

“ANTONOV” STATE-RUN ENTERPRISE AND UNITED AIRCRAFT BUILDING COMPANY INTRODUCE THE AN-158 AIRCRAFT

April could be considered for a good reason as a month when an addition of the “Antonov” family came up – the An-158 passenger regional jet (RJ). For the first time it was unveiled in the public in a hangar being ready for a flight on April 21. It looked beautiful and powerful, it was shined under the flashes of hundreds of cameras and attracted the attention of high ranking officials from the Russian and Ukrainian aviation industry as well as reporters from two states. After several days An-158 conducted its first flight. In July the aircraft will make its debut in Farnborough-2010.



National things

The summit between the President of the Russian Federation D. Medvedev and Ukrainian counterpart V. Yanukovich took place on April 21. An important project on more close cooperation between “Antonov” State-run Enterprise and United Aircraft Building Company was discussed at the meeting. The two sides agreed that the decisions would be taken afterwards on August 1, 2010. Taking into the account the very close cooperation links between two aviation industries and harmony of interests the deeper integration is the logic and economically sound step.

A New Antonov

One of the results of the team-work between Russian and Ukrainian aviation specialists is the creation of an experimental model of the Antonov RJ.

In April 2010 “Antonov” State-run Enterprise unveiled An-158. The aircraft outstrips its predecessor An-148-100 in terms of seating capacity which was increased due to the enlargement of the fuselage by 1.7 meters and, according to the words of Chief Designer of the Enterprise D. Kiva, due to the re-layout of the

**General Designer of ANTONOV
Aeronautical Scientific/Technical
Complex Dmitry Kiva and Deputy
Transport and Communications
Minister , the Head of Aviation
Authority of Ukraine Anatoly
Kolesnikov** ▶

cabin. In the end the number of seats was increased from 85 up to 99. The transit range is 2500-3100 kilometers. The luggage and cargo compartments as well as habitation modules became more commodious. The ability to take more passengers led to the cost effectiveness of the aircraft. The new "An" consumes 15% less fuel than its predecessor. The avionics were also upgraded. The new aircraft, as well as An-148, is able to fly under no-visibility conditions, - explains D. Kiva, - actually we got A-category certificate which gives



The new "Antonov" jet consumes 15% less fuel in average than its predecessor, that gives an opportunity for a customer to save on fuel



Aircraft



Ukrainian Air Force Chief Engineer Vladimir Samuleev and Igor Kravchenko, Designer General, SE Ivchenko-Progress CEO Zaporozhye Machine-Building Design Bureau Progress State Enterprise named after Academician A.G.Ivchenko are pleased with the new aircraft ▶

◀ **Ukrainian Air Force Chief Engineer Vladimir Samuleev and Director General of JSC "Motor Sich" Vyacheslav Boguslayev compare notes with the press.**



us opportunity to take off and land in the automatic mode in case an airfield is properly equipped.

Besides the modernity of the An-158 aircraft can be seen in the changed fuselage tail section and its geometry as well as in the wings terminal aerodynamic surface.

At the same time the systems of the An-158, its airframe, cockpit, power plant as well as the manufacturing procedure, service and maintenance, service records, training for the crew are the same as for An-148. It is very suitable for an operator as now he has the line of RJs at his disposal which could be used in accordance with the number of passengers in a route.

Cooperation

Due to the cooperation more than 200 enterprises from 15 countries took part in the construction. As a result the An-158

aircraft incorporates a lot of leading aviation technologies. Furthermore D. Kiva names Russia as a strategic partner in the process of the An-158 creation – around 70% of component parts were produced in Russia for An-148 and An-158. In this case the partners of the program do their best to meet the requirements of a customer who can choose the equipment which will be installed in the airplane at its own discretion. So as it was ordered by the "Rossiya" State Transport Company An-148 was equipped with four new systems of the airborne equipment. The aircraft equipped with the four new systems passed tests and an addition to the Certificate was granted.

For the operator's good

An-158 is not an advanced version of its predecessor, the aircraft is the addi-

◀ **General Designer of ANTONOV Aeronautical Scientific/Technical Complex D.Kiva, Director general of "Ilyushin Finance Co." A. Roubtsov and Director general of "Atlant-Soyuz" airlines E. Bachurin discuss the construction of the An-158 jet**



D. Kiva names Russia as the main and strategic partner in the An-158 jet construction. Around 70% of component parts for An-148 and An-158 are produced at the Russian enterprises

tion. The choice between the An-148 and An-158 airplanes is stipulated by the traffic flow. In places where the demand on transport services is not high the An-148 is apt to. In case if the number of passengers is high the An-158 becomes more cost-effective solution.



Aircraft

Today some companies from Russia, Ukraine, Asia, Africa and Latin America have already expressed their wish to purchase the An-158 airplane

An-148 and An-158 have a very high interoperability rate – the similar cabin and many modular systems. That's why in case when an operator has An-148 the expenses for the training of the crew for the An-158, maintenance and bringing into service are going to be little

Quoting D. Kiva, some VIP variants of An-148 and An-158 are under construction which can transport from 8 up to 41 passengers at the customer discretion.

Order it!

Today some Russian, Ukrainian companies as well as some companies from Asia, Africa and Latin America have already expressed their wish to purchase the An-158 airplane. The decision is driven by the positive results after the An-148 was fielded. Only the Ukrainian operator "AeroSvit" using the An-148 aircraft has transported 40300 passengers since 2009 only at regular flights. Four An-148, assembled in the Voronej city are used by the "Rossiya" State Transport Company.

The main supplies of the An-148 either to foreign or Russian operators are furnished by "Ilyushin Finance Co.", which now has more than 100 contracts for the aircraft. The marketing and sale of the An-158 in Russia are decided to be furnished by the same company. 20 foreign and Russian operators have expressed their wish to purchase the An-158 airplane (it is a sum of preliminary and inked agreements). The Russian Ministry of Defense, EMERCOM as well as other governmental institutes show their interest towards the An-158.

Production outlook

In this year the An-158 will undergo the certification. D. Kiva noted that the certification process will be new, however some works that were fulfilled at the An-148 would be credited for An-158. He added that before the end of this year the all trials were supposed to be over and the certificate would be granted in accordance with

modern demands and in strict conformity with modern airworthiness standards.

Today the production of the An-158 is ongoing. "Antonov" State-run Enterprise and United Aircraft Building Company agreed on the cooperation program and terms of delivery of the first aircrafts as well as the approach towards the formation of the price policy. D. Kiva says that the construction of the An-158 aircraft is planned to be in Kiev, however in the future it could not be ruled out that the production of the aircraft will be done in Russia as well.

It is possible like this and like that....

Looking after the consumer appeal, "Antonov" State-run Enterprise embarked on the work-out of different variants based on the An-158 (as it was with An-148 before). The design concepts implemented in the An-158 aircraft allow to create cargo variants including variants with side access hatch as well as rear hatch for disembarkation. The variants of patrol and special task aircraft are also could be considered.

Alexander Gudko

AH-158

The new generation An-158 regional jet is designed for transportation of 99 passengers. The jet was made on the base of An-148. The An-158 is an all weather aircraft and can be used:

- During day and night, at any time and under simple and adverse weather conditions;
- Within the range of geographic latitudes from 70 grad North up to 55 grad South;
- Under natural icing conditions at a temperature up to -30 centigrade;
- Under the outside air temperatures at zero altitude from -55°C up to +45° C;
- On the airfields with elevation from -300 up to 3000 meters above sea level;
- On the B-RNA V and P-RNA V class international air paths with the RNP1 accuracy;
- Within the SID, STAR, Approach schemes;
- At the IIIA ICAO category landing, etc.

The An-148 and An-158 airplanes have significant level of unification:

- Chassis and main airplane systems;
- B-436-148 power plant;
- The package of avionics and with extensibility of their functionality;
- Cockpit and command and control system;
- Maintenance and service systems;
- Forms and records system;
- Passenger modules of the cabin.

The distinguishing features of An-158 from An-148 are:

- Increased number of the passenger seats;
- The 2.5 meter-enlarged passenger cabin;
- Enlarged volume of overhead compartment in the passenger cabin;
- Improved design of the wing;
- The 9%-decreased fuel consumption;
- The 125-decreased direct operational costs.

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ANTONOV - 158

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Aircraft

Farnborough International Airshow 2010 is one of the momentous events in the international aviation industry, says Director General of the largest Russian aircraft leasing company "ILYUSHIN FINANCE CO." (IFC) **Alexander Roubtsov**. On the eve of the event the top manager told our reporter what business package the company is going to unveil in Farnborough, how the projects on market promotion for the "Antonov" regional aircraft family as well as the Tu-204CM medium-range and Il-96-400T cargo aircraft are developed. Alexander Roubtsov also mentioned some plans of the company regarding the under-construction airplane MS-21.

In 2009 one of the key events for "ILYUSHIN FINANCE CO." was the beginning of revenue flights of the An-148 new regional jets and Il-96-400T. Mr. Roubtsov, how much did these events effect on the stepping up interest from eventual customers towards these new jets?

The most significant event for the OJSK "ILYUSHIN FINANCE CO." in 2009, for sure, was the beginning of revenue flights of the An-148 new regional jet. The fact, that the An-148 jet has started to earn money for the operators and is practically used for the scheduled airline traffic, indicates that in general the aircraft came off. I shall be honest with you, the customers



THE INTEREST IN THE "ANTONOV" FAMILY AIRCRAFT IS KITING

raised some questions concerning some systems of the aircraft and software during the first months of the tests. I think, that, generally speaking, the problems that we have, were to a certain degree, expected. Today we step up efforts in order to reach the level of quality and reliability that allows the airplane to fly 12-15 hours

a day. That was a demand of our first customer, the GTK Rossiya (Russia) airline company. We think that this work should not be postponed. It is subject to the power plant, auxiliary power unit, aircraft control systems, avionics and other systems.

■ **Question:** If you analyze the situation over the aircraft market and customers

behavior, can you reckon what types of the "Antonov" family have good prospects? What types will generate buoyant demand in the future?

■ **Answer:** All types of the "Antonov" family aircraft attract the interest and the interest is growing. All types have found the market. It's another matter that the

interest towards the aircraft is peculiar in different regions of the world. For instance, special attention in Latin America is given to the An-158 airplane, and in Russia the An-148 is in the limelight. The An-168 VIP class aircraft with enlarged fuel tanks and extended range of flight also attracts the attention. Today the specialists of "Antonov" have embarked on the development of the An-178 cargo airplane, which we have not actively marketed yet. However we understand what we can expect from it. I think the airplane will find its place in the market in one-two years.

■ **Q:** What are the criteria of pricing for the "Antonov" family aircraft and other types of airplanes for a particular customer? Do you have any bailout approaches?

■ **A:** There are no two aircraft alike. For instance the demand for 75-seat airplanes is very high as they help to avoid losses. Instead of commissioning a 150-seat aircraft three times a week, like Airbus A320 or Boeing 737, and suffering problems with occupancy rate, you can use An-148. The airplane will fly on daily basis with 100% occupancy rate. Moreover the small airplanes are the premier choice for regular flights where the passenger traffic is not sufficient. In this situation the An-148 jet can be an efficient substitute for much larger aircraft. In addition, taking into account the ability of the airplane to take off and land as well as its special suitability for regional airfields these aircraft are able to do effective shuttle service to transport passengers to larger hub airports in order to provide full-load for long-range aircraft. Today the operators lack all issues mentioned above and demand for this type of the aircraft is outgrowing supply several times over. That is why we do not do any discount while selling the An-148 jet. As far as long-range aircraft are concerned the situation in this field is different. The supply of Boeing and Airbus is plenty. As a result, the alike Tu-204 aircraft suffer big problems in the market in comparison with, for instance, An-148 and in this case the terms of sale can be discussed.

All types of the "Antonov" family aircraft attract the interest and the interest is growing. All types have found the market. It's another matter that the interest towards the aircraft is peculiar in different regions of the world

■ **Q:** By the way, is the pool of customers for the Tu-204 CM equipped with the PC-90A2 engine expanding? Who are these customers?

■ **A:** We have only one launch customer, it is Atlant-Soyuz airline (Russia) and we are negotiating with others. As the negotiations move forward we will announce the results. Today for us the most important thing is that the aircraft should start flight tests and the certification process should begin. It is important to know what performance the aircraft will get after the certification, I mean fuel consumption, weight, etc. And far more important, the performance should be improved and not degenerated in comparison with previous modification.

■ **Q:** The situation over the aircraft is clear. Mr. Roubtsov, what can you tell about service support for the "Antonov"s and other aircraft?

■ **A:** We keep on cooperation with our company IFC-Technik, which is our traditional partner in this field. Today the company, together with us, created Diagnostic and Maintenance Centre for complicated avionics systems, aircraft air conditioning systems that are installed on the Il-96, Tu-204 and An-148 airplanes. Applying joint efforts we continue to increase our capabilities in accumulation and delivery of the spare parts. Besides, we are working on the creation of the An-148 Training Centre. We hope that in the next month we will reach the final agreement to establish the centre based on a Russian training centre. We hope to start training of the first group in the end of this year. Today the negotiations are being held with some training centers in Moscow and St. Petersburg.

■ **Q:** The figures and facts, given by you, indicate that IFC is an upswing company. Can you tell about the current values of the company? Ninety Il-96s, An-148s and Tu-204s were said to be produced. The more than \$2 billion agreement was achieved during the MAKS-2009 air show. How has the company's backlog of orders been changed since the last MAKS?

■ **A:** The total backlog of orders has been slightly increased. Now it has around 160 aircraft of all types, but the biggest part is for An-148, An-158 and An-168, around 130 airplanes. The backlog of orders is less for the Tu-204 jets of various modifications.

■ **Q:** How stable was IFC developed financially during the last year? What significant problems you could mention such as lending funds, non-payment of the customers, or may be something else?

■ **A:** The main problem is the intricate situation the air carriers found themselves in. Some of them violated the terms of lease payment. Overall, in 2008-2009 the situation in the industry was very complicated. Fortunately, today the growth of air transport service has become apparent, the air carriers are reverting to the normal business life. The second problem concerns the oversupply of the Western-made aircraft fleet which led to the low profitability of the air carriers. Their aircraft made flights for the purpose of fly but not to gain money. In the end this competition caused the erosion of economy in most companies. The money-winners are in minority which is not good for the well-being of this industry sector. And, as I said, the situation is getting better; we are still far from saying that the

Aircraft

industry of air transport service has been recovered. For the moment the problems still exist...

■ **Q:** What achievements of the company can you highlight on the eve of the Farnborough International Airshow 2010? Could you point out the main events, that took place in the first six months of this year?

■ **A:** The main event is the beginning of the An-148 jet delivery to our customers. The use of Il-96-400T is ongoing. Recently we have held negotiations with the Poliot (Flight) Airline Company (Russia), which confirmed its intention to lease one more

aircraft. The airplane is nearly completed and in the beginning of the next year, when it is equipped with the engine, we will provide the airplane to the customer. The same decision was taken regarding the fifth Ilyushin aircraft. In this case the cooperation with the customer is stipulated by the abilities and capacities of the factory that should provide the delivery of the aircraft in time.

The first six months of the year were marked by another significant event, that took place in our company, it is the first Organizational and Technical Conference on An-148 where we were asked a lot

of questions and a set of proposals was submitted. And we determined on setting some tasks that were agreed during the conference and on carrying out what was planned.

The fourth main event was the An-158's take-off. This aircraft is much awaited as we have already customers who are ready to lease it...

We seriously take the matter on MS-21 in hand this year. We are negotiating with the IRKUT Corporation and probably this year we will officially launch the marketing activities of the aircraft. It could not be ruled out that we ink the tentative agreement with IRKUT in order to clearly understand how to act in future and to start preparing the MS-21 jet for entering into the market. For our good we have great positive experience in entering into a market three previous types of the aircraft. I think that our efforts with this airplane will be successful as well.

■ **Q:** What is the main goal of IFC in Farnborough International 2010? Who are eventual buyers you plan to accord special priority?

