

Conflict Studies Research Centre



**The State of the Russian Aviation
Industry and Export
Opportunities**

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Key Points

* Exactly what has the management of the aviation industry done to maintain the workforce and to keep the enterprises running? For major aviation companies such as Irkut Corporation, RAC MIG, Holding Sukhoi and its associated enterprises, Mil Helicopter Plant with its associated enterprises, export of military craft and helicopters was and still is the prime strategy of survival. The domestic market was and still is in very bad financial shape and government promises to provide funds (via the Ministry of Defence and/or the Air Force Command) have not as yet materialised. As a result, any figures on research and development spending in the aviation sector need to be looked at very carefully. Very often, they reflect the wishes of the government and the defence industry officials, but they do not correspond to the bleak realities. There is also an inherent disparity between official statements that state defence orders have been increasing over the last two to three years, and the reality on the ground. Orders backed up by real finance and not merely promised funding for a limited number of new aircraft and a slightly larger number of new helicopters may appear on the horizon by the end of 2007 to early 2008 and/or later. As for fifth - generation aircraft, the story is a little different. There is a clear understanding by Sukhoi and others that the government still doesn't have the money to support the project. Nevertheless, the decision has been made that the project goes ahead with and/or without government support. There is however, an additional element of uncertainty, namely whether European Union member states such as, for instance, France, Germany and possibly Italy may join the programme. It is also unclear whether India will go along with it. It appears that the People's Republic of China is not interested.

* In the engine sector, the situation has stabilised and several large corporations such as Salyut, Saturn and UMPO have emerged. As for navigation and on - board equipment, Technocomplex appears to be the leading corporation. The St Petersburg based electronics firm ZAO Aerokosmicheskoye Oborudovaniye is as important as Technocomplex, and it seems

that these companies have managed to survive and become successful as a result of their export policy.

* Over the last fifteen years, the total number of enterprises in the aviation sector has declined by 10 to 20 per cent from officially recorded 293-306-315 to about 240-270 and this number is likely to decline further to about 220 or less. The crucial question remains, how many of them are still operational and what has happened to the rest? It can be suggested that between 80 and 100 enterprises are actually operational. The rest have either ceased to exist or left the aviation industry altogether, although they are still registered in the sector. However, many enterprises have been sidelined and/or are hoping that with the revival of the domestic market they will return. How many of them will survive through the difficult times remains unclear. For instance, the Saratov Aircraft Plant is currently producing consumer goods and not aircraft. Samara-based Aviacor formerly manufactured Tu-154s, but with the end of production it managed to get a new contract to manufacture the An-140. The rate of production, however, remains minimal and despite a new contract the future of the plant remains uncertain. On the other hand, the good fortune of the Sokol Aircraft Plant has so far been an exception to the rule.

* The official number of employees, 0.5 million, has been kept on the government payroll to avoid creating unemployment. The style of management differs from enterprise to enterprise. Some managers have been bold enough to reshape the structure and the working style of their enterprises; others remain unsure of what to do and which direction to follow.

* Airbus' financial investments in the Russian aviation industry have so far been rather modest: \$US3 million, \$US10 million, \$US200 million in a 10-year deal, or \$US20 million annually and/or even a \$US70 million purchase of 10 per cent stake in Irkut are not as large as Russian government officials would wish them to be. It means that Airbus consider the Russian aviation sector less attractive, than for instance, the Chinese. Government officials tend to exaggerate the importance of the Russian aviation market to the Western countries.

* The future of a co-operative project called 'Russian Regional Jet' remains uncertain, although the governments of Russia and France have allocated funds. It needs to be remembered that during these governments' previous co-operation on the installation of French engines and avionics, and the manufacture and the marketing of the MiG-AT combat trainer aircraft, the Russian and French governments provided financial support; however, very few MiG-AT have been ordered

by the Russian Air Force. So far the MiG-AT has not been exported as had been envisaged. Other examples of co-operative projects highlight their limited scope because they are primarily aimed at external markets. The Russian domestic market has so far been kept under tight control.

* The military aviation sector was streamlined and has the potential to prosper in the years to come in spite of gloomy forecasts. The commercial sector remains in disarray; it has not been restructured in spite of the various plans that have been proposed in the last fifteen years, and is likely to face a bleak future.

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The State of the Russian Aviation Industry and Export Opportunities

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Introduction

It is important to stress that this report deals with a variety of complex issues including various aviation industry programmes about which the author has been able to obtain concrete financial data. Unsatisfactory phrases such as 'lack of funding', 'lack of state funding', 'support for, albeit inadequately' and 'consideration is being given to more flexible funding', have not been cited in the report because they are not meaningful. In addition, statements such as, for instance, 'France may co-operate with Russia' or 'France will consider the possibility' need to be taken with a pinch of salt because of the vagueness of the language, which can also be misleading. The Russian press very often gives very general descriptions of what has occurred at the enterprise level since the early 1990s. It does, however, tend to shy away from providing financial estimates and other figures. On the other hand, spokespeople from a variety of enterprises remain vague in their own analysis and shed very little light on how this or that enterprise has managed to survive through the difficult times.

Here the author also attempts to give company structures and sales figures, however this is not always possible. On the other hand, technical characteristics and descriptions of the aircraft programmes are not cited here. They can easily be found either in the open press or on the Web.

As regards export opportunities, the author presents the current trends and attempts to chart future prospects. The author does not take into consideration the so-called potential export opportunities or memoranda of understanding, but deals with the contracts that have actually been signed and are being implemented. In addition, statements such as 'in principle' and 'in general' have not been considered. Emphasis is given to the important role that helicopter manufacturers have played and still are playing in the business. Their contribution tends to be underrated and sometimes is not considered to be as important as it actually is. There is a tendency to focus just on the export of aircraft and, as a result, to belittle the export of helicopters.

Some basic data

According to *Prospects of the Civil Aviation in Russia*,¹ in 2002 the aviation sector encompassed a total of 315 enterprises and research facilities, 166 enterprises and 149 research facilities and design bureaus. The same report cited the Accounting Office record, which stated that thirty-eight facilities dealt with technologies, fifty-six with scientific development, sixty-eight belong to the aircraft and helicopters sector, twenty-two dealt with special aviation equipment (details were not given), thirty-three dealt with engines, thirty-three belonged to assembly lines, while sixty-five belonged to instrument-making, including navigation instruments. The aviation

industry employed 0.5 million employees, while an additional 1.5 million were employed in associated industry enterprises.² Rosaviakosmos (the Russian Aviation and Space Agency) registered 306 enterprises belonging to the aviation sector. 76 are state-owned, while 230 are shareholding companies. Russia invested 27 million roubles (1 rouble = 2 UK pence) in 2002 and 63 million roubles in 2003 in the aviation sector, and was planning to invest up to 126 million roubles in 2004.³ It can be suggested that although the Accounting Office record was compiled in 2002, the total number of enterprises has not changed much. The author, however, disagrees with both sources of information and assumes that the number of enterprises has steadily declined since the early 1990s and is currently somewhere between 240 and 270. In addition, between 80 and 100 enterprises are actually operational.⁴ Employees have been kept on the government payroll in order to mitigate the so-called social unrest. The average monthly wage per person in the aviation sector is about 8,500 roubles,⁵ or about \$US290. It is important to note that the average monthly wage in the aviation sector has steadily increased from 5,194 roubles in 2002 to 6,549 roubles in 2003,⁶ and to 8,500 roubles in 2004.

For instance, during the 1990s the engine sector of the aviation industry was receiving between 25 and 30 per cent of total investments. In 2003 investment totalled 12 per cent of the overall investment, while in 2004 it totalled 14 per cent.⁷ According to Konstantin Makiyenko, deputy head of the Centre for Analysis of Strategies and Technologies (CAST), although the state is currently awash with money, 'our bureaucrats, including defence bureaucrats, are incapable of managing them. As a result, no single programme gets enough financing to become a mass-produced product'.⁸ Valery Bezverkhnyy, vice-president of the Scientific Production Corporation Irkut (also known as Irkut Corporation and/or Irkut) claims that the government needs to increase spending on aviation from 13 per cent of the defence budget, namely from \$US650 million of \$US5 billion in 2003 to 35 per cent over the next five years. He continued, 'At the present level, in five years there will be nothing left but ash'.⁹

As far back as 2001 the aviation industry's share of total arms sales was over 50 per cent, production grew by 40.2 per cent and the joint profit was over 17 billion roubles.¹⁰ In 2002 aviation's share of the total arms sales from Russia was about 67 per cent at \$US3.2 billion. The same share was envisaged for 2003.¹¹ Figures released by the Russian arms-trade company Rosoboronexport show that the 'bulk' of the \$US5 billion was generated by the sale of combat aircraft and air-defence systems.¹² Until recently, Russian military aircraft made up 25 per cent of global combat aircraft export trade. After 2003, Russia's share in this market began to decrease as a result of the conclusion of earlier contracts with the People's Republic of China (PRC, China) and India. According to Viktor Khristenko, Minister of Industry and Energy, arms sales generated between \$US2 billion and \$US2.5 billion in annual sales for the aviation sector, well short of the \$US5 billion to \$US6 billion envisaged. The latter figures would have allowed Russia to position itself as a top aviation manufacturer. Khristenko also added that, as a result of low sales, Russia could be out of the competition by 2010.¹³

2005 has delivered a rude awakening to the Russian aviation industry. For the first time since 2000 aviation's share of Russia's annual \$US5 billion defence exports fell from the 65 per cent of 2004 to an estimated 20 per cent.¹⁴ Furthermore, in 2005, for the first time in recent history, Russia did not deliver a single Su aircraft. New aircraft contracts are expected with Algeria, Indonesia and Thailand, but negotiations have been slow due to government and environmental problems in those countries.¹⁵ Is aviation's share likely to fall in the next three to five years? Such a possibility cannot be dismissed outright and much depends on the

competitiveness of the aviation sector and Rosoboronexport's efforts to look for a new market beyond China and India. This issue will be discussed in Section 5 below.

As far back as May 2002 it was reported that US Congressional analysis suggested that the American and Russian military aviation industries shared similar pressures; among them the need for continuing consolidation and the drive to sell more aircraft overseas. Non-Russian research contracts in 2002 made up 32 per cent of the work of TsAGI, which is the major Russian aviation research facility. Only 10 per cent comes from Russian aviation companies.¹⁶ It can be said that in the early 1990s the engine industry lost people and capability. For instance, up to 1999 the number of workers employed in the enterprises and the design bureaus decreased yearly by 10 per cent, then from 2000 the number of workers increased annually by about 2 to 7 per cent.¹⁷ As a result, the industry has not fully recovered from the losses of the early 1990s. In addition, several design bureaus in the engine sector have ceased to exist. As a result, organisations such as the Moscow-based Salyut Machine-Building Production Organisation and/or Association (also known as MMPP Salyut and/or Salyut) and the Ufa Machine-Building Production Organisation (also known as UMPO) took over and/or set up their own design bureaus. According to Valery Bezverkhnyy, 'Much of the real manufacturing capability has already been lost. Today the capacity is really very small'.¹⁸ How small remains unknown. It also needs to be stressed that a large number of domestic suppliers and manufacturing facilities ceased to exist because of a lack of domestic orders. In order to understand fully what constitutes the current aviation industry sector, we will now examine the company profiles.

1. Company Profiles

According to *Krasnaya Zvezda* the worst years for the aviation industry were the mid-1990s. And yet, the management of **Salyut** paid regular wages and, as a result, managed to retain the skilled workforce and the modern technological base. Relying on that base, management continued to search for a new ways to effectively develop their enterprise, manufacture new goods and provide services for domestic and external markets. Salyut, which manufactures the AL-31F engine for the Su-27/30 aircraft, increased its defence revenue from \$US180 million to \$US239 million in 2001 and about the same amount was expected in 2002. The average monthly wage was 12,000 roubles or about \$US400. The ratio between civil and military production was and still is about half and half. Over the last several years, the management of Salyut has annually invested between \$US50 million and \$US80 million of its revenue to purchase modern equipment. Without such equipment the development of the engine for the fifth-generation aircraft would not have been possible.¹⁹ In addition to taking over its associated design bureau, Salyut has also established an institute for higher education for its skilled workforce.

UMPO decided to follow the example set up by Salyut. Both organisations enlisted the assistance of experts in the engine sector from well-known research facilities such as TsIAM, VIAM and the Research Institute for Engines (NIID).²⁰ Salyut earned \$US239 million in defence revenue in 2001.²¹ Salyut, UMPO and the Scientific Production Organisation Saturn (also known as NPO Saturn and/or Saturn) earned \$US907 million in 2002 and \$US1042.4 billion in 2003.²² Saturn earned \$US268.8 million, and UMPO \$US390.6 million respectively in 2003.²³ Salyut earned \$US311.2 million, while UMPO earned \$US345.7 million in defence revenue in 2004.²⁴ In 2002, however, Salyut together with the Holding Sukhoi was given a licence to provide after-sales support, from which Salyut earned \$US38 million in

2004. In addition, in July 2005 Rosoboronexport signed a contract with China on behalf of Salyut to supply one hundred AL-31FN engines at a cost of \$US300 million.²⁵

Another interesting example of a regenerated enterprise has been **Saturn**. Saturn was formed by the merger of the Design Bureau Lyulka-Saturn and the series production plant Rybinskiye Motory and the shift to a single stock. The President of the new structure, whose company was announced in the summer of 2001, Yuri Lastochkin, has been building up the corporation, while overcoming the fierce resistance of minority shareholders, and being surrounded by the competing engine-building plants Salyut and Permskiye Motory.²⁶

NPO Saturn proceeded with general restructuring of its design bureau's technical base, the engineering corps was also restructured, and new equipment was installed in the sections which define the effectiveness and quality of the production processes. The marketing, economic and financial operations have been substantially enhanced and, as a result, Saturn was brought up to world standards. Saturn has also established long-term communications with domestic and foreign partners.²⁷ Undoubtedly, the success of Saturn attracted highly qualified workers to move from the Perm-based Aviadvigatel Design Bureau to Saturn. Between 1998 and 2003 more than fifty leading engineers, designers and managers left Aviadvigatel to work full-time at Saturn.²⁸ The average monthly wage at Saturn was 10,000 roubles or about \$US330. Another important aspect is higher education. Saturn pays for tuition for the children of its employees. As a result, it takes care of its further generation of skilled and well-educated workers.²⁹

