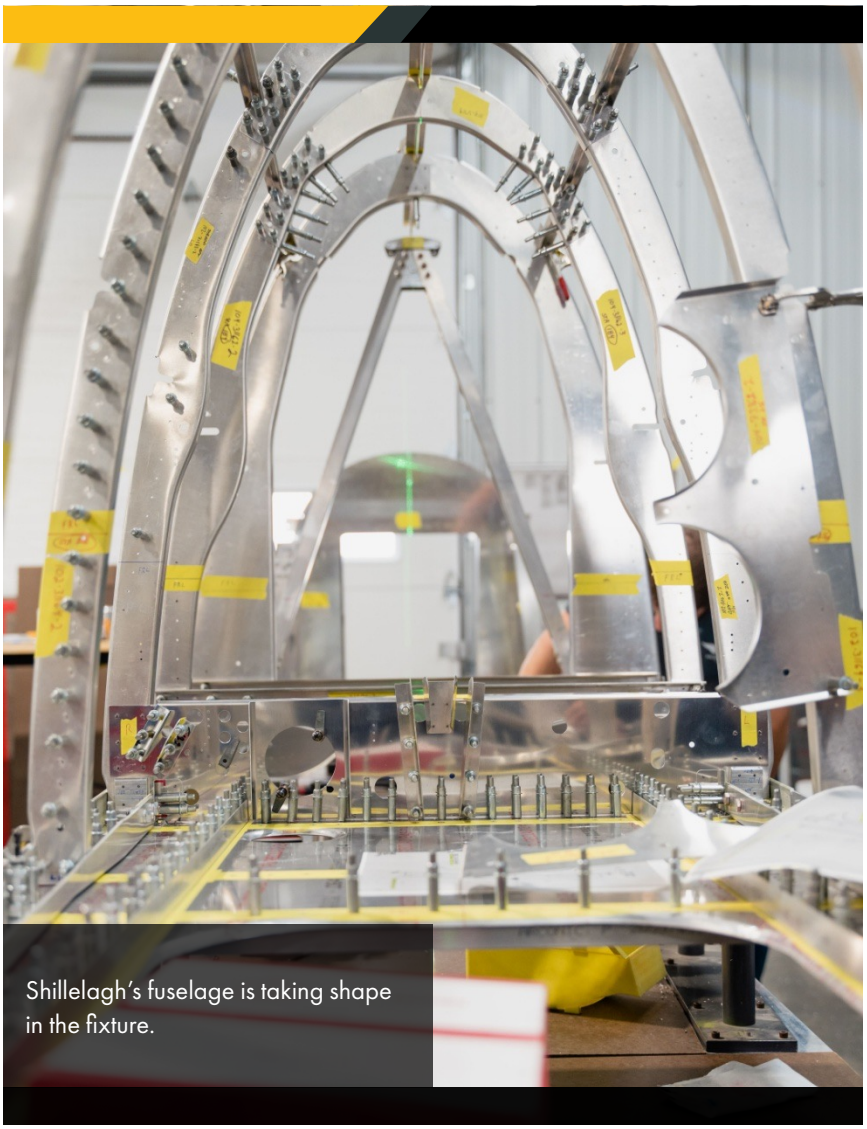
P-51B SHILLELAGH FALL UPDATE

Wings of the North Air Museum's P-51B

by Chuck Cravens

AIRCORPS AVIATION



Shillelagh's fuselage is taking shape in the fixture.

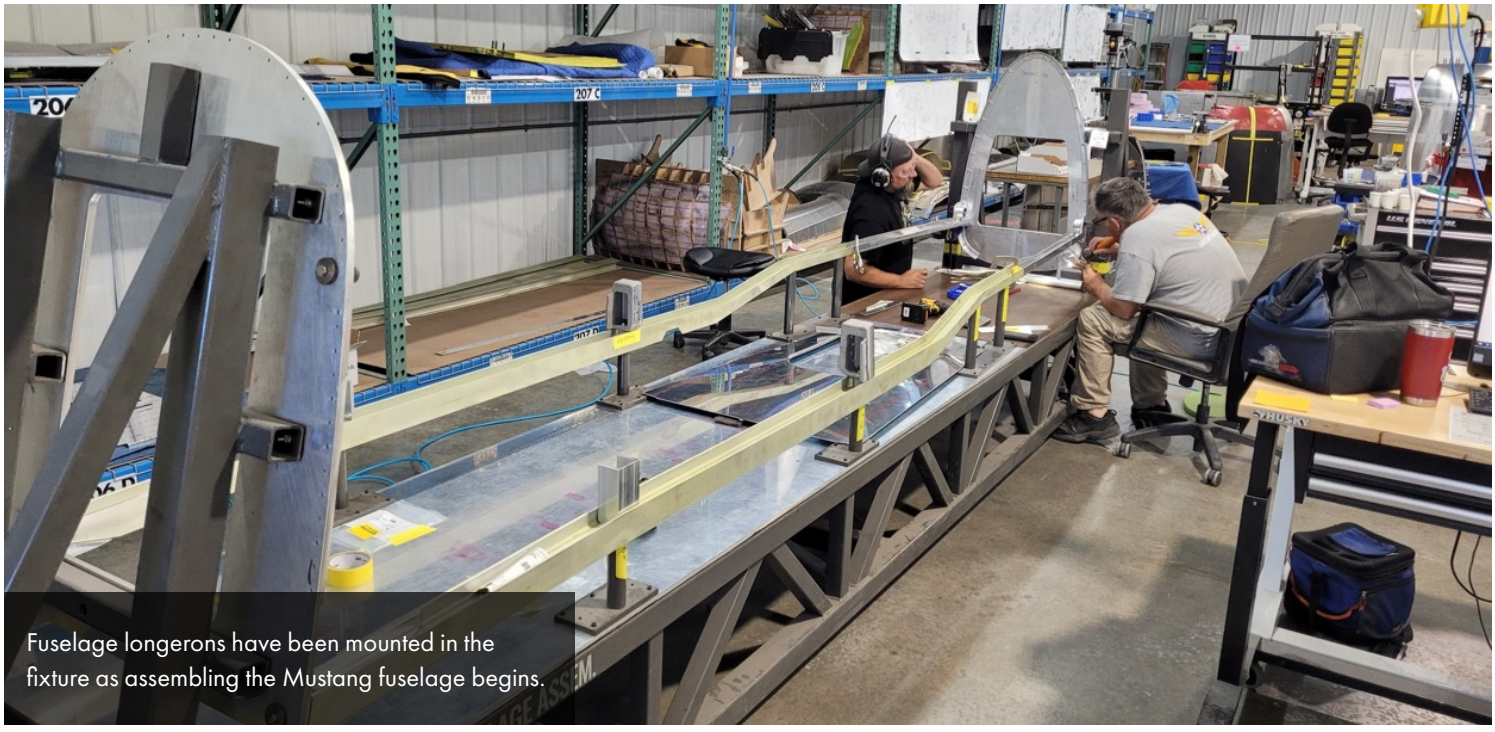
Update

See an original 1944 video that includes Shillelagh (before its repaint to it final version of the nose art), and a great interview of Ken Dahlberg here: https://www.aircorpsaviation.com/project/p-51b-shillelagh/