■ **A:** Farnborough, as the Paris Air Show and other air shows in Asia and Latin America, is a momentous event. We intend to meet airline companies, customers and suppliers. In particular, today we hold talks with some engine-building companies regarding the installation of foreign made engines in the An-148 jet family. We are very interested in this issue and primarily in the light of entering developed countries market of. In these countries the customers demand from a supplier a European or US power plant certificate as well as an en-block aircraft certificate. Moreover, we have eventual buyers for the An-148 jet equipped with foreign made engines. Farnborough is going to be a scene where the An-158 jet will be introduced. The representatives from airline companies, eventual buyers, as well as the industry specialists will attend the Air Show. So, as usual, we expect the hard work.

... main event was the An-158's take-off. This aircraft is much awaited as we have already customers who are ready to lease it ...



Alexander Gudko



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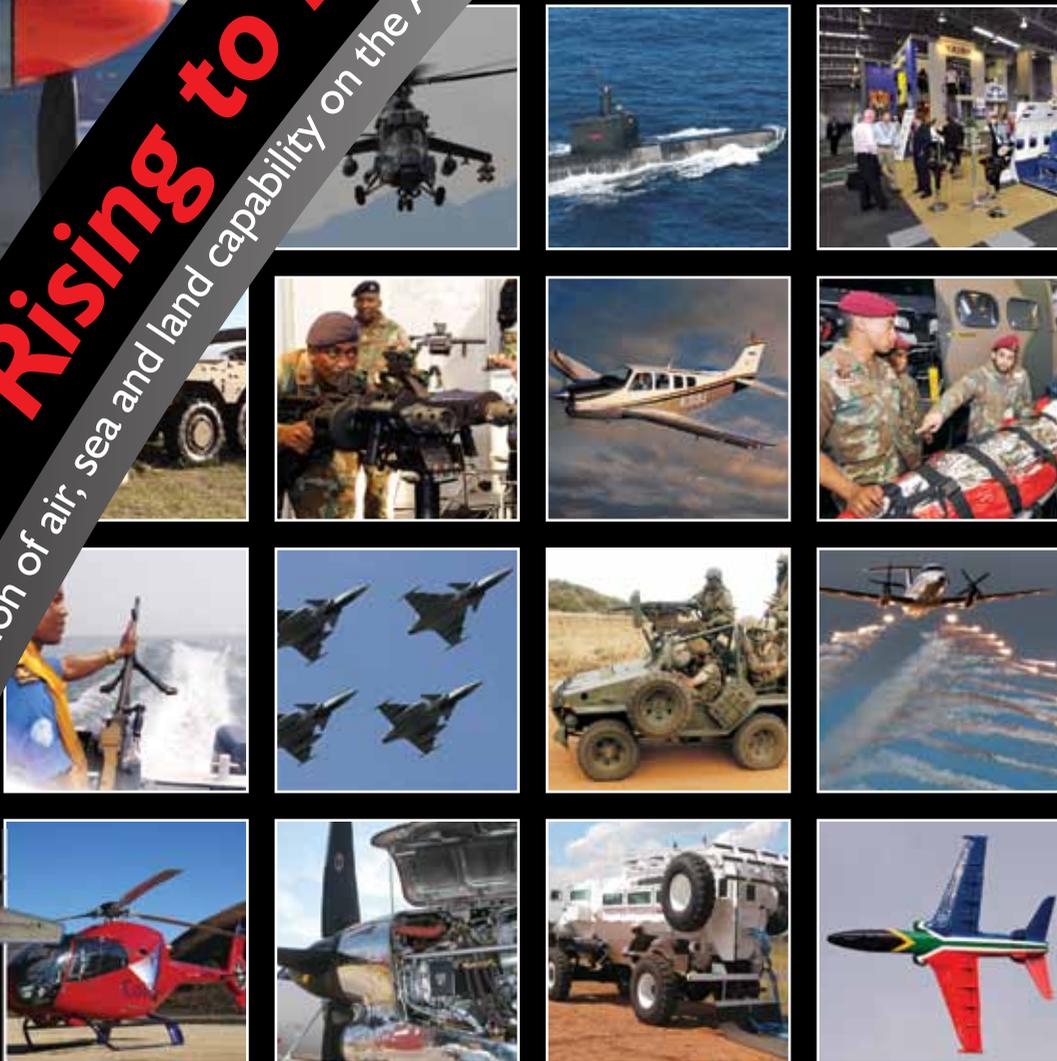
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PROJECT MS-21: TIME IS MONEY

The rivals of the MS-21 currently developed in Russia are narrow-body aircraft of Airbus A320 and Boeing 737NG families. So, it is clear what the designers should create. The problem they are facing is not simple as they should make the new liner in time. In time means before the A320NG and successors of Boeing 737 are ready to occupy their market niche. By the way, it is not the only task the designers face...

The high pace of the MS-21's development is not the excuse for possible technical drawbacks. Otherwise, it will lose chances to attract clients. Besides the short period of development, the designers should create a market product that will allow airlines compete with other actors. It is the first time Russia's medium-range airliner faces this task.

Finally, another problem is to find market niches, where the MS-21 will be able to outperform competitors and which will allow gaining about 10% of the global market of narrow-body long-haul airliners. This task is already being jointly solved by the UAC, Irkut and government. For example, promising agreements have been reached with Malaysian partners.

Chinese Bid

The situation is becoming worse and a Chinese actor is emerging besides Airbus and Boeing. According to official sources, the Commercial Aircraft Corporation of China (COMAC) has significantly boosted the development of COMAC 919 aircraft. It plans to roll out the aircraft in 2014 and carry out its maiden flight by the year-end. It is to be put into operation in 2016. China

is certainly trying to outperform Boeing and Airbus and enter the market first. That is why, it is going to put the new liner into operation four years ahead of the schedule. In November 2008, COMAC President Zhang Qingwei said in at the air show in Zhuhai that this aircraft family would hold from 130 to 200 passengers.

MS-21 vs Competitors: Technical Analysis

For the MS-21 to compete with its rivals head-to-head, everything should be on the top level – technologies, airframe and project management.

Given a favourable price, the aircraft can get over 8% of the market. Servicing the "breakthrough product" should be taken into account, too. Spending on the maintenance and repair works should be less by about 10%. Market experts say the MS-21's 200 series will beat the rival given it has a 20-25% lower fuel consumption than Airbus and Boeing. In addition, it should be 15% lighter than Airbus and feature a 10% lower structural weight than Airbus and Boeing. It goes without saying that the MS-21 should have 12-15% lower operational expenses

than its rivals. The MS-21-300 should be on the top and consume about 20% less fuel than Boeing and Airbus. Its operational expenses should be 11% and 10% less than those of Airbus and Boeing with the weight reduction featuring 8% and 3%, respectively.

The aircraft's name has number "21" telling that it is a perfect aircraft of the young 21st century. This perfection is achieved mainly due to the so-called "black" (composite) wing. The MS-21's single body elements, wing, centre section and tail unit are made from composites. The share of carbon composites reaches 40% (that of the Tu-204 is only 14%). The share of titanium alloys in the MS-21 is higher, too. New aluminum alloys account for about 33%. In addition, on order of the Ministry of Industry and Trade, the Central Aerohydrodynamic Institute is working to make the MS-21 "more electrical" with a maximum number of electrical drives and units. This will allow the designers to simplify the aircraft control system and reduce the weight as it will have no massive hydraulic parts.

Airlines Should Like the Aircraft...

The designers of the new family of long-haul aircraft are trying to meet the requirement of their future customers. According to the UAC, the MS-21 family will allow the airlines to optimize their airfleet both by size and by versions of each model with their flight range differing from basic to extended (ER). The configurations can be changed at

We have not only to build the MS-21, but to make it a market product, which will allow airlines do business in a competitive market.

The MS-21 family will allow the airlines to optimize their airfleet both by size and by versions of each model



MS-21 flight characteristics

	MS-21-200	MS-21-300	MS-21-400
Dimensions			
Wing span (m)	35.9	35.9	36.8
Length (m)	35.9	41.5	46.7
Height (m)	11.4	11.5	12.7
Cargo compartment volume (m ³)	37.4	53.3	70.1
Basic engine characteristics			
Type, model		turbojet	turbojet
Number of engines		2	2
Weight characteristics			
Maximum takeoff weight (kg)	67,600	76,180	87,230
Flight characteristics			
Cruise speed (M)		0.8	0.8
Maximum range (fully loaded in a single-class configuration and a seat pitch of 32", passenger weight with luggage – 100 kg), km		5,000	5,500
Seating capacity			
Passenger seats (in a single-class configuration, seat pitch is 32")	150	181	212
Passenger seats (in a high-density configuration, seat pitch is 30/29 ")	162	198	230

Information provided by UAC

the customer's request at any time of the life cycle by software readjustment. In addition to base versions, the MS-21-200LR with its range extended by more than 1,500 km against the ER version is being developed. Also, designers are working on MS-21's cargo and executive versions. In order to minimize operational expenses, the MS-21 family features reasonable unification of powerplant, airframe parts, cockpit, architecture of aircraft systems, component parts, assembly technique and operational methods and assets.

In addition, the MS-21's increased body diameter will allow airlines to choose the best seat cushion width/seat pitch proportion.

...and it Should Satisfy its Passengers

The designers of the new aircraft did not forget about the passengers, too. Long-haul airlines will be able to offer increased comfort for them. The MS-21's aisle, which is wider (550 mm) than that of its rivals, will allow charter airlines and discounters to reduce the airport turnaround time. The large body diameter allows raising the volume of hatches and underfloor luggage compartments. According to preliminary information, the interior volume per passenger will equal

**Russian Minister of Industry & Trade Viktor Khristenko:
“The new MS-21 medium-range aircraft
will enter the market in 2016-2017”**



1.04 cu.m, which is higher than that of the A320 and B737NG (0.992 and 0.984 cu.m, respectively). Thus, the MS-21 family is better. The width of a three-seat unit will exceed that of the B737 (1,500 mm) and match the A320 (1,570 mm).

Cleanliness is a Keystone of Success

Everybody knows that customers pay much attention to environmental standards of the aircraft they buy. So, MS-21-family aircraft will meet future environmental requirements. The effective perceived noise level measured in three points will be at least 15 EPNdB below the level set by ICAO Chapter 4. Engine emissions level should meet ICAO CAEP 6 requirements with a reserve of 50%. The MS-21’s CO2 emissions per seat will be 15-25% less than those of existing aircraft.

Maintenance

It is a common knowledge that all foreign customers pay attention to aircraft engines and the level of their maintenance in various countries as it is one of the most important components of aftersales services. Russian corporation Irkut reports that the MS-21 designed for the global civil aircraft market will be powered only with US Pratt & Whitney engines. Pratt & Whitney is known to have been supporting own developed logistic chain used by many airlines all over the globe for many years. So, there will be no problems with the service support of the new Russian airliner.

Irkut corporation President Oleg Demchenko admits that an advance aftersales support system is a key problem for Russian aircraft makers. Mr.Demchenko says it will be solved jointly with foreign servicing companies.

When Will Tomorrow Come?

According to brief information published on UAC site, the MS-21’s certification is scheduled for 2016. By the way, Russia’s Minister of Industry and Trade Viktor Khristenko called the same terms during his working meeting with Prime-Minister Vladimir Putin on June 18, 2009. He told that the new medium-range aircraft dubbed MS-21 would enter the market in 2016-2017 and stressed that “it will be the time of its sale”. These terms are known to have been repeatedly put off. Now that the competitors are at the back of the pack, any delays will result in losing customers. It is a common knowledge that it is much more difficult to catch up than to be in the lead. That is why, the MS-21 is likely to be put into operation in time voiced by high-ranking officials, funding will continue and partners will not let down.

Alexander Gudko

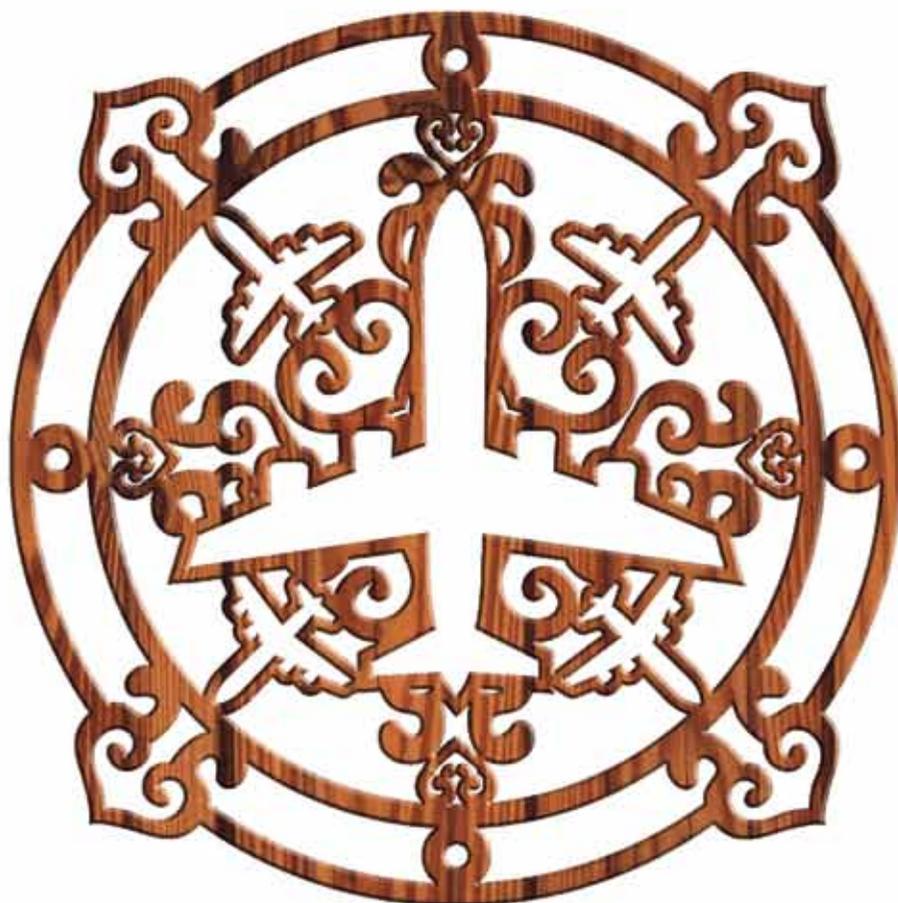
Technical characteristics of Airbus and Boeing aircraft

	Seating capacity	Range (km)	Operating empty weight (kg)	Maximum takeoff weight (kg)	Normal payload capacity (kg)	Maximum payload capacity (kg)	Operating empty weight (passengers)	Fuel consumption (g/seat-km per 1,000 nm)
A321	199	5300	48500	89000	19900	23000	243,71	20,09
A320	164	5000	42600	75500	16400	19900	259,75	20,91
A319	134	5650	40800	70000	13400	17700	304,47	23,56
B737-900ER	192	5100	44676	79010	19200	20270	232,68	19,68
B737-800	175	5000	41413	79010	17500	21650	236,64	20,31
B737-700	140	5300	37648	70080	14000	17190	268,91	22,68



