

# Title: Filton and Flying in the First World War

## Locations

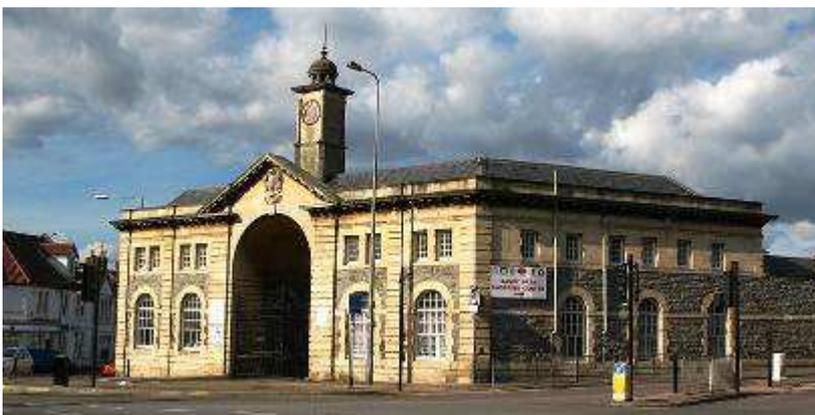
Grade 2 listed Hangars, Filton Airfield (site of the new Bristol Aerospace Centre)



**Pictures: Bristol Aero Collection**

The buildings are of national importance as the oldest surviving WW1 site in the UK where continuous aircraft production has taken place over 100 years and is still ongoing. Although Filton Airfield has closed and been sold to developers, the Great Western Air Ambulance still operates from the site. A new museum is planned in the hangars covering 100 years of aviation including a new home for Concorde.

## Brislington Tramways factory



**Picture: Geoff Sheppard**

[http://en.wikipedia.org/wiki/File:Brislington\\_old\\_tram\\_depot.jpg](http://en.wikipedia.org/wiki/File:Brislington_old_tram_depot.jpg)

The Bristol tram, bus and commercial vehicle factory opposite Arnos Court was taken over for aeroplane manufacture during the First World War.

## Theme

Technology in the air!



**Picture: Aerial view of Filton runway c1970 (Rolls-Royce Heritage Trust)**



**Picture: Aerial view of Filton 1916 (Bristol Aero Collection)**

### Mivart Street (Parnall's aeroplane manufacture)



**Picture:** [Rightmove.co.uk](http://Rightmove.co.uk)

The red brick factory in Mivart Street used by Parnalls was built in 1890 as The Epstein Building, and is now used for light industry and art and design studios.

### Coliseum, Park Row (Parnall's aeroplane manufacture)



**Picture:** <http://intelligentsystems.bristol.ac.uk/>

The Coliseum in Park Row Bristol, was used not only as an aircraft factory for Parnall's but also as a cinema, dance hall, exhibition centre, roller skating rink and a store by Bristol University. It is now part of the façade of the University's Merchant Venturers building.

### Resources

**Maps** of Filton / Bristol in 1914-18 and today for comparison:

<http://www.aviationarchive.org.uk/map/index.php>

<http://maps.bristol.gov.uk/knowyourplace/>

<https://www.google.co.uk/maps/place/Bristol+Filton+Airport/@51.520013,-2.583409,17z/data=!3m1!4b1!4m2!3m1!1s0x487191841c19899f:0xe6707885cf7be159>

**Images** (see background information below, website links and separate picture file attached)

**Films** – for example:

[http://www.bac2010.co.uk/film\\_clip\\_23.htm](http://www.bac2010.co.uk/film_clip_23.htm)

[http://www.bac2010.co.uk/film\\_clip\\_7.htm](http://www.bac2010.co.uk/film_clip_7.htm)

### Line (s) of enquiry

Look at maps and aerial photographs to see where Filton runway is located (present day as well as historical maps for comparison – see website links).

Plot on a map all the sites in Bristol and South Gloucestershire that have connections with the aviation industry (use two colours – one for sites during the First World War, a second for sites that are still active in the aviation industry today).

Research which aeroplanes took part in the First World War and the role they played.

