

# Aircraft

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An **aircraft** is any machine capable of atmospheric flight.

Aircraft fall into two broad categories:

- Heavier than air **aerodynes**, including autogyros, helicopters and variants, and conventional **fixed-wing aircraft**: *aeroplanes* in Commonwealth English, *airplanes* in North American English.

Fixed-wing aircraft generally use an internal-combustion engine and propeller or jet engine to provide thrust, which moves the craft forward through the air. The movement of air over the airfoil produces lift, which allows the aircraft to fly. Exceptions are gliders which have no engines and gain their thrust from gravity and thermal currents. That is, in order to maintain their forward speed they must descend in relation to the air (but not necessarily in relation to the ground). Helicopters and autogyros use a spinning rotor (a rotary wing) to provide both lift and thrust. The abbreviation VTOL is applied to aircraft other than helicopters that can take off or land vertically. Similarly, STOL stands for Short Take Off and Landing.

- Lighter than air **aerostats**: balloons and airships. Aerostats float in air in the same way that a ship floats in water, by displacing the air around the craft with a lighter gas (helium or hydrogen), or hot air. The distinction between a balloon and an airship is that an airship has some means of controlling forward motion and steering, while balloons simply drift with the wind.

*See also:* List of aviation, aerospace and aeronautical terms

There are several ways to classify aircraft. Below, we describe classifications by design, propulsion and usage.

Also see this List of aircraft.

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An Airbus A340 of SriLankan Airlines. This is a wide-bodied long-haul **aircraft**, with 24 Business Class seats and 288 Economy Class seats



A hot air **balloon** seen from nearly directly below. The burner flame is firing into the envelope



Bell 206B Jet Ranger III **helicopter**

# Types of aircraft

## By design

A first division by design among aircraft is between lighter-than-air and heavier-than-air aircraft.

Examples of lighter-than-air aircraft include non-steerable balloons, such as hot air balloons and gas balloons, and airships (sometimes called dirigible balloons), such as blimps (which have a non-rigid construction) and rigid airships, which have a rigid frame. The most successful type of rigid airship was the Zeppelin. The best-known Zeppelin was the Hindenburg which was destroyed in a spectacular fire in 1937.

In heavier-than-air aircraft, we can discern two major ways to produce the lift: aerodynamic lift and engine lift. In the case of aerodynamic lift, the aircraft is kept in the air because of aerodynamics, usually by means of wings of some kind. With engine lift, the aircraft defeats gravity by sheer engine power.

Examples of engine lift aircraft are rockets, and so-called VTOL planes, such as the Hawker Harrier.

Among aerodynamically lifted aircraft, the largest number falls in the category of fixed-wing aircraft, where horizontal airfoils produce lift, by profiting from the Coanda effect (*aeroplane* or *airplane*).

In a "conventional" configuration, the lift surfaces are placed in front of a control surface or tailplane. The number of lift surfaces varied greatly in the pre-1950 period, as biplanes (two wings) and triplanes (three wings) were numerous in the early days of aviation. Subsequently most planes are monoplanes.

The reverse configuration is the canard type, where small horizontal control surfaces are placed forward of the wings, near the nose of the aircraft.

Other possibilities include the delta-wing, where lift and horizontal control surfaces are combined, and the flying wing, where there is no separate vertical control surface (e.g. the B-2). A variable geometry ('swing-wing') has also been employed in a few examples of combat aircraft (the F-111, Panavia Tornado, and B-1 Lancer, among others).

The lifting body configuration where the body itself produce lift has been tested. So far the only significant practical application of the lifting body was in the Space Shuttle.

A second large category of aerodynamically lifted aircraft are the rotary-wing aircraft. Here, the lift is provided by rotating rotors. The best-known examples of this category are the helicopter, the earlier autogyro, and the tiltrotor aircraft (such as the V-22 Osprey).

A further category might encompass the wing-in-ground-effect types, for example the Russian ekranoplan, also nicknamed the "Caspian Sea Monster" and hovercraft, most of the latter employing a skirt and achieving limited ground or water clearance to reduce friction and achieve speeds above those achieved by boats of similar weight.