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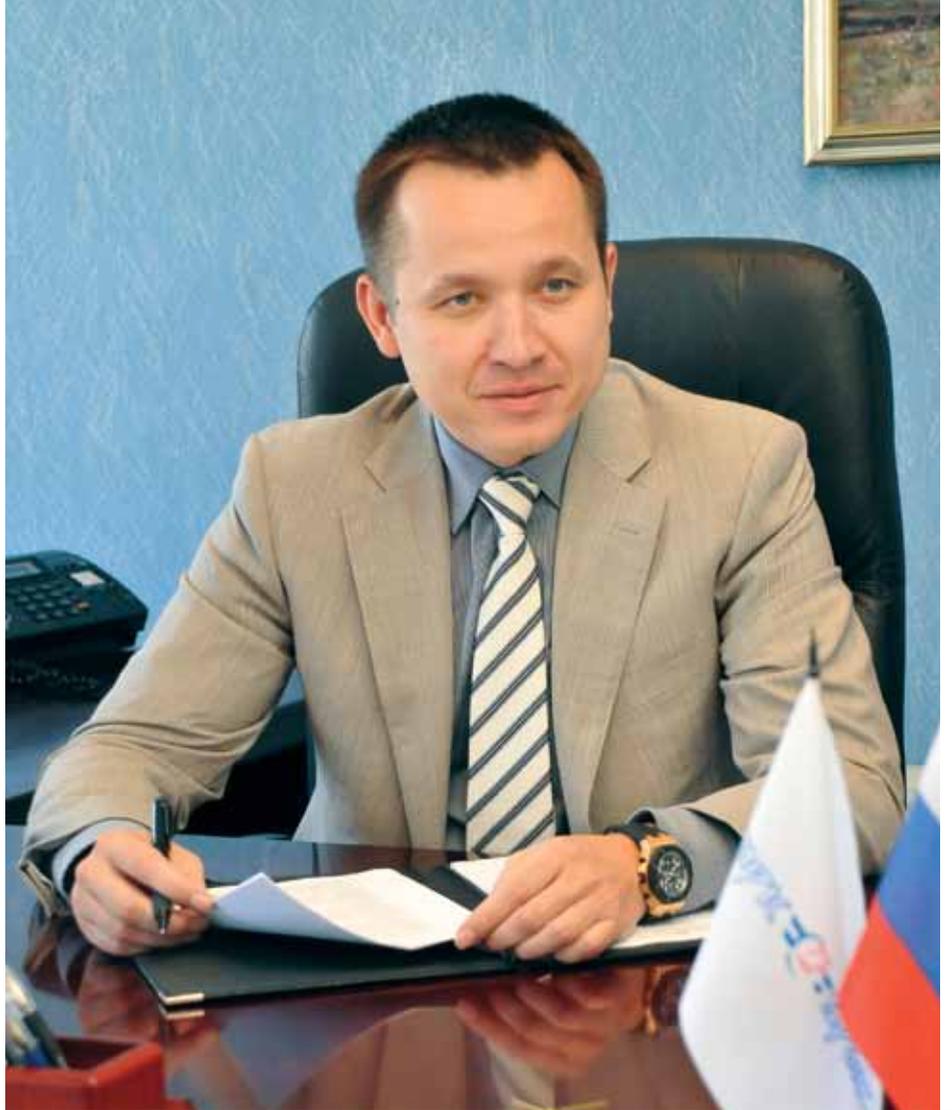
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Service

Sergey Artsyman,
Director General
the Saint Petersburg Aviation
Repair Company,
ZAO (SPARC, ZAO) ►

As any air materiel helicopters need timely and quality maintenance and modernization. At the same time, the development of modern technologies raises new demands for the re-equipment of material and technical base of the aircraft maintenance enterprises, airline companies and manufacturers. All these tasks the Saint Petersburg Aviation Repair Company, ZAO (SPARC, ZAO) has executed successfully and at the top level. The top managers, **Sergey Artsyman**, Director General SPARC ZAO, and **Pavel Rybkin**, Director General of SPARC Scientific and Production Association, ZAO (NPO SPARC), tell about development, the achieved results and future plans of the company.



THE SPARC: INNOVATIONS IN AIRCRAFT MAINTENANCE

■ **Question:** Mr. Artsyman, what kind of services does the SPARC company offer to customers today?

■ **Answer:** The Saint Petersburg Aviation Repair Company, ZAO (SPARC, ZAO) is rightfully considered to be a leading aviation company in Russia. Among the main services, we provide to our customers, are complete overhaul of the Mi-8/Mi-17 and Ka-32 all-modification-and-all-equipment helicopters, modernization of helicopters and installation of new equipment. Besides, we reequip helicopters to cargo-and-passenger, convertible and passenger ones as well as we furnish reconfiguration of helicopter VIP cabins with full-package of service documentation which have been agreed with the manufactures of the helicopters. One more service of

our company is sales – the supply of helicopters, components, spare parts, tools and accessories.

Since the establishment, the SPARC company has accumulated great experience and today it is well known both in Russia and abroad. We cooperate with the biggest Russian and foreign air companies from more than 60 countries. One of the attractive features of the SPARC company, as a business partner, is ability of the company to provide services in complex; beside the maintenance and repair as well as re-equipment or modernization the company, at the customer's discretion, provides the delivery of the serviced helicopters and its parts by different means of transport from the customer and back. This kind of service became possible due to the

fact that during the years of experience in the industry SPARC has turned into a big logistic centre. And this is not the end, the SPARC company provides customs clearance and customs escort of helicopters and their integral units assigned into the maintenance and out of it.

■ **Q:** For sure, today SPARC is a big player in the market. But now even to be able to meet competition, a company should go forward. What are the ways of the development, in your opinion?

■ **A:** Today, the company sets a course for reconstruction and modernization based on innovative solutions. Unfortunately today Russian aviation industry companies have test equipment as well as bench field maintenance test equipment which were designed in the 60s of the last century

**Working with electronic documentation
in the main rotor hub repair area** ▶



◀ **Electrical equipment repair area.
The area is equipped with new testing
equipment**

and now are used for the majority of helicopters and aircraft. The old means need to be substituted by new ones and these new means should meet the modern requirements. This is an objective affecting the State as a whole as well as manufacturers, aircraft-maintenance enterprises and carriers.

In 2009 we launched the process of modernization of our own manufacture. We substituted old equipment with new test equipment, integrated modern electronic documentation that meets international requirements. Besides, new complete overhaul technologies were developed, the manufacturing area was repaired and reconstructed as well as workplaces were refitted with up-to-date tools and accessories.

■ **Q:** This large-scale modernization needs considerable investments. What are the results of the modernization?

■ **A:** The implementation of the new test equipment in the process of helicopter maintenance allowed minimizing the terms of maintenance with the significant increase of quality; as a result the number of reclamations, submitted by customers, has been decreased. For instance, only in 2009 the number of reclamations decreased by more than 25%.

New high-tech test equipment and test systems allow providing diagnostic and tests of instrumental and radio-electronic equipment as well as mechanical units. The implementation of the new techniques in maintenance also has shown the high level of energy-savings in comparison with old ones, it gives the opportunity to make the best use of the manufacturing area and considerably bates demands for skilled personnel. Automatization of control gives the opportunity to ultimately

increase production, level of control accuracy and quality of the executed scheduled maintenance.

■ **Q:** The Russian aircraft repair holding SPARC is going forward and you look to the future with optimism, don't you?

■ **A:** Yes, as the fleet of the "Mil" and "Kamov" family helicopters is constantly expanding, and it means that the need in service, which our company provides, is increasing as well. I'm sure that the demand for our service will keep on growing. That is why today the work of the company focuses, first of all, on improvement of quality, reduction of terms of repair and maintenance. To accomplish these ends we constantly improve the technological process, equipment in-use, personnel training system. To provide full service, that meets the requirements to provide airworthiness for aircraft, is the paramount goal for SPARC.

**Maintenance and test area for main rotor hub hydraulic dampers.
The area is equipped with new testing equipment** ▶



◀ **Transmission and rotor system units
repair area**



◀ **Pavel Rybkin,
Director General
of the Saint Petersburg Aviation
Repair Company,
Scientific and Production
Association, ZAO (NPO SPARC)**

conformity and in reliance on current service documentation. When developed the test equipment, the specialists of Scientific and Production Association took care about customers – every unit is connected to a test system very easy and simply. An operator enters information on a unit (name, helicopter No, TTSN) and launches the test software, in the end the test system automatically exercises the full-scale test and control and issues a decision. The interface of a computer monitor provides the ability to monitor the test on the fly and graphically. The data of the test are stored to a database automatically.

Our experience shows that the use of test equipment when helicopters are being repaired allows to significantly increasing productivity and overall performance as well as quality, objectivity of control and adjustment of the controlled units. It is important that in this regard, so needed for aircraft maintenance and repair, electricity demand has been significantly decreased and manufacturing area has been diminished.

Apart from the integrated test equipment, SPARC Science and Production Association manufactures ad-hoc equipment, which positively affect quality of maintenance and flight safety. The SPARC-KONUS equipment belongs to this family. The equipment estimates main rotor blades in-track condition on ground, while hovering and in flight. Moreover, the built-in sensor gives an ability to determine the level and vibration source of a helicopter. Let me remind that the accuracy in estimation of main rotor blades in-track condition and vibration source allows minimizing the vibration, advancing comfort conditions of a flight for a crew and passengers as well as significantly minimizing fuel consumption in flight.

The SPARC-VIDEO equipment sparks interest as well. The equipment provides remote control over the outer guide vane of the TB3-117 and BK-2500 engines when run-up and tuned.

■ **Q:** Mr. Rybkin, aircraft repair holding SPARC is a well known company. What is SPARC Science and Production Association famous for?

■ **A:** Due to the increased volume of works, which are alien to a typical aircraft-repair company, SPARC created a new enterprise - Scientific and Production Association, ZAO (NPO SPARC). Among main tasks of the newly created enterprise are the training of flight and engineering personnel, the development and establishment of helicopter maintenance and repair service centers as well as the development and manufacture of test equipment and new generation complexes which are designed for test and control of aircraft components and units.

■ **Q:** Could you, please tell more about

test equipment, designed in Scientific and Production Association.

■ **A:** Test and control equipment by Scientific and Production Association is designed to equip laboratories of airline companies' aircraft maintenance base and state aviation technical service and maintenance units. Test equipment is used to test aviation and radio-electronic equipment of the Mi-8, Mi-8MT, Mi-8MTV, Mi-8AMT, Mi-17, Mi-17-1B, Mi-171, Mi-172 helicopters in maintenance.

The equipment mode of operation is based on the implementation of digital technologies and high accuracy measurement devices. Using our equipment the tests of the helicopter systems and components are conducted in accordance with strict technology

Testing equipment assembly shop ▶

■ **Q:** What companies do purchase your equipment?

■ **A:** First of all I'd like to mention that the equipment, produced by SPARC Scientific and Production Association, receive practical approval and reliability field testing at the Russian aircraft repair holding SPARC, the leading Russian maintenance enterprise. Our test equipment is provided and successfully used in the leading Russian airlines, such as Russian GAZPROMAVIA, UTAIR, ROSSIYA, NIZHNEVARTOVSKAVIA, ORENAIR, SPETSNEFTEGAZ, YAMAL as well as foreign companies. Due to the high quality our equipment has been accorded wide recognition. And this fact moves forward the SPARC Scientific and Production Association equipment to the leading positions when Russian repair and maintenance service centers being equipped.

■ **Q:** I think that the list of your customers would not be so impressive if you did not make your goal to maximally meet the requirements of the customers as a cornerstone, did not you?

■ **A:** Undoubtedly as today the SPARC Scientific and Production Association is an upswing company and has had already the stock of orders for several years ahead. But at the same time our company is ready for a dialog with an eventual buyer any time.

For instance, due to the order of some buyers our company developed and



produced the mobile test equipment. The use of mobile test equipment units minimizes the set-up/tear-down time of a laboratory by two hours and provides transportation of a unit by any means.

SPARC Scientific and Production Association offers to its customers an

umbrella approach to solve helicopter maintenance and overhaul, keep the high level of occupational awareness of air specialists. These give the client an ability to keep aviation equipment properly operating and ready to fulfill any assigned task.



Reliability field testing of fixed testing equipment in a lab environment ▶

◀ Test system in mobile configuration



PULSING TITANIUM

The world titanium industry is gradually recovering from the crisis demonstrating price and production growth. This process can be seen throughout the globe, from America to Australia. Positive changes are taking place on the Russian local titanium market, too. According to the Federal State Statistics Service, the production of titanium rose by 5.3% in February 2010 against the previous month and that of rolled titanium – by 32.7%. But experts say the pre-crisis level is going to be reached in 2011.

Crisis Cycles

The economic crisis of 2008 was the third one for the recent 12 years that made the titanium market shrink and then recover again. Some kind of cyclicity can be seen – each rise in air transportation and aircraft

making industry was followed by the world crisis. For example, the 10-year growth in air traffic, South-East Asia got into a deep economic crisis in 1998-1999. Thus, the demand for aircraft and, consequently, titanium, decreased.

By the beginning of 2001, the situation in the industry became better, but, despite favourable forecasts, the 9/11 attacks influenced air traffic industry badly. Aircraft makers and titanium producers faced either blocked or cancelled contracts. Orders for over 800 aircraft were cancelled all over the globe. Thus, the demand for titanium reduced almost twice. US corporations with a share of airspace products reaching 60-70% suffered most losing 10-40% of their profits.

Japanese and Chinese companies turned out to be less sensitive to the crisis as they used titanium only in the civilian sphere, namely in automobile industry, architecture and medicine, while aircraft industry accounted for only 5-10% of the total consumption.

Losses of Russian corporation VSMPO-Avisma were not so terrible. Its stable position can be explained by the high quality of its products and good price-quality relationship, which attracted clients to VSMPO-Avisma.

Temporary Growth

The growth of the world and Russian aircraft industry began in 2004. The wide employment of composition materials in airframes of new aircraft aimed at weight reduction required raising the share of titanium due to bad compatibility of carbon composite with aluminum alloys. In this case, titanium was the only solution due to unique physical properties.

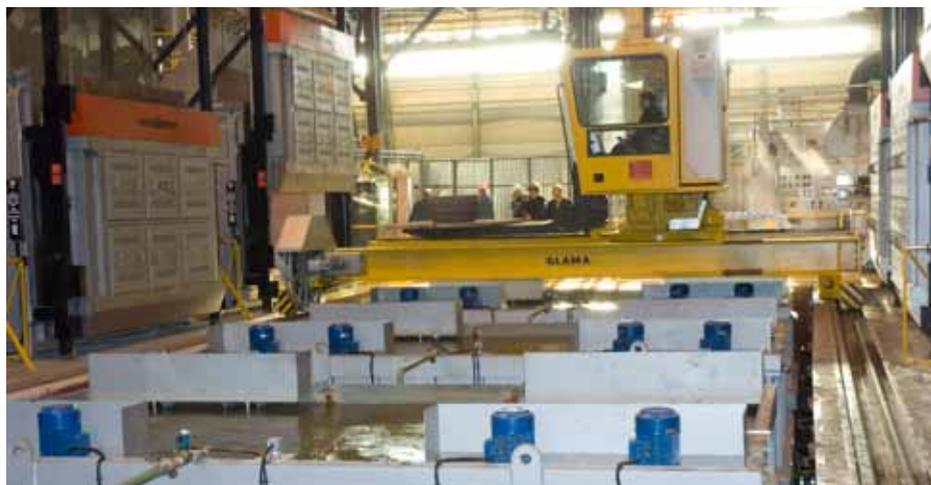
Japanese and Chinese companies turned out to be less sensitive to the crisis as they used titanium mainly in the civilian sector



The growing demand for high-quality materials made their main manufacturers, namely the USA, Japan and Russia rapidly renew and upgrade their production facilities with new titanium sponge and semiproducts production equipment and melting units.

Russia showed especially good results among other countries. VSMPO-Avisma carried out radical modernization aimed at manufacturing new high-quality products meeting the strictest requirements. It gradually reduced the production of low-finished goods but raised the assortment and share of highly-finished goods – ready items, plates, pipes, etc. To adapt the Russian titanium industry for foreign requirements, the company invested over \$450 million from 2000 to 2007. V.V.Tetyukhin, who was the company's general director during the most difficult years, has played the leading role in this process.

Due to these efforts, VSMPO-Avisma gained 27% of the world market and established strong ties with over 300 foreign companies by 2007. In addition, the company delivers titanium to over 1,000 clients from Russian and CIS countries. The share of VSMPO-Avisma's products in the most advanced projects increased every year



To adapt the Russian titanium industry for foreign requirements, VSMPO-Avisma invested over \$450 million from 2000 to 2007

and reached in 2007 30-40% for Boeing, 55-60% for Airbus, 90% for Embraer and 90% for Goodrich, the largest manufacturer of chassis.

The content of Russian titanium alloys in aircraft increased, too. For example, only

VSMPO-Avisma's titanium is used in the Boeing-787 Dreamliner. The company manufactures dozens of unique pressed articles. For example, it manufactures a 3.5-t pressed landing-gear beam for the Airbus A380.



Metal



Despite the fall of titanium products output by almost one third in 2009, VSMPO-Avisma derived \$6 million of profit. Of course, it is several times less than in 2007 and 2008 but not bad for the crisis period

The clients appreciate the quality of VSMPO-Avisma's products. "At first we bought standard-quality products from VSMPO and now we are buying extra-quality ones. Rolls Royce understands that VSMPO-Avisma can manufacture products of the quality we need. No doubt, we would have failed to fulfill our tasks if we had not cooperated with VSMPO-Avisma", said external laboratory technical auditor of engine-making company Rolls Royce.