Shillelagh, early July 1944, USAAF photo

Fuselage Structure

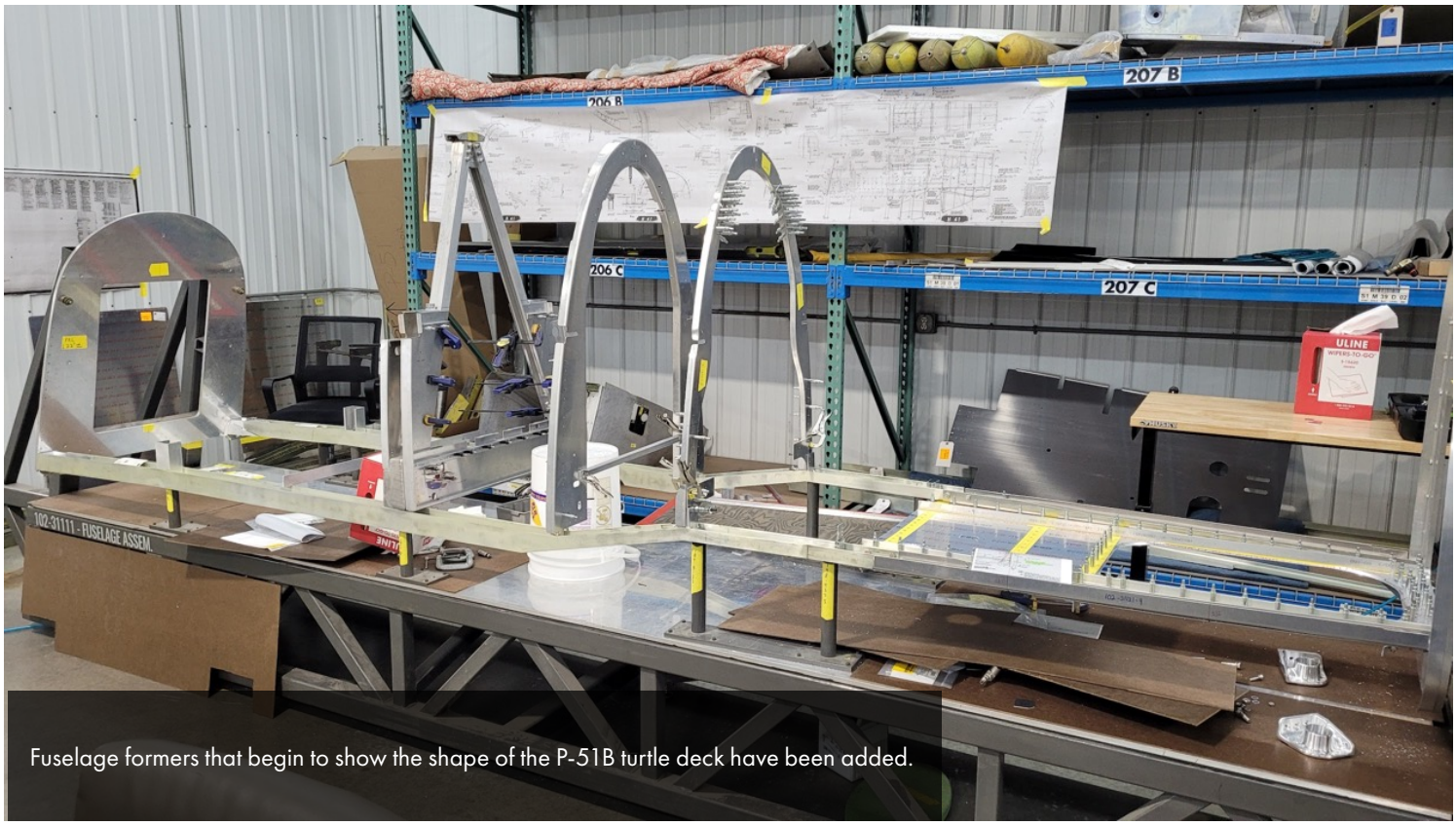
Parts for building the fuselage have been fabricated over the past months and it is finally time to begin assembly of the main fuselage in the alignment fixture.



Fuselage longerons have been mounted in the fixture as assembling the Mustang fuselage begins.

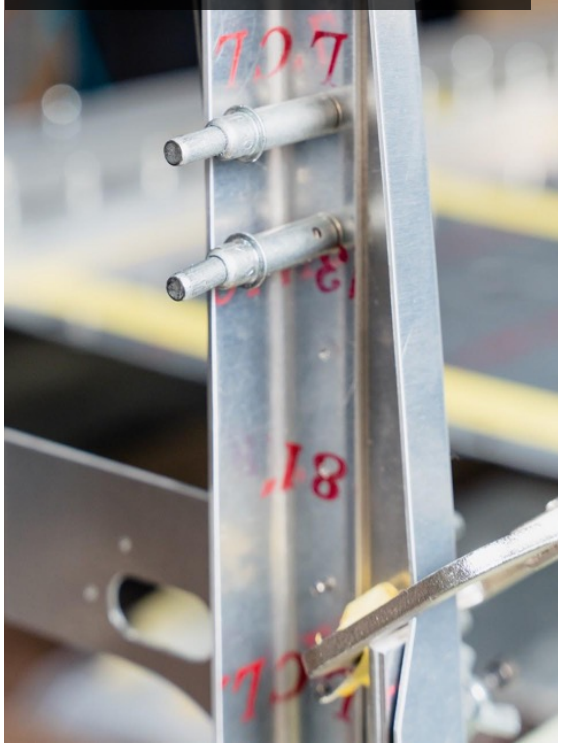
The inverted vee-shaped structure is known as the nose over structure, upper. It served much as a roll bar protects the driver in a race car, the nose over structure protects the pilot in case of a rollover.

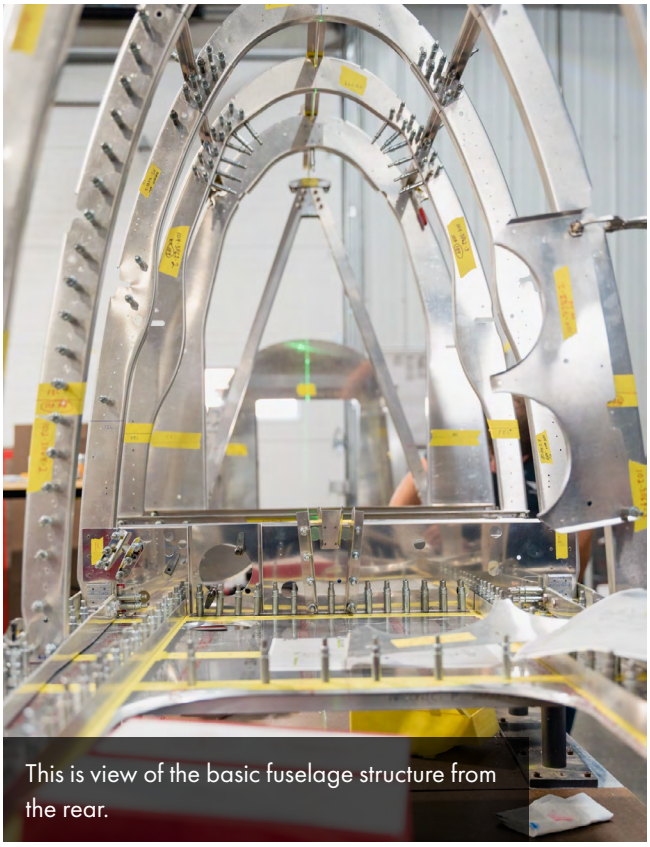
The rollover structure is shown from the rear of the fuselage.



Fuselage formers that begin to show the shape of the P-51B turtle deck have been added.

