



Know the
basics in
90 minutes

Quicklook at **Flying**





About Quicklook at Flying

IN not much more than a century, flying has been transformed from small beginnings into a vast industry that has opened up endless possibilities and affected every human being.

How did the Wright brothers first achieve flight? What keeps an aircraft in the air? How safe is flying now? How has the flight industry developed? What does the future hold?

Quicklook at Flying takes us back to the pioneers of aviation and explains how the past has helped to shape flying as we know it today. It covers commercial and military aviation and the aircraft manufacturing business, giving an insight into the challenges faced by airlines. It explains how air travel is made safe and what happens when things go wrong.

You are taken into the workings of the industry: how pilots train, the world of navigation and air traffic control and the role of engineers and designers.

You are talked through your first flight in a light aircraft.

Quicklook at

Flying

Paul Smiddy



Quicklook
books

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*To Jim Watson, who put me on the right glide slope and
all other pilots who never made it back.*

The history of flight



SOME say if God had meant Man to fly, He would have given us wings. I disagree with this: we were meant to fly, because in His wisdom, He gave us a raft of talented, hard-working and daring engineers and entrepreneurs in the 19th and early 20th centuries, who discovered how to take man aloft.

Travelling light

The first moves into the air were by balloons – so-called lighter-than-air craft. A Portuguese pastor, Father Bartolomeu de Gusmao, made the first recorded demonstration of a hot-air balloon. In 1709 he launched his small vehicle in a room of the court of King John V of Portugal. The successful flight concluded with a collision with the window, the curtains then catching fire!

In 1783, two Frenchmen, Jean-François Pilâtre de Rozier and François Laurent d'Arlandes, made the first manned balloon flight in a Montgolfière (named after the two brothers who designed it). The equipment had previously been tested on a Noah's Ark of animals. Ten days later came the first solo flight – a respectable 36 kms. In 1784 came the first balloon flight in Britain, and a year later Blanchard & Jeffries were the first to cross the English Channel. (De Rozier was killed that year attempting the same feat).

All these balloons were kept aloft by hot air: the heat derived not always from burning wood, but from esoteric materials such as wool or even old shoes. By the early nineteenth century the attention shifted to lighter-than-air gases, particularly hydrogen. The dangers of this gas were soon brought home, when Blanchard's wife became the first woman balloonist to die – in 1809. Her balloon caught fire whilst she watched a fireworks display.

Passenger carrying became a commercial activity, and balloon meetings

became very popular events. Balloons had been used by the French in 1870 in their war with Prussia. In 1878 the British Army cottoned on, and by 1885 observation balloons were in use in the Boer War. In the First World War they were in widespread use by both sides: the static nature of trench warfare enhanced the balloon's utility as an observation vehicle and for artillery "spotting".

In the second half of the 19th Century, the desire for more control over the direction of flight led to the development of dirigibles (steerable airships). There was widespread activity across Europe, with France in the lead. Inevitably most were powered by steam engines – whose weight and relative inefficiencies constrained the capability of the whole machine. In 1884 two Frenchmen, Renard and Krebs, made a 8kms circular journey in their *La France* airship – the first fully controlled airship flight in the world. After some pursued the blind alley of electric power, internal combustion engine power took over from 1888.

At the turn of the century the grand patron of airship development appeared on the scene. Count Ferdinand von Zeppelin had witnessed the use of balloons in the US Civil War. Concerned by the lead established by arch-rival, France, in this arena, Zeppelin started to build his first airship in 1899, the prosaically named *Luftschiff Zeppelin 1*. This was on the shores of Lake Constance – destined to remain the epicentre of German airship development. LZ1 was huge by current standards (128m long), with a power/weight ratio beating any previous French efforts. Nonetheless it was still too under-powered for success.

Britain's first airship, *Nulli Secundus*, did not fly until 1907. The colourful Samuel F ("Colonel") Cody was its flight engineer.

Dirigibles gradually acquired more rigid frames, and by the outbreak of the First World War, their military potential was appreciated. Germany started the conflict with its *L3* (158m long, with 630hp), and finished with the *L70* (211m/1715hp). Zeppelins were used for offensive purposes – to bomb Britain. British airships were generally only used for naval observation. The North Sea class were for example 80m long with 480 hp.

The superior German design was copied by the British for its post-war airships, when passenger transport, with designed ranges of more than 3000 miles over the extended British Empire, became the main intended use. The

development of airships in the UK came to an abrupt end on 4 October 1930 when the *R101* flew into the ground at Beauvais in Northern France in bad weather, killing all 48 on board. This machine had been designed and manufactured by the British Government. This fraught process was subject to several delays, and political pressures led to a premature maiden (& final) flight.

