BOMBARDIER

BACKGROUNDER

CRJ NEXTGEN FAMILY OF REGIONAL JETS

Bombardier's *CRJ NextGen* (next generation) aircraft are the most recent step in the evolution of the *CRJ Series* airliners, the world's most successful family of regional aircraft.

In February 2007, Bombardier launched the 100-seat *CRJ1000* regional jet, and a few months later, in May, announced that the interiors and windows for this aircraft would also be available for *CRJ700 NextGen* and *CRJ900 NextGen* regional jets. In addition, compared to the classic *CRJ700* and *CRJ900* aircraft, the *CRJ700 NextGen* and *CRJ900 NextGen* regional jets offer reduced fuel consumption, lower trip operating costs and lower airframe direct maintenance costs.

CRJ1000 NextGen

Bombardier Aerospace delivered the first *CRJ1000 NextGen* regional jets to launch customers, Air Nostrum of Valencia, Spain and Brit Air of Morlaix, France in December 2010. Since entry into service, both operators have been reporting the excellent passenger appeal and very high reliability of the *CRJ1000 NextGen* aircraft, as shown by the aircraft's scheduled completion rate of 99.9 per cent and the aircraft's 99.4 per cent dispatch reliability.

In addition, the *CRJ1000 NextGen* aircraft has been achieving a mission fuel consumption rate that is four per cent better than estimated. The additional savings in fuel burn results in an average annual savings of approximately $220,000 US per aircraft. The improved fuel burn also directly results in a four per cent reduction in carbon dioxide emissions, equivalent to an average reduction of nearly 700 tons of greenhouse gases per aircraft, each year.

Proving that it has been a sound investment, the *CRJ1000 NextGen* aircraft is achieving the lowest cash operating cost per mile for operators in its market segment, while delivering extra range, exceptional reliability and a greener footprint. The *CRJ1000 NextGen* aircraft is also achieving six per cent greater range than previously advertised, providing additional operational flexibility.

Introduced specifically to meet the needs of growing regional airlines for jets with up to 100 seats, the *CRJ1000 NextGen* regional jet is the optimized solution in the regional airline industry for medium-haul route applications, particularly for the replacement of older-generation, single-aisle aircraft in thin markets. The competition is 22 per cent heavier than the *CRJ1000 NextGen* aircraft, and this is one of the key factors in the *CRJ1000 NextGen* aircraft's lower fuel burn.

CRJ900 NextGen and *CRJ700 NextGen*

Fuel burn on the *CRJ700 NextGen* and *CRJ900 NextGen* aircraft has been reduced by up to four per cent, and airframe direct maintenance costs lowered by up to nine per cent, compared to the current standard of *CRJ700* and *CRJ900* aircraft.

The nine per cent savings in airframe maintenance costs will be achieved in conjunction with the *CRJ1000 NextGen* aircraft program by increasing the interval between “A” checks to 600 flight hours from 400, the “C” checks to 6,000 flight hours from 4,000, and extending Calendar inspections to three years; harmonizing flight hour/cycle calendar and component usage parameter tasks to reduce aircraft down time and maintenance labour over the life of the aircraft; and revising scheduled task procedures as appropriate to reduce labour and minimize out-of-phase maintenance intervals.

Total cash operating costs over a 500-nm (926-km) U.S. sector are well below those of the competition. The *CRJ700 NextGen* aircraft has a nine per cent advantage over the competition, while the *CRJ900 NextGen* aircraft has a five per cent advantage over the competition.

CRJ NextGen Aircraft Interiors

The new interiors of the *CRJ NextGen* aircraft feature larger overhead luggage bins, larger windows, improved lighting, and redesigned ceiling panels and sidewalls.

A new and enhanced bin design provides increased bin volume, larger bin doors for easier storage of roller bags, and optimization to allow more passengers to store roller bags without any effect on sitting head room. The improved bin permits the storage of up to 27 per cent more roller bags in the *CRJ700 NextGen* aircraft and up to 21 per cent more in the *CRJ900 NextGen* aircraft.