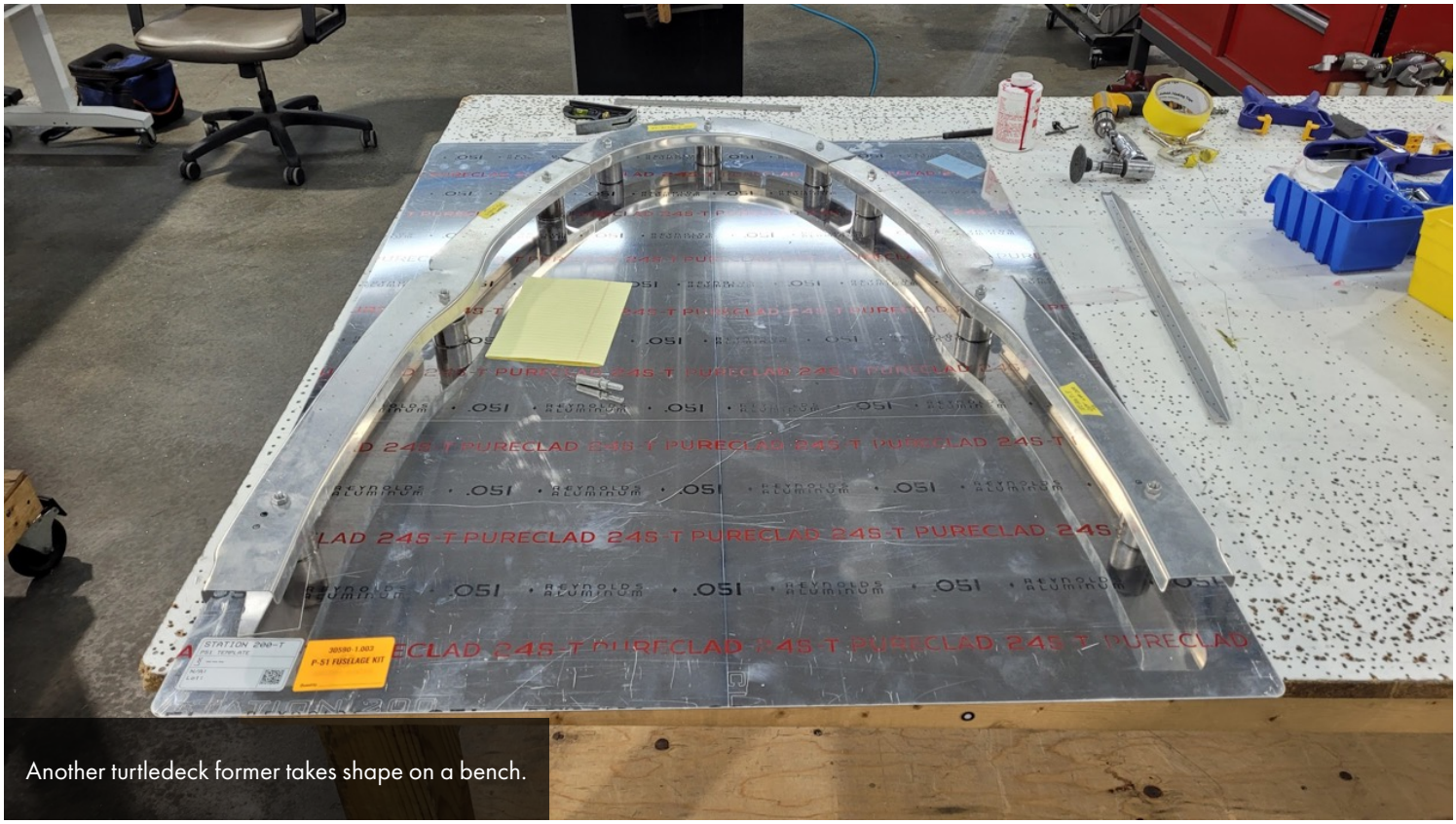
Here is a close-up view of one of the stiffeners clecoed in place on a fuselage former.



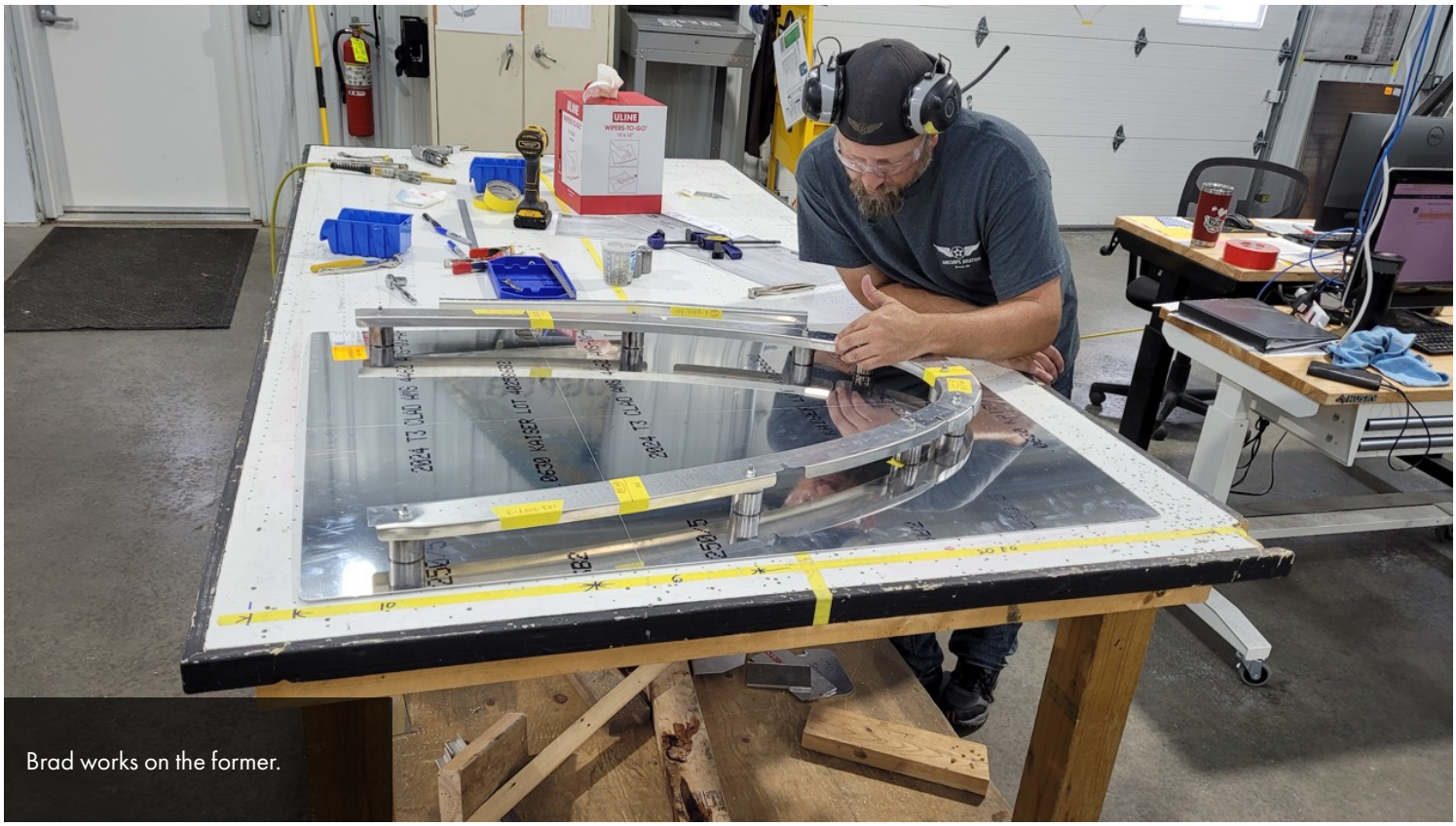


This is view of the basic fuselage structure from the rear.

