

Superjet 100 (SSJ100)

- certified model RRJ-95B and RRJ-95LR-100, is a new-generation Russian commercial jet developed and produced by Sukhoi Civil Aircraft Company. The SSJ100 is an advanced and cost-effective commercial aircraft, built with state-of-the-art technologies in aerodynamics, engine and aircraft systems. The Superjet 100 can be operated through short-to-medium range routes.

The first SSJ100 prototype was **rolled out** from SCAC's final assembly shop at Komsomolsk-on-Amur (Russia) in September 2007. The first flight was successfully accomplished in May 2008. In spring 2011 the aircraft operated its **first commercial flight**.

Certain requirements of the world leading airlines to the product have become the starting point for the SSJ100 design. The aircraft has been fully developed based on the digital technologies, for instance, using CATIA V5.

Wide scale retrofitting of plants in Komsomolsk-on-Amur and Novosibirsk was implemented. New technologies in aircraft production have been implemented such as jiggles construction, automatic stitching of aircraft details, automatic riveting and others.

The Superjet 100 is equipped with two SaM146 turbofan engines produced by PowerJet, a joint venture between French Snecma and Russian Saturn. The engine was specially developed and built for the Superjet 100 aircraft.

The SSJ100 incorporates the best of all the most modern Western technology – leaders of aviation industry.

Enhanced takeoff and landing performance, high cruising speed, operations in wide range of environmental conditions allow to plan flexibly route network, increasing the number of destinations. The SSJ100 can be used both at regional and mainline routes.

The Superjet 100 cruises at a Maximum Operating Speed of **Mach 0.81** and at 40.000 ft / 12.200 m.

The maximum cruising speed of Mach 0.81 in SSJ100 (871 km / h) allows SSJ100 to operate at the same flight levels as the most common types of short-haul aircraft, thereby optimizing not only airlines' fuel costs but also the time required for the flight.

Long Range version has a longer, compared to the SSJ100 Basic, range of up to 4 320 km, Maximum Take Off Weight –49 450 kg and strengthened wings for increased weight. The SSJ100 LR is equipped by SaM146 engine with increased by 5% takeoff thrust performance.

SSJ100 can be efficiently operated in a wide range of climate conditions like those of Central Russia, its Far North, South East Asia and Mexican high-mountains regions. The aircraft operates at the range of temperatures varying **from minus 54 to plus 45 degrees**.

Sukhoi Civil Aircraft Company was founded in 2000 in order to create and develop new models of commercial aircraft. Principal directions of the company's activity are development, certification and production as well as marketing, sales and after-sales support. Headquartered in Moscow, SCAC has a production branch seated in Russian city of Komsomolsk-on-Amur, where the final assembly is done. Superjet 100 is the main project of the Company.

SuperJet International (SJI)

SuperJet International (SJI) is the international arm of Sukhoi Civil Aircraft Company (SCAC) supporting the Superjet 100 (SSJ100) Program.

SuperJet International's responsibilities, in coordination with the manufacturer SCAC, include: marketing and sales, delivery and customization centre for Western markets, EASA certification, support in flight testing, flight and maintenance crew training, worldwide after sales support and services.

The partnership SJI and SCAC is the widest programme of cooperation between Italy and Russia ever signed in the civil aviation. Both countries are marked by a long history of knowledge in the aerospace sector, by engineering talent and passion for innovation.

SSJ100: THE RIGHT CHOICE

for Airlines

- it is the ideal **complement for narrow-body operators**
- **replacement of aircraft with larger capacity** (such as the A320, B737) operated with low passenger payload during seasonal downturn. SSJ100 may substitute both aircraft of larger capacity for a long period in a “low” season and during a day;
- it offers the **comfort of a narrow-body**
- SSJ100 is an **active component in the concept of hubs**, which allows airlines to optimize their costs, delivering passengers by a smaller aircraft in an airline base airport. And other benefits.

for Passengers

The comfort of the SSJ100 cabin is comparable with medium and long-haul aircraft:

- **the height** of passenger compartment in the central aisle is 83.46 inches / **212 cm**;
- comfortable **wide seats**, comparable to those being usually installed on medium and long-haul aircraft;
- wide central aisle;
- **significant living space** for each passenger: an increased seat pitch in SSJ100 basic configuration (32 inches / 81.28 cm) allows even tall passengers to feel comfortable on-board;
- large windows for natural light and better outside view;
- **spacious** 78.74 inches / 2 m length **overhead bins** without inside partitions for convenient accommodation of hand luggage;
- LED lighting system with warm light of the lamps;
- roomy toilets, the one in the rear service area is adapted **for people with reduced mobility**, in addition, it is equipped with a wide diaper board;
- boarding to SSJ100 can be performed **through a mobile stairway and a boarding bridge** as well.

