



Boeing 787 Dreamliner

The Boeing 787 Dreamliner is a long range, mid-sized, wide-body, twin-engine jet airliner developed by Boeing Commercial Airplanes. It seats 210 to 330 passengers, depending on variant. Boeing states that it is the company's most fuel-efficient airliner and the world's first major airliner to use composite materials for most of its construction. Its development has involved a large-scale collaboration with numerous suppliers.

On January 28, 2005, the aircraft's initial designation 7E7 was changed to 787. Early released concept images depicted a radical design with highly curved surfaces. On April 26, 2005, a year after the launch of the program, the final and more conventional external 787 design was set.

Boeing unveiled its first 787 in a roll-out ceremony on July 8, 2007, at its Everett assembly factory, by which time it had become the fastest-selling wide-body airliner in history with nearly 600 orders. By April 2010, 866 Boeing 787s had been ordered by 56 customers.

The aircraft was originally scheduled to enter service in May 2008, but production had been delayed multiple times, and in August 2009, the scheduled service entry date was pushed back to the fourth quarter of 2010. The aircraft's maiden flight, originally planned for August 2007, took place on December 15, 2009 in the Seattle area. The 787 is currently undergoing flight testing with a goal of receiving its type certificate in late 2010.

Production

After stiff competition, Boeing announced on December 16, 2003, that the 787 would be assembled in its factory in Everett, Washington.^[4] Instead of building the complete aircraft from the ground up in the traditional manner, final assembly employs just 800 to 1,200 people to join completed subassemblies and to integrate systems. Boeing has assigned its subcontractors to do more assembly themselves and deliver completed subassemblies to Boeing. Boeing would then perform final assembly. This approach results in a leaner and simpler assembly line and lower inventory.

Boeing has previously shipped 737 fuselage barrel sections by rail from Spirit AeroSystems' Wichita, Kansas, facility to Boeing's narrow-body final assembly plant in

Renton, Washington. As the major 787 components have many systems pre-installed before delivery to Everett, final assembly time is reduced to three days. This is less than a quarter of the time traditionally needed for Boeing's final assembly process. In order to speed delivery of the 787's major components, Boeing has modified three 747s purchased from Chinese and Taiwanese airlines. Called Dreamlifters, these widened airplanes can house the wings and fuselage of the 787 as well as other smaller parts.

Major components

Boeing manufactures the 787's tail fin at its plant in Frederickson, Washington, the ailerons and flaps at Boeing Australia, and fairings at Boeing Canada Technology. For economic reasons, the wings are manufactured by Japanese companies in Nagoya such as Mitsubishi Heavy Industries, which also makes the central wing box. This was a new and daring step for Boeing, which has historically guarded its techniques for designing and mass producing commercial jetliner wings. The horizontal stabilizers are manufactured by Alenia Aeronautica in Italy; and the fuselage sections by Global Aeronautica and Boeing's Charleston facility in North Charleston, South Carolina (USA), Kawasaki Heavy Industries in Japan and Spirit AeroSystems, in Wichita, Kansas (USA).

The passenger doors are made by Latécoère (France), and the cargo doors, access doors, and crew escape door are made by Saab (Sweden). Japanese industrial participation is very important to the project, with a 35% work share, and many of the subcontractors are supported and funded by the Japanese government. On April 26, 2006, Japanese manufacturer Toray Industries and Boeing announced a production agreement involving \$6 billion worth of carbon fiber. The deal is an extension of a contract signed in 2004 between the two companies and eases some concerns that Boeing might have difficulty maintaining its production goals for the 787. On February 6, 2008, TAL Manufacturing Solutions Limited, a subsidiary of the Tata Group (India) announced a deal to deliver floor beams for the 787 from their factory at Mihan, near Nagpur, India to assembly plants in Italy, Japan and the United States.

Messier-Dowty (France) builds the landing gear, which includes titanium forged in Russia, and brake parts from Italy, and GE Aviation in Yakima WA builds several actuators for the landing gear. Thales supplies the integrated standby flight display and electrical power conversion system. Honeywell and Rockwell-Collins provide flight control, guidance, and other avionics systems, including standard dual head up guidance systems. Future integration of forward-looking infrared is being considered by Flight Dynamics allowing improved visibility using thermal sensing as part of the HUD system, allowing pilots to "see" through the clouds. Connecticut (USA)-based Hamilton Sundstrand provides power distribution and management systems for the aircraft, including manufacture and production of Generator Control Units (GCUs) as well as integration of power transfer systems that can move power from the Auxiliary Power

Unit (APU) and the main engines to the necessary parts and machinery of the aircraft. Cold weather test of the APU took place in Alaska.

Flight Testing

The Boeing 787 flight test program is composed of six -8 aircraft, ZA001 through ZA006. The first four aircraft are Rolls-Royce Trent 1000 powered jets while the last two are GE GEnx-1B64 powered. ZA001 on December 12, 2009 completed high speed taxi tests, including post-rotation takeoff abort, the last major step before flight.

Shortly thereafter, on December 15, 2009, Boeing conducted the Dreamliner's maiden flight with the first 787-8, originating from Snohomish County Airport in Everett, Washington at 10:27 am PST,¹ and landing at Boeing Field in King County, Washington at 1:35 pm PST. Originally scheduled for four hours, the test flight was shortened to three hours because of bad weather.

The second 787, ZA002 in ANA livery, flew to Boeing Field on December 22, 2009 to join the flight test program. The third 787, ZA004 joined the test fleet with its first flight on February 24, 2010. The fourth 787-8, ZA003 flew its maiden flight on March 14, 2010. On March 24, testing for flutter and ground effects was completed. This cleared the aircraft to fly its entire flight envelope. The first four 787 test aircraft have flown 898 hours and 30 minutes in 288 flights combined as of June 5, 2010.

Boeing plans to exhibit the 787 at the 2010 Farnborough Airshow in Great Britain.

On March 28, 2010 the 787 completed the ultimate wing load test which requires that the wings of a fully assembled aircraft be loaded to 150% of design limit load and held for 3 seconds. The wings were flexed approximately 25 feet upward during the test. Unlike the 777 however, the wings were not tested to failure. On April 7, Boeing announced that analysis of the data showed the ultimate load test was a success.

On April 23, 2010 Boeing delivered their latest 787 to a hangar at Eglin Air Force Base, Florida for extreme weather testing. The 787 will undergo testing in temperatures ranging from 115 degrees Fahrenheit to -45 degrees Fahrenheit. Boeing will take the 787 through the steps necessary to prepare for takeoff once the plane stabilizes at either temperature extreme. Various sensors will determine if all airplane operations proceed as anticipated. The weather testing is to be completed by May 7, 2010.

On May 12, 2010 Boeing conducted the first General Electric GEnx engine runs on a Boeing 787 Dreamliner. This on the first of two test aircraft with the GEnx engine, the ZA005.