

Airplane Timeline

Efforts to tackle the engineering problems associated with powered flight began well before the Wright brothers' famous trials at Kitty Hawk. In 1804 an English baronet, Sir George Cayley, launched modern aeronautical engineering by studying the behavior of solid surfaces in a fluid stream and flying the first successful winged aircraft of which we have any detailed record. And of course Otto Lilienthal's aerodynamic tests in the closing years of the 19th century influenced a generation of aeronautical experimenters. In the 20th century, advances in aeronautical engineering soon had us soaring in safety and comfort across all the continents and oceans.

1901 **First successful flying model propelled by an internal combustion engine**

Samuel Pierpont Langley builds a gasoline-powered version of his tandem-winged "Aerodromes," the first successful flying model to be propelled by an internal combustion engine. As early as 1896 he launches steam-propelled models with wingspans of up to 15 feet on flights of more than half a mile.

1903 **First sustained flight with a powered, controlled airplane**

Wilbur and Orville Wright of Dayton, Ohio, complete the first four sustained flights with a powered, controlled airplane at Kill Devil Hills, 4 miles south of Kitty Hawk, North Carolina. On their best flight of the day, Wilbur covers 852 feet over the ground in 59 seconds. In 1905 they introduce the Flyer, the world's first practical airplane.

1904 **Concept of a fixed "boundary layer" described in paper by Ludwig Prandtl**

German professor Ludwig Prandtl presents one of the most important papers in the history of aerodynamics, an eight-page document describing the concept of a fixed "boundary layer," the molecular layer of air on the surface of an aircraft wing. Over the next 20 years Prandtl and his graduate students pioneer theoretical aerodynamics.

1910 **First take off from a ship**

Eugene Ely pilots a Curtiss biplane on the first flight to take off from a ship. In November he departs from the deck of a cruiser anchored in Hampton Roads, Virginia, and lands onshore. In January 1911 he takes off from shore and lands on a ship anchored off the coast of California. Hooks attached to the plane's landing gear, a primitive version of the system of arresting gear and safety barriers used on modern aircraft carriers.

1914 **Automatic gyrostabilizer leads to first automatic pilot**

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Lawrence Sperry demonstrates an automatic gyrostabilizer at Lake Keuka, Hammondsport, New York. A gyroscope linked to sensors keeps the craft level and traveling in a straight line without aid from the human pilot. Two years later Sperry and his inventor father, Elmer, add a steering gyroscope to the stabilizer gyro and demonstrate the first "automatic pilot."

1914-1918 **Dramatic improvements in structures and control and propulsion systems**

During World War I, the requirements of higher speed, higher altitude, and greater maneuverability drive dramatic improvements in aerodynamics, structures, and control and propulsion system design.

1915 **National Advisory Committee for Aeronautics**

Congress charters the National Advisory Committee for Aeronautics, a federal agency to spearhead advanced aeronautical research in the United States.

1917 **The Junkers J4, an all-metal airplane, introduced**

Hugo Junkers, a German professor of mechanics introduces the Junkers J4, an all-metal airplane built largely of a relatively lightweight aluminum alloy called duralumin.

1918 **Airmail service inaugurated**

The U. S. Postal Service inaugurates airmail service from Polo Grounds in Washington, D.C., on May 15. Two years later, on February 22, 1920, the first transcontinental airmail service arrives in New York from San Francisco in 33 hours and 20 minutes, nearly 3 days faster than mail delivery by train.

1919 **U.S. Navy aviators make the first airplane crossing of the North Atlantic**

U.S. Navy aviators in Curtiss NC-4 flying boats, led Lt. Cdr. Albert C. Read, make the first airplane crossing of the North Atlantic, flying from Newfoundland to London with stops in the Azores and Lisbon. A few months later British Capt. John Alcock and Lt. Albert Brown make the first nonstop transatlantic flight, from Newfoundland to Ireland.

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1919 **Passenger service across the English Channel introduced**

Britain and France introduce passenger service across the English Channel, flying initially between London and Paris. 1919 the first nonstop transatlantic flight, from Newfoundland to Ireland.

1925-1926 **Introduction of lightweight, air-cooled radial engines**

The introduction of a new generation of lightweight, air-cooled radial engines revolutionizes aeronautics, making bigger, faster planes possible.

1927 **First nonstop solo flight across the Atlantic**

On May 21, Charles Lindbergh completes the first nonstop solo flight across the Atlantic, traveling 3,600 miles from New York to Paris in a Ryan monoplane named the *Spirit of St. Louis*. On June 29, Albert Hegenberger and Lester Maitland complete the first flight from Oakland, California, to Honolulu, Hawaii. At 2,400 miles it is the longest open-sea flight to date.

1928 **First electromechanical flight simulator**

Edwin A. Link introduces the Link Trainer, the first electromechanical flight simulator. Mounted on a base that allows the cockpit to pitch, roll, and yaw, these ground-based pilot trainers have closed hoods that force a pilot to rely on instruments. The flight simulator is used for virtually all U.S. pilot training during WWII.

1933 **Douglas introduces the 12-passenger twinengine DC-1**

In that summer Douglas introduces the 12-passenger twin-engine DC-1, designed by aeronautical engineer Arthur Raymond for a contract with TWA. A key requirement is that the plane can take off, fully loaded, if one engine goes out. In September the DC-1 joins the TWA fleet, followed 2 years later by the DC-3, the first passenger airliner capable of making a profit for its operator without a postal subsidy. The DC-3's range of nearly 1,500 miles is more than double that of the Boeing 247. As the C-47 it becomes the workhorse of WWII.