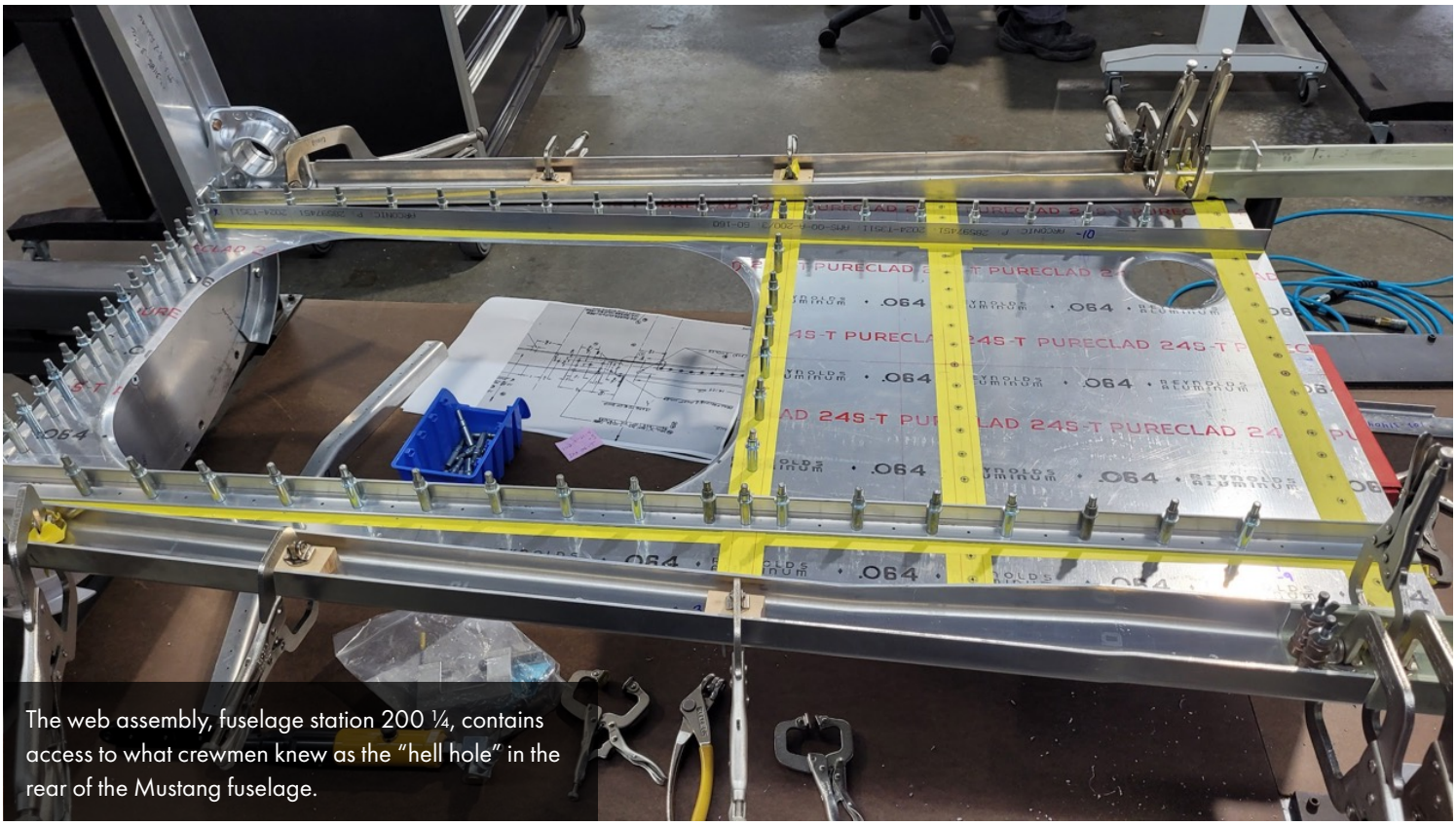
This view from the front shows the rollover structure and the formers behind it.



Another turtledeck former takes shape on a bench.



Brad works on the former.



The web assembly, fuselage station 200 ¼, contains access to what crewmen knew as the "hell hole" in the rear of the Mustang fuselage.

The fuselage formers that shape the turtledeck are all in place, ready for longerons to be installed.

Brad and Paul work on fitting longerons.

The rear potion of the under-fuselage scoop/radiator and oil cooler sections is ready

Ailerons and Elevators

The ailerons and elevators are being assembled in parallel with work on the fuselage.

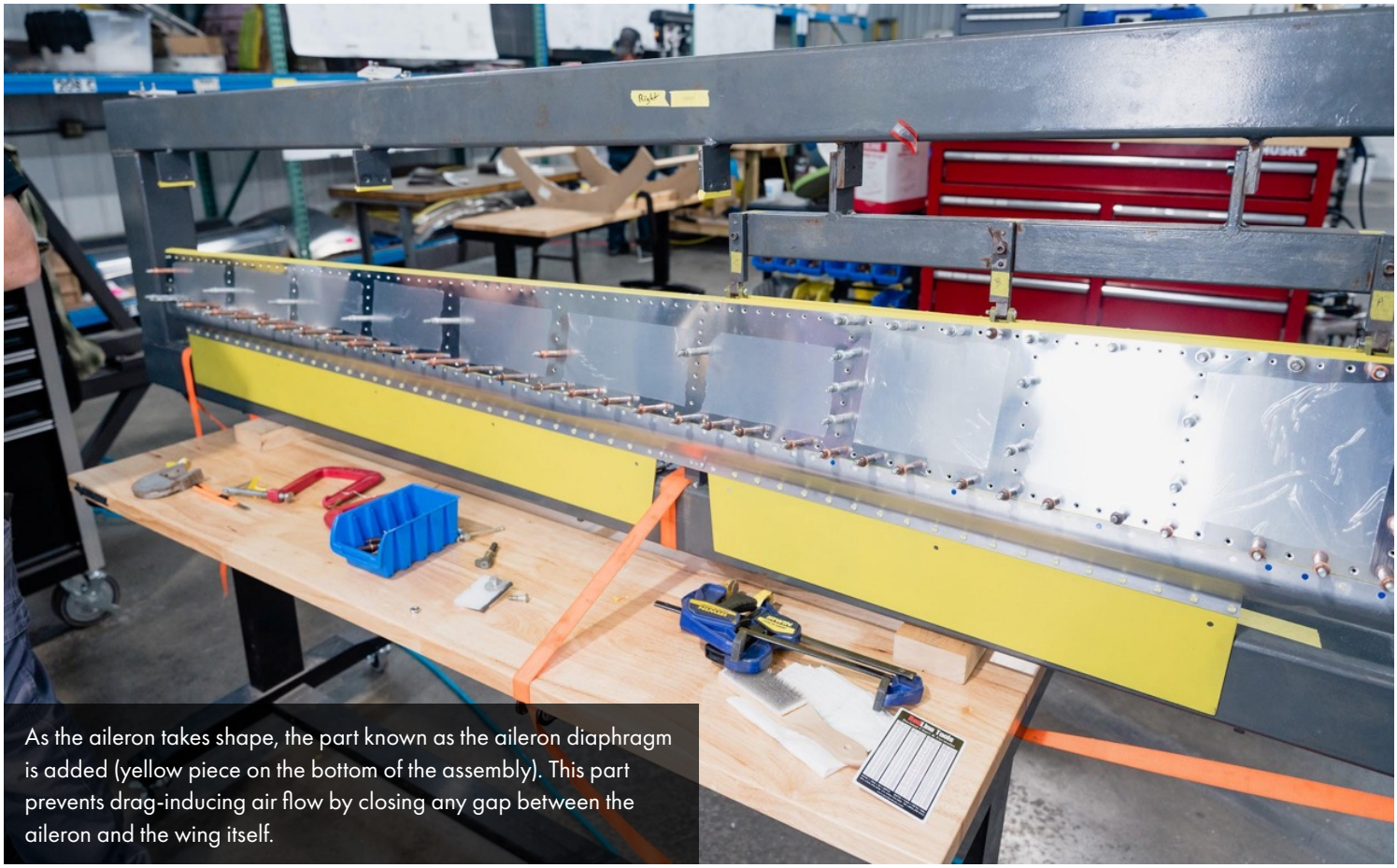
An aileron trailing edge is assembled.

Various aileron parts await assembly.

The basic structural framework of an aileron takes shape in the fixture.

Once the aileron structure has been assembled, it goes to paint and subsequently returns to the fixture for skinning.