On 16 August 2005 a contract was signed between Rosoboronexport on behalf of Saturn and Hindustan Aeronautics Limited (HAL) for licensed production of a thousand engines by the Indian firm. According to Yuri Lastochkin, the \$US300 million deal covers the development and licensed production of AL-55I engines for India's HJT-36 trainer aircraft.³⁰ Saturn will also deliver 240 D-30KP-2 engines for the IL-76 and IL-78 aircraft that China recently purchased from Russia and will be paid more than \$US300 million. According to Lastochkin, this sum will be invested in the development of the company and the same money will also allow the completion of the development and beginning of serial production of a new engine for the military transporter.³¹ According to Alexander Piontkovskiy, Saturn's director for Information Technologies (IT), Saturn has purchased the most advanced equipment, which was distributed over four industrial sites located in Lytkarino, Moscow, Rybinsk and Volzhsk. The corporate centre is equipped with a server that, according to its production capacity, is the third largest in Russia. Saturn continues to purchase IT equipment and also plans to increase computer base capacity.³²

In addition, it is worth mentioning ZAO **Aerokosmicheskoye Oborudovaniye** (Aerospace Equipment), which was established in 1998 and incorporated more than thirty aviation industry enterprises. According to a decision by the Russian government, Aerospace Equipment was named the leading supplier of military avionics for the 140 Su-30MKI that will be produced under licence in India.³³ In addition to India, China largely remains the main customer of the company. Mikhail Dmitriyev, chairman of the Russian Committee on Military-Technical Co-operation (MTC or Komitet po Voenno-Tekhnicheskomu Sotrudnichestvu (KVTS)) signed a decree granting a licence to Aerospace Equipment to provide after-sales support.³⁴ Aerospace Equipment earned \$US444.2 million in defence revenue in 2004.³⁵

Technocomplex research and production centre also needs to be mentioned. It was established in 1997 and brings together seventeen designers and manufacturers of aircraft on-board equipment with a total workforce of over 33,000. Technocomplex has about \$US1 billion on the order book for the foreseeable future, but at the same time it is continuing to expand its market opportunities. It has accumulated no debts and has a steady flow of orders.³⁶ For instance, in 2002 Givi Djandjgava, president of Technocomplex, stated that the volume of sales of the centre was between \$US400 million and \$US450 million annually.³⁷

1.1 From the Irkutsk Aviation Production Organisation (IAPO) to the Irkut Corporation

The best known example of a successful private company is Su-maker Irkut. However, it needs to be emphasised that, in spite of Irkutsk Aviation Production Organisation's lean times in the early 1990s, it has retained its workforce and manufacturing capacity and developed new aircraft. Undoubtedly, the major contract with India to manufacture and deliver the Su-30MKI, which was signed in 1996, was the turning point in the history of IAPO. The quantity of experimental and design work was so large that IAPO had to invest more than \$US200 million of its own as well as calling on external financial backing.³⁸ In 2001 with the arrival of a new management, a serious shift was made in the direction of the company. According to Sergei Tsivilev, senior vice-president of Irkut, the main task facing the management was the building of a transparent public company that could use its advantages in the market.³⁹ Such characteristics as a readiness to take risk, to be responsible for its actions and to be advanced players have become the key elements of company strategy.⁴⁰ Alexander Sergunov, chief technology officer of Irkut, also noted that the company has invested \$US30 million in over 250 new machines since 2001 and was expected to complete the programme with an additional two years' investment at \$US10 million a year.⁴¹ No further information has been published on the completion of the programme.

Alexey Fedorov, Director-General of Irkut, noted that the company plans to increase the civil side of its business to about 50 per cent of revenue from the current less than 10 per cent, adding that the most likely move is to focus on niche products such as the Be-200.⁴²

Company structure and sales

Irkut Corporation (formerly IAPO) was established on 19 December 2002.⁴³ It was the first Russian company to be audited to Western accounting standards.⁴⁴ In 1997, the then IAPO took a 40 per cent stake in the Taganrog-based Aviation Scientific and Technical Complex Beriev (also known as Beriev Complex and/or Beriev), manufacturer of the Be-200, while 38 per cent was owned by the Aviation Holding Company Sukhoi (also known as Holding Sukhoi and/or Sukhoi). It followed this by buying a controlling stake in the Zhukovskiy-based Russkaya Avionika (or Russian Avionics), which specialise in navigation and targeting systems. In 1999 or 2000 it added the electronic design house Irkut-Aviastep.⁴⁵ Irkut has spent \$US70 million of its \$US127 million on the purchase of 75.46 per cent of the Yakovlev Design Bureau.⁴⁶ According to Elena Fedorova, press secretary of Irkut, it holds 20 per cent of the Saratov Aircraft Plant. Irkut received shares in the plant as a result of its acquisition of the Yakovlev Design Bureau.⁴⁷ The latter was one of the shareholders in the plant, but the other shareholders remain unknown. It appears that in early 2004 Irkut created a systems integration division and was going to offer its expertise to other Russian companies seeking to upgrade

military aircraft for the export market. Alexey Fedorov noted that the company gained valuable experience when integrating a multinational system package on the Indian Air Force's Su-30 MKI. The aircraft uses equipment from suppliers including Thales of France and Elisra of Israel as well as Indian and Russian suppliers.

The new division's first project was expected to be the development of an unmanned aerial vehicle (UAV) designated for para-public missions. The company will base the UAV's systems on the Aria 200 integrated avionics suite developed for the Be-200.⁴⁸

The make-up of the company shareholders is unclear; there are at least two versions. Irkut's major shareholders include the Moscow-based finance and consulting company ZAO Kompaniya FTK (20.6 per cent), the Forpost Commercial Bank (20.6 per cent), the Holding Sukhoi (14.7 per cent), St Petersburg-based electronics firm ZAO Aerokosmicheskoye Oborudovaniye (10.18 per cent) and the Moscow-based ZAO Brunswick UBS Warburg Nominees (nominal holder, 25.76 per cent). Other corporate shareholders own 4.9 per cent and individuals 3.55 per cent of the shares.⁴⁹ However, according to *Defense News*, Irkut, which before the initial public offering (IPO) (on 26 March 2004) was 70 per cent controlled by its ten top managers, has seen this stake decline to 50.3 per cent, while the government's 14.7 per cent was reduced to 13.4 per cent. Of the 23 per cent offered on the market, between 12 per cent and 15 per cent ended up in the hands of foreign investors.⁵⁰

IAPSO sales in 2000 were 5.16 billion roubles, of which 4.95 billion were exported.⁵¹ *Defense News* in its annual grading of the top 100 defence companies noted that IAPSO was ranked 92nd in 2001 and earned \$US230.7 million in defence revenue.⁵² According to the 2003 ranking, Irkut was placed 58th in 2002 and earned \$US505.8 million. Irkut was 77th in 2003 and earned \$US468.4 million.⁵³ Finally, in the latest ranking Irkut was placed 66th in 2004, earning \$US624.5 million.⁵⁴

It is also known that in May 2004 Irkut had a \$US4.5 billion order book.⁵⁵ Airbus has signed a \$US200 million 10-year deal with Irkut for the supply of parts for its A320 family craft.⁵⁶

The European Aeronautic Defence and Space Company (EADS) and Irkut have declared their intention for EADS to take about a 10 per cent stake in Irkut. As a result, EADS would receive a non-executive position on the Irkut board of directors.⁵⁷ Irkut has for the first time named five independent directors to its eleven-man board. The six other members are senior executives at Irkut and its affiliates, now including Oleg Demchenko, Director-General of the Yakovlev design bureau.⁵⁸

Beriev Complex: On 4 July 2003 the newly elected board of directors of Beriev Complex met for the first time. Deputy Director-General Victor Kobzev presented a plan for the strategic development of the complex. The main aim is to maintain its special niche manufacturing position and to obtain the leading global position as a designer of amphibious, hydro- and naval craft for civil and military purposes. To realise this ambition, they are to: form a balanced portfolio order, fully computerise engineering tasks, recruit younger workers but at the same time to retain the key technical experts and, finally, invest funds in the abilities of highly qualified workers.⁵⁹

1.2 The Russian Aircraft Corporation (RAC) MIG

A less successful story is that of the RSK MIG (the Russian Aircraft Corporation MIG), which was established in December 1999. Between 1994 and December 1998

the company was called VPK (Voyenno-Promyshlennyy Kompleks/Military Industrial Complex) MIG. The company amassed heavy debts to the government banks (or perhaps the Ministry of Finance) that supported the production. Despite severe financial constraints, Nikolai Nikitin, Director-General of MIG, oversaw the reinvestment of export revenues in research and development and the construction of a modern assembly shop at MiG's manufacturing facilities in Lukhovitsy, a small town situated near Moscow. He also managed the diversification of MiG's military business by arranging the production of the Tu-334 commercial craft.⁶⁰ Nikitin was dismissed in early November 2003 and replaced by Valery Toryanin. Toryanin, as the Director-General of the RAC MIG, managed to reduce the debt to between \$US300 million and \$US500 million from \$US1 billion, but still failed to come to an agreement with the creditors and investors on additional credits.⁶¹ Toryanin was dismissed in late September 2004 and replaced by Alexey Fedorov. According to Fedorov, 'MIG is in debt, but the situation is not critical'. He added that the company has a plan to improve its financial health, upgrade its facilities, and negotiate with the Russian government to eliminate the nearly \$US300 million debt that it inherited from its previous management.⁶²

In 2001, the company signed \$US1 billion worth of contracts for thirty-six MiG-29s and in 2002 delivered \$US370 million worth of craft.⁶³ In 2002 it delivered \$US350 million worth of craft.⁶⁴ The company earned \$US190 million in 2003.⁶⁵ *Defense News*, in its annual grading of the top one hundred defence companies, noted that RAC MIG was ranked 88th and earned \$US403 million in defence revenues in 2004.⁶⁶ According to Alexey Fedorov, the company currently has orders worth more than \$US1 billion.⁶⁷

In October 2005 the company launched a programme of management restructuring. The programme envisages reducing the administrative staff by 40 per cent by the end of 2005. The financial savings gained from the redundancy programme would be allocated to raising the wages of qualified employees and enhancing the capabilities of the MIG Engineering Centre (also known as the MIG Design Bureau). The redundancy programme is directly linked to the market expansion of the company's products and the design of new aircraft technology.⁶⁸ The strong engineering centre was led by Vladimir Barkovskiy since 1999. In addition, the company owns a very expensive property, where the engineering centre was located for many years. The sale of this could bring in a substantial income, which is likely to be much greater than the current and potential contracts for MiG-29s and Su-30s.⁶⁹

In June 2004 the company average monthly wage was 10,500 roubles. The company envisaged raising this to about 11,500-12,000 roubles by late 2004.⁷⁰ Whether it has managed to do this is unknown. What is known, however, is that since 2002 the company average monthly wage has steadily increased.

RAC MIG holds 49 per cent of the Kamov Helicopter Plant; the remaining 51 per cent is owned by the Moscow-based AFK Sistema, a private financial and industrial group.⁷¹ AFK Sistema formed Holding Kamov, which was the marketing company since 2004. Holding Kamov's primary function is to market the Ka-32 and Ka-226 helicopters.⁷²

1.3 The Sokol Aircraft Production Plant (Sokol): Moving from the margin to the centre

According to Vasily Pankov, Director-General of the Nizhniy Novgorod based Sokol Aircraft Production Plant, in 2001 for the first time in several years Sokol made

income of 170 million roubles (\$US5.6 million), following losses by the company of 15 million roubles (about \$US500,000) in 2000 and 86 million roubles (\$US2.8 million) in 1999.⁷³ In 2004 Sokol earned 2.5 billion roubles in revenue, while net loss was 70 million roubles.⁷⁴

Pankov noted that when he was appointed Director-General of the plant in 1998, the MiG-21 upgrade order from India was the plant's only business. Furthermore, the order has generated relatively little income and/or development for the plant given that the plant's added value was very small and the major value of the order accrued was by VPK MIG, which was responsible for the design. Finding this situation to be both inequitable and slow, Pankov set up Sokol's own design capability and then sought to act as co-ordinator of the inputs from the aircraft's designer, the providers of avionics and other on-board systems including Phazatron in addition to Rosvooruzheniye (forerunner of Rosoboronexport).⁷⁵ However, unlike Alexey Fedorov, Pankov either did not want to or was unable to acquire a controlling block of shares in his enterprise and he failed to invest money in the research and development of an analogue to the Su-30MKI fighter in the light fighter class – the multifunctional MiG-29UBT complex with the Osa phased array radar.⁷⁶

Pankov also noted that the involvement in the plant's activities of the plant's controlling shareholder, the Kaskol Group, brought a new contract for parts of the fuselage and empennage of the Aermacchi's basic trainer the SF-260. Although the order was small, it involved both the training of over 100 Sokol workers in Italy and the certification of a number of Sokol's production facilities by the Italians, following favourable reports by the Federal Aviation Authority (FAA) in 1996.⁷⁷ On 21 May 2001 Airbus signed a deal with the Kaskol Group on behalf of Sokol to develop A318, A340 and A380 parts production.⁷⁸ There have been reports that Airbus signed its first supplier contract with the Kaskol Group in late December 2003 (this information is not correct). Under the terms of the agreement, Sokol and Irkut will manufacture 300 sets of floor grids for the fuselage section 13/14 of the A320 family through to 2008.⁷⁹ Under the January 2004 deal with India for the Admiral Gorshkov aircraft carrier, Sokol was contracted to build sixteen MiG-29K aircraft for \$US730 million.⁸⁰ Sokol also manufacture the Yak-130 combat trainer aircraft for the Russian Federation Air Force (RFAF). In 2005 the RFAF and Sokol signed a contract for Sokol to supply twelve craft between 2006 and 2007.⁸¹ It remains unclear, however, whether the RFAF have paid in advance for the craft or the company will receive payment on delivery.