In that very 2007, joint enterprise Ural Boeing Manufacturing (UBM) was set up specially for the Boeing 787 Dreamliner project. It featured high-tech equipment for primary mechanical processing of titanium presswork made by VSMPO-Avisma.

The main suppliers of sponge began to increase production volumes in order to meet their clients, too. According to Roskill analysts, in 2007 the largest consumers of titanium were the USA (29%), EU (24%), China (15%), Japan (12%) and Russia (6%).

Experts say the demand for aircraft will remain high in the long run, so high-quality

titanium will be needed, too. As of February 2008, the total backlog of Boeing and Airbus equaled 5,014 aircraft, that of Bombardier – 147 and Embraer – 452. It was planned to almost double the cargo fleet by 2025. In addition, there were plans to build 900 aircraft for India and 2,600 – for China by 2020. It goes without saying that the demand for titanium was to rapidly increase not only in North America and Europe, but in Asia, too and not only in the airspace sphere, but in the industrial one as well.

Thus, the world titanium sponge production could reach 310 thousand tons a year by 2011, which is twice as much as in 2006 (125.8 thousand tons).

Crisis in 2008 – Difficult but not Critical

The economic crisis that broke out in 2008 spoilt the plans of many companies as the market of titanium shrank immediately. US aircraft makers suffered most of all. "In 2009, the number of new orders for aircraft

reduced by more than 3 times against 2007, while orders for wide-body planes fell by 5 times", said analyst of Bank of Moscow's Analytical Department Andrei Kucherov. Delays in the Boeing B-787 and Airbus A380 projects worsened the situation despite they were not connected with the crisis.

The two years of crisis were difficult but not critical for Russian company VSMPO-Avisma. Experts say several reasons can explain the situation. "First, the company authorities turned out to be forward-looking as they managed to hold control over their business, take anti-crisis steps to regulate production and demand by reducing output, cutting expenses and cancelling uncertain projects", thinks Chief of the Analytical Department of consulting company Sogra Yuriy Kirillov.

Second, the company's stable position can be explained by the diversification of its clients represented by the automobile industry, medicine, power industry, oil-and-gas and chemical sector and other spheres that need titanium. Thus, the growing share of industrial consumers reduces the dependence on the airspace industry, which is especially important when the civil aviation is down.

Third, long-term projects with major aircraft makers helped the company. In other words, the company did not stop production and manufactured small amounts specified by the agreements.

Despite the fall of titanium products output by one third in 2009, VSMPO-Avisma derived \$6 million of profit. Of course, it is

several times less than in 2007 and 2008 but not bad for the crisis period.

Analyst Andrei Kucherov thinks that the main growth of the company's results should be expected in 2011-2012. General Director Mikhail Voevodin has the same opinion and says that the company is going to raise production by 30% and reach the pre-crisis level by the end of 2011. The number of orders has already started growing. For example, during the first months of 2010, the amount of orders for the Boeing 787 project exceeded the level of 2009. The Dreamliner's production will start this summer. Orders for Airbus A380, A350 and Sukhoi Superjet-100 are being already implemented.

By the way, VSMPO's \$1-billion investment programme will last till 2014.

Rivals are Watching

At first, VSMPO-Avisma competed for orders from aircraft makers with US companies Timet, RTI and ATI. But soon China is going to emerge as a major player. Experts say this country should not be underestimated. According to statistics, in 1997, its titanium sponge production accounted for 3% of the world level and in 2006 – for 14.9%. In 2006, China manufactured 15,000 tons of this product and in 2008 – 49,000 tons. Soon, China will reach the level of 80,000 tons of titanium sponge a year and at the dumping price.

Of course, China still lacks capacities, technologies, special equipment to produce highly-finished goods. At present, it cannot compete with global titanium

leaders – VSMPO-Avisma and Timet but it is step-by-step mastering titanium production and learning how to melt out ingots and manufacture semi-finished goods.

We should be ready that in 5-10 years China will become the leading player of the global titanium industry manufacturing high-quality production for the aerospace industry.

"China has mastered the production of titanium sponge and is a key actor of the global metallurgical industry that cannot be denied", proves Sogra analyst Yuriy Kirillov.

Experts warn that China has excellent chances to beat its rivals and gain control over the market. That is why we should solve this problem already now. "We can win China by two ways: product quality and entering the Chinese market", says Nadezhda Nochevnaya.

Not to be overtaken, VSMPO-Avisma is developing its powerful production and R&D assets working on new alloys and technologies closely cooperating with Russia's leading R&D centres, such as the All-Russian Scientific Research Institute of Aviation Materials (VIAM), Ural Polytechnical Institute (UPI), etc. Raising the processing level, i.e. manufacturing complicated mechanically-processed products is another preventive step in this difficult competition. In addition, VSMPO-Avisma has managed to enter the Chinese market supplying titanium for S-919 and ARJ-21 airliners. Now, China needs only 1.5 thousand tons of titanium a year but this figure is likely to grow every year. The participation of the Russian

corporation in Chinese projects on equal terms is beneficial for Russia as it gets new sales markets for products it makes.

Own Raw Stock Needed

Titanium deposits were found in 48 countries and are estimated at 1.2 billion tons. They are chiefly located in Russia, Australia, India, Canada, China, Norway, the USA, Korean Republic and South Africa.

China has the largest expected reserves of titanium. Nevertheless, it "keeps on buying new deposits abroad, namely in Latin America and Africa", said Yuriy Kirillov. Despite the sensible resistance of foreign countries, China promotes the principle: "Buy abroad as you can always use national resources".

Russia ranks second after China by titanium reserves though it still imports titaniferous ore from India and Ukraine (the Volnogorsk and Verkhnedneprovsk mining and metallurgical complexes). Leading experts from VSMPO-Avisma, VIAM and other organizations think Russia needs its own raw materials base that will guarantee our independence in this sphere. Russia has three fully-explored major fields and the Tsentralnoye field in the Tambov Region is even ready for development. The crisis suspended all respective decisions and now it is high time the Russian government started solving this problem again. To this end, several billion rubles are needed, but titanium is a strategic metal, so this problem should be solved.

Svetlana Komagorova

China has mastered the production of titanium sponge and is a key actor of the global metallurgical industry that should be taken into account



MOTOR SICH TODAY



Vyacheslav A. Boguslayev
Chairman of the Board of Directors,
Motor Sich JSC

Motor Sich JSC is among leading world's manufacturing facilities that practice the whole cycle of the advanced aero engine development from design, manufacture,

and tests to in-service support and overhaul. Successful operation of company products in more than 120 countries is an acknowledgement of their quality and reliability.

Now, the range of Motor Sich engines both commercialized and under various stages of development for passenger, cargo, and military cargo aircraft covers turboprops and turbopropfans of 400 to 14,000 shp, as well as by-pass engines of 1,500 to 23,400 kgf, with D-436-148 engine for An-148 family passenger aircraft highlighted. The engine meets ICAO requirements for emission and noise levels. In terms of its performances, the engine in question is not inferior to its foreign competitor products still under development.

Motor Sich JSC has developed AI-450-MS two-shaft auxiliary gas turbine engine for various An-148 modifications and other passenger and cargo aircraft powered by D-436 family propulsion engines. It is intended to start propulsion engines as well as to supply compressed air and power to airborne systems with propulsion engines inoperative. High efficiency of AI-450-MS engine is achieved due to low specific fuel consumption

sequent of high thermodynamic cycle parameters, high unit performance indexes, and the pattern of air bleed from an ancillary compressor, as well as low run costs.

Various An-148 aircraft modifications can carry up to 80 passengers, with high comfort level and the distance range of 2,000 to 5,200 kilometers. With regard to cost/quality ratio, it is superior to all the competitor products. Excellent aircraft performance characteristics, the possibility to operate it on the substandard quality airfields due to a high engine location over the runway, and a low life cycle cost allow us to hope that the aircraft in question will draw customers' attention all over the world. Currently, An-148 aircraft is operated successfully by Russia and Ukraine airlines.

In April 2010, a new An-158 passenger airplane powered by two D-436-148 engines was rolled out at Kiev based Antonov state-owned company. Due to its longer fuselage, An-158 lift capacity is higher than that of An-148: it can carry up to 99 passengers. An-158 fuel efficiency is also higher than that of An-148. On 28 April 2010, An-158 carried out successfully its maiden flight followed by certification tests.

D-436-148

In the context of its characteristics this series-produced engine is not inferior to the foreign analogs that are still at the stage of development





The aircraft certification is to be completed in 2011, as well as its first deliveries.

Nowadays, work is under way to develop cargo and military cargo aircraft on An-148 platform, which are able to carry a 20-ton cargo to a distance of up to 2,000 km or a 15-ton cargo to a distance of up to 3,200 km.

Motor Sich JSC along with Salut FGUP MMPP have launched commercial manufacture of AI-222-25 engine that provides the maximum thrust of 2,500 kgf for Yak-130 operational trainer that will be supplied to pilot training centers in Russia and Algeria in the upcoming future.

AI-222-25F engine, an AI-222-25 engine modification with afterburner, has been designed for next operational Yak-130 modifications and competitor supersonic aircraft developed in other countries. AI-222-25F engine thrust is 4,200 kgf provided the afterburner is installed.

The engine gas-generator is actually harmonized with AI-222-25 turbo-jet bypass engine, with additional accessories and systems installed on it to assure afterburner operation and jet nozzle adjustment.

In 2007, Motor Sich JSC was granted the Certificate of Type for a new TV3-117VMA-SBM1V helicopter engine

developed by the company designers. Its takeoff power depends on the helicopter type and can be adjusted between 2,000 and 2,500 shp by the automatic control system that can keep the takeoff power specified up to higher ambient temperatures: the takeoff power of 2,200 shp can be kept up to the temperature of +44°C. In case of one engine in service failure, the normally operating engine will start operating in 2.5-minute power setting, with its power being 2,800 shp, and then in 30-minute power setting, with its power equal to that of takeoff power setting. 30-minute continuous takeoff power set

AI-222-25

High AI-222-25 engine performances along with perfect Yak-130 aerodynamics ensure maneuvering aircraft capabilities corresponding to those of the 4th and 5th generation fighters





Mi-8mtv

ting is also introduces, with two engines operating, to provide emergency climbing. The engine also can be restarted and fly at higher altitudes (6,000 and 9,000 m respectively) than its precursors.

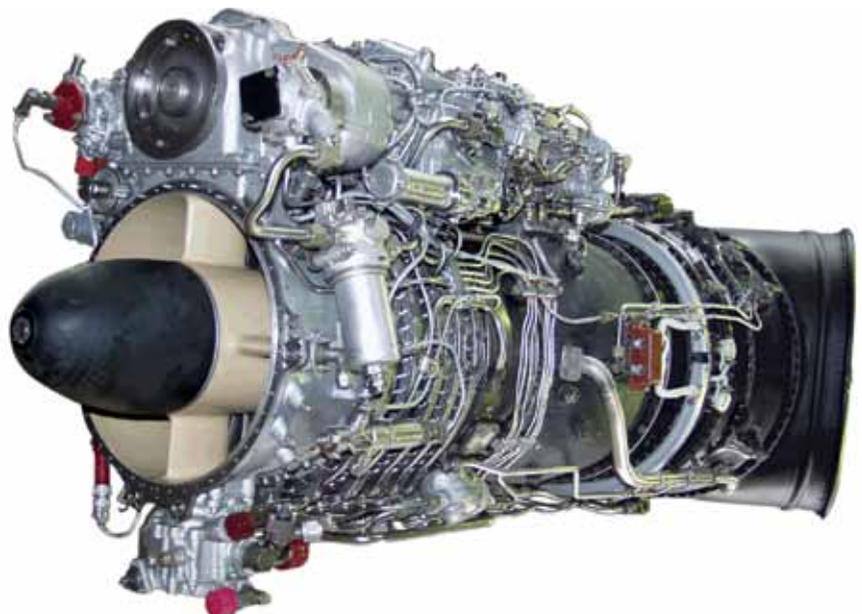
TV3-117VMA-SBM1V engine life indexes are enlarged: its first run life and time between overhauls (TBO) is 4,000 hours/cycles and its total life is 12,000 hours/cycles. TV3-117VMA-SBM1V engine weight and dimensions are equal to those of engines installed on Mi and Ka helicopters, as well as its mount dimensions to be connected to the helicopter structures. It allows us to re-engine Mi and Ka helicopters without reworking helicopter airframes and systems, with expenditures low and terms short. Re-engining makes it possible to

improve substantially helicopter performances when operating at high altitudes and temperatures. In 2009, modernized and powered by TV3-117VMA-SBM1V engine, Mi-24 helicopter was introduced into service with the Ukrainian armed forces.

On 19 May 2010, Mi-8MTV helicopter powered by TV3-117VMA-SBM1V en-

gines took off from the airport of Konotop Aircraft Repair and Overhaul Plant. When testing, the helicopter climbed to the altitude of 8,100 m for 13 minutes and set up the world record. Earlier, Mi-24 helicopter powered by TV3-117VMA-SBM1V engines had shown record climbing capacity: it climbed to the altitude of 5,000 m for

TV3-117VMA-SBM1V



In case of one engine failure, a second one will start operating in 2.5-minute power setting whose power is 2800 shp, with its power in 30-minute power setting equal to takeoff power

9 minutes only, which means 2.5-fold increase in climbing capacity.

Developed in cooperation with Ivchenko-Progress GP, AI-450 engine is the smallest one manufactured by Motor Sich JSC, with its take-off power being between 370 and 730 shp subject to engine modification. Its AI-450M modification is intended for re-motoring Mi-2 helicopters earlier manufactured.

Currently, Motor Sich JSC is developing MS-500V helicopter engine that is a baseline engine of the engine family of 600...1,000 shp power class, with those engines intended to power various helicopters whose weight is 3.5...6 tones. According to experts, the sector of helicopters powered by this engine class will be the most prospective one in the coming years due to their versatility. Besides freight and passenger services, the helicopters in question can be used widely as corporate and VIP transport, transport for rescue operations, medical and evacuation missions; for eliminating breakdowns, patrolling highways, oil/gas pipelines, and coast line; for ecological monitoring, etc.

Designed according to Kazan Helicopter Factory specification requirements for Ansat type helicopter, MS-500V engine whose takeoff power is 630 shp will be the first in MS-500V model rank. The MS-500V family engine design is simple and effective, which is typical for the engines of this power class. The core engine consists of the single-stage centrifugal compressor with high pressure

ratio, inverse flow type annular combustor, and single-stage turbine. The single-stage free turbine power is transmitted through the integrated intermediate reduction gear to the main helicopter gear. The engine is equipped with the advanced electronic control system with hydromechanical redundancy.

Currently, gas dynamic parameters are being streamlined at the testbed, as well as development works are being completed on core engines and full-scale engines. A number of specialist testbeds have been manufactured at Motor Sich JSC for sub-assembly development and to ensure successful certification process.

Developing engine family on basis of baseline design or baseline core engine is used widely in the world practice. This principle ensures economic advantages at all the stages of the engine life cycle. In light of this, when designing MS-500V engine, design solutions were used to provide the development of promising engines of other types and purposes on its base.

High performance products offered by Motor Sich JSC to the global market are manufactured on a certified production basis.

The company Quality System meets the requirements of ISO international standards, which was confirmed with

the Certificate by Veritas Bureau. Motor Sich JSC has accumulated great experience in working with foreign customers both from CIS countries and countries world over, and it can offer a wide range of brand-new products for cutting-edge promising engines for fixed- and rotary-wing aircraft.

Manufacture durable, reliable, and user-friendly products that meet entirely customers' requirements is our main goal. We are keen to cement the existing positive image of Motor Sich JSC as a well-established and dependable partner.