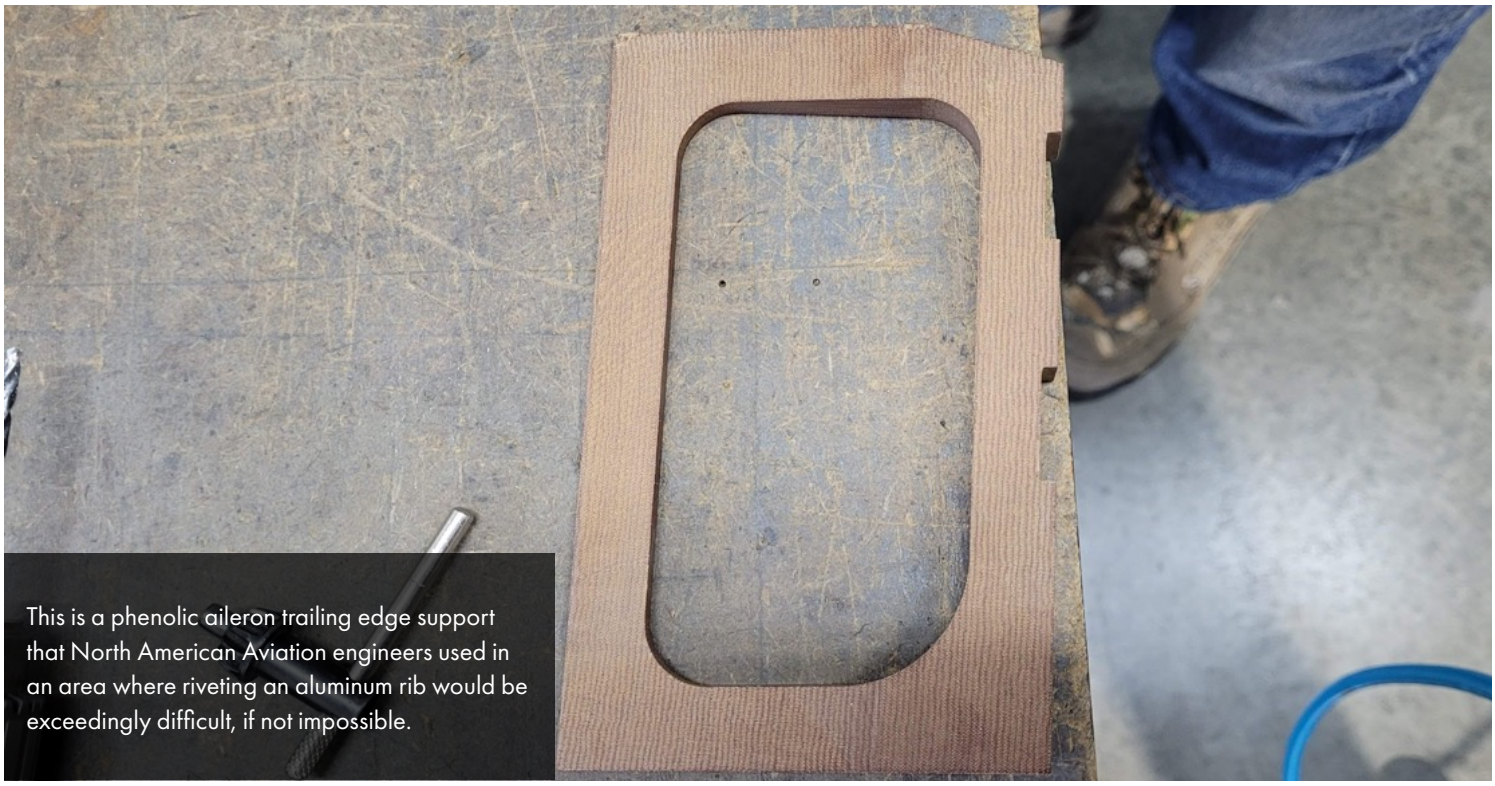
Skins are being fitted.



As the aileron takes shape, the part known as the aileron diaphragm is added (yellow piece on the bottom of the assembly). This part prevents drag-inducing air flow by closing any gap between the aileron and the wing itself.

Aileron skin has been clecoed in place.

Brad prepares to install a phenolic former into the aileron



This is a phenolic aileron trailing edge support that North American Aviation engineers used in an area where riveting an aluminum rib would be exceedingly difficult, if not impossible.

"One of the things we take for granted is our freedom. The most debilitating thing we can do to the human condition is to take away our liberties. We don't think about it because we think it can't happen to us."

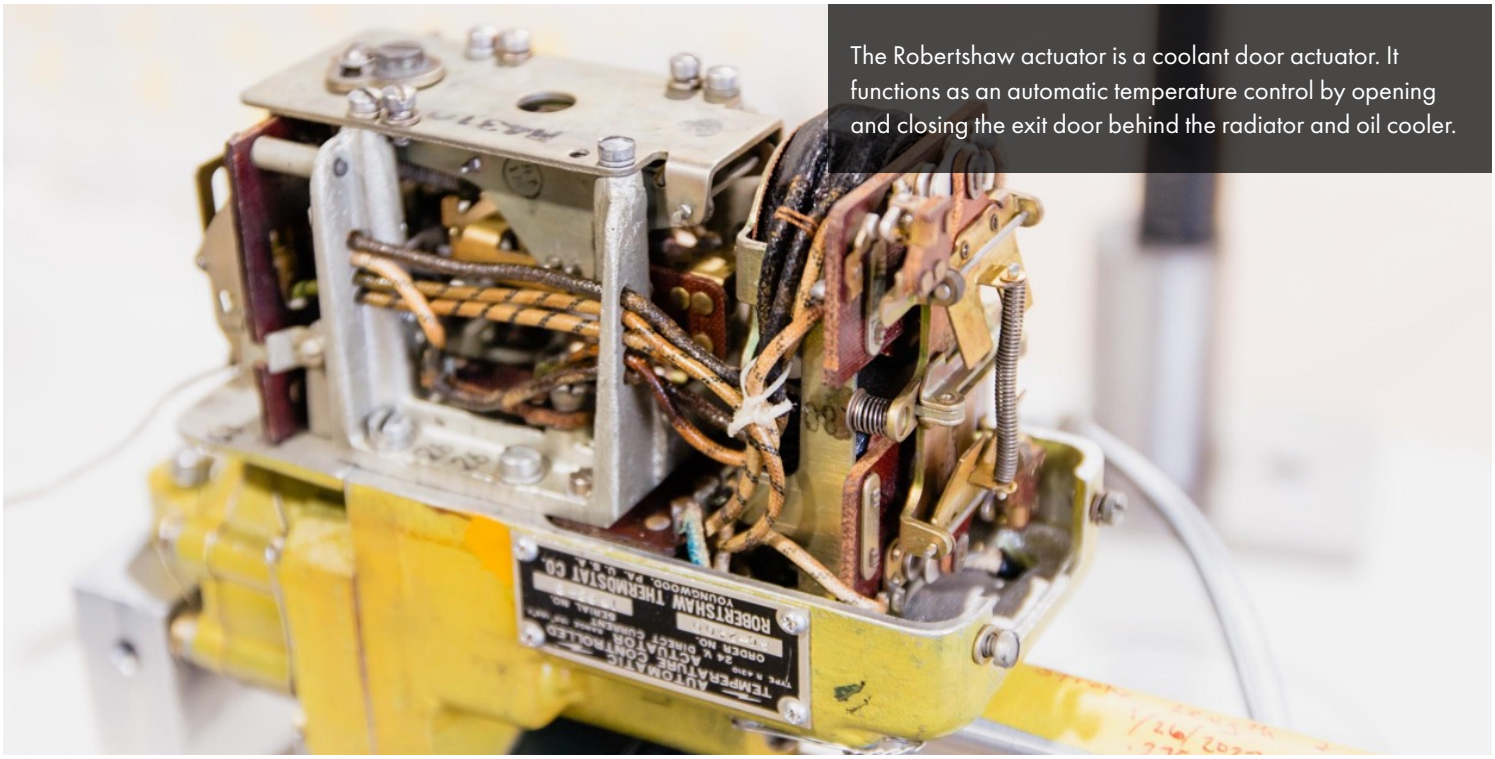
Ken Dahlberg, recollecting the feeling of being liberated from a POW Camp

https://wotn.org/

Here, the internal framework of the elevator structure can be seen. Both of Shillelagh's elevators are original assemblies from the 1940s and were found to be usable with a few minor changes and parts replacements.

The entire elevator can be seen here.