TECHNICAL PERFORMANCE

CAPACITY

Flight Crew	2
Minimum Cabin Crew	2
Passengers	up to 103

EXTERNAL DIMENSIONS

Wings Span	m	27.80
Length	m	29.94
Height	m	10.28

BAGGAGE CAPACITY

Cargo Volume	m ³	21.76
Checked Baggage per Pax	m ³	0.25
Total Baggage Capability (checked and unchecked)	m ³	28.86
Total Baggage per Pax	m ³	0.33

PERFORMANCE

		Basic	Long Range
Maximum Range 87 seats (100 kg per pax)	km	2.960	4.320
Maximum Cruise Speed	M	0.81	0.81
Takeoff Field Length(TOFL) [ISA, SL, MTOW, zero wind,dry RWY, no slope]	m	1.760 (1.675*)	1.940
Landing Field Length [MLW, ISA, SL, zero wind, dry RWY, no slope]	m	1.425	1.425

WEIGHTS

Maximumramp weight (MRW)	kg	46.080	49.650
Maximum Takeoff Weight (MTOW)	kg	45.880	49.450
Maximum Landing Weight (MLW)	kg	41.000	41.000
Maximum Zero Fuel Weight (MZFW)	kg	40.000	40.000
Maximum Fuel Weight	kg	12.690	12.690

*- B100 option with SaM-146-1S18 engine

The Engine SaM146

The SaM146 is produced by PowerJet, a Company owned 50/50 by Snecma of France and NPO Saturn of Russia, and endows the Superjet 100 aircraft with economic performance.

An optimized air-frame design concept led to the development of the SaM146 advanced turbofan engine. The regional jet market demands purpose-built engines, designed for frequent flights and quick turnaround, with no unscheduled down time.

The new modular SaM146 engine combines proven CFM56 experience with new technology and 20% reduction in components to dramatically reduce operating and maintenance costs, while maintaining industry-leading performance, reliability and operability.

Description:

- Latest third-generation, redundant Full Authority Digital Engine Control (FADEC) optimizes mission performance while reducing fuel consumption.
- Engine interchangeability with Common Right and Left (CRL) design reduces spares requirement.
- Engine nacelle clamshell doors facilitate access to engine Line Replaceable Units (LRUs)
- Fewer stages and parts in the high-pressure compressor (six stages including two blisks) of the single-stage high-pressure turbine reduce maintenance costs, fuel consumption and weight.
- Optimal geometry of fan blade using 3D design ensures minimum blade stress and maximum fan efficiency

Engine Characteristics	1S17	1S18
Thrust class (APR)	17.300 lbf	17.800 lbf
Takeoff thrust	15.400 lbf	16.100 lbf
Bypass ratio	4.43	4.43
Maximum climb thrust	3.740 lbf	3.740 lbf
Fan diameter	48"2	48"2
Engine overall length	3.590 mm	3.590 mm

PowerJet, founded in July 2004, is a joint venture of Snecma (Safran) of France and NPO Saturn of Russia. The company manages the SaM146 engine program, including development, production, marketing and sales, as well as customer support and MRO services. In April 2003, the SaM146 engine was selected to power Superjet 100 aircraft.

SSJ100 PRODUCTION

Production Facilities

Production is performed by the Komsomolsk-on-Amur Branch of Sukhoi Civil Aircraft Company (KnAF) with direct participation of other plants located in Russia where SSJ100 parts are being produced. Finished components are delivered to KnAF where their final assembly is performed.

