

## Fixed Wing Aircraft: An Overview

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### OPINION

A fixed-wing aircraft is a heavier-than-air flying machine, such as an aeroplane, that can fly using wings that generate lift due to the forward airspeed of the aircraft and the shape of the wings. Fixed-wing aircraft differ from rotary-wing aircraft (which have wings that form a rotor mounted on a spinning shaft or “mast”) and ornithopters (in which the wings flap in a manner similar to that of a bird). A fixed-wing aircraft’s wings are not always rigid; kites, hang gliders, variable-sweep wing aircraft, and aeroplanes with wing morphing are all examples of fixed-wing aircraft. Gliding fixed-wing aircraft, including various types of free-flying gliders and tethered kites, can use moving air to gain altitude. Powered fixed-wing aircraft (aeroplanes) that use an engine for forward thrust include powered paragliders, powered hang gliders, and some ground effect vehicles. Most fixed-wing aircraft are flown by a pilot on board, but some are purpose-built to be unmanned and controlled remotely or autonomously (using on-board computers). Even with a hypothetically perfect efficient propulsion system, the kinetic energy associated with those speeds is enormous by today’s energy development standards. Furthermore, collisions between the spacecraft and cosmic dust and gas can be extremely hazardous to both passengers. Researchers at the University of Stuttgart’s Institute of Space Systems (IRS) have been investigating a possible propulsion system for space transport based on an approach known as inertial electrostatic confinement (IEC) of plasma sources. An electric field is used to heat plasma to fusion temperatures. Both electric space propulsion systems and air breathing propulsion systems can reduce the amount of propellant required to launch rockets into space.

Archytas was said to have designed and built the first artificial, self-propelled flying device around 400 BC in Greece, a bird-shaped model propelled by a jet of what was probably steam and said to have flown 200 metres (660 ft). This machine may have been suspended in preparation for flight. The 11th-century monk Eilmer of Malmesbury made one of the earliest purported attempts with gliders, which failed. According to a 17th-century account, the 9th-century poet Abbas Ibn Firnas attempted a similar feat, though no earlier sources record this event. Sir George Cayley proposed the modern aeroplane in 1799 as a fixed-wing flying machine with separate systems for lift, propulsion, and control. Cayley was building and flying fixed-wing aircraft models as early as 1803, and

in 1853 he built a successful passenger-carrying glider. On a beach in 1856, Frenchman Jean-Marie Le Bris made the first powered flight with his glider “L’Albatros artificiel” being pulled by a horse. [Citation required] In 1884, the American John J. Montgomery flew a glider in controlled flight as part of a series of gliders built between 1883 and 1886. Otto Lilienthal, Percy Pilcher, and others made similar flights at the time. Sir Hiram Maxim created a 3.5-ton craft with a 110-foot (34-meter) wingspan, powered by two 360-horsepower (270-kW) steam engines driving two propellers.

His machine was tested with overhead rails to prevent it from rising in 1894. The test demonstrated that it had sufficient lift to take off.

The craft was uncontrollable, which Maxim must have realized because he later abandoned work on it. The Wright brothers’ flights in 1903 with their Flyer I are recognized as “the first sustained and controlled heavier-than-air powered flight” by the Fédération Aéronautique Internationale (FAI), the standard-setting and record-keeping body for aeronautics. [15] The Wright Flyer III was capable of fully controllable, stable flight for extended periods of time by 1905. Alberto Santos Dumont, a Brazilian inventor, designed, built, and piloted an aircraft that set the first world record recognised by the Aéro-Club de France in 1906, flying the 14 bis 220 metres (720 ft) in less than 22 seconds. The FAI certified the flight. The 1908 Bleriot VIII design was an early aircraft design with the modern monoplane tractor configuration. It had movable tail surfaces that controlled yaw and pitches, as well as roll control provided by wing warping or ailerons and controlled by the pilot via a joystick and rudder bar. It was a significant forerunner to his later Bleriot XI Channel-crossing aircraft, which flew in the summer of 1909. The so-called Golden Age of Aviation occurred between the two World Wars, during which both updated interpretations of earlier breakthroughs – such as Hugo Junkers’ pioneering of all-metal airframes in 1915, leading to giant multi-engined aircraft with wingspan sizes of up to 60+ metres by the early 1930s, and adoption of the mostly air-cooled radial engine as a practical aircraft powerplant alongside powerflying – occurred.

Aeroplane (also spelled airplane or simply plane) is a powered fixed-wing aircraft propelled forward by thrust from a jet engine or propeller. Planes are available in a wide range of sizes, shapes, and wing configurations. Planes are used for a variety of purposes, including recreation, transportation of goods and people, military

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operations, and research. A seaplane is a type of fixed-wing aircraft that can take off and land (alight) on water. Amphibian aircraft are seaplanes that can also operate on dry land. These planes were also known as hydroplanes. Seaplanes and amphibians are typically classified as floatplanes or flying boats based on their technological characteristics. A ground effect vehicle (GEV) is a vehicle that achieves level flight near the earth's surface by utilising the ground

effect – an aerodynamic interaction between the wings and the earth's surface. When necessary, some GEVs can fly higher out of ground effect (OGE) – these are classified as powered fixed-wing aircraft. A glider is a heavier-than-air craft whose flight is supported by the dynamic reaction of the air against its lifting surfaces and whose free flight is not reliant on an engine. A sailplane is a fixed-wing glider designed for soaring, or the ability to gain height and fly for extended periods of time in updrafts of air.