Look up information (or use background given below) on the following Bristol-made aeroplanes:

- Bristol Boxkite

	<ul style="list-style-type: none"> <li>• Bristol Scout</li> <li>• Bristol Fighter</li> </ul> <p>How did they differ? What made each one better than the previous?</p> <p>Discuss what made an aeroplane successful in the First World War (prompt: materials, safety, weapons, pilots)?</p> <p>Why were women employed in the workplace during the war? What were their working conditions like?</p> <p>What do the clothes and materials shown in the different photographs tell us about the life and times 100 years ago? How old do the people look?</p>
<p><b>Websites</b></p> <p>BAC 2010: 100 years of the Bristol Aeroplane Company  <a href="http://www.bac2010.co.uk">www.bac2010.co.uk</a></p> <p>Aviation Archive  <a href="http://www.aviationarchive.org.uk/">http://www.aviationarchive.org.uk/</a></p> <p>Squadrons based at Filton in the First World War:  <a href="http://www.forces-war-records.co.uk/unit-info/3351/">http://www.forces-war-records.co.uk/unit-info/3351/</a></p> <p>Aerial images  <a href="http://www.britainfromabove.org.uk/image/epw037151">http://www.britainfromabove.org.uk/image/epw037151</a>  <a href="http://www.britainfromabove.org.uk/asearch?search=Filton%20Airfield">http://www.britainfromabove.org.uk/asearch?search=Filton%20Airfield</a></p>	<p><b>Challenges</b></p> <p>Compare a fighter aeroplane from the First World War with one today. What are the main differences and why?</p> <p>Investigate a range of materials to see which are strong and light enough to fly. How can you improve the shape of structures to make them stronger?</p> <p>Look at the designs for early aeroplanes (see picture file). Draw and annotate an aeroplane's most important design features.</p> <p>Develop a timeline showing how aeroplanes have changed over 100 years.</p> <p>Are any of the names of the Bristol fallen (in the Forces records, on war memorials etc.) associated with the squadrons that flew out of Bristol?</p>
<p><b>Visits / visitors</b></p> <p>Invite a visitor from Airbus / Rolls-Royce to do an aviation activity in school</p> <p>My Future My Choice offer aviation workshops in schools  <a href="http://www.myfuturemychoice.co.uk/">http://www.myfuturemychoice.co.uk/</a></p> <p>Invite a Bristol Aero Collection volunteer to talk to the class</p> <p>Visit to RAF museums at Cosford, Hendon</p> <p>Visit to Fleet Air Arm Museum, Yeovilton</p> <p>Visit to Bristol City Museum to see the BoxKite</p> <p>From 2017 visit the new Bristol Aerospace Centre!</p>	<p><b>Historical skills</b></p> <p>Research and using historical sources</p> <p>Ordering events and objects in a chronology</p> <p>Changes over time – especially in materials and technologies</p> <p>Comparisons – similarities and differences</p> <p>Knowledge and understanding of the changing workplace and the role of women</p> <p>Interpreting information – especially maps and images</p> <p>Linking local, national and international events</p>

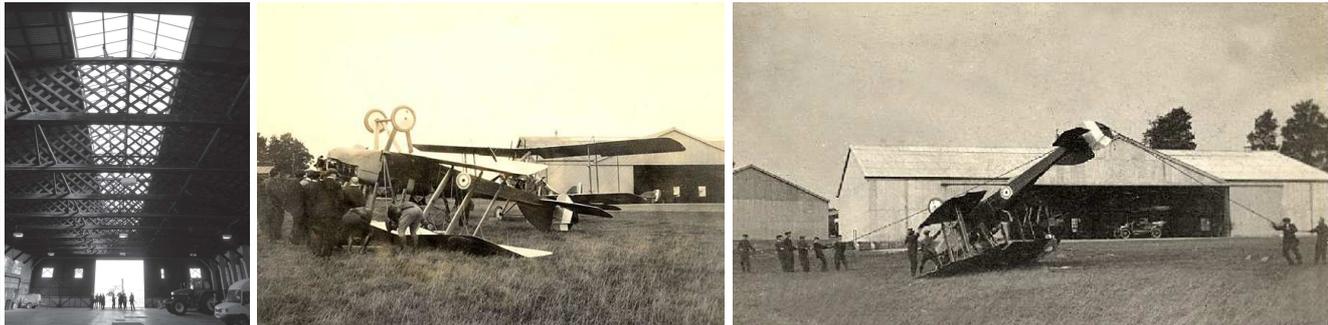
## Title

# Filton and Flying in the First World War

## Background information

The Bristol Aeroplane Company has been a major player in aeroplane production for over 100 years. Started by Sir George White in Filton in 1910, it founded a number of aviation industries in the region many of which, such as Airbus and Rolls-Royce, continue today.

The main hangars that will house the new Bristol Aerospace Museum at Filton are Grade 2 listed First World War aircraft sheds. The original RFC / RAF site opened at Filton in 1915. The large three bay Belfast Hangar (called 16S) was built in 1917. It was part of the Filton Aircraft Acceptance Park, where aeroplanes were delivered, assembled and prepared ready to be dispatched for war.