A meeting of the shareholders of the Sokol Aircraft Production Plant took place on 3 June 2005. A new board of directors was appointed including eleven members. It is important to emphasise that four of the eleven members represent RAC MIG, one the Irkut Corporation, one the Sokol plant, three members the state, one the banking sector, and one the shareholder of the plant, the Kaskol Group. Alexey Fedorov has been appointed chairman of the Board of Directors. As a result, it can be stated that Sokol, which until recently has been sidelined from consolidation of the aviation industry, will be directly involved in consolidation of the companies and enterprises around Irkut.⁸² The state (probably the Ministry of State Property, Minimushchetvo) has a 38 per cent stake in Sokol, while about 50 per cent belongs to the Kaskol Group.⁸³

1.4 From the Aviation Military-Industrial Complex (AMIC) Sukhoi to Aviation Holding Company Sukhoi

The Aviation Military-Industrial Complex Sukhoi declared that in 2001 its revenue exceeded \$US2 billion. The exact figures at the time of publication are not known.⁸⁴ Since the formation of AMIC Sukhoi the average monthly wage in Komsomolsk-on-Amur Aviation Production Organisation (KNAAPO) (one of its associated facilities) has increased from 5,000 roubles to about 10,000 roubles. At KNAAPO the powerful Engineering Centre was created.⁸⁵ It needs to be stressed that, since December 1992, KNAAPO has been exporting Su-30 fighters to China. Recently KNAAPO has also received orders from Indonesia and Vietnam. This enabled KNAAPO to weather the financial difficulties, unlike some other aviation organisations. Although in 2004 and 2005 KNAAPO upgraded the Su-27 for the Russian Federation Air Force, the Air Force has not paid for the work, which has been valued at one billion roubles.⁸⁶

Company structure and sales

The government approved the creation of the Aviation Holding Company Sukhoi (formerly AMIC Sukhoi) in November 2003. The holding would have a 50 per cent stake in the Sukhoi Design Bureau, a 74.5 per cent stake in KNAAPO and Novosibirsk Aviation Production Organisation (NAPO), 38 per cent in Beriev and 14.7 per cent in Irkut Corporation. There are nine members of the company board, including Yuri Koptev, the chairman and Mikhail Pogosyan, the chief executive.⁸⁷

The Sukhoi Design Bureau established the Centre for Logistic Support, which takes care of after-sales support. As a result, for the first time in its history, the bureau performed as an independent authority and provided after-sales support of \$US110 million in 2003.⁸⁸ *Jane's Defence Weekly* reported that Holding Sukhoi earnings from after-sales support in 2004 amounted to \$US132 million, compared with \$US14 million in 2003 (though this sum was not correct, see note 89). In 2005 the company expects to earn more than \$US150 million. According to Mikhail Pogosyan, 'In its foreign economic operations with the supply of spare parts and provision of maintenance Sukhoi seeks to reach \$US200 million a year'.⁸⁹ In addition, in early 2000 AMIC Sukhoi established the Sukhoi Civil Aircraft (SCAC) subsidiary, which is tasked with the design and development of the Russian Regional Jet (RRJ).

Currently, the company generates more than 90 per cent of its revenue through sales and research and development in the military sector. However, by 2015 it aims to generate between 30 and 35 per cent from the civil sector, with a further 10 per cent from after-sales support. The remaining 55 to 60 per cent would come from the combat aircraft market and from research and development revenue.⁹⁰

Defense News in its annual grading of the top one hundred defence companies noted that the company was ranked 24th in 2001 and earned \$US1,522 billion in defence revenue.⁹¹ One year later, the company was ranked 38th and had reached \$US988 million in defence revenue.⁹² In 2003 the company was ranked 29th and had reached \$US1,425 billion in defence revenue.⁹³ Most recently, the company was ranked 34th in 2004 and reached \$US1,469 billion in defence revenue.⁹⁴

According to Alexander Grushevski, director for Information Technologies of the Holding Sukhoi, NAPO plans to establish a modern computer and engineering centre.⁹⁵ In early July 2003 AMIC Sukhoi signed a support and spares contract on behalf of NAPO with Algeria for the maintenance of Algeria's Su-24 strike aircraft.⁹⁶

It appears that Holding Sukhoi has been ready to invest an undisclosed sum of money in NAPO in order to maintain the plant's activities. The relatively small production of the modernised Su-24s and its replacement Su-34s have not yet been paid for by the Ministry of Defence (MoD) and/or the Air Force Command. It can be suggested that Sukhoi has been playing a risky game with NAPO by financially supporting the plant's activities and hoping that the MoD and/or the Air Force Command would pay for the work rather sooner than later. Whether this gamble will pay off remains to be seen. The plant's production of the An-38 has been very small, so small in number that even Russian sources have difficulty in counting them.⁹⁷

Ilyushin Corporation in the making: In accordance with a government decree, in February 2004 the merger began of the Intergovernmental Ilyushin Aviation Complex with the Voronezh Aviation Production Organisation (also known as VASO) and Ilyushin Aviation Complex. Victor Livanov, Director-General of the Ilyushin Aviation Complex, noted that creation of the Ilyushin Corporation will be completed in the first quarter of 2006.⁹⁸

Tupolev Joint Stock Company (JSC): On 6 December 2002 Igor Karavayev was appointed Director-General of the Tupolev Joint Stock Company. Tupolev JSC currently holds 44 per cent of the Tupolev design bureau, 44 per cent of the Ulyanovsk-based plant Agregat, 44 per cent of the Taganrog-based Taganrog Aviation (Tavia) and 49 per cent of the Samara-based holding company Aviacor.⁹⁹ On 28 January 2003 Ilya Klebanov, then Minister for Industry and Science, was appointed chairman of the Board of Directors. The Ministry of State Property holds 51 per cent, while the Gosinkor (the State Investment Corporation) holds 40.8 per cent.¹⁰⁰ As for the remaining 8.2 per cent, it is not known who holds them.

1.5 Mil helicopter producers: Moving ahead and enhancing their marketing reputation

Mil helicopter producers comprise the Kazan Helicopter Plant (also known as KVZ), Mil Helicopter Plant (also known as MVZ), Rostvertol and Ulan-Ude Aviation Plant (also known as UUAZ).¹⁰¹ Compared with aircraft manufacturers, helicopter manufacturers have been and still are more successful, with sales of both civilian and military helicopters worldwide.

Company structure and sales

Between 1994 and 2000, Russia's largest helicopter manufacturer, Kazan Helicopter Plant, earned up to \$US1.1 billion and is looking for sales of up to \$US3 billion by the end of 2010.¹⁰² The Republic of Tatarstan holds 29.92 per cent of KVZ.¹⁰³

The Moscow-based Mil Helicopter Plant is publicly owned – 31 per cent of its shares belong to the state, 30 per cent to Mezhhregional'nyy Investitsionnyy Bank (MIB, Interregional Investment Bank), 13 per cent to Rostvertol and 9.6 per cent to United Technologies.¹⁰⁴

In 2001 MVZ earned about \$US130 million.¹⁰⁵ Since April 2001, when MVZ emerged from bankruptcy, turnover has more than tripled (the sum remains unknown), and income in 2002 rose from \$US17 million to \$US35 million. According to Yuri Andrianov, Mil's Director-General, with help from Rosoboronexport, Mil has restored developer's intellectual rights on the Mil brand and taken an aggressive stance on unauthorised repairs and upgrades. As a result,

Andrianov said, 'Mil acts as the main developer for any changes on Mil helicopters, and carries responsibility for the whole cycle of testing and certification'.¹⁰⁶ The net revenue in 2004 increased by 3 million roubles over the previous year and is well above 115 million roubles. The volume of financial receipts has steadily increased. For instance, in 2003 it was 923 million roubles, while in 2004 it increased to 1012 billion roubles and the forecast for 2005 stood at 1260 billion roubles.¹⁰⁷ Mil helicopter producers are expected to rake in \$US500 million in revenues in 2005, and that figure is expected to gradually grow.¹⁰⁸

The biggest shareholder in Rostvertol is the Rossiiskiy Credit Bank (11.6 per cent), with remaining shares distributed between management and staff. On 5 March 2004 the Ministry of State Property acquired a 3.6 per cent stake.¹⁰⁹

The Ministry of Economic Development has named Ulan-Ude Aviation Plant as the best aviation exporter for two years in succession and various rating agencies have repeatedly acknowledged Ulan-Ude to be one of the most dynamically developing Russian companies.¹¹⁰ In 2001 UUAZ earned \$US88.5 million.¹¹¹ In 2003 the annual wage of an employee was 107,300 roubles,¹¹² or 8,491 roubles per month. The State holds 49 per cent, while Rosoboronexport holds an additional 14 per cent.¹¹³

2. Workforce

Kazan Technical University based in the Republic of Tatarstan has helped retrain aviation industry's skilled workforce. It has also set up branches in aviation industry enterprises situated in the Republic.¹¹⁴

Irkut claims that the 22,000-employee enterprise has productivity levels three times the average in the sector.¹¹⁵

Beriev Complex employs 2,500 people.¹¹⁶

The Sukhoi Design Bureau succeeded in preserving the backbone of its design bureau, numbering at about 5,000 staff.¹¹⁷ According to Victor Subbotin, SCAC Director-General, more than 1,200 people have been working full-time on the RRJ's airframe and systems, including **eight hundred** (author's emphasis) full-time employees of SCAC.¹¹⁸

NAPO employs 6,000 workers.¹¹⁹

KNAAPO employed 19,460 workers in 2004.¹²⁰

RAC MIG comprises fourteen different enterprises. It has a total of 60,000 employees. The so-called brain of the corporation was and still is the MIG Engineering Centre.¹²¹ According to Nikolai Nikitin, Director-General of RAC MIG, this company alone has 14,000 employees, while the rest of the corporation's enterprises have over 40,000,¹²² or to be more precise 46,000 employees.

In 2003 the Sokol Aircraft Production Plant reduced its overall workforce by 1,121.¹²³ According to a Russian source, Sokol employed 10,000 workers in 2003;¹²⁴ it can be said that, after the lay offs, 8,879 were still employed at the plant.

Salyut employed 14,190 workers, while UMPO employed 3,690 in 2004.¹²⁵

Saturn employs 18,000 workers, while 2,000 work in the Moscow-based Scientific Technical Centre Lyulko and Lytkarino Machine-Building Plant located near Moscow. The rest are employed in Rybinsk on two industrial sites and at the design bureau. 7,000 are engaged directly in design and development of engines. Every year Saturn takes in between 150 and 170 graduates and, as a result, remains one of the very few top engine-developing facilities in the Russian Federation. The average age of the company workforce is 43. Furthermore, about 3,000 employees are under 30 and further on 5,000 are under 40.¹²⁶

According to another source, between 1999 and 2003 the average age of employees in the aviation sector has been steady at 45 years. In addition, the number aged between 40 and 49 has remained constant at about 30 per cent of the total in the sector. The number over 30 has slightly increased from 12.88 per cent in 1999 to 17.7 per cent in 2003, while the 50-59 age group has also slightly increased from 23.44 per cent in 1999 to 27.53 per cent in 2003.¹²⁷ As a result, it can be said that the aviation industry, compared with the other sectors of the defence industry, was and still is attractive to younger people, relatively well-paid and, not least important, the average age is below, for instance, that of the armoured industry, which is 54 and over. There is a certain dynamism associated with the aviation industry and undoubtedly their export opportunities directly affect the monthly wages and increase the motivation of the employees. As a result, it can also be suggested that the average age of 45 can be sustained in the next three to five years at least.

3. Financial revenue and investment

Aircraft and engines

Be-200

The management of Irkut claims to have invested the equivalent of \$US265 million in the craft to date.¹²⁸ It remains unclear whether this amount includes research and development costs.

IL-112

The Ilyushin Aviation Complex was selected to meet the Russian Federation Air Force's requirement for a next-generation airlifter. Development of the project was included in Russian President Vladimir Putin's 2002-10 armament programme and state funding has been allocated, starting from 2004.¹²⁹ According to Victor Livanov, Director-General of the Ilyushin Aviation Complex, the state funding allocated for the project is insufficient and, as a result, the Ilyushin Complex had to invest its own funds in the project.¹³⁰ The size of financial investment remains unknown.

IL-214

This project is financed by the companies directly involved, and not by the government. The aircraft is being developed under the designation Multi-role Transport Aircraft (MTA) as a joint venture of Hindustan Aeronautics Ltd of India (50 per cent), Irkut Corporation (40 per cent) and the Ilyushin Aviation Complex (10 per cent). The fourth partner, Rosoboronexport, has not invested any money, but is needed by Irkut and Ilyushin, who have no licence for independent contacts with foreign partners. The supporters of the IL-214 have not asked for state money and do not depend on it.

The Russo-Indian MTA programme is the first in Russia's history to be carried out with a foreign partner. The cost of the research and development was estimated in the Russo-Indian business plan at \$US352 million.¹³¹ In the coming months, the

Russian participants will evaluate a new work scheme, financing and the business plan proposed by the Indian partners.¹³²

MiG-AT

As far back as March 2002 it was reported that the French government lent €58 million (\$US51 million) to Snecma and Thales to help the French companies fund their share in the construction of a pre-series of fifteen MiG-AT in conjunction with RAC MIG. The report also noted that the project had then stalled because of the Russian government's inability to pay its share, which amounted to about €100 million. The rest of the funding (the sum has not been cited) is to come from Russian industry.¹³³ There has been no information released since then on the financial state of the project.

Su-27SM

The Air Force has ordered the upgrade of the Su-27, known as the Su-27SM. Funding for the upgrade was, however, provided from the income that the AMIC Sukhoi generated from fighter exports.¹³⁴ According to Mikhail Pogosyan, within the framework of the state order, in 2006 funding allocated for the aircraft upgrade programme will increase by 250 per cent.¹³⁵ What this actually means in real figures, the source does not say.

AL-41F engine

According to Yuri Chepkin, director of the Saturn Moscow Centre, the research and development costs on the variable cycle, thrust-vectoring engine have totalled \$US1.5 billion since the early 1980s, and \$US300 million is required to complete the effort.¹³⁶ According to Mikhail Kuzmenko, chief designer and technical director at Saturn, Saturn and UMPO have invested about one billion roubles of their own money to produce five prototypes.¹³⁷

Su-30MK

Fedorov said that Irkut will continue to work on the Su-30MK. The company has already invested \$US280 million in the fighter aircraft and will invest \$US70 million more.¹³⁸

Su-30MKI

Su-30MKI research and development has cost about \$US400 million, provided by IAPO and AMIC Sukhoi.¹³⁹

Su-34 (formerly Su-27IB)

According to Mikhail Pogosyan, Director General of Sukhoi, funding for the purchase of the Su-34 was allocated in Russian President Vladimir Putin's 2002-10 armament programme.¹⁴⁰ As for the amount of funding, the source did not say.