Komsomolsk-on-Amur:

- *"Sukhoi" Company (JSC) Branch - "KNAAZ named after Y.A. Gagarin"*
Wing, high-lift devices, center-section and F2, F3, F4 production. System installation
- *Komsomolsk-on-Amur Branch of Sukhoi Civil Aircraft Company*
Fuselage assembly, final assembly, system installation and SSJ100 testing

Novosibirsk:

- *"Sukhoi" Company (JSC) Branch - «Novosibirsk aircraft production association named by V.P. Chkalov»*
Empennage and F1, F5, F6 fuselage parts production

Voronezh:

- *Voronezh Aircraft JSC*
Composite parts of SSJ100 production

Ulianovsk:

- *Aviastar-SP*
Interior installation
- *Spektr-Avia*
SSJ100 Painting

Zhukovsky:

- *SCAC Flight Test Center*
Ground and in-flight testing
- *SCAC Delivery center*
SSJ100 delivery to customers

Venice (Italy):

- *Completion and Delivery center for the Western customers*
Painting, interior installation, ground and in-flight testing, deliveries

Komsomolsk-on-Amur Branch of Sukhoi Civil Aircraft Company

Komsomolsk-on-Amur Branch of SCAC was established in 2005 to build the new regional aircraft Superjet 100. In 2007 the first engineering development model was shown for the first time and after a year it had the first flight.

It took just five years to manufacture the first production aircraft in 2010 since the Branch had been established.

Komsomolsk branch of SCAC now includes: Components Distribution Centre, Fuselage Assembly Shop with five working stations, Final Assembly Shop with seven working stations and Flight-Test Section with two working stations.

CERTIFICATION

In January 2011 the Superjet 100 obtained IAC AR Type Certificate from the Russian Certification Authority. The Certificate **confirmed compliance of the SSJ100 with the airworthiness regulations and authorized commercial operations of the aircraft and its safety.**

In February 2012 - the Superjet 100 (model RRJ-95B) received its Type Certificate from the European Aviation Safety Agency (EASA). This certificate recognizes that the SSJ 100 aircraft demonstrated compliance with the EASA airworthiness and environmental requirements. The recognition allows the European airlines, as well as those airlines operating in countries which use EASA regulations as a reference standard, to accept and operate the SSJ100 aircraft. The Superjet 100 is **the first ever Russian passenger “Large Airplane” to achieve the EASA CS-25 Certification.**

In May 2012 Supplement to the SSJ100 TC on expanding operational conditions at the high outside air temperature up to +45 C was awarded by IAC AR.

In November 2012 Supplement to the Certificate was issued on expanding operational conditions in the high north latitude area. The flight tests proved the proper functioning of the aircraft avionics, most notably the inertial reference system and the satellite navigation systems GPS and GLONASS, in flights in high north latitude area (up to 78 degree) and temperature – up to 54 below zero.

In June 2013 the first Europe export certificate was issued.

In August 2013, Aviation Register of the Interstate Aviation Committee (IAC AR) issued a Supplement to the Type Certificate for RRJ-95LR aircraft – Long Range version of Superjet 100.

In March 2014 Aviation Register of the Interstate Aviation Committee (AR IAC) issued a Supplemental Type Certificate for Superjet 100 aircraft, which confirms that this type of aircraft can perform flights under Area Navigation in RNAV 1 and P-RNAV systems.

In June 2014 Aviation Register of the Interstate Aviation Committee (AR IAC) issued a Supplemental Type Certificate confirming that SSJ100 can operate in **CAT IIIa** environment, including landing with crosswind conditions and on narrow 30-meter-wide runways.

In October 2014 Sukhoi Civil Aircraft Company received a Supplemental Type Certificate, which allows Superjet 100 to perform reduced thrust takeoff. Operating mode with engines working with a reduced engine speed and lower turbine gas temperature allows to reduce engine load and to extend engine lifetime, so this, in turn, minimizes aircraft maintenance cost.

In November 2014 first ever in Russia the Aviation Register of Interstate Aviation Committee (IAC AR) issued a Supplemental Type Certificate for the Superjet 100 (SSJ100), permitting the usage of Vertical Navigation (VNAV) functionality at all stages of flight. VNAV functionality of Superjet 100 significantly decreases crew workload and ensures compliance with all applicable restrictions.

In November 2014 Aviation Register of the Interstate Aviation Committee confirmed the possibility to equip the Superjet 100 aircraft with the enhanced comfort passenger cabin interior. This Major Change Approval to the baseline Superjet 100 Type Design, issued by IAC AR In late November 2014, confirms the safe operation of this aircraft type in the VIP configuration submitted for certification.