*Left: Internal view of hangar showing the Belfast trusses. Centre and Right: A Royal Aircraft Factory designed B.E.2 overturns on arrival or dispatch, 1916. The building behind (16M) will become the Conservation workshop of the new museum.*

At the outbreak of the First World War aeroplane production was a very new industry (the Wright Brothers first flight was only achieved in 1903). The Bristol Boxkite was the first aeroplane commercially manufactured by Sir George White's Aeroplane Company established on the site of the tramway works at Filton in 1910. Sir George redirected part of his workforce of carpenters from producing trams to aeroplanes – seeing the potential of flying as part of a wider transport network. One of these employees was George Challenger. These tram workers became an important part of the war effort.



*Left: Bristol Tramways Aircraft Workers tinsmiths shop, 1914-1918. Right: Women join as aircraft workers.*

The Bristol Boxkite – officially called a Bristol-Challenger Biplane – was designed by George Challenger. It was made of wood, wire and cotton with the wings strengthened with a varnish called dope. The solo pilot sat in the open as this was before cockpits.



Left: Sir George White inspecting a Boxkite prior to flight on the Downs, November 1910, (Bristol Aero Collection).  
 Right: An officer shaking the hand of a pilot in a Bristol Boxkite aircraft in Australia, August 1915 (Australian War Memorial DAD0034, reproduced in *Take Flight*, BCDP 2010).

But its potential role in defence became clear when it carried out an unofficial reconnaissance flight over Army manoeuvres on Salisbury plain in September 1910. The War Office first ordered four Bristol Boxkites from Filton in 1911. This began the company's long-lasting business association with the British military.

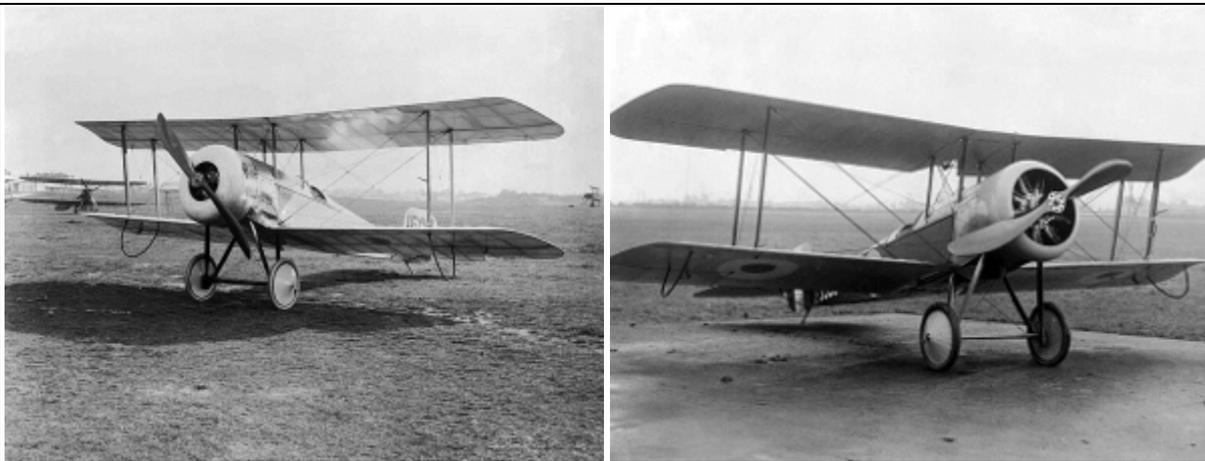
76 Boxkites were built at Filton and 22 were sold abroad. A full size replica of the Bristol Boxkite used for the film *Those Magnificent Men in their Flying Machines* is suspended in the Front Hall of Bristol City Museum and Art Gallery.

The British & Colonial Aeroplane Company also set up flying schools as there was a need to train up pilots quickly. The 'Bristol' Flying Schools at Larkhill on Salisbury Plain and another at Brooklands in Surrey trained nearly half of military pilots at the start of the First World War. At this time 80 per cent of the country's qualified pilots were either trained on Bristol aircraft or at Bristol Flying Schools. There were also flying schools set up overseas. In fact, at the outset pilots were being trained who may well have gone on to fight against the Allies in the First World War.



