The first objects to fly that carried people were balloons, which were pioneered in France by the Montgolfier brothers in 1783. Some of the basic scientific principles of heavier-than-air flight were laid down in England in the early 19th century by Sir George Cayley. In the 1890s Otto Lilienthal of Germany became the first person to make and fly successful gliders. The American brothers Wilbur and Orville Wright were inspired by Lilienthal and by 1902 had developed a fully practical biplane (double-winged) glider that could be controlled in every direction. Fitting a small engine and two propellers to another biplane, the Wrights on December 17, 1903, made the world's first successful human-carrying engine-powered heavier-than-air flight at a site near Kitty Hawk, on the coast of North Carolina.

By the 1920s the first small commercial airlines had begun to carry mail, and the increased speed and range of aircraft made possible the first nonstop flights over the world's oceans, poles, and continents. In the 1930s more efficient monoplane (single-wing) aircraft with an all-metal fuselage (body) and a retractable undercarriage became standard. Aircraft played a vitally important role in World War II (1939–45), developing in size, weight, speed, power, range, and armament. The war marked the high point of piston-engined propeller craft while also introducing the first aircraft with jet engines, which could fly at higher speeds. Jet-engined craft became the norm for fighters in the late 1940s and proved their superiority as commercial transports beginning in the '50s. The high speeds and low operating costs of jet airliners led to a massive expansion of commercial air travel in the second half of the 20th century. In the early 21st century, improved electronic technology led to the development of remotely operated or autonomous robot aircraft called unmanned aerial vehicles (UAVs), or drones.

In 1799, Sir George Cayley set forth the concept of the modern airplane as a fixed-wing flying machine with separate systems for lift, propulsion, and control.

Lilienthal in mid-flight, Berlin c.1895 Otto Lilienthal was the first person to make well-documented, repeated, successful flights with gliders, therefore making the idea of "heavier than air" a reality. Newspapers and magazines published photographs of Lilienthal gliding, favorably influencing public and scientific opinion about the possibility of flying machines becoming practical. Lilienthal's work led to him developing the concept of the modern wing. His flight attempts in Berlin in 1891 are seen as the beginning of human flight and the "Lilienthal Normalsegelapparat" is considered to be the first airplane in series production, making the Maschinenfabrik Otto Lilienthal in Berlin the first air plane production company in the world. Lilienthal is often referred to as either the "father of aviation" or "father of flight".

Early dirigible developments included machine-powered propulsion (Henri Giffard, 1852), rigid frames (David Schwarz, 1896) and improved speed and maneuverability (Alberto Santos-Dumont, 1901)