1933 **First modern commercial airliner**

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In February, Boeing introduces the 247, a twin-engine 10-passenger monoplane that is the first modern commercial airliner. With variable-pitch propellers, it has an economical cruising speed and excellent takeoff. Retractable landing gear reduces drag during flight.

1935 **First practical radar**

British scientist Sir Robert Watson-Watt patents the first practical radar (for radio detection and ranging) system for meteorological applications. During World War II radar is successfully used in Great Britain to detect incoming aircraft and provide information to intercept bombers.

1935 **First transpacific mail service**

Pan American inaugurates the first transpacific mail service, between San Francisco and Manila, on November 22, and the first transpacific passenger service in October the following year. Four years later, in 1939, Pan Am and Britain's Imperial Airways begin scheduled transatlantic passenger service.

1937 **Jet engines designed**

Jet engines designed independently by Britain's Frank Whittle and Germany's Hans von Ohain make their first test runs. (Seven years earlier, Whittle, a young Royal Air Force officer, filed a patent for a gas turbine engine to power an aircraft, but the Royal Air Ministry was not interested in developing the idea at the time. Meanwhile, German doctoral student Von Ohain was developing his own design.) Two years later, on August 27, the first jet aircraft, the Heinkel HE 178, takes off, powered by von Ohain's HE S-3 engine.

1939 **First practical singlerotor helicopters**

Russian emigre Igor Sikorsky develops the VS-300 helicopter for the U.S. Army, one of the first practical singlerotor helicopters.

1939- 1945 **World War II spurs innovation**

A world war again spurs innovation. The British develop airplane-detecting radar just

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in time for the Battle of Britain. At the same time the Germans develop radiowave navigation techniques. The both sides develop airborne radar, useful for attacking aircraft at night. German engineers produce the first practical jet fighter, the twin-engine ME 262, which flies at 540 miles per hour, and the Boeing Company modifies its B-17 into the high-altitude Flying Fortress. Later it makes the 141-foot-wingspan long-range B-29 Superfortress. In Britain the Instrument Landing System (ILS) for landing in bad weather is put into use in 1944.

1947 **Sound barrier broken**

U.S. Air Force pilot Captain Charles "Chuck" Yeager becomes the fastest man alive when he pilots the Bell X-1 faster than sound for the first time on October 14 over the town of Victorville, California.

1949 **First jet-powered commercial aircraft**

The prototype De Havilland Comet makes its first flight on July 27. Three years later the Comet starts regular passenger service as the first jet-powered commercial aircraft, flying between London and South Africa.

1950s **B-52 bomber**

Boeing makes the B-52 bomber. It has eight turbojet engines, intercontinental range, and a capacity of 500,000 pounds.

1952 **Discovery of the area rule of aircraft design**

Richard Whitcomb, an engineer at Langley Memorial Aeronautical Laboratory, discovers and experimentally verifies an aircraft design concept known as the area rule. A revolutionary method of designing aircraft to reduce drag and increase speed without additional power, the area rule is incorporated into the development of almost every American supersonic aircraft. He later invents winglets, which increase the lift-to-drag ratio of transport airplanes and other vehicles.

1963 **First small jet aircraft to enter mass production**

The prototype Learjet 23 makes its first flight on October 7. Powered by two GE CJ610 turbojet engines, it is 43 feet long, with a wingspan of 35.5 feet, and can carry

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seven passengers (including two pilots) in a fully pressurized cabin. It becomes the first small jet aircraft to enter mass production, with more than 100 sold by the end of 1965.

1969 **Boeing 747**

Boeing conducts the first flight of a wide-body, turbofan-powered commercial airliner, the 747, one of the most successful aircraft ever produced.

1976 **Concorde SST introduced into commercial airline service**

The Concorde SST is introduced into commercial airline service by both Great Britain and France on January 21. It carries a hundred passengers at 55,000 feet and twice the speed of sound, making the London to New York run in 3.5 hours—half the time of subsonic carriers. But the cost per passenger-mile is high, ensuring that flights remain the privilege of the wealthy. After a Concorde accident kills everyone on board in July 2000, the planes are grounded for more than a year. Flights resume in November 2001, but with passenger revenue falling and maintenance costs rising, British Airways and Air France announce they will decommission the Concorde in October 2003.

1986 **Voyager circumnavigates the globe (26,000 miles) nonstop in 9 days**

Using a carbon-composite material, aircraft designer Burt Rutan crafts Voyager for flying around the world nonstop on a single load of fuel. Voyager has two centerline engines, one fore and one aft, and weighs less than 2,000 pounds (fuel for the flight adds another 5,000 pounds). It is piloted by Jeana Yeager (no relation to test pilot Chuck Yeager) and Burt's brother Dick Rutan, who circumnavigate the globe (26,000 miles) nonstop in 9 days.

1990s **B-2 bomber developed**

Northrop Grumman develops the B-2 bomber, with a "flying wing" design. Made of composite materials rather than metal, it cannot be detected by conventional radar. At about the same time, Lockheed designs the F-117 stealth fighter, also difficult to detect by radar.

1995 **First aircraft produced through computer-aided design and engineering**

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Boeing debuts the twin-engine 777, the biggest two-engine jet ever to fly and the first aircraft produced through computer-aided design and engineering. Only a nose mockup was actually built before the vehicle was assembled—and the assembly was only 0.03 mm out of alignment when a wing was attached.

1996-
1998 **Joint research program to develop second-generation supersonic airliner**

NASA teams with American and Russian aerospace industries in a joint research program to develop a second-generation supersonic airliner for the 21st century. The centerpiece is the Tu-144LL, a first-generation Russian supersonic jetliner modified into a flying laboratory. It conducts supersonic research comparing flight data with results from wind tunnels and computer modeling.