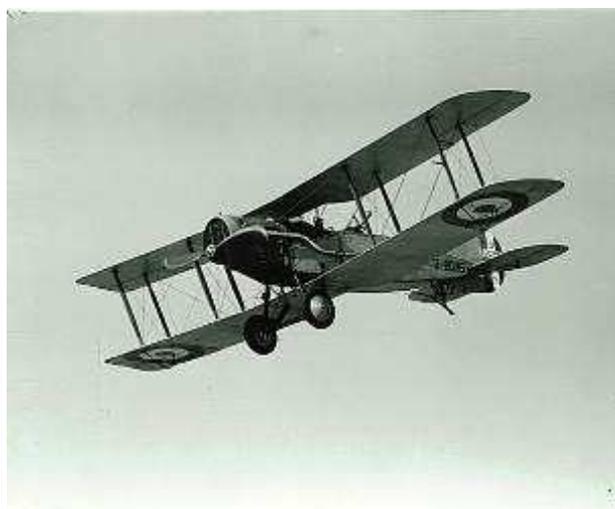
Left: Photograph of the Royal Flying Corps balloon at the Bristol Flying School, Larkhill by T L Fuller, 1912 (© J T Fuller, reproduced in *Take Flight*, BCDP 2010). Right: The government took over the Bristol Flying Schools during the war. The Bristol Aeroplane company re-started them afterwards. This photo from c1931 shows Tiger Moths and hangars alongside the A38 on the site now occupied by the Royal Mail (Rolls-Royce plc, reproduced in *Take Flight*, BCDP 2010).

The next Bristol aeroplane to be developed just before the outbreak of the First World War was the Bristol Scout (which first flew in February 1914). It was also a single sweater, but the Bristol Scout was more manoeuvrable than the Boxkite. Initially the Scout 'C' version was not armed as, like the Boxkite, it was designed for reconnaissance. However, pilots adapted them with rifles, so a later ('D') version was built by 1915 with a Vickers machine gun timed to fire through the spinning propeller so as not to shoot your own aeroplane down (a hazard of using rifles!). 161 Bristol Scout Cs were built (many at the Brislington tramway site as the Filton works were fully employed developing the Bristol Fighter) as well as over 200 Scout Ds. The Bristol Scout was the first aeroplane ever to take off from a ship!



Left to right: Scout C, c1915 and Scout D, 1916 (Airbus, reproduced in *Take Flight*, BCDP, 2010).

The Bristol Fighter was the most successful Bristol aeroplane in the First World War. It was designed by Frank Barnwell (who also designed the Bristol Scout). He was a designer who joined George White's Aeroplane Company in 1911 and was chief designer until his death in 1938 (he died in a light aircraft he had built himself).



Left: Bristol Fighter c1916 (Bristol Museums). Right: Restored Bristol Fighter, 1961 (Rolls-Royce Heritage Trust).

The Bristol Fighter, also known as the Brisfit, supplied 17 squadrons in the First World War. It took two crew – the pilot at the front (who was also armed) and the observer at the back whose role was to spot enemy aeroplanes and targets, fire a machine gun and drop bombs.

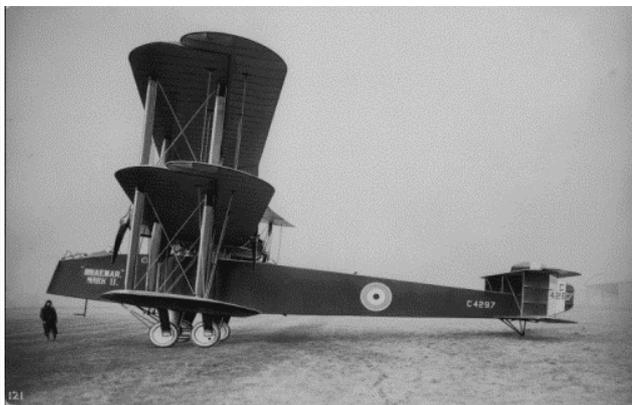
By the end of the First World War, 4,747 Bristol Fighters had been completed. Over 2,000 had been built at Filton, 1,000 at Brislington and others by subcontractors. The aircraft was also licensed to be made in the US. It was so successful it remained in RAF service until 1932.

After the First World War the Fighter was adapted as a civilian touring aircraft and used as the first airline operations in Australia in 1921. It was one of the aircraft that delivered the early air mails in the 1920s.



Left: Close up of Bristol Fighter fitted with a Falcon engine, 1917 (Bristol Aero Collection, reproduced in *Take Flight*, BCDP, 2010). Centre: Royal Flying Corps mechanic in Filton Aircraft Acceptance Park with Bristol Fighters waiting for their engines, c1917 (Rolls-Royce Heritage Trust, reproduced in *Take Flight*, BCDP, 2010). Right: Sheet metal workers at the Brislington works, c1918 (Bristol's Museums, Galleries and Archives, reproduced in *Take Flight*, BCDP, 2010).