T-50 – fifth-generation aircraft

Mikhail Pogosyan noted in summer 2005 that the design bureau had already spent about \$US100 million of its own funds on the project. He also added that the government is promising to boost the fifth-generation aircraft funding in 2006, but has not provided details.¹⁴¹ It appears that the issue of the perennial lack of financial support for the design and development of the fifth-generation fighter finally drove Russia to the European Union. Mikhail Pogosyan has invited European companies to participate in developing this fighter aircraft for the Russian Federation Air Force.¹⁴² As for the participation of India in such an undertaking, there have been a large number of reports suggesting this, but also suggesting perhaps not now.

Tu-160

In January 2002 the Kazan Aircraft Production Organisation (KAPO) has received a contract to upgrade the Russian Federation Air Force's fifteen Tu-160 Blackjack bombers (the source did not provide any details as to the value of the contract). The Tupolev Design Bureau stated in January 2002 that the Tu-160s could stay in service until 2030, by when a new strategic aircraft should be ready. In 2001, Air Force officials stated that the Ministry of Defence had funded research and development for such an aircraft.¹⁴³ The amount of funding that has been allocated for the project remains unknown.

Yak-130

The total cost of research and development, including the construction and testing of four pre-production aircraft has been estimated at \$US200 million. Up to 2002, 84 per cent of the programme costs have been borne by the Yakovlev design bureau, with the rest of the funds coming from the state budget.¹⁴⁴ The management of Irkut, which took over the Yakovlev design bureau in April 2004, noted that research and development funding for the Yak-130 has so far exceeded \$US100 million.¹⁴⁵

Helicopters**Ansats**

Kazan Helicopter Plant has invested \$US80 million in developing the Ansats, a light, twin-turbine, multipurpose helicopter.¹⁴⁶ In the second half of 2002 the Russian Ministry of Defence and Kazan Helicopters signed a contract for the development of a military training version of the Ansats,¹⁴⁷ named the Ansats-U. First state funding (how much is unknown) was provided in early 2004 for the Air Force to acquire an initial batch of the aircraft under an allocation in Russia's 2005 defence budget. The development programme has so far totalled 500 million roubles (\$US17 million) with a further 100 million roubles (\$US3.4 million) required to complete certification activities.¹⁴⁸

Ka-226

Russia's Ministry for Emergencies (also known as MChS) has been funding the project to develop the Ka-226.¹⁴⁹ In addition, the Bashkortstan budget provided the funding for assembly of the first helicopter in December 2004.¹⁵⁰ As for the overall investment, no information is available.

Mi-28N

Rostvertol intends to finance the pre-production of the Mi-28N all-weather attack helicopter from funds raised by a partial share sale. The share sale was approved by shareholders on 5 March 2004. The Ministry of State Property acquired a 3.6 per cent stake, estimated to be worth \$2.1 million. The company has already made a significant investment in the programme (how much is unknown) to cover the Air Force's inability to adequately support the Mi-28N.¹⁵¹ In addition, in 2004 the Ministry of Defence spend several hundred million roubles (the exact amount is a state secret).¹⁵²

Mi-38

Alexander Lavrentiev, Director-General of Kazan Helicopters, said that \$US500 million has been invested in the Mi-38 helicopter (a replacement for the Mi-8/17 Hip), with the Russians bound to pledge an extra \$US100 million for more prototypes.¹⁵³ He also noted that participants provided between \$US700 million and \$US800 million, however this amount will be exceeded. Half of the total sum has

been already spent. KVZ invested about \$US125 million in the Mi-38 project and this investment will be repaid after sales of between 80 to 90 helicopters after 2015.¹⁵⁴

To conclude, the companies have so far invested their own funds in the design and manufacture of aircraft and helicopters. As long as they continue to earn money from exports they will continue to invest. The government's share of the funding remains minimal and it is suggested that this will remain so for the next three to five years.

Unmanned aerial vehicles

CAST in its by-monthly journal *Eksport Vooruzhenii* reported the merger of Irkut and the Yakovlev Design Bureau. Irkut's purchase of this design bureau provides Irkut with a solid base to diversify its overall programmes. The Yakovlev design bureau, in addition to developing the Yak-130 combat trainer aircraft, is well-known for the design and development of unmanned aerial vehicles. Irkut is very interested in penetrating the UAV sector of the market.¹⁵⁵ This is the fastest growing sector in the global military market. As has been reported above, Irkut has created a new division. It remains unclear, however, how much money was invested in the creation of this division, although it is evident that the development and manufacture of UAV is becoming a very important current trend in Russia.

A defence industry source said that the Russian MoD had 'finally paid attention' to the increased UAV developments by foreign designers and was likely to fund the Yakovlev design bureau's research work.¹⁵⁶

According to Internet sources, the Kamov design bureau first flew an unmanned helicopter, the Ka-37, in 1993, after developing it with their own funds.¹⁵⁷

The MVZ chief designer, Alexei Samusenko, said that the prototype of Mil's first unmanned helicopter may be built in 2006 if the company's directors approve funds required for its development. He also said that up to now the company has been investing its own money in the programme, but he refused to specify how much.¹⁵⁸

Irkut so far has used its own funds to develop the UAVs. All the designers lament the lack of orders from the Air Force and that they have to spend their own money on research and development.¹⁵⁹

To conclude, it remains unknown how much money (not even approximately) has been allocated for the task, since Russian open sources have not by and large disclosed such information. Furthermore, the companies themselves consider such information classified.

4. Co-operative projects

With its well-educated and highly skilled workforce, the Russian aerospace industry is in an ideal position to contribute to joint ventures with western companies and will play a role in the global market in the future.¹⁶⁰

For instance, Dassault Aviation and AMIC Sukhoi have signed a broad-ranging agreement as European and Russian firms continue to reinforce co-operative ties. Under a preliminary agreement signed on 20 June 2003 the two companies decided to form a working group to explore how they could collaborate on combat and civil aircraft, as well as unmanned aerial vehicles, unmanned combat aerial vehicles

(UCAVs) and supersonic business aircraft applications. Dassault officials stressed, however, that the focus of collaboration with Sukhoi, at least initially, would be on contributing know-how, rather than on joint programmes.¹⁶¹ Furthermore, it is important to stress that as Alexey Poveshenko, an adviser to Mikhail Pogosyan noted, the companies cannot act until they receive clearance from the two governments.¹⁶² A source in the Russian aerospace industry said that there has been little progress between Sukhoi and EADS due to government hurdles about exchanging sensitive information.

As far back as September 2002 it was reported that EADS and the then IAPO were studying the feasibility of jointly producing and marketing the Be-200.¹⁶³ One year later EADS and a newly created Irkut were planning to change their co-operation deal with Rolls-Royce Deutschland to develop a Westernised Be-200 fire-fighter into a legal joint venture. At that time the two companies decided to create a single marketing and sales organisation before seeking European approval.¹⁶⁴ However, in late December 2004 the three companies were considering terminating their joint effort to develop a Rolls-Royce Deutschland BR715-powered version of the Be-200. According to Alexey Fedorov, 'Our EADS colleagues appear to be ready to stay with the project even if Rolls-Royce decides to leave it'.¹⁶⁵ Finally, on 16 August 2005 during the MAKS 2005 air show EADS and Irkut (without Rolls-Royce) signed an agreement to establish a joint venture to market the Be-200. The new company will be named EADS Irkut Seaplane SAS. The deal calls for Irkut to have 70 per cent and EADS 30 per cent of the joint venture. The new company will be led by a German – Johannes Falke, former managing director of the Manching-based MiG Aircraft Production Support.¹⁶⁶

In an extension of a previous accord signed in 2004, EADS Test and Services and Beta Air will jointly develop and market test systems and services based on Beta Air's ATE-200 and EADS's ATEC Series 6 to airlines in Russia and the Commonwealth of Independent States (CIS), who are increasingly turning to Western-built aircraft.¹⁶⁷

In an interview with *Defense News*, Alexey Fedorov noted that Irkut has been looking at the opportunity for an industrial partnership with Eurocopter. This would involve some licensed assembly of Eurocopter products in Russia with further transfers to manufacturer components.¹⁶⁸ During the ILA air show in Berlin on 11 May 2004 EADS signed a strategic agreement with Irkut, which involves Irkut servicing helicopters built by Eurocopter that are operated in Russia. Irkut and Eurocopter continue negotiations to create a joint venture that may include the assembly of Eurocopter products in Russia.¹⁶⁹ There has been no further information on the subject of a joint venture since May 2004.

As long ago as June 2003 Givi Djandjgava said that Technocomplex had reached agreement with Thales and Sagem Défense Sécurité (also known as Sagem) on the joint development of future navigation and display systems for use on fifth-generation fighters, as well as the use of French sensors in new electro-optical systems, helmet-mounted sights and night-vision goggles.¹⁷⁰

Major US and Russian simulator companies and the Russian government's largest aeronautical research and development organisation have teamed up to build a new and varied line of simulators for civil and military aircraft and helicopters. Under the deal, Evans and Sutherland (E&S) of Salt Lake City teams up with TsAGI. Evans and Sutherland has also signed with the Penza-based Penza Simulation Company.¹⁷¹ The first product of these agreements is a joint venture to provide a

Mi-8MTV helicopter simulator to be operated by the St Petersburg Aviation Repair Company (SPARC).¹⁷²

The Ekaterinburg-based Urals Optical Mechanical Plant (UOMZ) has signed a three year co-operation programme with its Malaysian partner, Malaysian Trans-national Trading Corporation Berhad (MATTRA). In the framework of this programme, UOMZ will provide for the maintenance of optico-electronic systems (also known as optronic systems and/or OES) of the Royal Malaysian Air Force's MiG-29 fighters.¹⁷³

Sometime in the summer of 2004 Saturn and Snecma Moteurs established a joint venture, PowerJet, which will power Sukhoi's 60 to 95-seat Russian Regional Jet.¹⁷⁴ PowerJet's prime task is to co-ordinate the development, marketing, sales and support of the SaM-146 engines.¹⁷⁵ On 14 October 2005 the same companies inaugurated a new joint venture, VolgAero, to manufacture SaM-146 engines.¹⁷⁶

Sagem Défense Sécurité, part of the Paris-based Safran Group and RAC MIG signed an agreement at the Paris Air Show in June 2005 that outlines areas of co-operation in avionics for future export versions of MiG fighters.¹⁷⁷

During the 7th Moscow International Aviation and Space Show, MAKS 2005, EADS signed an agreement with RAC MIG to develop military technology. A company source said it will focus on the development of unmanned combat aerial vehicles.¹⁷⁸

On 18 August 2005 Finmeccanica units Alenia Aeronautica and Aermacchi announced co-operation deals with Irkut covering trainer aircraft, unmanned aerial vehicles and civil aircraft engineering.¹⁷⁹ It should be underlined that the agreement on co-operation on UAVs is at a very early stage and still needs political acceptance at a much higher level. Although ministers of defence of both countries met in Moscow in November 2005,¹⁸⁰ no agreement has yet been reached.

One of the very few co-operative projects between Russia and Belarus has been the co-operation between the Moscow-based aircraft interior designer producer Kvand and the Belarus Indela Laboratory on an adventurous UAV design, including a fixed-wing vertical take-off and landing variant.¹⁸¹

To conclude, although the extent of the projects is certainly large they are mainly aimed at export markets. The Russian domestic aviation market is for the time being off limits to foreign aviation companies. Co-operation between the former republics of the Soviet Union has been so far very limited and it appears that in the future such co-operation is unlikely to expand. This is partly because most, excluding Belarus, Georgia, Ukraine and Uzbekistan, possess no extensive aviation industry infrastructure and partly because many have already turned away from co-operation with Russia, or are slowly doing so.

5. Export Opportunities

It is important to stress that export opportunities provide Russia with the chance to repay debts to countries such as the Czech Republic, Slovakia, and South Korea.

Undoubtedly, the best promotion for the Russian-built aircraft was and still is an air-to-air exercise. For instance, in February 2004 such an exercise was staged between the United States Air Force (USAF) F-15Cs and Indian Air Force Su-30MKs. Although details of the engagement are classified, it has been evident that a poor performance by the F-15C has shaken the Air Force's fighter pilot community.

Service leaders have claimed that US-trained pilots in Sukhoi fighters usually defeat similar pilots in F-15s and F-16s, but they now appear concerned that they have lost advantages in training and equipment.¹⁸² Six Su-30K aircraft of the Indian Air Force took part in the 'Garuda II' exercise from 15 June to 1 July 2005. French pilots used the exercise to assess the 'threat-benchmark' of the Su-30. One Mirage pilot said that 'In close combat the Mirage 2000-5 [appears] more "nervous" than the Sukhoi. A decision must be achieved in the first minute or the sheer power and the agility of the Su-30 will overwhelm you.'¹⁸³

It appears that after years of the Soviet and present Russian government's monopoly of the Indian defence market, the current government and the officials of the defence industry realised that the monopoly may be short-lived. As a result, Russia is fortifying itself to face competition in the Indian defence market from US rivals that are savvy about after-sales service. To improve its image in that sector, Russia is launching a joint venture in Mumbai called Rosoboronservice India Limited (RIL) to provide after-sales warranty work on Russian naval and Air Force equipment. As well as India, the company also expects to serve Russian equipment buyers in Indonesia, Malaysia and Sri Lanka.¹⁸⁴

Undoubtedly, countries such as Indonesia, Malaysia and Vietnam will continue to purchase Russian-built aircraft, but they cannot under any circumstances replace Russia's major customers, China and India. Even though Thailand and Russia concluded their first bilateral agreement on military co-operation in late October 2003, the author is not convinced that Thailand will purchase military craft from Russia. More words than deeds have come from the government of Thailand. Two reports published on 19 and 20 December 2005 contradicted each other. The first report, published in the *Moscow Times*, claimed that Russia has signed a preliminary agreement to sell a dozen Su fighters to Thailand.¹⁸⁵ The next day, Thailand denied the report. Thai Prime Minister Thaksin Shinawatra told reporters that 'It is just a discussion, we have not agreed on anything'.¹⁸⁶ On the other hand, the Philippines in about 2011 may consider purchasing the MiG-29. As a result, RAC MIG will have to work out a long-term plan of how to keep the Philippines interested in purchasing the aircraft.