And finally, the flapping-wing ornithopter is a category of its own. These designs may have considerable potential but are not yet practical.

- Reference (<http://history.nasa.gov/SP-367/appenda.htm>)

## By propulsion

Some types of aircraft, such as the balloon or glider, do not have any propulsion. Balloons drift with the wind. For gliders, takeoff takes place from a high location, or the aircraft is pulled into the air by a ground-based winch or vehicle, or towed aloft by a powered "tug" aircraft.

Most early aircraft used a piston-engine with propeller as propulsion. Although the configuration of the engine can vary (rotary, radial, inline), they all work according to the same principles.

During World War II, emphasis placed on air superiority brought about development of the first jet engines. Different types exist, such as the ramjet, pulse jet, turbojet, and the turboprop, the latter of which still uses a propeller.

Rocket planes have occasionally been experimented with. They are restricted to rather specialised niches, such as spaceflight, that require exceptionally high speed.

There are also model airplanes and even model helicopters. Many are radio controlled. They are flown at special fields

## By usage

Three major uses for aircraft may be seen: recreational, military, and commercial.

Recreational pilots generally make use of single engine; easy to fly aircraft or non-complex aircraft. (e.g. Cessna High Wing design) Gliders and balloons are used almost exclusively for recreational purposes although they have been used in times of war in the past. For instance, balloons were used for observation in the American Civil War and World War I. Gliders were used to deliver troops into occupied territory during World War II and also for recreation .

Though used a handful of times for reconnaissance during the Italo-Turkish War, the first widespread use of military aircraft was in World War I, for reconnaissance and surveillance. Soon they were adapted for attacking the ground or enemy vehicles/ships/guns/aircraft, and the first bombers were born. In order to prevent the enemy from bombing, fighter aircraft were developed to intercept and shoot down enemy aircraft.

Tankers are used to refuel planes in mid-air, thus increasing their operational range.

Commercial aviation can be divided into passenger transport and cargo transport. For the former, large planes have been developed that can transport up to 500 passengers over large distances. Commercial cargo aircraft are often similar to military transport aircraft, or might be adapted from the passenger fleets of an earlier era.

Other uses include search-and-rescue operations (especially by helicopters), border protection and water-bombing (fire-fighting). Further divisions can be drawn between aircraft designs having conventional (taildraggers), tricycle (nosedragger), undercarriage, and amphibious floatplanes (wheeled aircraft converted with pontoon floats) or flying boats(use the body of the aircraft for floatational).

## Related topics

- Aerial refueling
- Aeronautics
- Aircraft carrier
- Aircraft manufacturers
- Aircraft spotting
- Airline call signs

- Airliner
- Air safety
- Amelia Earhart
- Aviation
- Bomber
- Charles Lindbergh
- Contrail
- Early flying machines
- Fighter aircraft
- Flight controls
- Jet engine
- Lifting body
- Military aircraft
- Model aircraft
- Santos Dumont
- Spacecraft propulsion
- Spacecraft
- Successful aircraft types
- Undercarriage
- Wright brothers

## External links - Aircraft

- Smithsonian Air and Space Museum (*<http://www.nasm.si.edu/>*) -- Excellent online collection with a particular focus on history of aircraft and spacecraft
- Virtual Museum (*[http://invention.psychology.msstate.edu/Tale\\_of\\_Airplane/taleplane.html](http://invention.psychology.msstate.edu/Tale_of_Airplane/taleplane.html)*)
- Prehistory of Powered Flight (*<http://www.centennialofflight.gov/essay/Prehistory/PH-OV.htm>*)
- Aircraft-Info.net (*<http://www.aircraft-info.net>*)
- The Evolution of Modern Aircraft (NASA) (*<http://www.hq.nasa.gov/office/pao/History/SP-468/contents.htm>*)
- Airforces (*<http://www.DefenceTalk.com>*)
- Series of Photo Essays on British Aviation (*<http://www.challoner.com/aviation/index.html>*)

<p>List of Aircraft   Aircraft Manufacturers   Aircraft Engines   Aircraft Engine Manufacturers Airlines   Air Forces   Aircraft Weapons   Missiles   Timeline of aviation</p>
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*A separate article is about the movie Airplane!.*

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