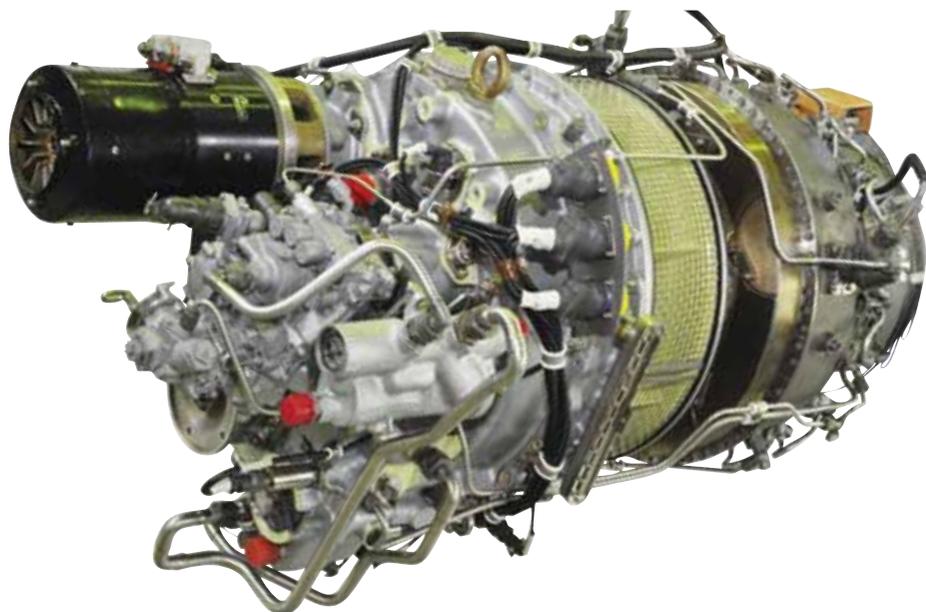


Motor Sich JSC

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E-mail: eo.vtf@motorsich.com
<http://www.motorsich.com>

MS-500V

Will become the base for a family of engines in the power class of 600...1000 hp to be installed on helicopters of various purposes



Test & Search

The mankind has entered the twentieth century, discovering new era. The era of technical progress. People invented the various cars and mechanisms. Speed and capacities were increased. Sometimes they went out of control. In this situation ground tests began to play the increasing role. There were special ranges worldwide. Bombs were blasted, cars and tanks were tested, rockets were launched there. Of course, aircrafts did not escape the fate. There are ranges of ground tests of aviation technics and weapons ranges in any developed country of the world, Russia is not an exception. The one of such ranges is near capital of Russia — Moscow. There is The Federal Governmental Enterprise “State Governmental Scientific-Testing Area of Aircraft Systems” (FKP “GkNIPAS”). It was founded in 1941.

■ **Question:** Mr. Koshelyev what was the purpose of the Scientific-Testing Area of Aircraft Systems ?



GkNIPAS: RELIABILITY ON THE EARTH – SAFETY IN AIR

■ **Answer:** The main aim of its creation was the providing of aviation system tests, and also the researches in the field of aerodynamics and aeroballistics. Thousands unique experiments and tests have been performed. Nowadays the test range is one of the largest in Russia. Its experimental base allows to perform tests and exercises of the major units and aircraft fighting components and fighting complex trials. The test range stands allow to work with fighting products, simulating the conditions of their real application. The main hallmark is practically unlimited range of information received with smaller risk and expenses, in comparison with flight tests. The hallmark of the test range is the high-speed rail track. Nowadays the length of it is 2,5 km, but in the nearest future will be extended up to 7 km. The track has really unique construction. Its

Our partners trust, their interest in the mutual cooperation is the guarantee of our prosperity

hydro-brake system allows to perform tests with the preservation of tests object.

■ **Q:** What kind of tests and experiments does the Scientific-Testing Area perform?

■ **A:** We have been performing tests to the emergency escape out of the aircrafts, starting up of ammunition, the various tests for dynamic influences and the function of the system. Almost all planes and helicopters of State Aviation Industry were tested here. The rail track was already mentioned in our conversation. Many experiments with various systems of rocket arms, tests of parachute systems, aircraft seats, and also tests of aircraft constructions to the birdproofing

were conducted there. The track allows to conduct researches in the field of high-speed aerohydrodynamics and sonic boom effect, as well as different tests of missile warheads and detonating fuze to the blows, load-factors and tests to brake mechanisms. One of the major kind of experiments is the test to compatibility of the aircraft with its arms. The true to life conditions of flight modeled on the stand. There is a specially equipped shooting gallery in the testing range where aerial gun system evaluations, reliability of capture inspections, shooting drills with modeling the flight modes are performed. The damage control plays the huge role for

ANDREY IVANOVICH KOSHELYEV

Andrey Ivanovich Koshelyev has been working at the training range since 1981 after graduation of Tyulskiy Polytech Institute. Nowadays Andrey Ivanovich is the Head of The Federal Governmental Enterprise "State Governmental Scientific-Testing Area of Aircraft Systems" (FKP "GkNIPAS"). It is the first enterprise in Russia.

Andrey Ivanovich Koshelyev's career is filled with creativity, activity directed towards the creation, development and improvement of the aviation test data systems. One cannot but notice the distinguish feature of Mr. Koshelyev – his sense of responsibility for the business and the training range future. A.I. Koshelyev proved to be creative professional, active, just and demanding leader. He got government rewards.

the planes and helicopters. Special tests to aircraft constructions durability and also the efficiency of fighting parts of rockets are estimated. The various situations are simulated here. For example, shell hit into an aircraft engine or a fuel tank. There is a special stand for the safety of fuel systems optimization. Fuel tanks are being tested to the fire and explosive tests in this place.

■ **Q:** As far as I know the special subject in the operation of the testing range is experiments connected with missile usage.

■ **A:** That's right. The rockets and their missile parts are being tested to the variously in the range To define, the way the missile part will be during the hit shell or another foreign object, the missile parts are being shot away by the special nucleus. Rockets are being heated up with the help of incoming flow, simulating supersonic speed of flight, engines and airborne systems are taken the same tests too. How long-term storage does effect a missile? How long a missile could be stored for? The special test allows to answer these questions. The test takes part in a special climatic chamber. The safety is the main requirement at work with any product containing explosives, especially it concerns rockets. There are several stands where their safety estimations can be checked in the training range.

The wide experience received during the result of the various tests, influenced experts to create the number of independent researches which are realized in the pilot production. Among them are combat parts to aircraft guided missiles of the air-to-surface class, grenades with the penetrating effect for the grenade discharger and exclusive working out – anti helicopter mine.

■ **Q:** You told us about tests with the help of military technics, but do you conduct peaceful tests?

■ **A:** The military subject is not the only one in work of experts at the testing range. The most perspective and actual tests are the tests towards peace. Tests for the manufacturers of civil aviation technics. In this area, Officers from the FKP "GkNIPAS" have the vast experience in this field. Perhaps, it is possible to name the most demanded direction of experiments at the stand seat. The stand differs from foreign analogues, because the principle of the turned movement is realized here. This principle allows to save the object of the test.

■ **Q:** Today the great attention is given to safety of crew and passengers. Could you please tell us more about the tests?

■ **A:** The FKP "GkNIPAS" has been engaged more than ten years in working out the methods and the stand equipment for the tests of trauma safety and securities of crews and passengers of aircraft in the terms of emergencies. The analysis of aviation incidents and accidents shows that their big parts are connected with the takeoff and landing modes at which there are destructions of aviation seats, fastened systems and, as the result, serious trauma. Domestic and foreign aviation regulations require equipment tests and an interior of cabins of passenger aircrafts in the terms of a crash landing. At the Federal Governmental Enterprise "State Governmental Scientific-Testing Area of Aircraft Systems" founded and certified in the Russian Technological Regulation and Aviation Registration a stand "Seat", that helps to test the aviation seats in the condi-

tions of an aircraft crash landing. Today the stand "Seat" is unique in Russia, corresponds to the international requirements and certified to have the right to perform certified tests. By this time dynamic tests have been conducted for the seat equipment for the planes of the leading companies.

■ **Q:** Mr. Koshelyev, tell us couple words about the prospects of development of stand tests?

■ **A:** Modern aircraft of civil airlines development requires the expansions of possibilities of the created stand equipment. Besides, similar test technologies with a quantitative trauma estimation of crew members should be taken into not only for the civil aviation technics, but also for military aircraft that proves to be true with foreign experience. In connection with the urgency of this kind of work, the enterprise finds financial resources and continues researches to expansion of possibilities of the stand equipment for tests in the terms of high-speed aircraft and land vehicles crashes.

Eduard Voytenko





GKNIPAS

**State Governmental
Scientific-Testing
Area of Aircraft Systems**



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Navigation

President of the Russian Federation Dmitry Medvedev has repeatedly stressed the great importance of innovations in modernizing Russia. Fortunately, the Russian military-industrial complex still has modern enterprises that implement innovations and cutting-edge technologies in their products. Moscow Design Bureau Compas is one of them.

Interview with General Engineering Designer of Moscow Design Bureau Compas Gennadiy Karyukin.

■ **Question:** Gennady Efimovich, will you introduce your enterprise to the readers?

■ **Answer:** Our enterprise has a rich history that dates back to 1918 when the Soviet government issued a decree on setting up a telegraph plant.

Notably, it is our enterprise that created the first aircraft radio station, which was used during the record-breaking flight of



COMPAS IN THE WORLD OF HIGH TECHNOLOGIES

Chkalov en route Moscow – North Pole – Vancouver. In 1948, Compas became an independent structure designing navigation and communications equipment. Developing radio navigation equipment still remains our main line of business.

■ **Q:** And how come your enterprise managed to reach such a hi-tech level?

■ **A:** As we are chiefly designing equipment for aircraft and airspace systems, Compas has been always trying to employ the latest technologies in its products.

As early as 1958, we began to use digital methods of signal processing in our products. This technique was used in automatic aviation radio compasses – our main product at that time.

In the 1970's, we widely employed digital signal processing in our equip-

ment. We implemented it on all numerous products designed in that period. What was it made for? It allows significant reduction of weight and dimensions as analogue units cannot be made very small. Due to digital technologies, we sharply reduced the weight, size and power consumption of our equipment. A number of smart solutions by our programmers and mathematicians contributed to this, too.

In that period, we created the A-723 radio navigation receiver-indicator for the Air Force, which was linked with Alfa and Omega ground-based worldwide radio navigation phased systems as well as with pulse/phased ones including Chaika and Loran-S. The Navy received the Mars-75 multifrequency phased radio navigation system designed to provide ship navigation, hydrographic and

operation works as well as aircraft flights at a speed below 1,000 km/h.

The development of such complicated multifunctional equipment was impossible without digital signal processing technique. To this end, we began to develop software and hardware ourselves. At that time, there were few program debugging tools and we had to do this work.

A large reserve in digital processing methods created in the 1970-80's is being developed now with the following introduction in current products. Speaking about advanced equipment, some items cannot be made without digital signal processing at all.

■ **Q:** Gennady Efimovich, could you give examples of such products?

■ **A:** GLONASS, GPS and Galileo global satellite navigation systems are

subject to radio interference due to the low power of satellite signals. They are about 40 dB lower than natural radio noise on land surface horizon. Signals of such a low level can be easily suppressed by radio jamming equipment – a 1-WT noise jammer can disrupt the work of satellite navigation systems for 32 km around.

In order to reduce the influence of natural and man-made noise we made satellite navigation equipment with increased jamming protection. This would have been impossible without digital processing methods in principle.

At present, we are working on such equipment for aviation and guided weapons in order to solve tasks severe ECM environment. The newer equipment can be suppressed only by high-power jammers that can be easily detected and engaged by respective weapons.

Also, rapid signal search and solving navigation tasks is one of the main requirements for satellite navigation systems, which cannot be met only using analogue methods without digital processing ones.

■ **Q:** Please, tell us, what are the prospects of digital signal processing?

■ **A:** The wide employment of digital solutions allows minimizing analogue ones and solving all tasks with software means. What else can digital methods give us? Installing our equipment on different objects, we have to adjust its capabilities to

specific tasks and parameters of these objects. This adjustment was very difficult for analogue systems and it could even require designing the system from scratch. In case of digital equipment, in most cases it was enough to upgrade software and achieve required qualities.

For all these procedures to be efficiently tested before installing the product on the object, we created a simulator modeling GLONASS, GPS and Galileo signals. This device is very complicated and its creation would have been impossible without advanced digital processing methods. This simulator solves a wide range of tasks in the research and production sphere, namely finding technical solutions at the stage of development of client navigation equipment, its adjustment, performance evaluation during the production at the manufacturing plant, incoming inspection and periodic operational inspection, personnel training, carrying out R&D works as well as semi-natural modeling in order to find the best location of client navigation equipment on object involving highly-dynamic systems and scenarios of object movement by assigned trajectories considering compound effect of atmosphere, ionosphere and radio propagation conditions.

■ **Q:** Gennady Efimovich, what modern products of your enterprise could you name?

■ **A:** I would like to mention the A-737 product (aviation GLONASS/GPS receiver-indicator). It was designed mainly for military aviation and now almost all aircraft have this system. Its main task is to determine the aircraft position vector, i.e. three location components, three speed components and get exact time as satellite navigation allows using the united time system.

The A-737 has a number of modifications with additional functions. For example, the A-737I employs satellite navigation and land-based pulse/phased radio navigation systems. Experts think it is necessary are jamming protection of satellite navigation systems is still low, while pulse/phased systems are much more difficult to suppress. It is only natural that dual-standard equipment largely raises capabilities in combat environment.

The next version is the A-737D supporting differential mode. What for? It is not a secret that any satellite navigation system has inevitable errors. One of them is caused by inaccurate information on satellite motion parameters (ephemeris information). As the system measures the distance from the object to space vehicles and then calculates object location basing on this data, the accuracy of space vehicle location influences the accuracy of the whole system. The second error occurs as the signal emitted by the space vehicle gets through the ionosphere and troposphere, where it is refracted and distorted causing the incorrect measurement of the distance from the space vehicle. In order to remove these errors, especially given high location accuracy requirements, for example if guided weapons are employed, we use differential corrections. They are made by the land-based component of the system, which allows raising the accuracy up to several meters, which is vital for target engagement.

At the same time, we started designing equipment for high-precision guided weapons. First of all, it was intended for corrected air-launched weapons. For this purpose, we developed satellite navigation equipment. Testing this system in the differential mode demonstrated the circular probable error of several meters. Such equipment is installed on corrected air weapons.

SRNS IM-2 signal simulator



Navigation



■ **Q:** Foreign countries are known to investigate into new ways of satellite navigation employment in weapons systems. What prospects do you see here?

■ **A:** High results in the employment of satellite navigation systems in smart air weapons, chiefly corrected ones made us think about using it in tube artillery. The projectile is rotating during the flight, so its azimuth deviation is small. So, range deviation has always been one of the main problems in artillery. We can solve this task. The projectile is shot with the initial overshoot and at the descending path sector, our equipment switches on and homes the projectile right into the target.

In 2007, we initiated developing correction systems for tube artillery and MLRS systems. We are sure this equipment will help our armed forces solve its tasks more efficiently.

I should note that from the very beginning we refused from methods used by foreign designers in similar foreign systems. In their case, aerodynamic brakes are pulled out after the shot, stop projectile rotation and correct the non-rotating projectile. We had the task only not to influence projectile rotation. And we managed to solve this task chiefly due to the talent and skill of our engineers, who created the antenna assembly and smart solutions

of our mathematicians and programmers, who provided stable signal tracking. We employed here the most efficient digital processing techniques.

■ **Q:** What new aviation developments do you have?

■ **A:** We are working on helicopter ship board landing systems. Now, almost all corvettes and frigates have a helicopter on board. The dimensions of such ships do not allow installing traditional instrumental landing systems. So, it was decided to create a satellite navigation landing system for such small-size carriers.

We have created such a system. It differs from similar systems by the relative navigation mode. This means that after the system is switched on, the aircraft is fixed to the centre of the ship helipad. And no matter where the ship or helicopter moves, the latter will always be located in relation to the centre of this helipad.

This landing system is undergoing state tests now and will soon be put in operation with the Navy. We expect that successful tests will allow this system to be employed in the civilian sector, too, namely in helipads on offshore drilling platforms, ice-breakers, research and other ships.

■ **Q:** Will you tell us how did you manage to enter the space-rocket sphere not so long ago?

