



IL-76/PROJECT 476: THE SUCCESSFUL QUAD

In October 2012 the Russian defense ministry awarded United Aircraft Corporation (UAC) an order for 39 Il-76MD-90A heavy lifters, also referred to as Project 476. This is a launch order for the redeveloped Il-76, with deliveries scheduled for 2014-2020. It gives this popular type a new lease of life and extends its future well into this century..

The baseline four-engine quad had its maiden flight in 1971 and entry-into-service three years later. It was built in nearly a thousand copies. Among other nations, the type continues in service with the Russian air force (over 250 examples including special versions), Indian air force (16 Il-76MD air lifters, 6 Il-78MKI tankers and three AI flying radars), Pakistan (four Il-78 tankers acquired from Ukraine after overhaul) and China (about fifteen aircraft) as well as Algeria.

Presumably, by placing the large order for the Il-76MD-90A, Moscow meant to

convey a signal to potential customers in China and India. These countries already operate a number of "classic" Il-76 quads on which the Il-76MD-90A design is based. Beijing and New Delhi have long been targeted as primary foreign buyers of the newer airlifter able to transport a 114,500-lb payload over a range of 2,700 nm.

The launch order for the Il-76MD-90A was placed on 3 October, when Vladimir Putin visited Aviastar-SP plant in Ulianovsk. After witnessing a demonstration flight by

the type's first operable prototype, the Russian president said that the Rouble 140 billion (\$4.5 billion) contract [or \$115 million per aircraft] is expected to be followed by foreign sales. He especially mentioned China as a potential client for the renewed Il-76. "Some six years ago we were talking to our partners in the Asian countries, including the People's Republic of China. They were ready to buy from us some 50 airplanes. I am sure this new airplane will be in demand both in Russia and our potential partners abroad", Putin said.

The Ilyushin design house began "working in earnest" on the redeveloped Il-76 in 2005, the President of the Russian Federation stated. This happened after "long talks with our partners and friends in Uzbekistan (the final assembly of this machine was set at the plant at the Tashkent Aircraft Production Organization in the Soviet times). Unfortunately, we did not manage to come to terms, due to economic issues. Hence with, we made this final decision to set up a new manufacturing line at the Ulianovsk plant", Putin said.

The Il-76MD-90A features a reworked wing and a number of new onboard systems. The Il-76MD-90A relies on Aviadvigatel/Per Motors PS-90A-76 high-bypass engines attributed to fourth generation, each producing a thrust of 35,300lb.

Besides, the modified aircraft has an improved avionics set and a new pilot station featuring large LCD screens. The Il-76MD-90A promises a 10 to 15% reduction in lower fuel over the Il-76, and greater payload through increase in maximum take-off weight up to 463,000 lb. First operable prototype flew on September 22. State acceptance trials of two delivered aircraft should be finished in 2014.

Meantime, "classic" Il-76 remains popular on the secondary market. China has recently ordered ten used Il-76s from Russia's arms vendor Rosoboronexport. This move seems to be an interim measure to enlarge the People's Liberation Army inventory of the four-engine heavyweight airlifters before the Il-76MD-90A version becomes available.

The media learnt about the fact of this new Chinese order from Sergei Kornev, head of Rosoboronexport's aviation equipment department. He ran a press briefing at Airshow China 2012, held in the week starting 13 November. The man told reporters that, as of mid-November 2012, his company found seven suitable airframes on the secondary market. These were being subjected to a major overhaul effort. On its completion, these aircraft will be delivered to China and enter service with the People's Liberation Army Air Force. Touching on the remaining three airframes on order, Kornev said that Ro-



Russian air force Il-76MD

soboronexport continues looking for them on the market. The search is not limited to within the Russian air force inventory and that of other Russia's governmental structures, he added.

According to unofficial Russian websites, Rosoboronexport has so far found suitable airframes for overhaul at Staraya Russa maintenance station: three Il-76s from Russian air force, two from Belarus air force and three from Transaviaexport airline.

Kornev refused to provide an exact number of Il-76s already delivered to China. And yet he noted that not only Rosoboronexport, but also its Ukrainian counterpart Ukrspetsexport has been involved in sales of new and used Il-76s. According to western observers, during 1990s China received about twenty Il-76s new from TAPO, the Tashkent Aviation Production Organization named after Valery Chkalov. This plant is situated in the capital city of Uzbekistan. In the times of the Soviet Union, TAPO served as the manufacturing plant for the Il-76.

China placed first order for three Il-76MDs in 1990. Deliveries took place next year. A follow-on order for seven more followed in 1992, with shipments in 1993-1994. After several years, deliveries resumed in 1996, deliveries counted four airplanes. All of the above mentioned aircraft joined the PLAAF 13 Aviation Division.