In addition, Peru may consider upgrading and perhaps also purchasing additional MiG-29s. Although Brazil has formally terminated its six year effort to purchase twelve new fighters,¹⁸⁷ it does not mean that in the future the effort will not be revived. For instance, in 1998, following the economic crisis in Southeast Asia, Indonesia postponed its decision to purchase the Su-30 from Russia, but later, in April 2003, it decided to purchase the craft. A rather similar turn of events may occur with Brazil in the next three to five years. Besides these two countries, no other Latin American countries are likely to purchase Russian-built aircraft. For instance, Venezuela has been playing with the idea, but again more words than deeds have come from that government.

Another market for the MiG-29 is likely to be countries situated in the African continent, but, and that point needs to be stressed, their purchases will be small in quantity and their payment in hard currency will stretch over several years. *Jane's Defence Weekly* reported recently that Russia and Iran had concluded a deal to upgrade the Iranian fleet of MiG-29 and Su-24.¹⁸⁸

Although export opportunities from Russia tend to be associated with foreign countries, the republics of the former Soviet Union should not be forgotten. It can be suggested that the market opportunities in these countries are not as great and the revenues are not as large as, for instance, in China and India, but they

nevertheless remain important as a result of their political affiliations with Russia. For instance, the Kazakhstan Air Force has recently received four upgraded Mi-24s from Rostvertol. According to an official of the Kazakh MoD the country paid \$US3.73 million for the work. According to the Deputy Minister of Defence, the Kazakh Air Force has about fifty Mi-24s; all of them require repairs and upgrades. In 2006 a further five helicopters will be repaired and/or upgraded.¹⁸⁹ In late 2002 or early 2003 the Belarussian 558th Aviation Repair Plant (also known as 558 ARZ) based in Baranovichi in conjunction with the UUAZ-based firm Shturmoviki Sukhogo carried out a `deep modernisation` programme of the Su-25. It appears that the 558th ARZ has carried out its own upgrade of the MiG-29.¹⁹⁰ There is, however, no information available with regard to the upgrade of the Su-27. Armenia recently took delivery of ten new Su fighters to update its Air Force.¹⁹¹ Oleksiy Melnyk, First Deputy Minister of Defence of Ukraine, stated that `With respect to modernisation and upgrades, the ministry is looking at multiyear programmes that will result in extending airframe life span and improving fire-control radar systems [and] Western avionics upgrades and engine upgrades`.¹⁹² Ukrainian MoD and defence industry sources have informed *Jane's Defence Weekly* that there are negotiations under way with a number of potential Western [and not Russian] aerospace industry partners, including companies from France, Israel and the US.

For the time being only one of the former members of the Warsaw Treaty Organisation, Slovakia, has agreed to accept the RAC MIG conditions for the country's MiG-29 upgrade. Since Russia owed a debt to Slovakia, dating back to before 1989, part of this debt, namely about Kcs1.6 billion (\$US46.6 million) was allocated to the Slovak MoD.¹⁹³ On 21 June 2004 the Slovak Air Force commander, Jozef Dunaj, announced that a contract had been signed with RAC MIG to update 12 of the Slovak 21 MiG-29s. In February 2004 it was agreed that payment for the \$US43 million contract would be offset against Russia's debt to Slovakia.¹⁹⁴ Finally, in June 2005, the RAC MIG selected Western subcontractors for the upgrade. The Western subcontractors' share of the work is 10 per cent.¹⁹⁵ An agreement on the delivery of 16 Mi-171S transport and 10 Mi-35 combat helicopters (from Russia to the Czech Republic) worth \$US184 million was signed in September 2004. According to the Czech MoD, the helicopter delivery from Russia was part of the repayment of its debts (a total of \$US816 million) to the Czech Republic.¹⁹⁶ This region is no longer part of the current Russian market because countries in Central and Eastern Europe have joined the European Union and purchased US-built aircraft in the case of Poland and/or have leased Swedish-built aircraft in the case of the Czech Republic and Hungary. Furthermore, Bulgaria has decided to upgrade its helicopter fleet with the assistance of the Israeli company Elbit Systems Limited and the US manufacturer Lockheed Martin.

Interestingly, sales of Russian helicopters worldwide attract less attention than the sales of combat aircraft. This is because such sales brings less money and, as a result, attract less publicity. At the same time, over the last decade the use of combat helicopters was very extensive. For instance, the Mi-17 and Mi-24 have been used in the war against terror in Afghanistan, sometimes with US pilots at the controls. The US Army reportedly uses the Mi-24 rather than the Apache for its most demanding missions because the Russian helicopter has better armour protection, a rear compartment for troops;¹⁹⁷ its performance is more robust and it has more agile manoeuvrability than the Apache. Undoubtedly, this is the best promotion for both helicopters. The list of the countries that have already purchased the Mi-17 and its derivatives includes Algeria, China, Colombia, India, Iran, Mexico, Nigeria, Peru, South Korea, and newcomers such as Indonesia, Malaysia and Pakistan. As for the Mi-24/35, the list is shorter but nevertheless it

includes China, the Czech Republic, India, Nigeria, Sri Lanka and newcomers such as Indonesia and Venezuela.

In addition, KVZ has already signed deals to supply the government of South Korea with at least five Anshats as part of a state debt repayment.¹⁹⁸

Undoubtedly, the Mil helicopter producers have outperformed the Kamov Helicopter Plant in terms of financial revenue and the geographic distribution worldwide. However, one should not underestimate the strength of the Kamov Helicopter Plant and its volume of sales. For instance, it has sold the Ka-31 airborne early warning (AEW) helicopter to India¹⁹⁹ and the Ka-32 to Canada, Spain, Switzerland²⁰⁰ and South Korea.²⁰¹

6. Uncertain future and pitfalls ahead

Valery Bezverkhny noted that 'projects must be attractive to foreign partners. We cannot be isolated in Russia any more, even on military programmes.' The industry's future is not in being a simple supplier to Western aerospace companies. Instead, Bezverkhny continues, 'Our core competence today is the design and development stage; this is still in Russia because of our huge manufacturing history...it will be key for future co-operation'.²⁰² The design needs to be tailored to the country's requirement. Current Russian requirements are not comparable to those of the former Soviet Union. As a result, a large number of manufacturing sites will have to be closed down despite fierce resistance from the regional governments. This requires a very strong political will and a consistent implementation policy. Otherwise, the sector will remain as it is, muddling through. Undoubtedly, the situation remains very precarious, in particular for the Ilyushin Complex and Tupolev Joint Stock Company. Their domestic sales have been and still are minimal and their future remains uncertain.

According to the US-based Teal Group forecast, up to 2012 Russia's share of the global fighter market will be kept at about 11 per cent. However, by about 2015 the Russian fourth-generation aircraft will be pushed to the side by either the F-35 or F/A-18. The forecast for the Russian-built fifth-generation aircraft has been gloomy.²⁰³ Data from CAST suggests that between 200 and 300 new Su-27 and Su-30 fighters could be exported in the next ten to fifteen years, bringing in between \$US5 billion to \$US9 billion.²⁰⁴ Experts of the US-based company Forecast International estimate Sukhoi's share of the current world market of manufacturers of military fighters at about 14 per cent. In 2015 this share is to increase to 16 per cent. Sukhoi's export share on the aviation world market including co-production and production under licence is currently 25 per cent.²⁰⁵ It can also be suggested that RAC MIG export aviation's share in the years to come is likely to increase. Earlier obituaries have been premature. RAC MIG's venture into the commercial craft sector has taught the management a very valuable lesson, namely that the development and manufacture of passenger aircraft is not the company's forte. Instead RAC MIG needs to concentrate on design, development, manufacture and sales of military craft and the associated simulator systems. Not least important will be the increasing share of Mil helicopter producers. It is also evident that the Russian aviation companies will need to invest heavily in maintaining their infrastructure and keeping up an increased level of research and development. The government will not support them financially.

According to Yuri Koptev, head of the aerospace industry department within the Ministry of Industry and Energy, without governmental support 'we cannot count on remaining the world's third [largest] aircraft manufacturing centre'.²⁰⁶ According

to the development strategy of the aviation industry the funding for the design of the new generation of aviation technologies should be increased to \$US1.6 billion from the overall budget of the Russian Federation. The proposed funding should cover expenses for research and development, for the design bureaus and the enterprises.²⁰⁷ This is certainly wishful thinking, but the reality of the last decade has highlighted the inability of the state to provide much-needed funds. In addition, Yuri Koptev's statement should not be taken at face value. It may apply and might appeal to the grievances of the domestic manufacturers, but it has very little to do with reality.

Governmental support is also unlikely to materialise in the next two to three years. The 'promises' made by the government time and again have been unsubstantiated. As a result, it needs to be stressed that the aviation industry will have to look for a new market, in addition to China and India, and to continue to focus on export opportunities until the revival of the domestic market. However, even with the revival of domestic orders, the aviation industry's initial participation will remain minimal. In the long term domestic orders may increase but again it is important to stress, Russia's requirements are no longer of the volume of those of the former Soviet Union. However, for many officials in the Russian government and the regional governors the prevalent philosophy of the Soviet times: that they need to have a large air fleet and must remain the largest manufacturing centre still remains. It will take a considerable time to change this philosophy.

Endnotes

¹ 'Analiticheskaya Zapiska. Perspektivy Grazhdanskoi Aviatsii v Rossii' ('Analytical Note. Prospects of the Civil Aviation in Russia'), *Reitingovoye Aгенство Ekspert RA* (February-March 2002), 8.

²(http://www.ng.ru/economics/2003-06-16/4_aviaprom.html); (http://nvo.ng.ru/notes/2004-11-26/8_letter.html); (<http://www.gazeta.ru/lenta.shtml?358465#358465>); *Defense News*, 8 November 2004, 9. See also (http://nvo.ng.ru/notes/2004-11-26/8_letter.html). The same source also noted that an average annual wage of a worker in the aviation industry was 100,000 roubles, or about 8,500 roubles per month. See for comparison notes 5, 19 and 29. The Russian aviation sector comprises 312 enterprises with a workforce of 520,000, of which 29 per cent are state-owned and 33 per cent shareholding companies with state stakes, the rest being denationalised firms without any state interest. *Flight International*, 12-18 August 2003, 29. According to <http://www.izvestia.ru/economic/news90022>, the aviation sector employs 500,000 workers, while the volume of production is between \$US6 billion and \$US6.5 billion. In comparison, the European Union (EU) employs 400,000 workers, with a volume of production is about €60 billion: In other words, ten times greater than in Russia and with 100,000 fewer employees than in Russia. Thus the Russian aviation industry is not efficient. According to the latest Russian official figures, in 2004 the industry comprised 293 enterprises, including five major research centres: the State Research Institute of Aviation Systems (GosNIIAS), Gromov Flight Research Institute (LII Gromova), the Central Aero/Hydrodynamic Research Institute (TsAGI), the Central Aero-Engines Institute (TsIAM) and the All-Russia Scientific Institute of Aviation Materials (VIAM). V. N. Rybakov, 'Rossiiskaya aviatsionnaya promyshlennost'. Itogi 2004 goda. Osnovnye tseli i zadachi otrasli na 2005 god' ('Russian aviation industry. Conclusions for the year 2004. Main aims and assignments for the industry in 2005') in *Energiya Promyshlennogo Rosta (Energy of Industrial Growth)*, Special Edition 5 (2005), 8. See also *Materialy o sostoyanii aviatsionnoi promyshlennosti – Materials on the state of the aviation industry* (hereafter cited as *Materialy*). Moscow, 2005, 14.

³ *Krasnaya Zvezda*, 5 July 2003; (http://www.redstar.ru/2004/01/31_01/5_01.html). For an earlier report, see A. V. Sokolov, 'Sostoyanie i tendentsii razvitiya Rossiiskoi oboronnoi promyshlennosti' ('State and trends in development of the Russian defence industry') in *EKO*, 4 (2003), 120. No data are available for 2005.

- ⁴ V N Rybakov's article ('Rossiiskaya'; 8) states in clear terms that 122 enterprises are actually operational. This implies that the author's assumption has been fairly accurate.
- ⁵ (http://nvo.ng.ru/notes/2004-11-26/8_letter.html). For above the average wages, see notes 19 and 29.
- ⁶ (<http://www.vpk.russ> – online on 28 June 2004).
- ⁷ (http://nvo.ng.ru/armament/2004-04-02/6_chuyko.html).
- ⁸ *Defense News*, 25 July 2005, 24.
- ⁹ *Flight International*, 25 November-1 December 2003, 24.
- ¹⁰ (http://nvo.ng.ru/notes/2002-08-23/8_integration.html). According to other sources, however, aircraft sales accounted for about 70 per cent of Russia's arms exports. *Jane's Defence Weekly*, 21 November 2001, 20; *Defense News*, 3-9 December 2001, 10; (http://nvo.ng.ru/armament/2001-12-14/1_task.html); *Izvestia*, 18 December 2001. Aircraft sales accounted for 70 per cent of Russia's arms sales in 2003. (http://nvo.ng.ru/armament/2004-01-30/1_2003.html); *Kommersant Vlast*, 2-8 February 2004, 22-23.
- ¹¹ *Krasnaya Zvezda*, 5 July 2003. According to *Flight International*, the aviation industry accounted for 75 per cent of the defence industry exports in 2002. 12-18 August 2003, 29; *Interavia* (July-September 2003), 14.
- ¹² *Aviation Week and Space Technology*, 23 February 2004, 52.
- ¹³ *Defense News*, 3 October 2005, 22. See also *Voyenno-Promyshlennyi Kur'er* (hereafter VPK), 41, 2-8 November 2005.
- ¹⁴ *Flight International*, 9-15 August 2005, 28. According to Sergei Chemezov, director-general of Rosoboronexport, however, aviation's share fell (from 65 per cent) to about 30 percent to 32 per cent. (http://www.redstar.ru/2005/11/03_11/1_01.html). See also (<http://www.kommersant.ru/doc.html?docId=631437>).
- ¹⁵ *Defense News*, 3 October 2005, 22.
- ¹⁶ *Aviation Week and Space Technology*, 6 May 2002, 13. For instance, Airbus invested \$US1.5 million in long-term research with TsAGI. *Flight International*, 4-10 January 2005, 21.
- ¹⁷ (http://www.redstar.ru/2002/06/08_06/4_01.html).
- ¹⁸ *Aviation Week and Space Technology*, 22/29 August 2005, 36.
- ¹⁹ 28 September 2002. For some members of Salyut, see (http://www.redstar.ru/2003/12/09_12/1_04.html). See also (http://nvo.ng.ru/armament/2004-12-03/1_gorelov.html). For Salyut income in 2002, see note 22.
- ²⁰ (http://www.redstar.ru/2003/06/25_06/2_01.html). For an earlier report, see (http://www.redstar.ru/2003/04/29_04/n.html). See also (http://www.redstar.ru/2003/06/07_06/4_01.html). For the Russian government officials' reaction to creation of Salyut and its development similar to that of Irkut Corporation, see (http://www.nvo.ng.ru/2003-08-15/1_korporation.html).
- ²¹ *Defense News*, 11-17 November 2002, 42. See also note 19.
- ²² (<http://www.cast.ru/comments/?id=137>). For an earlier report, see (http://www.redstar.ru/2004/04/17_04/3_01.html). UMPO earned about \$US325 million in defence revenue in 2002. *Jane's Defence Weekly*, 2 July 2003, 21. Salyut earned \$US307.7 million in defence revenue in 2002. *Defense News*, 21 July 2003, 44. As a result, it can be said that Saturn earned \$US274.3 million in defence revenue in 2002.
- ²³ (<http://www.cast.ru/main/index.php?m=1&d=161&lang=1>). See also *Aviation Week and Space Technology*, 10 November 2003, 48. According to the author's calculation, Salyut earned \$US383 million in 2003.
- ²⁴ (<http://www.kommersant.ru/doc.html/?docId=584099>); (http://www.redstar.ru/2005/06/16_06/3_01.html); VPK, 29, 10-16 August 2005.
- ²⁵ *Ibid*; 26, 20-26 July 2005; *Obozreniye MAKS-2005 (Observer MAKS-2005)*, 16 August 2005, 38. For later reports, see VPK, 39, 19-25 October 2005; *Jane's Defence Weekly*, 2 November 2005, 16.
- ²⁶ (http://www.cast.ru/english/publications/makienko_trends.html). For an earlier report, see *Defense News*, 5-11 November 2001, 18. Lastochkin stated that the situation in the Russian civil engine-building has been 'not just critical, but overly critical'. The problem has been and still is financing: 'We can develop such an engine, but to perfect it we need hundreds of millions of dollars'. *Vedomosti*, 11 November 2004. In a later interview