Robertshaw Actuator



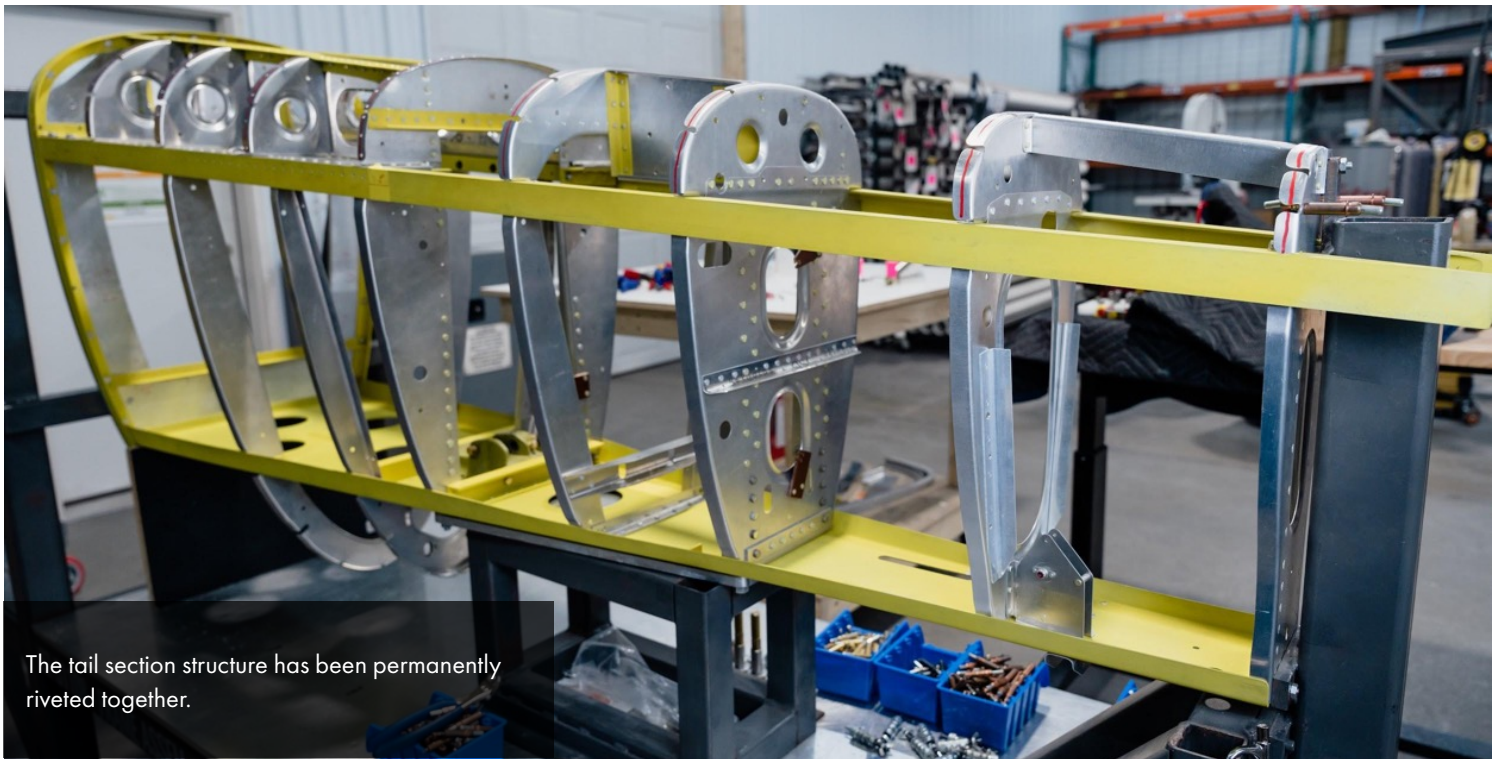
The Robertshaw actuator is a coolant door actuator. It functions as an automatic temperature control by opening and closing the exit door behind the radiator and oil cooler.

Tail Cone

The first of 3 major sections of the P-51B's fuselage to be assembled is the tail cone. While much of this structure is newly fabricated, all the castings in the tail cone are original wartime Mustang parts.

Clecoes hold the structure together. Once everything is fitted, the assembly is taken apart and sent to the paint shop to get its protective zinc chromate-colored paint.

Back at the restoration shop after painting, the tail cone assembly has been returned to the fixture for riveting.



The tail section structure has been permanently riveted together.

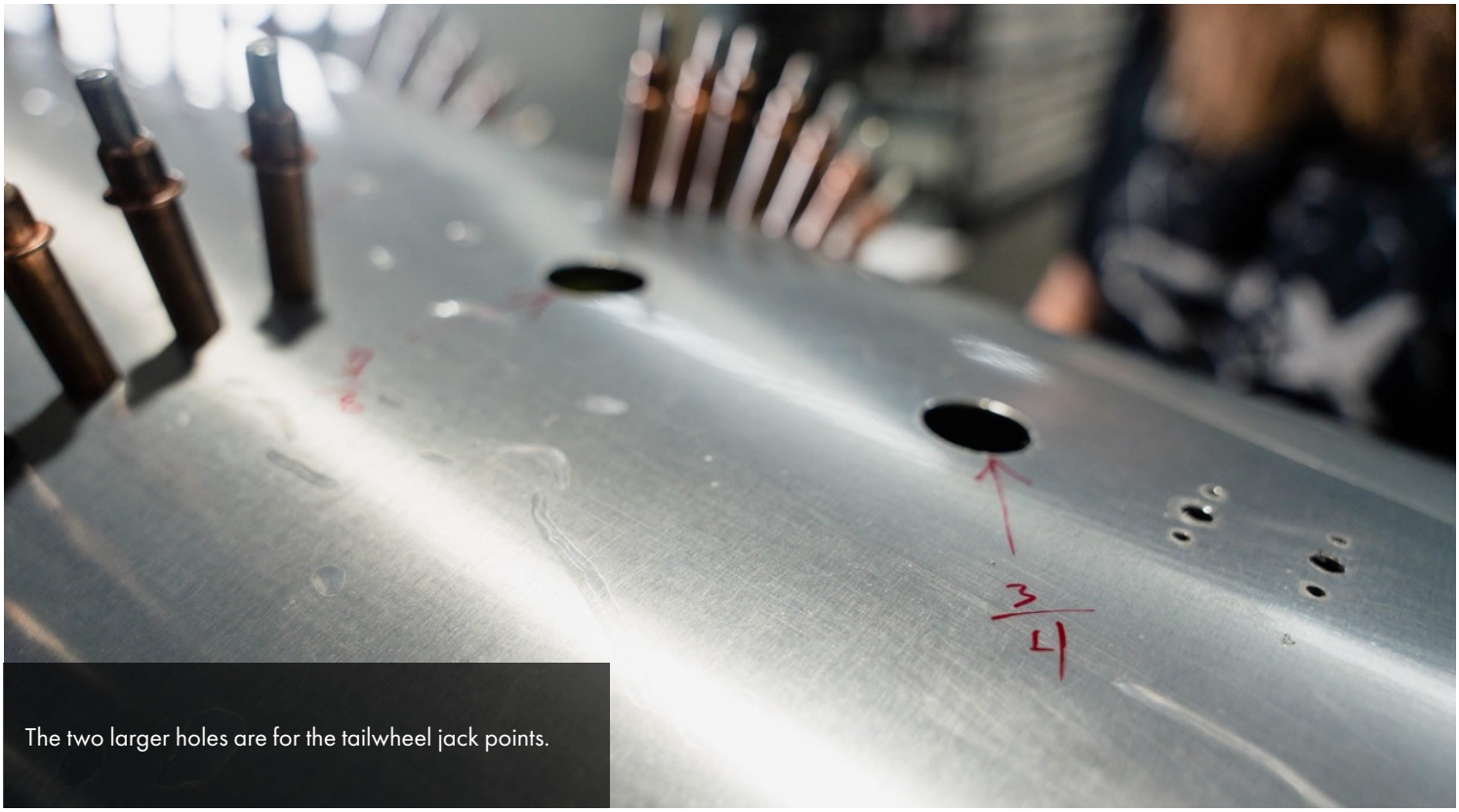
Theo works on the skin section that includes the opening for the tail wheel. Small adjustments to skin sections sometimes require hand filing.

The bottom skins are fitted to the upside-down structure.