■ **A:** We have been working in this direction since 1996, when we created ground-based trajectory measuring systems. When we started this work, we were not sure that satellite navigation equipment can rapidly find satellites at high velocities (several km per second). The first product we made was dubbed Terminator and was tested on Proton boosters. After that, it was installed on Soyuz and other boosters. By the way, we put this equipment on payload, too.

Our systems turned out to be very efficient and reliable on space-rocket vehicles and, thus, became popular with their manufacturers. One of the reasons is the need to control trajectory parameters. It is not a secret that if a rocket diverges from its trajectory beyond the limit, it is destroyed. As creating and operating ground-based trajectory measurement systems is very



**Automatic
radio compass ARC 35**

expensive, satellite navigation equipment significantly simplifies this task.

After our equipment proved to be efficient on boosters and upper stages, we began to develop this direction and now all such vehicles are equipped with satellite navigation systems. We were trying to improve such systems, minimize their dimensions and make them lighter. The first device installed on a booster weighed 4.5 kg, while now – only 1.5 kg and this figure is not final. This parameter is very important for space systems as putting each kilo into orbit is very expensive.

We also offer PRV single-board version is satellite navigation receivers under brand PRV. These devices can be built in radio telemetry systems of small space vehicles. About ten such vehicles have been launched with such devices with the first one called Zeya placed into orbit in 2007. It proved that our satellite navigation equipment can be used at very high velocities.

■ **Q:** Gennady Efimovich, mass media have reported that your enterprise is working

on search-and-rescue systems. What have you achieved in this field?

■ **A:** Advanced search-and-rescue systems are complicated complexes of organizations and communications structures designed to carry out all stages of search-and-rescue operations – from transferring emergency information to planning and conducting such operations.

A search-and-rescue operation starts from identification of emergency – an emergency signal, loss of the object from radar screen or the absence of radio contact for a certain time. After the emergency is identified, it is necessary to locate the distressed with accuracy sufficient for the rescue crew to find the object.

Present-day search-and-rescue systems are created on the international, national and internal levels.

At present, the COSPAS-SARSAT international satellite search-and-rescue system is used to detect objects in distress.

Ground-based data reception and processing stations called local user terminals

(LUT) receive signals from satellites they see, process them and submit information to the respective Coordination Centre. The space-based component includes at least four satellites on circular orbit. They constantly cover the area with a diameter of about 5,000 km. Also, geostationary satellites are used to relay signals sent by radiobeacons. Geostationary satellites allow sending information about a SAR event to respective bodies much quicker.

In COSPAS-SARSAT system, the location of distress radiobeacons is calculated by Doppler positioning method. In rugged terrain, this method does not allow accurate positioning due to multipath wave propagation. Some models of radiobeacons are equipped with GPS receivers transmitting emergency location information to the SAR Coordination Centre. The multipath effect and shadowing of the operational satellite constellation, however, hinder alert data transmission to the LUTs.

The location of radiobeacons working at a frequency of 121.5 MHz is carried out



Navigation

by means of direction finding. This method has a number of drawbacks. The main one is that rescue equipment should be located within the radiovisibility of alert data source, which can be impossible in case of incorrect emergency site positioning or rugged terrain.

To solve search-and-rescue missions, rapidly and efficiently coordinate efforts of SAR forces, they should have a bilateral data exchange with the distressed object, which will allow reducing time of detection and speed up the SAR operation. The lack of this exchange is one of the main drawbacks of COSPAS-SARSAT.

At present, Compas is developing the satellite search-and-rescue system featuring two-way data exchange between the distressed object and SAR services.

This system consists of three segments:

- space segment;
- user segment;
- control system.

The space segment is represented by GLONASS/GPS space navigation ve-

hicles as well as global communication satellites.

The user segment includes alarm radiobeacons (ARB) - installed on moving objects and personal ones (ARB-N). Also, there is a tendency to use radiobeacons on stationary objects to send warning signals in critical conditions (for example environmental or other danger).

The control system includes the United Coordination Centre (UCC) receiving emergency information and a network of command posts (CP). Also, the UCC provides monitoring of the whole system.

Emergency radiobeacons determine their location using GLONASS/GPS systems. The employment of two satellite navigation systems at once raises the accuracy of precise ARB positioning.

The emergency signal is sent by the ARB to the UCC via the radio channel of global satellite communication systems. This message contains the ARB's identifier, exact whereabouts at the time of emitting the alarm signal, emergency event occur-

rence time and emergency features. After receiving this emergency message, the UCC sends the reply message to the distressed ARB via the same radio satellite communications channel.

There is no need to develop a special communications system as the existing global satellite communications systems can be used for two-way day-and-night communication at any weather. Their main advantage is the lack of breaks in communication sessions. Thus, the emergency information will be rapidly delivered to the UCC.

The two-way communication will allow rapid and efficient coordination of SAR services and distressed objects. With that, the latter will be informed that their alarm signal is detected and SAR services have begun to work.

Gennady Efimovich, thank you very much for an informative and comprehensive conversation.

Viktor Murakhovsky





Schedule of Aerospace and Defence Exhibitions

July

Farnborough International Airshow

19–25 July

International Air & Space Show
London, Great Britain

www.farnborough.com

Phone: +44(0) 1252 532800

Fax: +44(0) 1252 376015

E-mail: enquiries@farnborough.com



September

Africa Aerospace & Defence

21–25 September

International aerospace exhibition
Cape Town, South Africa

www.aadexpo.co.za

E-mail: aad@amd.org.za



November

Airshow China

16–21 November

8th China International Aviation
& Aerospace Exhibition
Zhuhai, China

www.airshow.com.cn/en

Phone: +86 756 336 9235

Fax: +86 756 337 6415

E-mail: zhuhai@airshow.com.cn



Indo Defence & Aerospace

24–27 November

International Aerospace Exhibition
Jakarta, Indonesia

www.indodefence.com

Phone: 62-21 8650962, 8644756

Fax: 62-21 8650963



2011

February

AeroIndia 2011

9–13 February

8th India Aerospace Exhibition
Bangalore, India

www.aeroindia.in

Phone: +91-11-23371987

Fax: +91-11-23371987-0849

E-mail: contact@aeroindia.in



April

LAAD 2011

12–15 April

8th Latin America International
Aerospace & Defence Industry Exhibition
Rio de Janeiro, Brazil

www.laadexpo.com

Sergio.jardim@clarionevents.com

Sergio Jardim, Director

Phone: (55) 11 3214-1300 Ext: 200

E-mail: sergio.jardim@clarionevents.com



June

Paris Air Show. Le Bourget

20–26 June

Paris International Aerospace Show
Paris, France

www.paris-air-show.com

Phone: +33 (0) 826 465 265

Fax: +33 (0)1 47 20 00 86

E-mail: siae@salon-du-bourget.fr



September

Asian Aerospace 2011

8–10 September

Hong Kong, China

www.asianaerospace.com

David Lim, Project Director

Phone: 65 6780 4669

E-mail: david.lim@reedexpo.com.sg



Aviation Expo / China

21–24 September

Beijing, China

The 14th Aerospace Show in Beijing

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Fax: +852 25117427

Office in Beijing: +86 1087730641/42/43



November

Dubai Airshow

13–17 November

Dubai, United Arab Emirates

The 12th International Aerospace Exhibition
in Dubai

www.dubaiairshow.aero

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2012

February

Singapore Airshow

14–19 February

International Civil & Military Airshow
Singapore

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Fax: +65 6546 6062

E-mail: dannysoong@singaporeairshow.com.sg



12-15th
August



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AIRCRAFT AND AERONAUTICS



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WILL OPEN ITS DOORS

The first international salon of civil aircraft and aeronautics "InterAeroCom. Saint-Petersburg 2010" will open its doors from the 12th to the 15th of August, 2010 in the exhibition center "Lenexpo". The event will continue traditions of the first Russian air shows held in Saint-Petersburg in 1910 and will celebrate the 100 anniversary of Air Fleet of Russia.

"InterAeroCom. Saint-Petersburg 2010" is the first international salon of civil aircraft and aeronautics organized in Saint-Petersburg. The event will be held in the territory of one of the best exhibition centers of Russia "Lenexpo". A unique location of "Lenexpo" on the shore of the Gulf of Finland gives a great opportunity to demonstrate aviation over the gulf and



Exhibitions

ness of the significance of international civil aviation in the economic and social development of nations.

The aircraft exhibition will unite over 200 participants. These are Russian and foreign companies from such countries as, Germany, Lithuania, France, Ukraine, Czech Republic and others. Among them: airlines, design offices, aircraft engineers, airclubs, experts, research institutes, officials.

Within four days visitors of the air salon can not only see the newest technologies in aviation branch, visit seminars, conferences, but also enjoy the entertaining program, observe competitions of aeromodellers, see aircrafts in flight during the airshow.

Within the framework of the "InterAeroCom. Saint-Petersburg 2010" the following events will be held:

- International forum
- Aviation exhibition
- RC airplane models competition
- Kites festival
- Aeronautic fiesta in honor of the Air Fleet's 100th anniversary
- Aeromodellers show
- Cultural program
- Airshow

General Subjects of the Salon:

- Business aircrafts
- General aviation
- Aeronautics (airship building)
- Aircraft engineering
- Aircraft instrumentation, electrical components, avionics
- Aviation legislation
- Business and aviation
- Helicopters
- Russian and foreign airlines
- Intra-regional air service
- Air services between cross-border regions
- Small and ultralight aviation
- Special-purpose aircraft (forest conservation, pipelines, highways)
- Hydroaviation
- Private aircrafts
- Pilotless aircrafts
- Sports aircrafts

in the territory of the complex, to organize airshow.

The mission of "InterAeroCom. St.-Petersburg 2010" is to organize a new event for the various sectors of the aerospace industry where industry leaders may freely exchange the opinions about the future development of a long-term cooperation strategy. "InterAeroCom. St.-Petersburg

2010" — is a place where the specialists, businessmen and aviation enthusiasts will get an opportunity to have a better view of the civil aviation industry and promising programs by obtaining the most reliable first-hand information

The purpose of the airshow is to enhance prestige of civil aviation in Russia and to create and consolidate worldwide aware-

RUSSIAN AEROSPACE INDUSTRY MAKING INROADS IN SOUTHEAST ASIA

The increasing push by Russian companies and organisations backed by the government is playing a role to assert Russian aspirations to maintain its position as a major player in the aerospace industry.

It was reported that Russian arms export have been stabilizing at some six billion US dollars per year and besides the Middle East and South America, a significant amount of these orders are from the Asia-Pacific. These efforts have also been cemented by the various agreements such as defence cooperation and technical agreements with countries such as Vietnam, India, Malaysia and Indonesia. Russian companies and organizations such as Rosoboronexport has been a regular exhibitor at the major defence and aerospace events in the region since 1994 and has been a highly active in the promotion of Russian technologies and

products. These events include the LIMA and DSA series of exhibitions in Malaysia, Indo Defence in Indonesia, Defense and Security in Thailand and the Singapore Airshow.

Russia's headway in penetrating the Asia-Pacific defence market with significant aerospace and defence equipment sales in recent years is also boosted by the fact that more countries in the region are looking for cost effective buys to upgrade and re-arm their forces from diversified sources. This article looks Russia's aerospace industry exports to Southeast Asia and ASEAN (Association of Southeast Asian Nations) countries.

Combat Aircraft and Systems

Most of the aerospace exports to the region are in the form of combat aircraft, helicopters and air defence and offensive missiles. The export lineup include generation 4+ and 4++ Sukhoi-series aircraft, including Su-27SKM fighter, Su-30MK and Su-35 multi-role fighters, and Su-32 fighter-bomber.

Upgraded MiG-series combat aircraft of several generations, including MiG-29M, MiG-29M2, MiG-29SM and MiG-29SMT fighters, are also on the list.

Airborne armaments exported include the R-73E short-range air-to-air missile with an adapter pylon and a launcher for installation on foreign aircraft and the RVV-AE high performance medium-range air-to-air missile. Helicopters, including Mi-17V-5 military transport helicopter, Mi-28NE attack rotorcraft, Mi-35 series transport combat helicopters and Ka-50 attack helicopters have also taken the interest of many countries in the region.

The world's heaviest Mi-26 transport helicopter designed to airlift troops with combat equipment and carry large cargos weighing up to 20 tons, is also being marketed in the region. In its tactical transport version, the helicopter can carry up to 82 fully equipped paratroopers. The Mi-26 has an extensive record of service in many countries worldwide and in the Southeast Asian region.

Air defence systems, including Tor-M1 surface-to-air missile (SAM) system are also being promoted. The Buk-M2E medium range SAM system also has good export prospects in the Southeast Asian market. It is the sole medium range air defense system in the world able to

The export lineup include generation 4+ and 4++ Sukhoi-series aircraft, including Su-27SKM fighter, Su-30MK and Su-35 multi-role fighters, and Su-32 fighter-bomber...





... upgraded MiG-series combat aircraft of several generations, including MiG-29M, MiG-29M2, MiG-29SM and MiG-29SMT fighters, are also on the list

destroy in an ECM and counterfire environment not only strategic and tactical aircraft, helicopters and cruise missiles, but also tactical ballistic and air-launched missiles, including antiradar missiles, submunitions of precision-guided weapons as well as surface and ground targets.

India is the traditional big buyer of Russian defence products with new purchases of Sukhoi Su-30MKI fighters, missile frigates, submarines, main battle tanks and missile technology joint venture cooperation programmes such as the Brahmos. Following close is China, which is also another traditional big buyer but mostly for aerospace equipment and technology such as Su-27MKK fighter aircraft.

But their big-ticket items have also taken the interest of other Asia-Pacific countries. Major buys include fighters—MiG-29s to Malaysia and Myanmar, Su-27s to Indonesia and Vietnam, and the latest Sukhoi Su-30MKM to Malaysia. Russian airframe manufacturers are also presently trying to sell a significant batch of Mi-17 multi-purpose helicopters there. Also differing amounts of various short-range portable air defence missiles have been sold to most countries in the region including Singapore and Malaysia.

All this success in the campaign for aerospace exports comes despite the bad press and a reputation for providing a very thin and unreliable maintenance and spare parts package that the Russian suppliers and systems makers (and state export agency Rosoboronexport) have emphatically said that had been rectified with new management and supply chain network, and attractive transfer of technology arrangements. Besides hard sell tactics and creative financial arrangements have helped Russia to secure foreign markets beyond China and India, which still are the main buyers of Russian systems. However, it should not be forgotten that a strong economic region within the Asia-Pacific is Southeast Asia. The demand for aerospace products, both military and civilian, is steadily increasing. The demand for combat helicopters, cargo aircraft, helicopters and fighter aircraft remains high, especially with most of the countries region now recovering from the recent economic crisis.

These efforts have also been cemented by the various agreements such as defence cooperation and technical agreements with countries such as Vietnam, Malaysia and Indonesia. Jakarta turned to Russia and East European countries for weap-

ons in the last decade when it was under an arms embargo by the United States. Washington later restored military ties and lifted the arms embargo as a reward for Jakarta's cooperation with the US war on terrorism.

Moscow-Jakarta Deal

On September 6 2007 Indonesia sealed a \$1 billion deal to purchase Russian tanks, helicopters and submarines during a visit by the then President Vladimir Putin, marking a further sign of Moscow's growing re-engagement in the region. The visit by Putin, the first to Indonesia by a Russian or Soviet leader in about five decades also saw the signing of billions of dollars in mining and energy agreements worth up to \$8 billion. The first visit to Indonesia by a Russian political leader was by Nikita Khrushchev in 1960. Analysts said that Putin wants to reclaim some of the military and economic muscle Moscow had in Asia before the collapse of the Soviet Union in 1991.

These are very significant developments, which bring back memories of the late 1950s and early 1960s when then Soviet Union was a major player in Indonesia's development. The significance of the deal prompted some political analysts to say that Putin's visit itself and the accompanying deals marked "a new era" in Indonesia-Russia relations.

Russia, one of the world's leading arms traders with annual sales topping \$5 billion in bumper years, wants to break into new markets and to rebuild its influence in Asia where Washington, and now increasingly China, have held sway in recent years.