- Lastochkin reiterated his earlier statement that the state has not made serious investments in the engine sector. (http://www.redstar.ru/2005/02/04_02/2_01.html).
- ²⁷ (http://www.redstar.ru/2003/06/07_06/4_01.html).
- ²⁸ For a complete article, see *Aviainform (Aviation Information)* (August 2005), 10-12.
- ²⁹ For a complete article, see (http://www.redstar.ru/2005/10/15_10/5_03.html).
- ³⁰ (<http://www.defensenews.com/story.php?F=1038534&C=europe>). See also *Aviation Week and Space Technology*, 22/29 August 2005, 24.
- ³¹ (http://www.redstar.ru/2005/09/17_09/n.html).
- ³² For a complete article, see (http://www.redstar.ru/2005/10/29_10/4_01.html).
- ³³ (http://nvo.ng.ru/armament/2003-06-06/6_technics.html). According to Walter F. Ullrich, the company included various companies in the avionics and related industries producing all types of aircraft devices, airborne equipment and flight simulators. 'Flight simulation and simulator training in the Russian Federation' in *Military Simulation and Training (MS&T) Magazine*, 2 (2004), 12. See also *VPK*, 33, 7-13 September 2005. For details of the birth of the company, see *Military Review. (BelaPan Information Company)*, 30 January 2001; *Vremya Novostei*, 17 April 2001.
- ³⁴ (http://nvo.ng.ru/armament/2003-07-11/6_korotko.html).
- ³⁵ (<http://www.kommersant.ru/doc.html/?docId=584099>); (http://www.redstar.ru/2005/06/16_06/3_01.html). Aerospace Equipment turnover in 2001 amounted to about \$US270 million. *Vedomosti*, 27 August 2002. The company earned \$US488.9 million in defence revenue in 2003. *VPK*, 29, 10-16 August 2005.
- ³⁶ For a complete article, see (http://www.redstar.ru/2004/02/28_02/4_01.html). See also *Aviasalony Mira (World Air Show)*, 3, 18 August 2005. In September 2004 the Russian President Vladimir Putin signed an Act creating a unified avionics company, Avionika (not to be confused with Russian Avionics), based on an association of companies around the Technocomplex. The new company will develop and manufacture navigation systems, fire-control radars, automatic pilots, on-board computers, flight-control systems and life-support systems. *Flight International*, 5-11 October 2004, 27. For a complete list of enterprises, see (http://www.redstar.ru/2005/08/10_08/1_02.html). See also *VPK*, 33, 7-13 September 2005.
- ³⁷ *Izvestia*, 5 July 2002.
- ³⁸ For a complete and comprehensive article, see (http://nvo.ng.ru/armament/2003-08-15/1_korporation.html). For an earlier report, see (http://www.redstar.ru/2002/04/11_04/2_02.html).
- ³⁹ *Ekspert*, 41, 3-9 November 2003, 29.
- ⁴⁰ For a complete and comprehensive article, see (http://nvo.ng.ru/armament/2003-08-15/1_korporation.html). For an earlier report, see (http://www.redstar.ru/2002/04/11_04/2_02.html).
- ⁴¹ *Flight International*, 9-15 March 2004, 23. See also *Jane's Defence Weekly*, 10 March 2004, 22.
- ⁴² *Flight International*, 9-15 March 2004, 23. According to Internet sources (http://nvo.ng.ru/armament/2003-10-31/6_news.html), Irkut approved a plan of its strategic development up to 2013. The civil side of the business will increase from 14 per cent in 2003 to 45 per cent by 2013. See also *Ekspert*, 41, 3-9 November 2003, 29.
- ⁴³ (http://nvo.ng.ru/armament/2003-08-15/1_korporation.html). For the Russian government official's reaction to the formation of Irkut, see *Defense News*, 8 September 2003, 50.
- ⁴⁴ (<http://www.defensenews.com/> - online on 11 July 2003).
- ⁴⁵ *Flight International*, 18-24 May 2004, 35. In earlier reports it was noted that Irkut also owns 66 per cent of the related marketing firm Beta Air and holds 51 per cent of Russian Avionics. *Aviation Week and Space Technology*, 10 November 2003, 48. Beriev owns another 21 per cent in Beta Air with the remainder spread among private shareholders. *Aviation Week and Space Technology*, 21 October 2002, 63. According to *Aviation Week and Space Technology*, Irkut's stake in Beriev has increased to 54.2 per cent, while 38 per cent stake is left with Holding Sukhoi. 17 January 2005, 320.
- ⁴⁶ *Jane's Defence Weekly*, 5 May 2004, 19. Irkut raised \$US127 million from floating 23 per cent of its shares on the Moscow Interbank Currency Exchange (MICEX) on 26 March 2004. *Flight International*, 18-24 May 2004, 35. According to Oleg Demchenko, President of Yakovlev, the company's net profit was 617 million roubles (\$US19.8 million) in 2001 and 467 million roubles (about \$US15 million) in 2000. *Flight International*, 9-15 April 2002, 20.

In 2003 Yakovlev Design Bureau employed about 800 people and the company volume of sales was between \$US5 million and \$US15 million annually. *Ekspert*, 41, 3-9 November 2003, 20.

⁴⁷ (http://www.gazeta.ru/2004/09/08/oa_132873.shtml).

⁴⁸ *Flight International*, 16-22 March 2004, 18; 18-24 May 2004, 35;

(http://nvo.ng.ru/armament/2004-05-28/6_news.html).

⁴⁹ *Jane's Defence Weekly*, 12 November 2003, 22. See also *Aviation Week and Space Technology*, 10 November 2003, 48.

⁵⁰ 5 April 2004, 20. The remaining 13.3 per cent of Irkut belongs to an unknown group of people. As late as 27 May 2005 <http://www.kommersant.ru/doc.html?docId=587246> reported that the government stake in Irkut has been reduced from 14.7 per cent to about 13 per cent and transferred to the Holding Sukhoi.

⁵¹ *ConciseB2BAerospace* (May 2002), 102. In December 2000 India awarded IAPO a \$US3.3 billion contract for local assembly of 140 aircraft over 17 years at Hindustan Aeronautics Limited. *Flight International*, 2-8 July 2002, 15. These listings refer to the previous year's earnings. Thus, the 2002 listing contains data from 2001, etc. For clarity we refer to the year the figures relate to, not the year of publication.

⁵² 11-17 November 2002, 42. That is as far back as the *Defense News* goes with the annual ranking of the top one hundred defence companies including Russian companies.

⁵³ *Ibid*; 28 June 2004, 14.

⁵⁴ *Ibid*; 25 July 2005, 13.

⁵⁵ *Ibid*; 10 May 2004, 12. *Jane's Defence Weekly* reiterated *Defense News* note that Irkut has a \$US4.5 billion order book, however, it added that the company has also got a debt of \$US512 million, of which about 70 per cent is owed to Russia's largest saving bank, Sberbank. Alexey Fedorov, head of Irkut, claims that 'debt payments are firmly linked to fulfilment of the export orders' that enable the company to repay between \$US100 million and \$US150 million a year. 6 October 2004, 25. *Defense News* added that Irkut has outstanding orders worth \$US3.9 billion. 22 August 2005, 22.

⁵⁶ *Flight International*, 4-10 January 2005, 21. See also *Aviation Week and Space Technology*, 3 January 2005, 40.

⁵⁷ *Aviation Week and Space Technology*; 22/29 August 2005, 24. For earlier reports, see *Flight International*, 4-10 January 2005, 21; *Obozreniye MAKS-2005*, 16 August 2005, 30. Under a plan approved by the Irkut board of directors on 14 October 2005 EADS will have to pay about \$US70 million to acquire a 10 per cent stake in Irkut. *Defense News*, 24 October 2005, 30.

⁵⁸ For the independent members of the board, see *Flight International*, 6-12 July 2004, 24. For the names of the board of directors, see

<http://www.kommersant.ru/doc.html?docId=587246>.

⁵⁹ For a complete article including information related to the newly appointed board of directors, see <http://nvo.ng.ru/> - online on 18 July 2003.

⁶⁰ *Aviation Week and Space Technology*, 17 November 2003, 32.

⁶¹ *Jane's Defence Weekly*, 6 October 2004, 23. *Defense News* (7 June 2004, 14) noted that RAC MIG carried \$US700 million in debt, most of which originated from a \$US230 million loan that the company received in 1997 from the Ministry of Finance. For an earlier report, see <http://www.vremya.ru/2003/172/4>. According to other sources, the company's debts were estimated at \$US1 billion in January 2004. *Flight International*, 5-11 October 2004, 27. According to Internet sources (http://www.gazeta.ru/2005/02/03/oa_147116.shtml), RAC MIG still has a debt of \$US600 million.

⁶² *Defense News*, 7 February 2005, 11;

(<http://www.kommersant.ru/doc.html?docId=508820>). It remains, however, unclear whether it has been a debt of nearly \$US300 million and/or of \$US600 million. This difference in figures is very substantial.

⁶³ (<http://www.cast.ru/main/index.php?m=1&d=150&lang=1>). According to *Interavia*, RAC MIG total sales in 2001 amounted to \$US977.3 million compared with a little more than \$US100 million in 2000 and about \$US200 million in 1999. Expectations for 2002 have been about \$US1 billion. (March 2002), 22. These expectations were well beyond the reality, see note 65.

⁶⁴ (<http://www.vremya.ru/2003/172/4>). *Defense News* in its annual grading of the top one hundred defence companies noted that RAC MIG was ranked 96th and has reached \$US267

million in defence revenue in 2002. 21 July 2003, 44. There has been no available data pertaining to the company's defence revenue in 2001 and earlier.

⁶⁵ *Defense News*, 7 June 2004, 14.

⁶⁶ 25 July 2005, 14. Aleksey Fedorov stated that the company earned about \$US400 million in 2004 and has contracts worth \$US1.2 billion. However, he also added that the company plans to make deliveries in 2005 worth \$US250 million. *Defense News*, 7 February 2005, 11.

⁶⁷ (<http://www.defensenews.com/story.php?F=1038534&C=europe>). According to Internet sources (http://www.ng.ru/economics/2004-10-08/3_aviation.html), RAC MIG has orders worth about \$US1.4 billion. See also (http://www.redstar.ru/2004/06/11_06/2_01.html).

⁶⁸ (http://www.redstar.ru/2005/10/15/15_10/n.html).

⁶⁹ (<http://www.cast.ru/comments?id=148>); (<http://www.vremya.ru/2003/172/4>).

According to http://www.redstar.ru/2004/06/11_06/2_01.html, the value of property has been estimated at between \$US3 billion to \$US3.5 billion.

⁷⁰ (http://www.redstar.ru/2004/06/11_06/2_01.html).

⁷¹ *Defense News*, 7 June 2004, 14. This information is not accurate, see note 73.

⁷² *Obozreniye MAKS-2005*, 16 August 2005, 35. According to Internet sources

(<http://www.fin-rus.com/newtopics/news01855/default.asp>), Holding Kamov was established in 2003 to promote and ensure the efficient sales of the Ka-32 and Ka-226 helicopters on the domestic and international markets. Holding Kamov manages a 49.46 per cent equity stake in the Kamov Helicopter Plant. On 8 November 2005 AFK Sistema entered into an agreement with Oboronprom ZAO to sell 100 per cent of Holding Kamov for \$US11.8 million. See also *Aviation Week and Space Technology*, 5 December 2005, 42. It is not known who owns the remaining 1.54 per cent.

⁷³ *ConciseB2B Aerospace* (March 2002), 100.

⁷⁴ *Aviainform* (August 2005), 36.

⁷⁵ *ConciseB2B Aerospace* (March 2002), 100.

⁷⁶ (http://www.cast.ru/english/publications/makienko_trends.html).

⁷⁷ *ConciseB2B Aerospace* (March 2002), 101.

⁷⁸ *Flight International*, 3-9 December 2002, 28.

⁷⁹ *Aviation Week and Space Technology*, 5 January 2004, 13. See also

(<http://www.izv.info/economic/news69289>). According to the same Internet source the value of the contract has been estimated at \$US10 million and not at \$US3 million as cited in *Aviation Week and Space Technology*, 13.

⁸⁰ *Defense News*, 13 June 2005, 18; *Aviainform* (August 2005), 36; *VPK*, 35, 21-27 September 2005.

⁸¹ *Obozreniye MAKS-2005*, 16 August 2005, 40.

