

Restoration of Spitfire PR.IV AA810

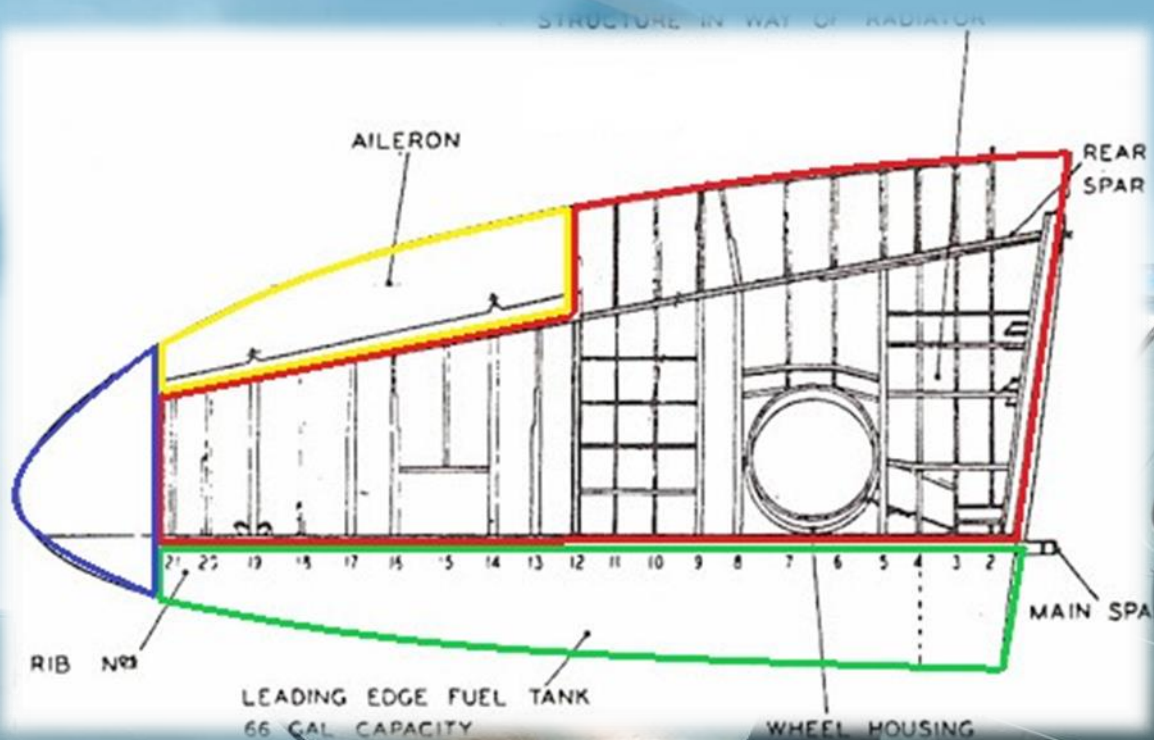


Wing rebuild and funding plan

On elliptical wings...

- The wings for AA810 represent one of the largest investments of the entire project
- Both wings will take around 26 months in total to restore to the point of flight, our quoted expenditure is £710,000 or £28,000 per month.
- The structure build can be broken down into five manageable sections:

Goal for 2022: Begin restoration of wings



Costs are for
paired
assemblies
to cover both
wings.

Radiator fairings
and u/c gear doors
(not shown)

£58,400

2022 Goal Green

Remaining costs

Leading Edge D
Box Structure

Red structure

Yellow structure

Blue structure

£180,000

£390,000

£57,600

£24,000

Wing Leading Edge D Box Structure

£180,000

The D Box Structure is the strongest element of the wing - it consists of the main spar booms and web, 21 nose ribs, mounting points for the main landing gear, and top and bottom leading edge skins



Individually constructed nose ribs are attached to the spar booms and the web to give the leading edge shape. At this time all the hard mounting points are added for the undercarriage.

Full length leading edge skins are hand formed to individually match each wing configuration. Once riveted together the leading edge box section is a standalone assembly. These assemblies represent 25% of the costs of the restoration of the wings.

The spar booms on the Spitfire are one of the most complicated ever made, each boom consisting of six interference fit tubes all slotted inside each other. The four booms that make up the spar cost near £40,000 in total.



Wing ribs and wheel bay structure

£390,000

Beyond the D box assemblies, the remaining wing structure in each wing consists of 21 main ribs, a single rear spar, and wheel bay structures.

Both of AA810's wings were recovered from Norway and much of the structure is reusable. However each individual part will need to be disassembled, cleaned, inspected, tested, treated, painted and refitted.

The wings of AA810 are very different to the wings normally found on a Spitfire. Whilst retaining the iconic Spitfire shape, the PR.IV had no guns, leading edge fuel tanks and in the port wing a special 18 gallon oil tank for long range operations.