In addition to the fourteen newly built Il-76MDs, China procured a small number of used airplanes from Ukraine and used some of those for certain specific ground testing. A quantity of used airframes went into China from inventories of independent industrial

players, including IIL, the Flight Test and Research Institute named after Mikhail Gromov. A couple of IIL test-beds found their way into China. These are test-beds on the Il-76 platform, outfitted with large rotating antennas above the fuselage. Presumably, these were used in the interests of China's flying radar program.

China received one very special airframe in 2002. The one was employed on flight trials of the Israel's Elta EL/M-205 PHALCON (Phased Array, L-band, CONformal, L-band) long-range observation radar. Israel was on contract to supply such equipment but under heavy pressure from the US, the respective contract was cancelled. This, however, did not prevent PLAAF from acquiring powerful flying radars.

In November 2003 China sent to the air the flying radar of its own make, the KJ-2000. It used the Il-76 as a platform. Following tests conducted on several development prototypes, PLAAF ordered four KJH-2000s to be produced using Il-76MD airframes taken from the 13 Aviation Division. In the new form, all four were delivered in late 2007, for service with the 76 Regiment of the 26 Aviation Division.

Earlier this century China was seeking to buy some 50-60 new Il-76s from Rosoboronexport, and even signed a preliminary agreement on 38 airframes (34 air lifters and four tankers) in September 2005. But materialization of that deal has been postponed. Kornev explains: "Indeed, there has been a postponement with fulfillment of that agreement due to the inability of the plant in Tashkent to build that many new

Success story



airframes and fulfill the solvent demand in China. That was the primary cause to a slow-down in Il-76 deliveries in a.

We put our hopes into the Il-76MD-90A model that is being re-launched into production at the Aviastar-SP plant in Ulianovsk. One such airplane is already flying, and the customers have been following flight-test progress with interest". As stated above, in early October Russia's president visited Aviastar-SP to inspect the Il-76MD-90A (Russian air force version of the Il-76MD-90A). That time Vladimir Putin said the reworked Il-76 is on offer to China and India. Asked to comment on that point, Kornev provided the following statement: "Rosoboronexport is working with these customers. In our view, the Il-76MD-90A has a large export potential, and we are making efforts to explore that potential. This newer version features modern avionics, higher payload-range capability, more powerful and economic PS-90A-76 motors. However, flight tests could take a couple of years". Today, the Il-76 is the only heavyweight air lifter type in the inventory of PLA's Air Force, giving it a strategic airlift capability. India has also relied on the Il-76 as its only strategic airlift aircraft. But recently New Delhi and Washington signed for a number of C-17 Globemaster aircraft.

Their deliveries are expected shortly.

Motors

It is interesting to note that the D-30KP engines powering the Il-76 are used in China not only on this aircraft type. Imported motors power China's indigenously developed Y20 heavy airlifter which began flight tests on 26th of January, 2013. Besides, China is known to have been installing D-30KPs into refurbished H-6 bombers (locally made Tupolev-16) in order to achieve a range extension. Russian officials turn a blind eye on this. Furthermore, China attempted production of reverse-engineered copies under the designation of WS-18. So far, however, their usage has been limited due to reliability issues.

In autumn 2012 executive director of NPO Saturn Ilya Fedorov spoke to press. He confirmed that his company was working on fulfillment of the Chinese order for 184 D-30KP turboprops intended for in-service Il-76s. Respective contract was signed in November 2011. It won approval of the Russian government in February 2012. According to Fedorov, the contract value is over US\$ 1.5 billion, with deliveries due to be completed by 2016.

On another occasion, Saturn reported that in the middle of October 2012 China accepted a batch of 12 D-30KP2 motors. In a press release the engine maker pictured this act of acceptance as a milestone for the company (otherwise, the production

of this elderly engine would have to close down due to weak solvent demand). China placed order for 184 motors in 2011, due for delivery by 2016. This year Saturn plans to assemble 60 D-30KP2s, and, starting next year, achieve annual production rate of 72 units. "China is a major overseas customer for Saturn", the engine maker said in the press release. In the period of 2009-2011 the company delivered 55 D-30KP-2s to China and thus fulfilled its obligations before that customer.

Saturn executive director Ilya Fedorov was quoted as saying that "the experience of operations of the Il-76 family aircraft in China has proved reliability of the D-30KP2 motors and simplicity of their maintenance. The Chinese customers expressed their complete satisfaction with the manufacturing quality of our motors and the level of after sales support from Saturn". Fedorov further stated that the follow-on order awarded in 2011 became "a logical step in further expansion of our cooperation, based on the positive experience of D-30KP2 operations. Successful fulfillment of our contractual obligations in frame of the follow-on order will give a further boost to Sino-Russian cooperation".