⁸² For a complete article, see (<http://www.cast.ru/journal/2005/sokol>). See also *Defense News*, 13 June 2005, 18; *Aviainform* (August 2005), 36-37; *Obozreniye MAKS-2005*, 16 August 2005, 20.

⁸³ *Defense News*, 13 June 2005, 18. The source did not list who else may have been the shareholders of the plant. For earlier information, see *Flight International*, 28 May-3 June 2002, 10; 3-9 December 2002, 38.

⁸⁴ *Interavia* (March 2002), 23.

⁸⁵ (<http://www.itogi.ru/> - online on 14 October 2002). For instance, in 2003 the annual wage of an employee at the plant was 129,200 roubles (*Materialy*, 15) or 10.766 roubles per month.

⁸⁶ (<http://www.strana.ru/stories/02/05/20/2976/265629.html>).

⁸⁷ For a complete article, see *Aviation Week and Space Technology*, 17 November 2003, 32. According to an earlier report, the holding was supposed to have a 51 per cent stake in the Sukhoi Design Bureau and 74.5 per cent stake in two production plants KNAPO and NAPO. *Defense News*, 3-9 December 2001, 12. For confirmation of the holding stake in the design bureau and two production plants, see Georg Mader, 'A tale of triumph and tragedy. Russian combat aircraft exports and industrial base' in *Military Technology*, 8 (2005), 43. According to <http://www.kommersant.ru/doc.html?docId=587246>, the government stake of about 13 per cent (and no longer 14.7 per cent) was transferred to the holding. This information was reiterated by *Defense News* (17 January 2005, 3). Sukhoi Design Bureau is publicly owned - 50 per cent belonging to Holding Sukhoi, 25 per cent to Oboronprom ZAO and 14 per cent recently acquired by OPK, a managing company of Mezhdunarodnyyi Promyshlennyyi Bank (or International Industrial Bank). *Aviation Week and Space*

Technology, 17 January 2005, 321. As for the remaining 11 per cent, no information was provided by the source.

⁸⁸ *Kommersant Vlast*, 2 February 2004, 24. A contract signed in 2003 to supply China with spare parts was valued at \$US106 million. In 2004 the value of the same contract has increased to \$US200 million. *Jane's Defence Weekly*, 16 June 2004, 33. According to Internet sources (<http://www.cast.ru/comments/?id=158>), Sukhoi's earnings from after-sales support to **Algeria and China** (author's emphasis) was \$US110 million in 2003 and was expected to be \$US150 million in 2004. See also *Kommersant Vlast*, 6, 14 February 2005, 37; *VPK*, 29, 10-16 August 2005.

⁸⁹ 19 January 2005, 30. See also *Flight International*, 25-31 January 2005, 25; *Kommersant Vlast*, 6, 14 February 2005, 37. *VPK* reported that Sukhoi earned \$US135 million in 2004. 39, 19-25 October 2005. See also (http://www.redstar.ru/2005/12/01_12/1_01.html).

⁹⁰ For a complete article, see *Aviation Week and Space Technology*, 17 November 2003, 32.

⁹¹ 11-17 November 2002, 40. That is as far back as the *Defense News* goes with the annual ranking of the top one hundred defence companies including Russian companies.

⁹² *Defense News*, 21 July 2003, 42.

⁹³ *Ibid*; 18 June 2004, 13.

⁹⁴ *Ibid*; 25 July 2005, 13. See also (http://www.redstar.ru/2005/10/15_10/n.html).

⁹⁵ (http://www.redstar.ru/2005/02/04_02/n.html).

⁹⁶ *Aviation Week and Space Technology*, 21 July 2003, 13.

⁹⁷ (<http://www.vesti.ru/news.html?id=61976&sid=6>). See also *Flight International*, 14-20 September 2004, 41.

⁹⁸ (http://nvo.ng.ru/armament/2005-01-21/6_news.html).

⁹⁹ (<http://www.kommersant.ru/lenta-small.html?id=58399>).

¹⁰⁰ (<http://www.kommersant.ru/lenta-small.html?id=61185>).

¹⁰¹ Sales by the three Mil helicopter manufacturing plants jumped to about \$US440 million in 2001, from \$US150 million in 1999. *Defense News*, 8-14 July 2002, 28. *Defense News* did not disclose the financial information for the year 2000 and information pertained to the sales of the fourth plant.

¹⁰² *Flight International*, 12-18 August 2003, 33. *Defense News* in its annual grading of the top one hundred defence companies noted that the Kazan Helicopter Plant was ranked 94th and reached \$US219.2 million in defence revenue in 2001. 11-17 November 2002, 42. KVZ's turnover in 2004 was \$US193 million. *Aviation Week and Space Technology*, 5 December 2005, 42.

¹⁰³ *VPK*, 32, 31 August-6 September 2005. In November 2005 Oboronprom ZAO took a stake in KVZ from the Republic of Tatarstan. In return, Tatarstan received a 15.1 per cent share of Oboronprom ZAO. *Aviation Week and Space Technology*, 5 December 2005, 42.

¹⁰⁴ *Ibid*; 17 January 2005, 321. The source did not specify who owns the remaining 16.4 per cent.

¹⁰⁵ *Defense News*, 8-14 July 2002, 28.

¹⁰⁶ *Ibid*. For more general information related to the financial difficulties of the Mil Helicopter Plant, see (http://www.redstar.ru/2004/12/11_12/3_01.html).

¹⁰⁷ (http://www.redstar.ru/2005/04/16_04/4_01.html).

¹⁰⁸ *Defense News*, 2 May 2005, 16.

¹⁰⁹ *Aviation Week and Space Technology*, 29 March 2004, 68; *Defense News*, 5 April 2004, 3.

¹¹⁰ *Military Technology*, 6 (2005), 142. Unfortunately, *Military Technology* has not provided any substantial economic data to support its claim. As a result, such information has to be taken with a pinch of salt.

¹¹¹ *Defense News*, 8-14 July 2002, 28.

¹¹² *Materialy*; 15.

¹¹³ *VPK*, 32, 31 August-6 September 2005. The source has not indicated who holds the rest of the shares.

¹¹⁴ (<http://www.izvestia.ru/comment/article2189981>).

¹¹⁵ *Aviation Week and Space Technology*, 10 November 2003, 48. See also *Flight International*, 9-15 March 2004, 23. However, according to *Defense News* (13 October 2003, 38) and

(<http://news.ft.com/servlet/ContentServer?pagename=FT.com/StoryFT/FullStory&c=Story>..) Irkut employs either 16,000 people and/or 14,000 people respectively. According to Internet sources (http://nvo.ng.ru/armament/2003-08-15/1_korporation.html), Irkut

employs more than 15,500 people. There is certainly a large difference between 14,000/16,000 and 22,000 and it remains unclear which figures are correct.

¹¹⁶ *Aviatsionno-kosmicheskii spravochnik 2003/2004. Promyshlennost' i uslugi. (Handbook of Aviation and Space 2003/2004. Industry and services)*. Moscow: Aerosfera, 2003, 124.

¹¹⁷ (<http://www.itogi.ru/> - online on 14 October 2002). A Sukhoi official stated that 'IAPO does not have a design school like Sukhoi. The Sukhoi design bureau has 5,000 people; IAPO, on the other hand, has 150 people. The Sukhoi design base has been created over generations. In Irkutsk they have the hands, but the brain is in Moscow.' (http://www.defensenews...hisweek_1133234.html&ttt=thisweek). Holding Sukhoi employs 80 people. (<http://www.kommersant.ru/archive/archive-material.html?docId=335648>); (http://nvo.ng.ru/armament/2002-08-23/1_putin.html).

¹¹⁸ *Flight International*, 28 June-4 July 2005, 40.

¹¹⁹ (<http://www.vesti.ru/comments.html?id=33675>); G. Mader, 'A tale'; 45.

¹²⁰ *Materialy*; 19.

¹²¹ (http://www.redstar.ru/2003/08/28_08/1_06.html).

¹²² (http://nvo.ng.ru/armament/2002-08-09/1_competition.html). According to *Materialy*, in 2004 RAC MIG employed 12,860 workers. 19.

¹²³ (http://nvo.ng.ru/armament/2003-01-31/6_news.html).

¹²⁴ *Aviatsionno-kosmicheskii spravochnik*; 121.

¹²⁵ *Materialy*; 19.

¹²⁶ http://www.redstar.ru/2005/02/04_02/2_01.html, which slightly contradicted http://www.redstar.ru/2005/08/13_08/4_02.html, which noted that 5,000 and not 7,000 employees are engaged directly in the design and development of engines. See also (<http://www.npo-saturn.ru/default>). For a different figure for employees, see *Aviation Week and Space Technology*, 2 August 2004, 44.

¹²⁷ *Materialy*; 30.

¹²⁸ *Aviation Week and Space Technology*, 10 November 2003, 48. For an earlier report, see (http://nvo.ng.ru/armament/2003-08-15/1_korporation.html).

¹²⁹ *Aviation Week and Space Technology*; 6-12 May 2003, 21.

¹³⁰ (http://nvo.ng.ru/armament/2004-07-09/6_news.html).

¹³¹ *Interavia* (May-June 2003), 43. For an earlier report on the project, see *Flight International*, 18-24 February 2003, 15.

¹³² (http://www.redstar.ru/2005/07/09_07/n.html).

¹³³ For a complete article, see *Jane's Defence Weekly*, 6 March 2002, 12. The development costs for the MiG-AT are said to be about \$US200 million. *Air Forces Monthly* (January 2003), 16. As a result, it can be said that the latest information, namely that for the time being the RAC MIG invested its own money in the design and development of the MiG-AT trainer aircraft, see (http://www.redstar.ru/2005/04/30_04/w.html), has been inaccurate.

¹³⁴ (http://nvo.ng.ru/notes/2003-06-06/8_vts.html).

¹³⁵ (http://www.redstar.ru/2005/10/29_10/w.html).

¹³⁶ *Flight International*, 23-29 March 2004, 6.

¹³⁷ *Defense News*, 29 August 2005, 9. According to Yuri Lastochkin, Director-General of Saturn, Saturn and UMPO invested about 1.5 billion roubles in the engine design. *Obozreniye MAKS-2005*, 16 August 2005, 16. This is certainly a considerable financial discrepancy.

¹³⁸ (<http://www.defensenews.com/story.php?F=2332469&C=europe>).

¹³⁹ *Flight International*, 2-8 July 2002, 15. See also note 38.

¹⁴⁰ *Ibid*; 26 August-1 September 2003, 20.

¹⁴¹ *Defense News*, 29 August 2005, 9. See also *Flight International*, 6-12 September 2005, 23. According to unofficial information, in 2005 Sukhoi design bureau received less than \$US10 million for the T-50 project. *Interavia*, 681 (Autumn 2005), 13.

¹⁴² For a complete article, see *Flight International*, 12-18 July 2005, 20.

¹⁴³ *Ibid*; 22-28 January 2002, 14. For further information, see also (<http://www.izvestia.ru/armia2/article886387>).

¹⁴⁴ *Interavia* (May 2002), 22. The same rate of 85 to 15 has been cited by the Internet source (http://nvo.ng.ru/armament/2002-05-31/6_korotko.html), however, the source also stated that the Ministry of Defence provided the funds. See also *Flight International*, 11-17 May 2004, 20. According to other source, Yakovlev said that it has invested company money, about 40 per cent of the total production cost, and that two airframes have been paid for (whether by the Ministry of Defence and/or by the Air Force, remains unclear). Yakovlev has

invested \$US26 million in Yak-130 development, while earning \$US77 million from the sale of data to Italy's Aermacchi. Yakovlev warned, however, that its own resources will be insufficient to complete the research and development for the aircraft. The MoD has reportedly given approval and funding for the production of ten Yak-130s. (*Flight International*, 9-15 April 2002, 20.) It needs to be stressed that investment of about 40 per cent of the total production cost including testing of four pre-production aircraft and the total cost of research and development has been estimated at about \$US170 million and has been borne by Yakovlev, while the remaining \$US30 million have been provided either by the Ministry of Defence and/or the Air Force. The Yakovlev investment of \$US26 million may cover the cost of construction and testing of two pre-production aircraft. What about the cost of research and development? There is a considerable funding gap between the \$US26 million presented in April 2002 and the excess of \$US100 million in April 2004. How can this gap be explained? Did Yakovlev invest over \$US74 million in just two years? This is very unlikely. There are too many questions and too few answers.

¹⁴⁵ *Flight International*, 11-17 May 2004, 20; *Jane's Defence Weekly*, 12 May 2004, 6.

¹⁴⁶ *Flight International*, 12-18 August 2003, 33. See also

(http://www.redstar.ru/2004/11/27_11/n.html).

¹⁴⁷ *Air Forces Monthly* (September 2002), 18.

¹⁴⁸ *Flight International*, 12-18 October 2004, 22. *Jane's Defence Weekly* noted that Kazan Helicopters funded the design and development of a military version of the Ansat, named Ansat-U, 10 August 2005, 13.

¹⁴⁹ *Flight International*, 12-18 August 2003, 34.

¹⁵⁰ (<http://www.vesti.ru/comments.html?id=32319>). The helicopter was assembled at the Kumertau Aviation Production Organisation (also known as KumAPO) factory located in Orenburg, Bashkortan.

¹⁵¹ *Aviation Week and Space Technology*, 29 March 2004, 68; *Defense News*, 5 April 2004, 3. The Russian government has cut all funding for development of the Ka-50/52 attack helicopter from its 2005 budget. *Flight International*, 2-8 November 2004, 6. Despite the government decision the Kamov design bureau decided to resume flight tests of the Ka-52 in July 2005. *Ibid*; 5-11 July 2005, 18. See also Andrey Zinchuk "Black Sharks" in Chechnya" in *Military Technology*, 9 (2005), 138.

¹⁵² (<http://www.izvestia.ru/armia2/article585948>). See also (http://nvo.ng.ru/armament/2005-11-11/6_helicopters.html).