New window cutouts increase the height of the windows from 13.8 inches (35 cm) to 15.8 inches (40 cm). In addition, the window shade handles are notched into the sidewall above the window to expose the full glass, resulting in a 24 per cent increase in viewing area. Long-life and lower-power-consumption LED lighting in the *NextGen* aircraft replaces the current fluorescent tubes. The LED cool lighting washes along the ceiling panels, washes the light under the bin door and illuminates the bin interior when the door is opened. (LED is also being used for the aircraft position lights.) Redesigned sidewall and ceiling panels, with their soft, flowing lines and shapes, in addition to the larger windows that maximize natural light, enhance passenger appeal. An audio- and video-on-demand in-flight entertainment system is a feature that is available to further enhance the passenger flying experience.

Flexible passenger cabins can meet the specific galley, lavatory and other requirements of airlines. Baseline *CRJ700 NextGen*, *CRJ900 NextGen* and *CRJ1000 NextGen* aircraft have 70, 88 or 100 seats at 31-inch (78.7 cm) pitch. In addition, the *CRJ NextGen* family will still offer airlines first/business/economy classes, allowing seamless operation with their mainline fleets.

Passenger baggage space ranges up to 8.2 cubic feet (0.23 m^3), meeting passengers' and airlines' needs for checked baggage.

CRJ Series History

The *CRJ* Series aircraft program had recorded firm orders for a total of 1,708 aircraft, with 1,638 of these delivered as of April 30, 2011. *CRJ* Series aircraft are in service with more than 60 airlines and have logged more than 28 million flight hours and 23 million take-off and landing cycles. In addition, corporate variants of *CRJ* Series aircraft are in service with more than 30 operators.

Launched in March 1989, the *Bombardier CRJ* Series aircraft (developed as the *Canadair Regional Jet*) was the world's first 50-seat regional jet. Rollout took place May 6, 1991, followed by the first flight four days later. Transport Canada type approval was awarded on July 31, 1992, followed on January 15, 1993 by the European Joint Airworthiness Authorities and on January 21, 1993 by the U.S. Federal Aviation Administration. The first customer aircraft was delivered in October 1992, and this aircraft entered revenue service with launch customer Lufthansa CityLine in November 1992. Bombardier Aerospace delivered the 1,500th *CRJ* Series aircraft in 2008.

***CRJ100/200*:** The original *Bombardier CRJ100* aircraft was powered by two rear-mounted General Electric CF34-3A1 high bypass ratio turbofan engines. The *Bombardier CRJ200* is powered by two advanced CF34-3B1 engines, each flat rated to produce 9,220 pounds (41.01 kN) of take-off thrust with Automatic Power Reserve (APR), with an optional high temperature flat rating for "hot and high" operations. It can cruise at speeds up to Mach 0.81 (464 knots, 860 km/h, 534 mph), and maximum range with 50 passengers is 1,700 nm (3,148 km, 1,956 sm). The aircraft is certificated up to 41,000 feet (12,496 m).

***CRJ440*:** In July 2001, Bombardier announced it was developing a 44-seat variant of the *Bombardier CRJ200* aircraft, which it designated the *Bombardier CRJ440* aircraft. Northwest Airlines was the launch customer for this *CRJ* Series aircraft variant.

***CRJ700*:** A 70- to 78-seat derivative of the 50-seat *CRJ200* aircraft, the *CRJ700* aircraft was launched on January 21, 1997 to meet the demand for larger aircraft with superior operating economics on regional airline jet routes. The *CRJ700* aircraft features an all-new 4th generation aerodynamic wing design with leading edge slats and a new fuselage structure that provides for increased passenger cabin space and an industry-leading 80,000 flight-cycle economic life.

Official rollout of the aircraft occurred on May 28, 1999, one day after the first flight. The aircraft received Transport Canada Aircraft Type Certificate on December 22, 2000 and European Joint Airworthiness Authorities Type Certificate followed on January 26, 2001. U.S. Federal Aviation Administration type approval was achieved February 16, 2001. Initial customer delivery to Brit Air of Morlaix, France took place on January 31, 2001. The *CRJ700* aircraft entered revenue passenger service with Brit Air on February 18, 2001.