Production

In December 2006 the Russian government made decision for restoration of the Il-76 production in an improved version. It

was decided to establish a new assembly line for the type at Aviastar-SP in Ulianovsk. Previously, the Il-76 assembly line was at TAPO plant in Uzbekistan capital city of Tashkent. Between nine and ten hundred such aircraft was the type's production run at TAPO. Of those, one hundred and twenty were exported to eleven foreign countries outside (Soviet Union and Commonwealth of Independent States), not counting lease those operated under lease or hire deals. During the process of preparations to production restart, Ilyushin design house reworked the old documentation packages into a new, computerized form featuring 3D drawings.

Over forty years of its history, the Il-76 saw many improvements introduced to the original model. Worthy of mentioning is the airplane's version with extended fuselage (two insertions each 3.3m, to increase cabin volume from 326 to 400 cubic meters) and higher-thrust PS-90A-76 motors. The Il-76MF had its maiden flight in 1995. This interim model was built in small quantities for experimental purposes and for the Jordanian air force.

The above mentioned Perm motors were also employed on the Il-76TD-90VD commercial cargo planes, a customized version



IL-76MD

for Volga-Dnepr airline. Several airplanes for the airline were assembled at TAPO earlier this century. Besides, the Russian air force ordered refurbishment of several Il-76MDs into the Il-76MD-90 variant. The latter also features Perm power plants in lieu of less powerful and far less economical D-30KP2s.

During the press of digitizing the initial drawing of the Il-76 wing, the designers introduced corrections so as to retain the wing's airfoil and overall dimensions, yet make the reworked wing more technologically sound. The reworked wing has a new structural layout: the wing panel is now a one-piece made using long panels with riveted frames. The number of the wing spars

reduced from there to two. This allowed a meaningful reduction in structural weight and manufacturing expenses.

The outdated Kupol-II nav system gave way to far more modern Kupol-III-76M(A), which works in conjunction with BPSN-2 satellite navigation. The SAU-1T-2B flight control system was replaced by SAU-76 digital FCS. The place of the elderly TA-6A APU is taken by far more modern TA-12A.

The Il-76MD-90A had its rollout ceremony on 15 December 2011. In July next year the airplane was handed over from the manufacturing division of Aviastar-SP to the plant's flight test station. The maiden flight occurred on 22 September 2012, with Ilyushin test pilots Nikolay Kuimov and



IL-76MD-90A

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Vladimir Irinarkhov at the controls. They were accompanied by navigator Valery Grechko, flight engineer Alexey Zhuravlev, radio operator Sergey Orlov, flight test engineer Vladimir Lysyagin, electric systems operator Alexander Tsvetkov and cargo compartment operator Alexey Mitin.

The same airplane registration 78650 and S/N 0102 flew a second – short, but spectacular – mission on 4 October, before the eyes of the Russian president. Speaking after the successful completion of that flight, Vladimir Putin said: "I have every reason to thank and congratulate the general designer (Genrikh Novozhilov) and the manufacturing plant general director (Sergey Dementiev) and the whole team who have worked hard to achieve this stage of the development of a new Russian air lifter. Today we witnessed the final stage of that development. Today's event is not merely a flight of a reworked Il-76. Essentially, this is a considerably reworked, almost new aircraft upgraded by 70%. Now we have an advanced air

lifter with outstanding performance and superior qualities in the domains of reliability, payload-range, fuel efficiency and capability to transport various cargoes. I am certain that the aircraft will be in demand in its home country and with our partners abroad".

Russian vice-premier responsible for military-industrial complex, Dmitry Rogozin, said that the long term procurement plan calls for acquisition of more than a hundred aircraft of the Il-76MD-90A type and its variations such as the Il-78M tanker and A100 flying radar. According to AviaStar-SP general director Sergey Dementiev, three airframes in the initial production batch are under work in the plant's workshops. Work on these commenced back in 2010. Dementiev said two of those airframes shall be complete in 2013, to enable deliveries in 2014.

In the last week of January the Il-76MD-90A prototype carried out a long-duration flight lasting for 4 hours 25 minutes, as part of the manufacturer's tri-

als. It originated at the Ulianovsk-Vostochny (-East) aerodrome. The airplane was manned by the crew under command of Ilyushin test-pilot Nikolay Kuimov. Most of the flight was at the altitude of 10,000 meters and uneventful. While in the air, the crew checked for would-be flaws in the onboard systems, and assessed the work of automatic flight control system. Besides the pilots assessed airplane's handling qualities, stability and maneuverability. It is interesting to note that the airplane flew for the first time after painting in a grey livery, after a comprehensive check and tuning of onboard systems and test equipment. Ilyushin ferried the prototype to Zhukovsky near Moscow. The airplane continues flights tests operating from the Ramenskoye aerodrome of Mikhail Gromov's Flight Test and Research Institute (LI I). ▀

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