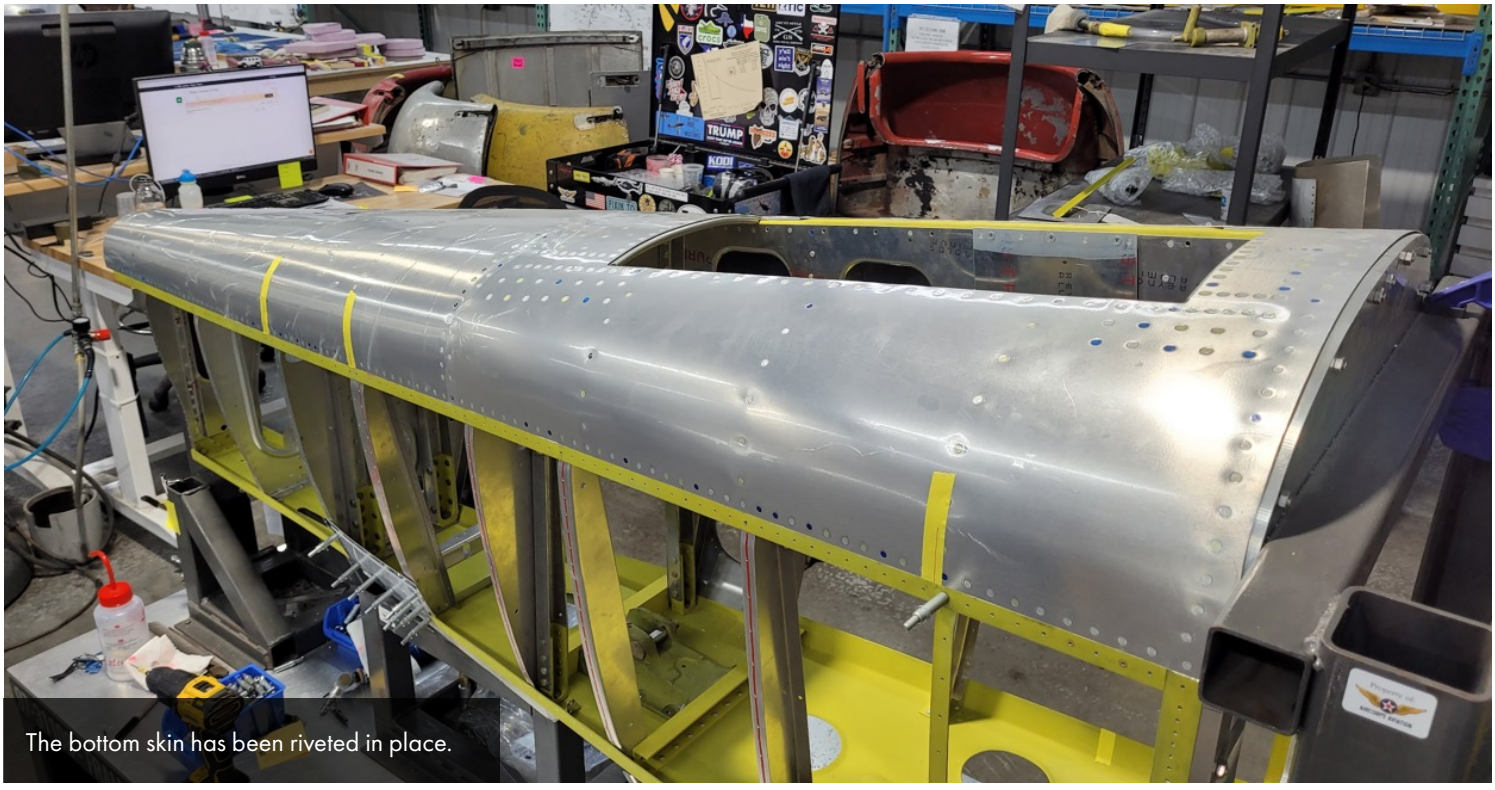
Here is a closer view of the horizontal stab Theo clecoes the skin section containing the tail wheel opening in place. ilizer structure.

Once the forward section has been fitted, Theo moves on to the rear skin.

It takes a remarkable number of clecoes to hold this large skin section in alignment.



The two larger holes are for the tailwheel jack points.



The bottom skin has been riveted in place.

The bottom skin has now been riveted in place.

With the bottom skins riveted in place, it is time to begin fitting the side skins.

Spot welding has been completed around the rear access panel. The dull acid-washed area shows where the spot welds are positioned.

Theo spot welds on the right side tail cone skin.

The P-51B, the First Truly Long-Range Allied Escort Fighter.

A rare color photo of a 354th Fighter Group P-51B undergoing maintenance. In the background is a B-17G. Photo from the American Air Museum in Britain, Roger Freeman Collection

The P-51 story has been well documented. For a comprehensive account of the B model, I highly recommend the fine book by James Marshall and Lowell Ford: P-51B Mustang, North American's Bastard Stepchild that Saved the Eight Air Force.

Briefly, the original impetus for what was to become the P-51 came from the British Aircraft Purchasing Commission. They were seeking more fighters to fend off the Nazi onslaught. The RAF had been impressed with North American aviation's rugged AT-6 trainer (called the Harvard in the RAF). The British commission approached North American Aviation to build Curtiss P-40s under license from Curtiss.

North American felt they could build a better fighter than the P-40 and in April of 1940, the chief designer for North American Aviation, J.H. "Dutch" Kindelberger, presented a proposal to design a fighter from the ground up, rather than producing the P-40 under license.

The British Commission reached an agreement to purchase approximately 300 of the new fighter. On April 10, 1940, a verbal agreement was reached to proceed with the new experimental NAA fighter, designated NA-73 by North America. The Anglo-French Purchasing Board as the British Purchasing Commission became known for a time, approved a purchase agreement with NAA for 300 fighters to be delivered to the British by January 1, 1941. The French agreed to purchase 40 in addition to the British purchase.

The first flight of the prototype NA-73 took place in October of 1940. Named Mustang by the British, the new fighter began combat operations with the RAF in April 1942.

The Mustang was powered by an Allison V-1710, normally the V-1710-39 or the V-1710-81.

The V-1710 had a single-stage supercharger that limited high-altitude performance. The often maligned Allison Mustangs, Mustang I and II, P-51, A-36, and P-51A were, in fact, effective fighters. The design wasn't primarily intended as a bomber escort. The British found them to be excellent as ground support fighter bombers and for long-range reconnaissance.

A Royal Air Force North American Mustang Mark IA (FD449) on the ground at Air Services Training Ltd, Hamble, Hampshire (UK), before issue to No. 268 Squadron RAF with whom it served in the tactical-reconnaissance role until 1944. Note the port-side oblique camera port aft of the cockpit. Photo Wikimedia Commons attributed to the Imperial War Museum.

Below 15,000 feet the Allison P-51s were faster than the early marks of Spitfire in use at the time. The Mustang 1s also carried twice as much fuel. That capacity, combined with the aerodynamically clean airframe, provided far greater range than the British fighters of the time. One only needs to note that the British used them in combat all through WWII until VE Day to recognize that the Allison Mustangs made a major contribution.

However, the Allison's single-stage supercharger limited performance above 15,000 feet. This had serious implications for bomber escort duty. Pre-war thinking was that bombers could defend themselves without escort aircraft, but combat experience had resoundingly shown the error of that philosophy.

War planners now recognized the need for a long-range fighter that could protect bombers for their entire mission including over the target.

The British recognized that a Mustang re-engined with the Rolls Royce Merlin two-stage supercharged engine might fulfill the need for a long-range escort.

The need to provide escort protection all the way to the target and back for the waves of USAAF daylight bombers was emphasized with the losses incurred on such raids as the two Schweinfurt missions in August and October of 1943.

However, the new Merlin engined P-51 Mustang, which could escort bombers to the most distant targets, would not be available until December 1943.

The British recognized the potential of a Mustang converted to the Merlin 61 when senior Rolls-Royce test pilot Ronnie Harker flew the Allison Mustang I on April 30, 1942. Harker's report to Rolls-Royce management closed with this comment " The point which strikes me is that with a powerful and good engine like the Merlin 61, its performance should be outstanding as it is approximately 35 mph faster than the Spitfire V with roughly the same power."[1]

The RAF in conjunction with Rolls-Royce decided to proceed with modifying a Mustang 1 to Merlin power. The version of the Rolls-Royce engine installed in the first experimental airframe was the Merlin 65. The new hybrid Mustang was named Mustang 10 or Mustang X.

[1]James Marshall and Lowell Ford: ***P-51B Mustang, North American's Bastard Stepchild that Saved the Eight Air Force***, Osprey Publishing, New York City, NY, 2020, p.134.

Rolls-Royce Mustang Mk.X. The British version of the Merlin conversion incorporated a P-40-like under-engine scoop housing the intercooler, Photo Wikipedia.

The Mustang X first flew on Oct. 13, 1942. The re-engined fighter's performance, especially at high altitude, was spectacular.