¹⁵³ *Flight International*, 22-28 July 2003, 17. According to *Jane's International Defence Review*, Russia's Federal Development Programme for Civil Air Technology provides Mi-38 funding amounting to 8.25 billion roubles (\$US275 million) through 2010. However, just 572 million roubles (namely 7 per cent) will be provided by the state budget, whereas 7.78 billion roubles should be invested by participants in the Mi-38 programme (including 3.9 million roubles, or about 50 per cent of the joint investment, to be paid by foreign participants). The Mi-38 programme has been an international venture since October 1994, run by the Euromil Consortium, which included three equal partners: the Mil Helicopter Plant in Moscow, the Kazan Helicopter Plant and Eurocopter. Although Eurocopter withdrew from Euromil it continued its participation in the programme. (February 2004), 24. In January 2005, however, an agreement between Eurocopter and its Russian partners to develop and manufacture Mi-38 was terminated. *Aviation Week and Space Technology*, 7 February 2005, 62; *Jane's Defence Weekly*, 4 May 2005, 18; *Flight International*, 5-11 July 2005, 24.

¹⁵⁴ (<http://www.izvestia.ru/armia2/article478949>); (http://nvo.ng.ru/armament/2004-10-08/6_mi6.html); *Jane's Defence Weekly*, 4 May 2005, 18.

¹⁵⁵ (<http://www.cast.ru/main/index.php?m=99&d=473&lang=>). See also (http://nvo.ng.ru/armament/2003-08-15/1_korporation.html); *Defense News*, 1 September 2003, 14; (<http://www.defensenews.com/story.php?F=2332469&C=europe>); *Ekspert*, 41, 3-9 November 2003, 29.

¹⁵⁶ *Jane's Defence Weekly*, 20 April 2005, 14.

¹⁵⁷ (<http://www.vectorsite.net/avuav9.html>).

¹⁵⁸ *Defense News*, 6 June 2005, 22. It appears that the company's directors approve funds required, see *Ibid*; 21 November 2005, 22.

¹⁵⁹ *Ibid*.

¹⁶⁰ *Airfinance Journal*, 262 (July-August 2003), 31.

- ¹⁶¹ For a complete article see, *Aviation Week and Space Technology*, 30 June 2003, 31-32. See also *Defense News*, 19 July 2004, 54. For an earlier report, see *Flight International*, 24-30 June 2003, 8.
- ¹⁶² *Aviation Week and Space Technology*, 13 October 2003, 28. *Defense News*, 21 November 2005, 22.
- ¹⁶³ *Aviation Week and Space Technology*, 9 September 2002, 21. In the follow-on report *Aviation Week and Space Technology* noted that an official at IAPO said that IAPO and EADS had basically reached agreement to set up a joint venture to provide after-sales support and other services for the Be-200. 21 October 2002, 63.
- ¹⁶⁴ *Flight International*, 2-8 September 2003, 21. See also *Ibid*; 18-24 May 2004, 35; *Aviation Week and Space Technology*, 26 July 2004, 21. According to Alexander Kuleshov, the Be-200 programme director, although the programme between the three partners has not been cancelled, the cost of this approach means that the partners have decided to obtain Western certification with the Russian engines, while continuing to study the BR715 idea. *Flight International*, 17-23 May 2005, 37.
- ¹⁶⁵ *Ibid*; 21 December 2004-3 January 2005, 23.
- ¹⁶⁶ *Defense News*, 22 August 2005, 22. See also (<http://www.kommersant.ru/doc.html?docId=602734>); *Flight International*, 23-29 August 2005, 10; *Jane's Defence Weekly*, 24 August 2005, 23.
- ¹⁶⁷ *Aviation Week and Space Technology*, 5 December 2005, 15. For information on Beta Air, see note 45.
- ¹⁶⁸ 13 October 2003, 38.
- ¹⁶⁹ (<http://www.defensenews.com/story.php?F=2918559&C=europe>).
- ¹⁷⁰ *Flight International*, 24-30 June 2003, 8.
- ¹⁷¹ For a complete article, see *Aviation Week and Space Technology*, 30 June 2003, 30-31. See also Walter F. Ullrich, 'Flight'; 10.
- ¹⁷² For a complete article, see *Flight International*, 16-22 September 2003, 31.
- ¹⁷³ (http://nvo.ng.ru/armament/2004-03-12/6_news.html). See also *Asian Defence Journal*, 3 (2005), 54.
- ¹⁷⁴ *Aviation Week and Space Technology*, 2 August 2004, 44. For an earlier report, see (<http://www.powerjet.aero/?id=25&sel=7>). See also Artem Fetisov, 'Tyaga na perspektivu' ('Drawing on prospect') in *Aviatransportnoye Obozreniye (Air Transport Observer)* (July-August 2005), 39; (http://www.redstar.ru/2005/10/29_10/4_01.html).
- ¹⁷⁵ *Flight International*, 1-7 November 2005, 62.
- ¹⁷⁶ For a complete article, see (http://www.asd-network.com/press_detail_B.asp?ID=5511). See also *Flight International*, 25-31 October 2005, 12; 1-7 November 2005, 62.
- ¹⁷⁷ For a complete article, see *Defense News*, 27 June 2005, 25. See also *Military Technology*, 7 (2005), 101.
- ¹⁷⁸ (<http://www.defensenews.com/story.php?F=1038534&C=europe>).
- ¹⁷⁹ For a complete article, see (<http://www.defensenews.com/story.php?F=1045679&C=europe>). See also *Defense News*, 21 November 2005, 22.
- ¹⁸⁰ *Interavia*, 681 (Autumn 2005), 15. See also notes 162 and 163.
- ¹⁸¹ For a complete article, see *Aviation Week and Space Technology*, 19 September 2005, 55.
- ¹⁸² *Flight International*, 25-31 May 2004, 15. This 'Cope India' exercise was staged in India and, no less importantly, the Su-30MK that participated was less potent than the latest version of the Su-30MKI. See also (<http://www.strana.ru/stories/02/01/16/2353/241125.html>); Alexander Mozgovoi, 'Nebo na zashchite morya' ('Sky on the defence of sea') in *Military Parade* (July-August 2005), 24-25. According to Lieutenant Colonel Paul (Biff) Huffman, 64th Aggressor Squadron commander, the Cope India experience 'was certainly a little eye-opening for the whole [USAF]'. Huffman continued, 'We saw there are some very capable countries out there, and some very capable hardware', *Aviation Week and Space Technology*, 31 October 2005, 50. In an earlier article, USAF and aerospace industry officials noted that the Russian-built Su-30MK, the high-performance fighter being exported to China and India consistently beat the F-15C in classified simulations. For a complete article, see *Aviation Week and Space Technology*, 27 May 2002, 47.
- ¹⁸³ *Jane's Defence Weekly*, 13 July 2005, 4.
- ¹⁸⁴ For a complete article, see *Aviation Week and Space Technology*, 25 July 2005; 28. See also *Defense News*, 26 September 2005, 14.

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- ¹⁸⁵ (<http://www.defensenews.com/story.php?F=1421359...>).
- ¹⁸⁶ (<http://www.defensenews.com/story.php?F=1423330...>).
- ¹⁸⁷ *Flight International*, 1-7 March 2005, 6. For an early report, see *Jane's Defence Weekly*, 1 December 2004, 10.
- ¹⁸⁸ 14 December 2005, 17. For an early report, see *Ibid*; 7 December 2005, 7.
- ¹⁸⁹ (http://www.redstar.ru/2005/11/15_11/n.html).
- ¹⁹⁰ The 558th ARZ main task is to upgrade the MiG-29 and Su-27 of the Belarus Air and Air Defence Forces. *Air Forces Monthly* (March 2003), 30. The source, however, has not indicated the cost of the upgrade.
- ¹⁹¹ *Defense News*, 10 October 2005, 18.
- ¹⁹² For a complete article, see *Jane's Defence Weekly*, 14 December 2005, 12.
- ¹⁹³ *Ibid*; 3 December 2003, 14. At the end of 2003 – the latest date for which figures have been available – Russia owed Slovakia \$US109 million. The debt has since been reduced after Russia agreed to upgrade Slovakia's MiG-29s. *Flight International*, 28 June-4 July 2005, 19.
- ¹⁹⁴ For a complete article, see *Air Forces Monthly* (August 2004), 9.
- ¹⁹⁵ *Flight International*, 21-27 June 2005, 38. See also *VPK*, 35, 21-27 September 2005.
- ¹⁹⁶ *Defense News*, 25 April 2005, 26; *Jane's Defence Weekly*, 13 July 2005, 14; *Jane's International Defence Review* (October 2005), 20.
- ¹⁹⁷ *Asia-Pacific Defence Reporter* (November 2004), 49.
- ¹⁹⁸ *Flight International*, 12-18 October 2004, 22; *Asia-Pacific Defence Reporter* (November 2004), 49; *Flight International*, 12-18 April 2005, 22.
- ¹⁹⁹ *Jane's International Defence Review* (October 2004), 24.
- ²⁰⁰ *Flight International*, 22-28 February 2005, 22.
- ²⁰¹ *Ibid*; 5-11 July 2005, 34.
- ²⁰² *Ibid*; 25 November-1 December 2003, 24.
- ²⁰³ *Ekspert*, 16-22 February 2004, 21.
- ²⁰⁴ *Flight International*, 21 December 2004-3 January 2005, 25.
- ²⁰⁵ (http://www.redstar.ru/2005/10/15_10/n.html).
- ²⁰⁶ *Defense News*, 8 November 2004, 9.
- ²⁰⁷ *Materialy*; 24.

Appendix: Profile of the Current Aviation Industry Heads

Vladimir Barkovsky, prior to his appointment as First Deputy Director-General of RAC MIG in 1999 worked at AMIC Sukhoi.²⁰⁸ He is currently head of the MIG Engineering Centre.

Valery Bezverkhny, regarded as a talented manager, was closely involved in the Irkut Corporation's share offering in 2004.²⁰⁹ He was born in 1959 in Ukraine.

Sergei Bodrunov has been Director-General of the St Petersburg-based Aerospace Equipment since 1999.

Boris Bregman was born in 1949; he graduated from the Kazan Aviation Institute and after graduation was sent to KNAAPO. At KNAAPO he was head of shop, head of the production division, and deputy Director-General for Economic and Commercial Issues. In 2002 he was appointed First Deputy Director-General of Holding Sukhoi and kept his position as deputy Director-General of KNAAPO. On 28 June 2003 he was appointed Chairman of the Board of Directors of the Holding Sukhoi.²¹⁰

Oleg Demchenko was born in 1944 and graduated from the Kuybyshev Aviation Institute. Until 1981 he worked on the enterprises of the Ministry of Aviation Industry where he began his career as shop master and ended up as Head of Production. Between 1981 and 1992 he headed the Main Directorates of the ministry. From 1994 he was Director-General of the Yakovlev Joint Stock Company. In 2003 he was appointed as a member of the Board of Directors of the Irkut Corporation and in 2004 became chairman of the Board of Directors of Irkut.²¹¹

Givi Djandjgava was born in 1940, graduated from the Moscow Energy Institute and began his career as an engineer at the Ramenskoye instrument-building design bureau (also known as RPKB). He was appointed Director-General of Ramenskoye (when exactly, remains unknown) and since 1997 has been president of Technocomplex.²¹²

Yuri Eliseyev was born in 1951, graduated from the renowned Moscow Bauman High-Technical College, and was appointed technical director of Salyut in 1994. Since 1997 he has been Director-General. He is one of a new generation of director-generals, who understands that the enterprise needs to keep its highly-qualified workforce, steadily improve scientific-technical potential and maintain its technological base, as well as conducting research and development and experimental work and purchasing the necessary equipment.²¹³

Alexey Fedorov was born in 1952, graduated from the Irkutsk Institute of Technology and received his Master of Business Administration (MBA) from Oklahoma State University. Between 1974 and 1989 he worked as a designer in the Irkutsk Aviation Production Organisation (IAPO). In 1989 he was appointed Chief Engineer, and in 1993 Director-General of the plant. In December 1996 he was appointed Director-General of the Aviation Military-Industrial Complex (AVPK) Sukhoi. Since August 1998 he has been Director-General of IAPO, which has meantime been renamed and restructured as Irkut Corporation.²¹⁴

Yuri Lastochkin has been Director-General of Saturn since 2001.

Denis Manturov was born in 1969 and graduated from Moscow University. Between 2000 and 2002 he was a doctoral student at the Moscow Aviation Institute. Between 1998 and 2000 he was deputy Director-General at the Ulan-Ude Aviation Plant; from 2000 to 2001 he was commercial director of the MVZ; and from 2001 to 2003 was deputy chairman of the State Investment Corporation. In 2003 he was appointed Director-General of the state-owned company Oboronprom ZAO.²¹⁵

Andrei Shbitov was born in 1961, graduated from the Kharkov Aviation Institute and returned to the Rostov-on-Don based Rostvertol Plant where he began his career as an engineer-designer. He then became Deputy General Designer, Director-General of the Engineering Company Special Helicopter Programmes, Director-General of the External Economic Relations, Deputy Director-General for Marketing and Sales and finally, in early December 2004, he was appointed Director-General of the Moscow-based Mil Helicopter Plant.²¹⁶

Sergei Tsivilev was one of a handful of top managers who moved to RAC MIG from Irkut, following Alexey Fedorov, Irkut's president, who was appointed Director-General of RAC MIG in October 2004.²¹⁷ He was Senior Vice-President for Economy and Finance at Irkut prior to his appointment as First Deputy Director-General of RAC MIG.²¹⁸

²⁰⁸ *St. Petersburg Times*, 25 December 2001.

²⁰⁹ *Aviation Week and Space Technology*, 14 February 2005, 46.

²¹⁰ (<http://nvo.ng.ru> – online on 18 July 2003).

²¹¹ (<http://www.kommersant.ru/doc.html?docId=587246>).

²¹² *Krasnaya Zvezda*, 23 November 2001. For a similar account with certain changes, see (http://www.redstar.ru/2005/08/10_08/1_02.html).

²¹³ *Krasnaya Zvezda*, 28 September 2002.

²¹⁴ For a complete article, see (<http://www.kommersant.ru/doc.html?docId=508820>). See also *Flight International*, 18-24 May 2004, 35.

²¹⁵ (http://www.redstar.ru/2005/02/12_02/4_02.html).

²¹⁶ (http://www.redstar.ru/2004/12/11_12/3_01.html); *Defense News*, 3 January 2005, 8; (http://www.redstar.ru/2005/04/16_04/4_01.html).

²¹⁷ *Aviation Week and Space Technology*, 4 July 2005, 52.

²¹⁸ (<http://www.kommersant.ru/doc.html?docId=587246>).

Want to Know More ...?

See: Materialy o sostoyanii aviatsionnoi promyshlennosti, Moscow 2005

Voyenno-Promyshlenny Kur'er, weekly (in Russian)

Defense News Weekly

Flight International (in English).

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