In December 2015 European Aviation Safety Agency (EASA) issued a Supplemental Type Certificate for the Superjet 100 (SSJ100), which confirms that this type of aircraft can perform flights under Area Navigation in RNAV 1 and P-RNAV systems

In December 2016: European Aviation Safety Agency (EASA) approval of Superjet 100 Long Range (SSJ100LR)

In February 2017: European Aviation Safety Agency (EASA) certified new model of SSJ100 – B100. The difference between the B100 and the base version is the increased-thrust SaM-146 engines; such engines are also installed to the long range version of the aircraft. Key characteristics of SSJ100 B100, certified type RRJ-95B-100, are flight range – 3048 km with expected payload under standard atmospheric conditions, maximum takeoff weight – 45880 kg, engine takeoff thrust – 16100 lbf, and takeoff distance reduced by 10% as compared to the base version.

TRAINING ACTIVITIES

There are two facilities providing Customers with flight and maintenance for SSJ100: one in Venice (Italy) and one in (Zhukovsky) Moscow, Russia.

Both centres offer the complete cycle of training for flight crews and technicians of SSJ100 customers and operators.

Two advanced SSJ100 Full Flight Simulators (FFS level V), manufactured by Thales Training & Simulation are currently in service for customer training at both SJI Training centres in Moscow and Venice.

The two centres are also equipped with the most advanced training tools and devices, including Computer Based Training (CBT), Flight Procedure Training Device (FPTD), Flight Training Device (FTD LV), and a Cabin Emergency Evacuation Trainer (CEET).

Through May 2018, SJI has trained 714 pilots, over 300 cabin attendants and over 2600 maintenance technicians for several airlines.

AFTER SALES SUPPORT

The following aftersales services to SSJ100 operators are being provided: logistic support, training of flight and engineering personnel, maintenance and repair, flight operation support, spare parts pool access, customers' authorization to use licensed SW, aircraft retrofit and modernization, 24/7 engineering support, provision of required data and access to customers' support informational portal.

Spares Distribution Program: Basic SuperCare Plan includes exchange parts pool access, guaranteed availability, LRU-off wing maintenance. SuperCare Plan Option includes on-site stock, Landing Gear/APU maintenance, engineering services.

The logistics strategy is based on the centrality of its main spares distribution center, located in Munich. This warehouse is managed by Lufthansa Technik Logistik (LTL). The support warehouse located at Sheremetyevo airport, Moscow, is aimed to cover spare parts requirements for Russian and CIS customers. Fort Lauderdale LTL warehouse represents the support warehouse to cover spare parts requirements in the Americas.

The Customer Support Center has several subdivisions within its structure. The task of Coordination Planning and Control Group is to register operators' and MRO providers' requests and assign the responsible specialists, as well as to monitor the progress of request processing. Fleet Managers agree the time period of SB implementation with the operators to ensure production support by SCAC. Engineering desk is responsible for technical issues solution and development of the plan of actions for problems elimination. Spares parts and components delivery is under the responsibility of Logistic Group within the Logistic Department.

SSJ PROGRAMME DEVELOPMENT

The modernized SSJ100 version is being developed as part of the import component substitution program. Russian design and development companies and manufacturers were invited to participate in this program. The modernization of a number of aircraft systems is going to be carried out. The number of American components will be reduced by several times. The goals pursued by the development of the new version are: costs reduction, operational costs reduction, the increase of the after-sales support flexibility because of alternative suppliers availability and the new markets invasion.

In Winter 2017 Superjet 100 performed its first flight with the installed **saberlets** in Zhukovsky. The results of research and experiments showed that the installation of the saber-like tips allows to simultaneously improve the take-off and landing performance and decrease the fuel consumption for not less than 3%. The expected improvement of the take-off and landing characteristics will be obvious for the carriers operating the aircraft at regional runways and in hot weather conditions as well as on mountain aerodromes (Hot&High). SCAC is consequently implementing the Superjet 100 improvement program aiming at market expansion and the increase of the number of Customers, the current Operators

satisfaction level growth and the maintenance of the high competitive level of the product. The wing tips installation being the part of the improvement program will provide the operators with cost cut up to \$70000 per year per one SSJ100.

SSJ100 IN OPERATION

First deliveries of Superjet100 were started in 2011. As of **April 2019** the number of SSJ100 being operated by the customers are **138**. The aircraft in service operated more than **570 000** flight hours totally for more than **370 000** revenue flights.

Russian Aeroflot, Yakutia Airlines, Yamal, IrAero, Gazpromavia, Azimuth, RusJet, Azimuth, Severstal, Russian Government structures: Ministry of Internal Affairs, Special Flight Division Rossiya, EMERCOM are operating now the aircraft in various modifications. Mexican Interjet, Irish CityJet, Royal Thai Air Force are also among the operators.