"We have agreed to expand cooperation in areas we consider most important such as energy and mining, aviation, communications and others," Putin said after the talks with President Susilo Bambang Yudhoyono at the presidential palace. "There's a good perspective to work together in the military and technical fields," he said. Indonesia ordered ten Mi-17V-5 utility transport helicopters, five Mi-35PN attack helicopters, 20 BMP-3 amphibious tanks and two Type 636 Kilo-class diesel-electric submarines from Russia, which will provide state credit facilities.

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Prior to the latest deal, Indonesia had earlier agreed to buy six Sukhoi combat aircraft in a deal worth \$335 million. Interestingly, however, weapons such as ordnance and missiles for the Sukhoi fighters were part of the \$1 billion deal, it was reported. The long-awaited contract was for the procurement of three Su-30MKs and three Su-27SMs (built by the Komsomolsk-on-Amur Aircraft Production Association (KnAAPO).

The Saga of the Indonesian Fighter Deal

In its endeavour to improve the capability of its air force whose assets were depleted due to sanctions and the ensuing difficulty in getting spares, cash-strapped Jakarta had earlier inked a \$500 million contract with Rosoboronexport State Corp to purchase 12 Sukhoi fighters (Su-30Ks) and eight Kazan Helicopter-built Mi-17-IV armed utility helicopters in August 1997.

A few months later, technicians and pilots began training in Russia but the Asian financial crisis of that year which hit Southeast Asia hardest forced Indonesia to shelve the order. In September 2002, Indonesia and Russia agreed to continue cooperation in defence and trade through

a counter-trade system. On April 24, 2003, Indonesia and Russia signed a Military Technical Agreement. Following this, defence hardware purchased from Russia included two Su-27SK single-seat air superiority combat aircraft and two Su-30MK tandem-seat multi-role combat aircraft along with related armaments packages valued at \$171 million and two Rostvertol-built Mi-35PNs and related systems worth \$21.9 million. Earlier in 2004, Indonesia wanted to purchase six Su-27SKs and two Su-30MKs from Russia but that was shelved due to financial constraints.

More Sukhoi Fighters in the Pipeline for the Region

Meanwhile, Russia's Irkutsk Corporation has completed deliveries of the Su-30MKM to the Royal Malaysian Air Force (RMAF). The last batch of six aircraft arrived onboard a Ruslan (Condor) An-124 transporter at an airbase in northern Malaysia completing the delivery on Aug 17, 2009.

The contract for 18 Su-30MKM multi-role fighters for RMAF was signed during the official visit of the then Russian President Vladimir Putin to Malaysia in August 2003. According to the RMAF, all the

ground support equipment and aircraft of the final batch of Sukhois delivered have been assembled and are undergoing flying tests.

At the same time, it was reported that Russia would fulfill a contract on the delivery of eight Su-30MK2 fighters to Vietnam sometime in 2010, state arms exporter Rosoboronexport said. Russia and Vietnam signed a \$500 million agreement on the sale of eight Su-30MK2 fighters in January 2009.

"The contract was signed in January, and we will fulfil it in 2009-2010," Alexander Mikheyev, deputy general director of Rosoboronexport said at the MAKS-2009 air show. Mikheyev said Vietnam had already made several advanced payments under the contract and the deliveries would be made in two batches of four aircraft each. Su-30MK2 is an advanced two-seat version of the Su-27 Flanker multi role fighter with upgraded electronics and capability to launch anti-ship missiles. Russia's Federal Service for Military Cooperation said that Vietnam had expressed interest in buying additional Su-30MK2 fighters and talks on a new contract could start in the near future.



Future Aircraft Export Sales

Russia's first stealth fighter – known as the PAK/FA- intended to match the latest US designs made a successful maiden flight recently, giving a boost to the country's efforts to modernise its armed forces and retain export market sales. The new fighter is also important for future Russian arms sales, as it will allow the country to compete more efficiently in the global arms market. In a statement on the company website recently, Sukhoi director Mikhail Pogosyan said the company planned to develop its fifth-generation fighter programme further with India, its biggest client for existing planes. Sukhoi is Russia's largest exporter of military planes and accounts for about a quarter of the country's annual arms sales, which reached \$7.4 billion last year (2009). The new fighter is Moscow's answer to the American-built F-22 Raptor stealth fighter – the world's only fifth-generation fighter yet in service – which first flew in 1997.

Speaking at the Irkutsk plant's anniversary celebrations recently, Russian Prime Minister Vladimir Putin said: "The Irkutsk Aviation Plant success story has proved that Russia has not forgotten on how to make the world's first high-level combat aircraft. Now we have led our commercial aviation on a new level and work on the most promising programmes like the MC-21. The Irkut Corporation and the Irkutsk Aviation Plant have the highest role and responsibility is the highest here."

Irkut Corporation's Oleg Demchenko is optimistic and confident that the corporation will fulfil the new tasks. According to him, last year marked the new frontiers as the outcome surpassed \$1 billion with a tendency to grow further. Russia's Ministry of Industry and Trade has named Irkut the best exporter in the field of aviation technology in 2008. Oleg Demchenko said that the corporation is going to reach the new stage of development in order to become one of the world leaders in both military and commercial aviation industry.

According to Moscow's based experts, the Russian government and the United Aircraft Corporation (UAC) has already chosen Irkut as one of the two centres

of excellence for the aviation industry's consolidation process. Irkut is to become the basis for the UAC division including the Ulianovsk-based AVIASTAR and Voronezh-based plants for Tu-204, An-148 and other passenger and transport aircraft. The new division will also include the Ilyushin design bureau as well as commercial part of the Tupolev design bureau. The division will form up various branches for military and commercial aircraft development, including Su-30MKI/MKM/MKA family of fighters and the Yak-130 combat trainers.

Civilian Aerospace Industry Cooperation

Russian aerospace industry cooperation and sales to the Southeast Asian region have not only been in the defence business, as helicopters such as the Mi-17 of various types have been used in the commercial field and by civilian organizations. For example, several Mi-17 helicopters are being utilized by the Malaysian Fire and Rescue Services Department (Bomba) and the giant Mi-26 have been employed in the timber industry in the Indonesian and Malaysian Borneo territories.

In April this year, JSC "Scientific and Production Corporation "Irkut" (Irkut Corporation) has signed an agreement with Malaysian company Ujud Sentosa Sdn Bhd for the establishment of a Regional Centre and the promotion of new transport and civil aviation projects of Irkut Corporation to the markets of Southeast Asia.

The preceding consultations revealed that the new civil projects of Irkut Corporation, especially the short/mid range MC-21 passenger aircraft and its family, possess a practical interest for Southeast Asian operators. Local experts believe that the claimed technical and economic parameters of passenger and transportation aviation projects have promising marketing prospective in the region.

The Agreement between Ujud Sentosa Sdn Bhd and Irkut Corporation was inked by Dato' Mustaffa Abd Rahman, Chairman of Ujud Sentosa and Vladimir Sautov, Vice President for marketing and external relationships.



The objective of the Agreement is to promote and embark on new projects of Irkut Corporation in civilian transport aviation (passenger and cargo carrier version), as well as in developing technology cooperation between Russian and Malaysian companies in Malaysia. The MC-21 passenger aircraft has become the corporation main long-term commercial project. Irkut Corporation has become the prime contractor for Russia's most ambitious national commercial aviation programme. The MC-21 has been developed to fill the gap between the existing middle range liners, Boeing 737 and the Airbus-320 replacement. The first MC-21s are to be delivered to customers in 2016.

Indonesia

Indonesia has in the past operated Russian fighter aircraft, such as the MiG-17F/PF Fresco and the MiG-21. Other



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Soviet-built aircraft once in service with the Indonesia Air Force include the Tu-16KS Badger bombers, Il-28 jet bombers and An-12 transport aircraft. Soviet-built helicopters, which were once in service with the Indonesian Air Force, include the Mi-4 transport helicopter and Mi-6 heavy transport helicopter.

After the Cold War, Indonesia again open up to the prospect of operating Russian aircraft, through a combination of pragmatic outlook and economic sensibilities. Indonesia ordered a number of Mi-17s to fulfill their rotary transport requirement, as well as a pair of Mi-35 Hinds attack helicopters for their Army air wing. Another six Mi-35 were ordered later. Indonesian Air Force were also operating new generation Russian fighters such as the Su-27SK/SKM and Su-30MK/MK2, which came with armaments such R-73 short-range and RVV-AE beyond visual range air-to-air missiles, to buffed up their deterrence capabilities.

Laos

Laos is a traditional recipient of Russian arms. In the past ten years, Laos have ordered a number of Russian helicopters, such as the Ka-32 Helix multirole and Mi-8/Mi-17 Hip transport helicopters, to fulfill their requirements. Other Russian aircraft, which has served in the Laotian Air Force include the An-2 Colt utility, An-24 Coke transport, and Yak-40 Codling trainer aircraft.

Malaysia

Malaysia was traditionally dependent on Western arms, but the country was

among the first in the region to induct Russian aircraft in large numbers after the end of the Cold War. In 1994, Malaysia ordered 18 MiG-29 aircraft along with a large complement of R-73 short-range air-to-air missiles. The aircraft were soon upgraded with better radar and air-to-air refueling probe as part of the contract. Soon after that, the country ordered a number of Mi-17, for their fire fighting and rescue department. In 2003, Malaysia again ordered Russian aircraft to fulfill their requirement, this time the phenomenal Su-30MKM along with a large complement of air to air and air to ground armaments, in a deal worth \$900 million. All 18 Su-30MKM have arrived in country.

In June 2010, a Malaysian company, Crecom Burj Resources has announced that it is investing \$5 billion to purchase 50 Russian passenger aircraft, the MC-21, which will be delivered from 2014 onwards. The company plans to lease out the aircraft to commercial airlines in the Asian region, of which some have shown an interest, as they are retiring their older aircraft.

Myanmar

The Indochinese state of Myanmar is largely dependent on non-Western arms, and Russia naturally is one of the main suppliers, along with China. The state has ordered a number of Mi-17 helicopters in the mid-90s, and ten MiG-29 Fulcrum combat aircraft in 2001. Additional 20 MiG-29K aircraft were ordered late 2009 as part of a \$570 million deal. The deal also includes an order for ten M-35 attack helicopters.

Thailand

Thailand is a state, which traditionally very much dependent on US arms, but recently the state has ordered three Mi-17 helicopters in a \$27 million deal, to fulfill their requirement. The 2008 deal comes with the option for three more helicopters.

Vietnam

Vietnam has operated a number of Soviet and Russian aircraft over the years, and the recent orders of Su-27SK and Su-30MK2V combat aircraft are just the latest in the long history of Soviet/Russian aircraft in service with the Vietnam Air Force. Other combat aircraft in service with the Vietnam Air Force include the MiG-21Bis Fishbed, Mig-23ML and Su-22 Fitter. The Vietnam Air Force also operated a number of Yak-52 prop trainers and has ordered eight Yak-130 jet trainers.

Vietnam has also ordered Mi-17 transport helicopter to beef up their fleet of helicopters, which consists of Mi-8 Hip, Mi-6 Hook, Ka-25 Hormone, Ka-27 and Ka-35 Helix as well as other helicopters of French, Polish, US make. Vietnam Air Force also operated about three dozen Mi-24 attack helicopters.

The Vietnam Air Force is operating a number of Russian aircraft in the transport role, including the An-2 Colt, An-26 Curl, and An-38. For reconnaissance purposes, the Vietnam Air Force operates a small fleet of An-30 Clank.

M.G.Mahmud,
Editor of ADJ

Specially for Air Fleet magazine



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INDIAN DEFENCE INDUSTRY: PROJECTS & PROSPECTS

Projections no doubt are impressive. Indian defence procurement is projected to rise to an estimated USD 42 billion (including USD 19.20 billion for capital acquisition) by 2015 which could make the country as one of the most attractive markets in the world.

The defence capital expenditure budget is expected to achieve an impressive compound annual growth rate (CAGR) of 10 per cent from 2011 – 2015. Total indigenous production over 2011-2015 is estimated to need to expand from approximately USD 30 billion to more than USD 70 billion in the span of five years to be able to achieve 70 per cent indigenisation by the year 2015.

It is estimated that India is likely to spend nearly USD 80 billion for the next five years (2010-2015) on capital expenditure. In this background, foreign defence suppliers can ill-afford to ignore this huge market. In fact, they are seeking to incorporate the Indian defence industry into their global supply chains. The opportunities are immense – particularly in key domains of maritime,

land, aerospace and electronics – if they understand the Indian defence requirements and domestic industry capabilities.

There is little doubt that there is a huge opportunity for foreign players to partner with Indian defence industry in terms of formation of joint ventures and technology partnerships between them. The aerospace and defence sector is growing at an unprecedented rate and emerging as a key participant in the Asia Pacific region. Foreign OEMs are now looking at India as a critical market as well as a potential manufacturing partner.

Over the past decade, the Defence Ministry has put into motion plans for an

unprecedented modernisation programme of its defence capabilities. In this context, India has embarked on a major defence acquisition programme, aimed at increasing the size, capability and self-reliance of its Defence Armed Forces. In the Union Budget 2010-11, expenditure of about USD 32.03 billion has been earmarked for national defence.

Experts said while it is clear that India is seeking a high level of self sufficiency in delivering its ambitious defence re-equipment and expansion programme, it is also evident that there will be a high level of reliance on overseas interests to supply the necessary technology in a number of

■ FDI in defence industry is indeed essential





India may become a major defence production hub

areas. They say India is gradually becoming a key outsourcing hub for the global defence industry. The continuous revisions of the Defence Equipment procurement procedures in the recent past suggest the intent of the Indian Government to streamline the procedures and make the system more transparent and speedier.

It was noted that India is considered as the next destination of manufacturing given country's strength like wider supplier base, low cost manufacturing, persistent focus on infrastructure development, huge pool of skilled workforce and increased penchant for enhancing competitiveness by the respective domestic firms.

India has set a target for 70 per cent of new acquisitions in the future to be sourced from indigenous production. So, to meet the target of 70 per cent indigenisation, local industry should achieve an average growth rate of 30 per cent a year over the next five years.

But an Indian defence industry official said the current offset contracts are still not sufficient for Indian industry growth and hopefully the target for offset contracts at USD 10 billion by 2011 will give further boost to the industry.

Use of offsets, transfer of technology, FDI and the public and private sector defence industries in India should be brought together in a comprehensive defence

industrialisation strategy for India.

The sheer volume of planned expenditure is expected to create new opportunities for foreign firms, as total spending will grow in absolute terms. India is also host to a mature manufacturing sector, which means it will often be able to offer more cost-competitive terms for large platform builds.

India is currently the 10th largest defence spender in the world as the Government is continuing active support to develop and enhance the defence procurement process.

The defence industry in India is poised at an inflection point in its expansion cycle driven by the modernisation plans, the increased focus on homeland security, and India's growing attractiveness as a 'home market' defence sourcing hub.

Opportunities

Indian Industry is upbeat about the opportunities in defence and aerospace, and eager to grow its industrial capabilities in this space, but is looking to Government to continue its process of developing and fine-tuning the procurement regime and industry drivers that will enable industry to grow a robust and sustainable defence industry in India.

India currently procures approximately 70 per cent of its equipment needs from abroad, but aims to reverse this balance

and manufacture 70 per cent or more of its defence equipment in India.

The government has put in place the building blocks to incentivise the growth of a domestic defence industry, which on its part has identified three areas where it is seeking further Government input. These are the procurement process, the need for a defence industrial strategy for India and tax and regulatory incentives.

India is at a hugely exciting juncture in the growth of its defence industry. By leveraging its own major defence procurement cycle and its inherent skills and capabilities, India can use this opportunity to become a major defence production hub for both domestic and global defence systems.

With skilled intensive manufacturing capabilities and a world class IT base, India has the right ingredients to become a key link in the global defence supply chain.

The outlook is bright, but will require Government's on-going active management and fine-tuning of policy, regulations, process and fiscal environment to help ensure strong domestic growth and achievement of self-sufficiency.

However, Indian industry also needs to respond to this opportunity in a rapid and well structured manner.

Strategy for defence

Defence production is seen as an opportunity not only for the industrial majors in India, but also for a large number of Micro, Small and Medium Sized Enterprises (MSMEs) which are now turning their attention to the unexplored defence sector which promises sustained business opportunities.