***CRJ705*:** The *CRJ705* aircraft, which has its own type designation with a maximum capacity of 75 seats, has an overall length of 118 feet eight inches (36.2 m), or 12 feet (3.01 m) greater than the *CRJ700* regional jet, and a wingspan of 81 feet six inches (24.85 m). Redesigned winglets and aerodynamic changes give the *CRJ705* aircraft excellent airfield performance.

Air Canada was the launch customer for the *CRJ705* aircraft, which in Air Canada configuration has 10 two-plus-one Executive Class® seats at 37-inch pitch (94 cm) and 65 two-plus-two Hospitality Class® seats at 34-inch pitch (86.4 cm).The aircraft is powered by two General Electric CF34-8C5 engines, each with a normal take-off thrust of 13,360 pounds (59.4 kN) or 14,510 pounds (64.5 kN) with Automatic Power Reserve (APR). The optional CF34-8C5A1 engines, with 2 per cent increased take-off thrust, provide 13,630 pounds (60.6 kN) of take-off thrust.

The *CRJ705* aircraft shares many of the features of the *CRJ900* aircraft described below.

CRJ900: The *CRJ900* aircraft is a minimum change stretch of the 70-seat *CRJ700* aircraft with a baseline capacity of 86 seats in single-class configuration. Designed to serve the 90-seat regional airline segment, it was officially launched by Bombardier Aerospace at the Farnborough Air Show on July 24, 2000.

Transport Canada awarded the *CRJ900* regional jet its Aircraft Type Certificate on September 9, 2002, followed by the U.S. Federal Aviation Administration on October 31, 2002 and Europe's Joint Airworthiness Authorities on December 18, 2002.

The first customer aircraft was delivered to Mesa Air Group on January 30th, 2003 and entered revenue service in April 2003.

Compared to the *CRJ700* aircraft, the *CRJ900* aircraft has up to seven per cent higher thrust General Electric CF34-8C5 engines, with a maximum thrust of 14,510 pounds (63.2 kN) with APR. Other enhancements include a strengthened main landing gear, upgraded wheels and brakes, a strengthened wing, increased volume in the forward underfloor baggage hold, an additional underfloor baggage door and two additional overwing exits.

The *CRJ900* aircraft can cruise at speeds up to Mach 0.83 (475 kts, 881 kph, 547 mph) and is certificated to 41,000 feet (12,497 m). Normal cruise speed is Mach 0.78 (447 kts, 828 kph, 514 mph).

MILESTONES

CRJ100/200/440 Series

Program launch:	March 31, 1989
Rollout:	May 6, 1991
First flight - *CRJ100*:	May 10, 1991
Certification:	July 31, 1992
First delivery:	Lufthansa CityLine, October 19, 1992
Service entry:	Lufthansa CityLine, November 1, 1992
First flight – *CRJ200*:	13 November 1995

CRJ700 Series

Program launch:	January 21, 1997
First flight:	May 27, 1999
Rollout:	May 28, 1999
Certification:	Transport Canada, December 22, 2000
	European Joint Aviation Authorities, Jan 26, 2001
	U.S. Federal Aviation Administration, Feb16, 2001
First delivery:	Brit Air, January 31, 2001
Service entry:	Brit Air, February 18, 2001

CRJ900 Series

Program launch:	July 24, 2000
First flights:	
1st Prototype:	February 21, 2001
1st Production Aircraft :	October 20, 2001
Certification:	Transport Canada, September 9, 2002
	U.S. Federal Aviation Administration, Oct 31, 2002
	European Joint Aviation Authorities, Dec 18, 2002
First delivery:	Mesa Air Group, January 30, 2003
Service entry:	Mesa Air Group, April 26, 2003.

CRJ1000 NextGen

Program launch:	February 19, 2007
First flight (prototype):	September 3, 2008
Certification:	Transport Canada, November 1, 2010
	European Aviation Safety Agency, November 9, 2010
	U.S. Federal Aviation Administration, December 17, 2010
First delivery:	December 14, 2010

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