AA810 will be unique in being rebuilt to this configuration and therefore represents a significant historical opportunity to preserve this specific engineering design for future generations.



Rib sections are complicated with most parts being individual to each assembly. Great care is taken to restore each useable part to retain a high level of originality.



Wing ribs are paired and can be built individually on bench either alongside the D Box jig work, or separately at a later date. Once the rib kit is built up, these items can then be bolted to the D Box assemblies and skinned.

The rib work and skinning of the wing represents 54% of the total cost of restoring AA810's wings.

Ailerons and Flaps Structure

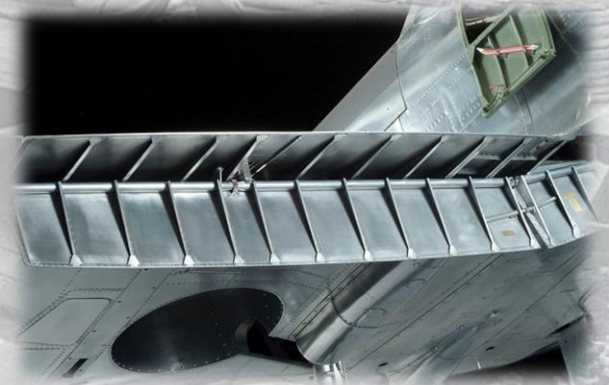
£57,600

Around 80% of the port Aileron and 30% of the starboard aileron was recovered from Norway when we found AA810 in 2018. The port aileron in particular is in really excellent condition therefore significantly reducing the costs associated with their restoration to flight.



Around 80% of the starboard flap assembly was also recovered, the majority of which can be reused in the restoration.

Using the parts recovered from the wreck and other wartime manufacture parts that are available to us, we can reduce the restoration costs of the aileron and flap assemblies significantly. Overall these assemblies represent 8% of the restoration costs of the wings.



Wing Tip Structure

£24,000

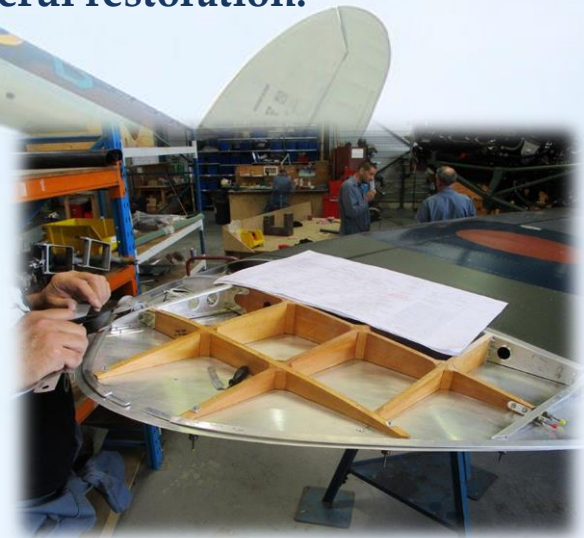
In 2018 the project recovered both wingtips from the mountain, the port wingtip was virtually undamaged, the starboard wingtip broken into three parts.



One original top skin will be kept for display but the internal structure and the remaining skins will be able to be used after careful restoration.

Interestingly the wingtips use a mixture of aluminium, steel fittings and spruce, a leftover from traditional 1930's manufacturing.

The restoration of the wingtips using the original parts represents 3% of the wing restoration costs.



Gear doors and Radiator fairings

Specific to the early marks of Spitfire are the radiator fairing and the smaller oil cooler housing that sit under the wing. We recovered both from AA810 but only the radiator fairing has salvageable parts within it.

Gear doors are made as a kit and are then fitted and trimmed individually to the wing. We have acquired an original repairable door to reduce costs.

With our salvageable parts and our wartime door, the restoration of these parts represent 9% of the costs of the wing restoration.



Summary

The wings are by far the most significant expenditure for the project, but will reuse the most original material from AA810. The overall financial investment required is £710,000 over 26 months.

- **Main spars and D Box Structure are priced at £180,000.**
(25% of wing restoration costs)
- **Wing Rib and wheel bays are priced at £390,000.**
(55% of wing restoration costs)
- **Ailerons and Flaps structure priced at £57,600.**
(8% of wing restoration costs)
- **Wing tip structure priced at £24,000.**
(3% of wing restoration costs)
- **Gear Doors and radiator fairings priced at £58,400.**
(9% of wing restoration costs)

Project AA810 is seeking financial assistance from the Fettes Community past and present to accelerate the restoration of these iconic wing structures following the impact of Covid-19. Together, AA810 can still fly in 2024.