The need of the hour is to combine the skills of the public and private sectors to develop a partnership that can achieve the aim of self-reliance in defence production.

There is a need for a comprehensive industrialisation strategy for defence, and within this, a holistic approach to the roles of offsets, transfer of technology, FDI and the various public and private industry players. There is also strong support for extending the use of offset credit banking, allowing offset credit trading, and

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introducing the use of multipliers. Offset investment requires greater direction by Government, targeting to ensure its full potential benefit is realised

Transfer of foreign technologies to India is essential for realising the goal of self-sufficiency. Receipt of technology assets under major procurements is currently the exclusive remit of the Defence Public Sector Units.

Industry is hopeful that with the DPP Amendment 2009 and its introduction of the Buy and Make (Indian) category, it will start to see private sector companies competing with the DPSUs for technology assets.

Experts say India needs to take bold steps in FDI policy for the defence sector. The government has said it favoured continuing with the FDI limit of 26 per cent.

Offsets obligation should be instrumental in inviting technology to India. India needs

the Tata Group, Godrej & Boyce, Bharat Forge, Larsen & Toubro, the Mahindra Group, Kirloskar Group, Samtel and other companies ramping up their aerospace and defence capabilities, it's likely that there would be increased opportunities not just for the existing SMEs to scale up but for new SMEs to explore business opportunities in this sunrise sector.

Indian Defence budget for 2009-10 is USD 31 billion, and expected to reach USD 100 billion mark in the next ten years. The Government of India has been undertaking initiatives to encourage participation by the private sector. Huge opportunities exist for maintenance and repair, avionics, communication systems, control system design and software design among others.

The global recession and significant margin pressures will continue to force global OEM and Tier-1 suppliers to undertake

ers who are already seeing benefits in establishing a strong presence in India. The effective implementation of the offset policy coupled with an attractive FDI policy can tremendously speed up the pace of indigenisation. Domestic aircraft demand, cost arbitrage and India's Offset policy, are compelling aerospace majors to consider setting up subsidiaries, enter into joint ventures or outsource design, components, sub-systems, accessories to the Indian aviation industry.

India received the largest number of R&D and engineering design investments. The domestic industry, however, is not in favour of Foreign direct investment (FDI) in the defence sector raising raised to 100 per cent from the present 26 per cent, but is pushing for increasing the FDI limit to 49 per cent. In May 2001, the government allowed the participation of the private sector in the defence industry permitting 100 per cent equity with a maximum of 26 per cent of FDI, subject to licensing.

Under the 2008 Defence Procurement Procedure, up to 49 per cent FDI was allowed on a per case basis. However, the foreign investment promotion board is yet to approve the formation of a venture with a 49 per cent FDI component.

"FDI in defence industry is indeed essential because most defence products involve a relatively high level of technology and this technology gets transferred only if the foreign partner has a long term stake in the company. The aim of seeking FDI by India in its defence sector may be to get both funds and technology," a key defence industry official commented.

There is a suggestion that the current 26 per cent FDI in defence may be increased and joint venture (JV) with foreign partner should be encouraged in research and development, and the intellectual property rights should be kept with the JV.

Foreign partner should ensure JV's access to the global market, subject to the government approval. The partner should bring high level specialised technology that is not easily available.



national defence policy wherein global interdependence can be leveraged in the most optimal way.

According to a recent report, there are currently over 6,000 SMEs supplying around 20-25 per cent of components and sub-assemblies to Defence Public Sector Undertakings, Ordnance Factories, DRDO and the armed forces.

With opening up of the defence sector and the leading industrial houses such as

major restructuring and cost cutting exercises. Emerging economies like India, which provide significant cost benefits are being increasingly considered as an outsourcing destination for manufacturing. The defence offset policy and its inherent strengths position India as an attractive investment destination for the aerospace industry.

Offsets provide an added incentive to global aerospace majors and their suppli-

Indian import syndrome

India should consider incentives like tax holidays and grants, and leverage its technical manpower against foreign technology. Besides, import of dual use technology should be encouraged as it benefits other segments of the economy also. The best bet against the import syndrome – which is susceptible to black mail by technology denying regulations – is to utilise the competencies of Indian industry, skill sets and talent in defence domain towards qualifying and quantifying the level of 'self reliance' of the nation, the user, developer and producer forms a triad on which hinges the national strategy and the interest of the country.

At present, India is sourcing most of its defence requirements from external sources, so much so that its dependence on external sources is to the tune of 70 per cent. This dependence is in terms of import of new weapons, systems, as well as upgradation and overhaul of existing systems.

Considering India's status as a global economic power, experts believe this is a highly undesirable situation. Moreover, India's export base is also woefully meagre. The Government realises fully well the adverse impact of over-reliance on external sources in meeting India's critical defence needs, and has made it clear in no uncertain terms that self-reliance in critical technologies is its primary objective.

On its part, the Government has taken some concrete policy decisions to reverse the present trend. Since May 2001, the Government has allowed, 100 per cent participation of private sector in the defence production, with an additional provision of 26 per cent through FDI. As a result of this, Defence production has moved from the 'Reserve Category' to the 'License Category', where the private sector can produce any defence item after obtaining a license for its production. The private sector has thus, got an opportunity to transform into system producers and integrators, from their earlier role of suppliers of raw material and components. Due to economic reforms and liberalisation, India's private sector has shown dynamism, taken rapid strides, and emerged as a competent force.

There is little doubt that the private sector, along with the public sector enterprises will help India translate the vision of self-reliance into a reality. The private sector and the public sector need not necessarily view each other as 'potential rivals', but rather as 'prospective partners' in defence industry.

In addition to the liberalisation of defence production, India has periodically revised its Defence Procurement Procedure to promote indigenous development of weapons and systems under the "Make" category. Under this category, India has proposed that the Government would share 80 per cent of the developmental cost with the developmental agencies, including those in the private sector.

A defence-specific offset policy is in place to enhance indigenous defence industrial capability, as also to usher in

defence PSU Bharat Electronics Limited's moves to forge a joint venture with foreign partner in the area of precision-guidance seekers for missiles has hit an air-pocket with FDI cap perceived as lower by potential suitors. The Bangalore-headquartered company has been pursuing nearly a dozen joint venture proposals, majority of them with foreign partners, for some time now but without headway largely due to interested technology firms overseas finding the extent of their equity well short of expectations.

Last year, the Government rejected a proposed joint venture between Larsen & Toubro and Franco German aerospace and defence group EADS, in the area of electronic warfare systems, avionics and radars, as it would exceed caps on foreign investment. Industry officials suggested that



transparency and responsibility. The policy has been drawn up to benefit the Indian industry through technology inflows, foreign investment, partnership with foreign companies and investment in Indian companies".

In the defence sector in India, upper limit prescribed for foreign companies to invest in joint ventures is capped at 26 per cent but a strong case is being made out to raise it to 49 per cent. For example,

FDI limit in defence industries be raised to 49 per cent and allowing up to 100 per cent FDI on a case to case basis, in high technology, strategic defence goods, services and systems that can help eliminate import dependence.

Sunny Jerome
Managing Editor,
AEROMAG ASIA

Specially for Air Fleet magazine

Dassault Mirage 2000BR



BRAZIL FLEXES ITS MUSCLES

In the last years, Brazil has been in the highlights of the world press, and it has no relation with the Soccer World Cup. Seem as one of the brightest economies in the South Hemisphere, a regional leader in Latin America, and a welcomed new player in world decisions; Brazil has, in some ways, needing to change the way the country look and think about itself. Recently, a top American attache told me that, in some ways, Brazil is like that son that grew up, finished his studies, but refuses to leave his parents' home. This kind of "self-esteem" problem is clear when the Brazilian media criticizes president Lula's government for trying to make Brazil a world player.

Someone could say – "Brazilians are used to think small (except in soccer, of course)".

But Brazil has nothing in common with "small". The country is continent size, and has gas, strategic minerals and fresh water resources of world importance. Now, for the first time in its history, the government created an official politics connecting this resources, the social and economical targets, and the military power needed to achieve (or better, to guarantee) these goals. A Ministry of Defense was created in June 1999, becoming responsible for a National Defense Strategy Plan, which has one of its priorities in the modernization and re-equipment of the Brazilian Armed Forces.

The Fighter Tender Soap Opera

And what military programs are today on the way?

Let's begin with the Air Force. The For a A rea Brasileira (FAB, Brazilian Air Force) is since late 90s, looking for a modern, 4th generation, multirole fighter. The first attempt was made in July 2000, during the president Fernando Henrique Cardoso government, and the competitors for the tender were the so-called Dassault Mirage 2000BR (France), Sukhoi Su-35 (Russia), Saab JAS39C Gripen (Sweden) and Lockheed-Martin F-16C Block 52 (USA). From non-official sources inside the FAB, it's known that the JAS39C was the "winner", with the Su-35 in the second

place. But political questions, and economical disputes (Embraer put itself as a Dassault partner), resulted in the tender being cancelled, without a winner, by the next president, Lula.

In the meantime, FAB had to put out of service its remaining Mirage III E interceptors, and as a stop-gap solution, Brazil bought 12 Mirage 2000, from the stocks of the Arm e de l'Air (French Air Force), but it was in no way a first-step in the direction of a French choice for a 4th generation fighter. Only in November 2007, president Lula allowed a new tender for a real new fighter. Almost a year later, in October 2008, an official commission selected the "short list" winners – Dassault Rafale C (France), Saab JASNG Gripen (Sweden)

and Boeing F-18E/F Super Hornet (USA). It was a surprise, as one of the preferred planes (and the “winner” for FAB’s fighter pilots) in the initial FX tender, the Russian-built Sukhoi Su-35, was put out in the new selection.

In September 2010, president Lula himself expressed his preference for the French fighter, and also the Defense minister, Nelson Jobim, did the same – but apparently, it was not the opinion of the Air Force. In January 2011, the official analysis made by FAB was “released” (non-officially) to the Brazilian media, making clear that FAB considered the JAS39NG as the best choice, with the Super Hornet as the second. The result was a real political crisis between the Presidency, the Ministry of Defense and the Air Force – and the result was... silence.

An official decision was expected to April 22nd 2010, Day of Fighter Aviation in Brazil, but nothing occurred; and since then, the so-called F-X 2 tender is paralysed, not to say, dead. 2010 is an presidential election year in Brazil, and as time goes, it seems far and far away the chance

es that president Lula will want to take any decision in a so delicate issue, which may generate problems for him with the military people and the general public opinion – and, of course, reflects in the performance of the president’s candidate, Dilma Roussef. Recently, during a trip to Europe and after a meeting with the French president, Nicolas Sarkozy, Mrs. Roussef told to journalists that the F-X 2 tender was not an issue discussed by her with Sarkozy. Asked if she has the same Lula’s preference for the Rafale, she shortened answered – “I had no preferences for anything”.

So, the future of the multirole fighter tender is uncertain...

The Question of Trainers

Today, there is no official requirement from the Air force for new trainers, and in the current structure, Brazilian military pilots begin their flying instruction in the piston-engined T-25 Universal, then go to the turboprop-engined T-27 Tucano for the advanced stage. After that, for future fighter pilots, the combat training is made with the A-29 Super Tucano (which is re-

placing in this role the jet-powered EMB-326 Xavante). But the training version of the light-attacker Super Tucano is hardly a good solution for the advanced stage of fighter training. It lacks speed, endurance and maneuverability for that challenging role. Above all, it is not a jet. And the situation becomes worst if Brazil finally decides to buy a 4th generation multirole fighter, which certainly would create an even bigger gap between the operational fighter force and the available trainers.

So, although there are still no official tender, the new Italian-built jet trainer, the Aermacchi M.346, is already being marketed in Brazil, and also the Korean-built T-50. But, when and how the Air Force will choose a jet trainer is still a question not answered.

In other side, the T-25 fleet is approaching its 35th anniversary; and the T-27 fleet is not much younger, these planes are close to be 30 years-old. In fact, the T-27 will have to be replaced before the T-25. Anyway, there also an ever greater need for a new basic trainer and a new advanced one. Bu, by now, nothing is being even discussed about it – at least, in public...

The T-25 fleet is approaching its 35th anniversary; and the T-27 Tucano fleet is not much younger, these planes are close to be 30 years-old

Mi-35M, The First Ever Brazilian Attack Helicopter

But, the needs of the Air Force are not only fighters. And in other areas, real things are happening. On April 17th 2010, in an official ceremony at Porto Velho Air Base, in the Amazon Region, the Brazilian Air Force accepted its first three Russian-built Mil Mi-35M attack helicopters. In total, Brazil purchased 12 of these machines, which are the first ever Russian-built combat flying assets operated in the country. They are being delivered directly to the 2 Squadron of the 8 Group (2 /8° GAv), which were moved from Recife (Atlantic coast) to Porto Velho (Amazon Region), and the new helicopters will operate mainly in cooperation with the Super Tucano turboprop attack planes, against illegal flights in that area (specially, the ones connected with drugdealers) and also against border intrusions by foreign guerrilla groups (like the Colombian



T-27 Tucano

World Wide Reviews

FARC). The Brazilian Army Aviation tried to “add” at least four more Mi-35M to the original contract, but it doesn’t happen so far. But an attack helicopter has been a long time requirement from the Army, and if the experience with the Mi-35M operated by the Air Force be successful, there are great chances that the Army Aviation become the next client of the type in Brazil.

Also talking about rotary-wings machines, Brazil signed with France an mutual strategic cooperation agreement which has as its most important programs the development of a nuclear-powered submarine in Brazil (with French technology) and the local production, in Brazil, of the Eurocopter EC.725 heavy-medium multirole military helicopter. The today’s planning foresees the first of these attack submarines, with nuclear-plant propulsion, being delivered by 2021; but it is already on the way the enlargement of Helibras (Brazilian Eurocopter subsidiary) plant in Itajub town, which will house the local EC.725 production line. The first three are scheduled to be delivered already by this year’s end, and the total production will be of 50 machines, which will be split between the Air Force, the Army and the Navy. Of course, each Force’s batch will have its own modifications, due to specific requirements.

Brazil and the BRIC

In another field, this new positioning of Brazil in the world-wide scenery has been having reflexive in a visible increase in his diplomatic acting in the last years, like one more form of obtaining recognition as much more than just a regional power, and in this context, the country has been looking actively for a bigger integration with other members of the so-called BRIC (group of fast-growing economies composed by Brazil itself, and also Russia, India and China). In Brazilian government eyes, the country may obtain a new level of world projection if associates itself with an economic “super-power”, like China, or a world major player in the energy market, as Russia.

But the agenda of the other BRIC members may be different.

China is already the third biggest economy in the world, so it absolutely doesn’t need Brazil or the BRIC itself to play strong in the world arena. Russia, by its side, is already a G-8 member, and already has a strong ally in South America – Hugo Chavez’s Venezuela. And it’s important to note that both Russia and China are already permanent members of United Nations’ Security Council. Also, in the context of BRIC group, only Brazil is a non-nuclear power.

And another crucial difference between Brazil and the other BRIC members are in the military industry. With the glamorous exception of Embraer, Brazil doesn’t have military industries capable of offering high-technology hardware in the world market. The once powerful Avibras, which produces the multiple artillery rockets launcher system Astros-II, is today just a pale shadow of it was in the 80s. The helicopter manufacturer, Helibras,

is just a subsidiary of Eurocopter, and so don’t have much ambitions outside Brazilian borders. A similar situation is Aeroeletronica, an advanced avionics manufacturer in Brazil, which is a subsidiary of the Israeli Elbit Systems. And, if the Brazilian defence industry has these connections with European, American and even Israeli companies; there isn’t anything like that with Chinese, Russian or Indian companies. To be true, historically, the economical and industrial relations of Brazil with the other BRIC members has been little more than marginal.

But things may change – and the Russian-built Mi-35M now operating in the Amazon Region, in Brazilian Air Force markings, is a proof of that.

The world is moving. And so is Brazil.

Claudio Lucchesi,
ASAS Magazine publisher,
specially for Air Fleet magazine

In total, Brazil purchased 12 Mi-35M attack helicopters, which are the first ever Russian-built combat flying assets operated in the country





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