My Bristol F.2b Fighter Project.

D-8096 of the Shuttleworth Collection. A surviving original.

World War I (1914-1918) aviation in its myriad facets has been a lifelong passion. I grew up reading stories of Rickenbacher, Udet, Bishop, Guynemer, Richtofen, Mannock, Voss exploits in the skies over the Western Front. My appetite for information about this period where aviation established itself as a valuable military asset was insatiable. Every text within the libraries in my school and home town were devoured as fast as I could get my hands on them. Subjects of my interest ranged widely from history, biography of key contributors, designers approaches to engineering solutions, the manufacturing and the development of mass production techniques, the pilot's vivid descriptions of aerial combat to their mechanics discussions on maintainability and best practices of the aviation mechanic. I was fascinated with them all.

My childhood room resembled more of a museum hangar full of historic aeroplanes than modest living quarters in small town Western Pennsylvania. One of my favorite pastimes was building models of these aircraft. I chronicled the development of the aeroplane and segregated them according to period and nation of origin. I should have bought stock in Airfix, Matchbox, Monogram and Revell! One day the accumulated knowledge reached critical mass and I realized that I wanted to build and fly my own aircraft from the Great War and the dream has stuck with me every since. Searching high and low for several years for a suitable design that would meet my needs led me to the conclusion that if I wanted to fly a full scale multi-place World War I aircraft it was going to be up to me to design and build it.

You might ask yourself why anyone would want to own and fly one of these old, slow airplanes. To which I answer, the reasons for flying are as numerous as there are pilots.

Personally I like to fly low and slow, do the odd wing over, steep turn and fancy myself over the Western Font on the lookout for the Hun. In short, I fly for the sheer joy of flight. Having a unique, one of a kind aircraft also appeals to my sense of vanity. Of course your mileage may vary…

I had several design criteria in mind as I approached the design process. Key among these were safety, reliability, maintainability, full-scale, multi-place, use of modern materials and simple construction methods that the average guy could tackle with a minimum of special tools in his or her home garage. The research of the Bristol F.2b Fighter design has spanned more than a decade. The difficulty being that nowhere in the world does a full set of engineering drawings exist for the Bristol Fighter. This is due to many original drawings being discarded after production ceased, losses to fires at storage facilities and the ravages of time. I've collected as much of the partial sets as I able, the rest I had to must fill in myself by visiting surviving original examples, taking hundreds of photographs and deciding based on my knowledge of materials and processes that existed at the time how to incorporate a particular feature.

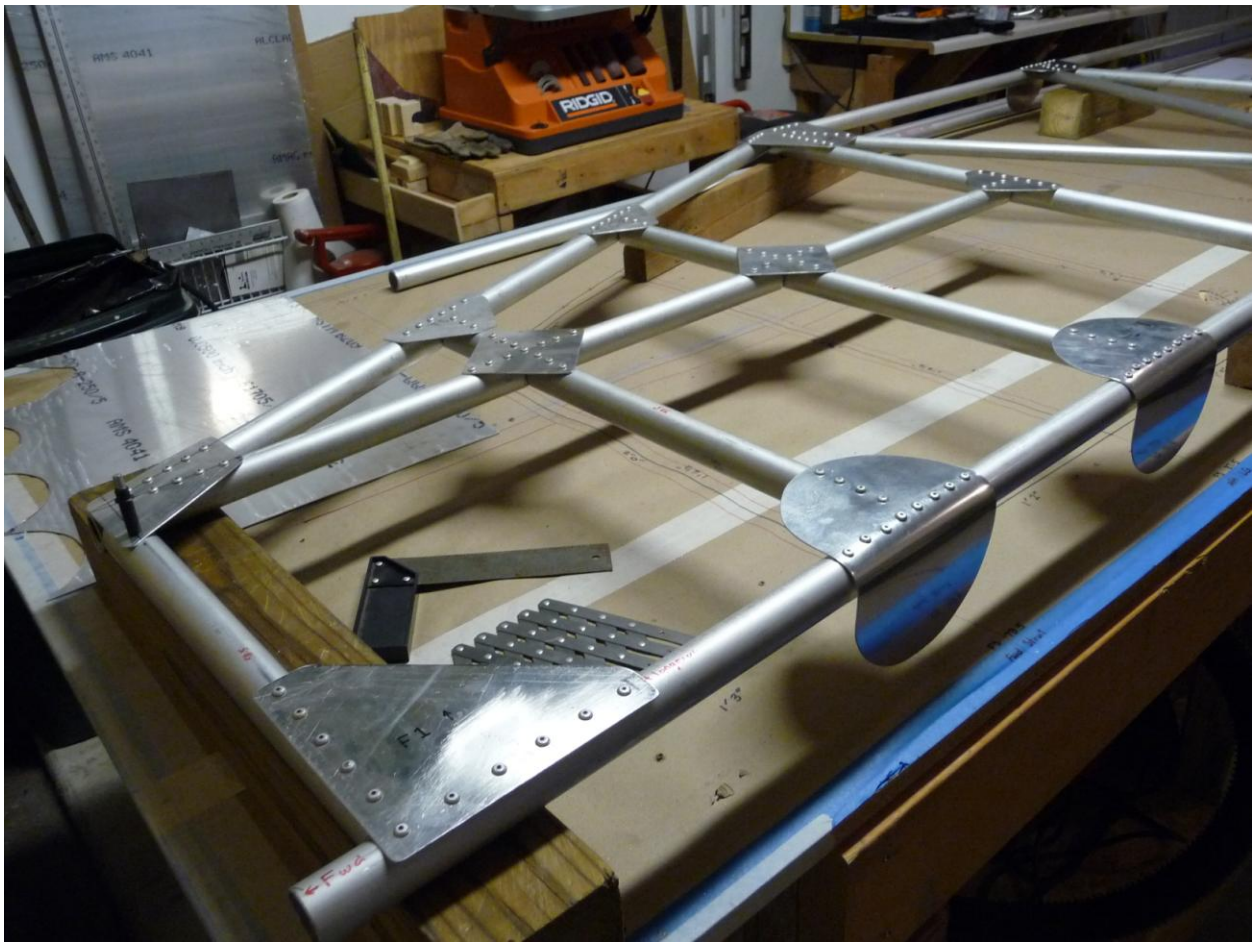
The resulting design employs aluminum tube and gusset fuselage, wing and tailplane construction. 4130 chrome-moly steel is used for highly stressed parts such as strut fittings, axles, flying and landing wire attachment lugs, cabanes, fuselage to wing attachment struts and the tail strut assembly. The wings are made of aluminum ribs on aluminum tube over tube spars with front and rear shear webs. The entire structure is covered using a modern heat shrink polyester fabric system such as the Stewart Covering System. Powerplant is a Fairchild Ranger L-440C that has been modified to run in the upright position. The engine swings a custom Culver wooden prop made to admiralty specification having broad scimitar blades. The panel has modern VFR instrumentation in the standard six-pack configuration, a GPS, radio and transponder. The resulting aircraft is half the weight of the original design, is substantially stronger and with 200hp will at least equal performance of the original.