Another Bristol aeroplane developed during the First World War was the triplane Braemar Bomber (1918) intended to use for retaliatory bombing raids on Berlin. It came too late and was converted into a 14 seat Pullman passenger aeroplane in 1920. But it was too large and was quickly obsolete.



Left: Braemar Bomber, 1919 (Bristol Aero Collection reproduced in *Take Flight*, BCDP, 2010). Right: Staged photo-shoot for the interior of the Pullman passenger aeroplane, showing wicker chairs and ornate décor, 1920 (Bristol's Museums, Galleries and Archives, reproduced in *Take Flight*, BCDP, 2010).

One of the main changes in the aeroplane factories during the First World War was the recruitment of women into the workforce. The aircraft industry was essential war work so highly skilled men were retained. Women were brought in to replace men who had been conscripted and to boost production. They were used especially in stringing (making the wood and wire frames over which canvas was stretched and sewn by hand) and doping the aircraft wings (with a highly toxic varnish that tensioned the fabric). Women were given milk to drink to counteract the giddiness, headaches and fatigue induced by working with the varnish.

The increasing shortage of men as the war progressed meant that women were trained to take on more traditional male roles including working in the machine shops at lathes, in the cabinet and carpenters' shops and in aircraft assembly. The unions blocked attempts to train women in highly skilled work. Men and women would have been segregated into different areas at the time. A separate canteen and restroom for women was built at Filton in 1916.

The workplace returned to more traditional gender roles after the war – with many women missing the working life and independence they had experienced.



Left: Portrait of Ada Smith in mop cap and overalls, 1918 (private collection, reproduced in *Take Flight*, BCDP, 2010). Right: A group of wartime women workers, c1918 (private collection, reproduced in *Take Flight*, BCDP, 2010).

The demand for aircraft was so high during the war that other companies were brought into the aviation industry, especially those with skilled carpenters as aeroplanes were mainly made of wood. One of the most successful such companies was Parnall & Sons, a Bristol-based shop fitting and cabinet-making firm. They built around 600 aircraft including Avro 504s and Short Brothers' 827s from unusual places they took over including the Coliseum building on Park Row which had been an ice skating rink and theatre where early films were shown.

They also had works at Mivart Street in Eastville, Belmont Road in Brislington and Quakers' Friars. The aircraft had to be dismantled and towed out to Filton for final assembly and test flights. This was not ideal and post-war part of the Parnalls firm returned to shop fitting while a separate aviation business was established by George Parnall at Yate in an Aircraft Repair Depot built by German POWs which was then one of the largest aerodromes in the country. After the Second World War when the demand for aeroplanes dropped off, the company diversified into making washing machines!



Left: Women workers at Parnall's Coliseum works c1917 (Fishponds Local History Society, reproduced in *Take Flight*, BCDP, 2010). Right: Avro 504 frame in workshop c1917 (Fishponds Local History Society, reproduced in *Take Flight*, BCDP, 2010).

A number of squadrons operated from Filton in the First World War preparing for departure to France. They flew different types of aircraft as well as those designed and made in Bristol. In 1916 No. 33 Squadron was formed at Filton, from elements of 12 Squadron, flying Royal Aircraft Factory designed B.E.2 aircraft. In the same year No. 42 Squadron was formed at Filton from crews of 19 Squadron Royal Flying Corps also equipped with the B.E.2 biplanes (which were built by both the Bristol Aeroplane Company and Vickers). No. 66 (Fighter) Squadron was formed at Filton later in 1916 with Sopwith Pup biplanes and the squadron moved on to France in March 1917. Also in 1916 No. 62 Squadron (Training) Squadron was formed from elements of No.7 Training Squadron – equipped with the Bristol Fighter from May 1917. The 101 Squadron was disbanded at Filton following its return from France in 1919 where it had flown the Royal Aircraft Factory F.E.2 as a night bomber squadron.

Filton remained an operational base throughout the Second World War. In the 1950s and early 1960s, Filton was designated as a V-bomber dispersal base. During the Cuban Missile Crisis (1962) Avro Vulcan V-bombers at Filton were kept at 'immediate readiness' status with engines idling.

Filton runway closed in 2012 and the land has been sold for development. The site will include the new Bristol Aerospace Museum telling the history of 100+ years of aviation in the area, preserving the rich heritage and providing a new indoor home for Concorde.