Despite the undoubted romance of inter-continental travel by airship, the tragic demise of the *R101* destroyed popular faith in the airship concept in Great Britain. This was unfortunate for the team behind the rival *R100*, built by private enterprise, which showed much more promise. Germany continued to use the airship as an international ambassador for its technological skills, and also for spying. The *Graf Zeppelin* (range an astonishing 6,250 miles) made several leisurely flights over England's manufacturing heartland in order to make clandestine photographs of likely targets for subsequent war.

However 6 May 1937 saw another defining aviation disaster: the *Hindenburg* (even longer than the *Graf Zeppelin* at 245m) exploded into flames as it tried to moor at Lakehurst, New Jersey, after a transatlantic crossing. Anyone who has seen the newsreel footage will be amazed that 62 people of the 97 on board managed to survive. The craft had been designed to be inflated by helium, but had had to use the much more flammable (but cheaper) hydrogen. This tragedy sounded the death knell for passenger airship travel. Recently there has been some revived interest in the use of airships for carrying freight, and for observation.

Fixed Wing Flying

From an inspired 13th century Friar (Roger Bacon) onwards, many intellectuals over the ages were fascinated by the concept of flight by flying machines. They were typically inspired by the flight of birds. Most, including Leonardo da Vinci, raced down the blind alley of trying to replicate flight by the flapping of wings.

The unsung hero of successful aircraft development was a Yorkshire nobleman, Sir George Cayley. A gifted engineer (inventing, inter alia, the self-righting lifeboat), he was the first to identify the four key forces of aerodynamics (lift, weight, drag, and thrust). By 1853 he had constructed a glider

that embodied many valid aeronautical concepts. This made a successful flight across the Dale near his house. Soon afterwards his coachman (alleged to have been press ganged into the role) is said to have become the first human to make a fixed wing flight.

A German, Otto Lilienthal, had been making great strides in glider design. His wing shapes were much more fashioned after birds' than Cayley's. Again he was still over-focussed on replicating flapping wings. However he successfully flew in several designs of gliders from his hill near Berlin. He died in a crash in 1896: his designs relied for stability in the pilot hanging below the wing, and this was insufficient to cope with strong gusts.

Other work by a Scot, Percy Pilcher, and a French-born American, Octave Chanute, takes us to the acknowledged founders of powered flight: the Wright brothers. Orville and Wilbur, bicycle makers from Ohio, had been inspired by Lilienthal. Three years' work on gliders in North Carolina was supplemented with original aerodynamic research. On 17 December 1903, Orville made the first powered flight – only 12 seconds and 120 feet, but a beginning! The Wrights soon stimulated military interest, and sold their first aircraft to the US Army in August 1909. This was despite causing the first aircraft fatality when Orville killed his passenger on a demonstration flight for the Army in 1908.

The Wrights' flights in Europe must have caused a degree of anguish; Alberto Santos-Dumont making the first European flight in October 1906. Europe's designers made rapid progress and Louis Blériot managed to cross the English Channel on 25 July 1909. The pace of development was frenetic. The first floatplane (that could take off from water) flew in 1910. The following year saw an Italian lieutenant innovate by dropping grenades on Turkish troops in Libya. In 1914, the first air to ground radio communication was achieved. That year Igor Sikorsky (who later became a founding father of the helicopter) broke distance records with a 1490 mile trip around Russia.

The First World War obviously accelerated the pace of development even further. The Royal Flying Corps started out with observation aircraft such as the BE2. This weighed 972 kgs and could trundle along at no more than 72 mph. Fighters and bombers soon evolved. By the close of

About the author

PAUL SMIDDY is, by his own admission, hopelessly obsessed with flying. He spent most of his childhood surrounded by model aircraft or listening to the stories of his great uncle – one of Britain’s earliest pioneer aircraft designers.

At the age of 16, Paul learned to fly gliders with the Air Cadets. A year later, after gaining a RAF Flying Scholarship, Paul obtained his private pilot’s license at Doncaster Airport, which he put to good use flying Chipmunks and Bulldogs with the RAFVR whilst at university.

For the last 25 years, although slightly distracted by a highly successful career in finance, Paul’s aviation obsession has been a major part of his life. A Liveryman of the Guild of Air Pilots and Air Navigators, he has been an active private pilot all of his life, flying to destinations all over Europe, USA and the Caribbean, among others.

In 2001, Paul flew in the London-Sydney Air Race. While he maintains that it was less of a race than a test of patience, it nevertheless sparked in Paul a new passion: competitive flying. From 2003, he has been a member of the Great Britain Flying Team, participating in the rally flying discipline in European and World Championships across Europe and South Africa.

Paul has a house in Northern France, flying to which has given him plenty of opportunity to study wave patterns in the English Channel. He has also contributed to a number of magazines on matters of both flying and finance. Of course, he chooses flying wherever possible.

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About the author

Paul Smiddy learned to fly gliders at the age of 16. He has been an active private pilot all his life and has followed his passion for all aspects of aviation throughout.



He has been a member of the Great Britain Flying Team and undertaken trans-continental flights in light aircraft.

Paul regularly writes about flying for various publications.

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