So what is tube and gusset construction?

The original aircraft used a truss type of structure made up of wired braced wooden struts held together by a myriad of metal fittings formed from mild steel sheet. These aeroplanes were essentially handmade and assembled by skilled factory workers from thousands of parts. Many of which were labeled "fit on job". Standardization of parts didn't occur until the late 1920 and early 1930s as the aviation industry moved from cottage industry to large scale manufacturers.

Tube and gusset construction replaces the original wooden structures with 6061-T6 aluminum truss structure joined by formed plates or gussets which are riveted together using

aircraft grade (Cherry Aerospace CherryMax brand) blind rivets (see example pictures below). Stresses are transferred from member to member through the gussets and thus dissipated throughout the structure. This method of construction has been used to build hundreds of World War I replicas over the past thirty years. Noteworthy is the fact that there has not been a single structural failure in that same time period, proving the viability of the technique.



Right side forward fuselage structure showing tube and gusset construction.

Fuselage structure.

Horizontal stabilizer under construction

Elevators under construction

Construction commenced in September of 2009 with a planned completion date of March, 2013. This to allow time to fly off the mandatory restrictions to be able to show the airplane at Oshkosh, Dayton and Gardner to commemorate the Centennial of the World War I aviation heroes of my youth.

About me: Retired USAF C-130 Flight Examiner Flight Engineer. USAF Aircraft Maintenance Master Technician and Supervisor. Certificates held: Private Pilot (SEL), Airframe and Powerplant Mechanic, Flight Engineer (turboprop). I hold one degree in Flight Engineering and one in Computer Science. Currently employed as a Senior Program Manager at a leading

Telecommunications company. Founder, and CEO of Great War Replica Aircraft LLC, http://www.greatwarreplicaaircraft.com

You can follow the build on Photobucket at http://s871.photobucket.com/home/TSJohnson66226/index

Plan sets will be available after flight testing of the prototype is completed.

Historical reference for the Bristol F.2b Fighter

Designed by Frank Barnwell in 1916 as a replacement aircraft for the Royal Aircraft Factory RE.8 and the Armstrong-Whitworth FK.8. The F.2b first saw action during the Battle of Arras in early April, 1917. On its first patrol with the new aircraft, 48 Squadron lost four of the six planes, with no losses to the Germans flying Albatros D.IIIs led by Manfred Von Richtofen. The aircraft was not at fault, the "Brisfit" was a good fighter, maneuverable, sturdy and well armed, it was the British tactics that were to blame. Once the British pilots caught on to the fact that they should employ it as a fighter the "Brisfit" became a potent offensive weapon. It became the RFC's pre-eminent two seat reconnaissance/fighter aircraft. A total of 5,329 aircraft were eventually built. The Bristol F.2b remained in operational service at home and abroad until finally being retired in 1932. Longevity of service being the testament to the versatility of this great design.

General characteristics:

Crew: 2 (pilot & observer/gunner)

Length: 25 ft 10 in

Wingspan: 39 ft 3 in

Height: 9 ft 9 in

Wing area: 405 ft²

Empty weight: 2,145 lb (GWRA version – 1,063lb)

Max takeoff weight: 3,243 lb (GWRA version – 1,650lb)

Powerplant: 1× Rolls-Royce Falcon III liquid-cooled V12 engine, 275 hp (GWRA version – 200hp Fairchild Ranger L-440C-5 air-cooled inline six cylinder engine)

Performance:

Maximum speed: 123 mph at 5,000 ft

Range: 369 mi (3 hours endurance)

Service ceiling: 18,000 ft

Rate of climb: 889 ft/min (GWRA version – 1,000ft/min)

Armament:

1 × .303 in forward-firing Vickers machine gun in the upper fuselage

1 or 2 × .303 in Lewis Guns in the observer's cockpit

Bombs: 240 lb

Sorry the GWRA version is unarmed!