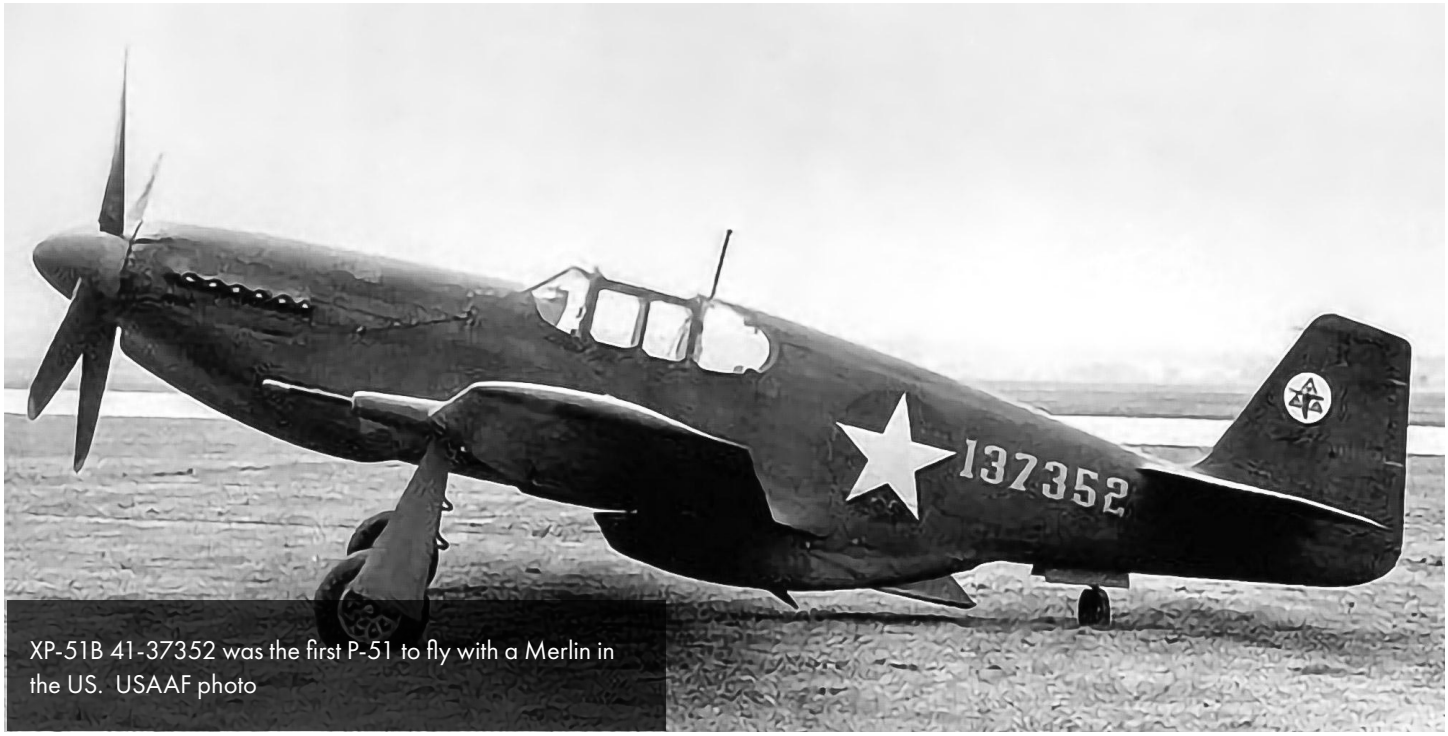
Concurrently, back in the US, the political attitude of the USAAF brass had changed regarding the Mustang. Originally uninterested in the P-51, the US Army Air Force had received good reports on Allison Mustang's combat performance from the RAF.

The USAAF acquired Mustang 1As as an attack and reconnaissance aircraft. This was the Mustang variant equipped with 4 20 mm cannons in the wings. At about the same time, the USAAF and North American sought priority for the very first Packard Merlin V 1650-3 engines for test purposes.

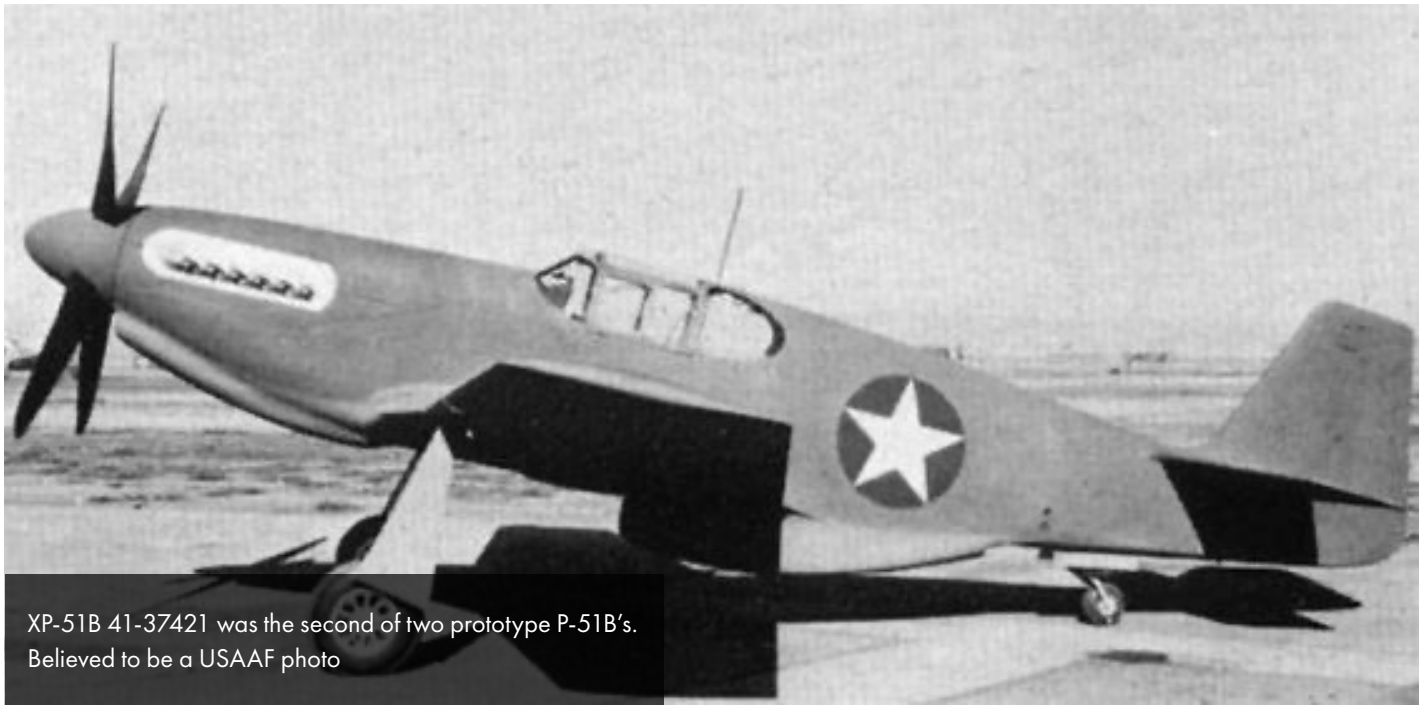
In early July of 1942, USAAF Material Command and North American Aviation came to an agreement to modify P-51s (NA-91) 41-37352 and 41-37421 to Merlin power by installing Packard Merlin V-1650-3s. Initially, the designation of the Merlin Mustang was to be XP-78. By the time the first US Merlin-powered Mustang flew on Nov. 30, 1942, about 6 weeks after the British Mustang X, the designation was changed from XP-78 to XP-51B. Performance gains over the Allison Mustangs were remarkable at higher altitudes. The new Merlin Mustang was 100 mph faster than an Allison Mustang at 30,000 feet.

The first production P-51B rolled off the assembly line and flew in May of 1943. The USAAF ordered 400 and Britain over 1000.

The demand was so strong that North American Aviation decided to build the same airframe at its Dallas factory to meet the need. The Dallas versions were designated as the P-51C and were identical to the P-51Bs built at the Inglewood, California factory.



XP-51B 41-37352 was the first P-51 to fly with a Merlin in the US. USAAF photo



XP-51B 41-37421 was the second of two prototype P-51B's. Believed to be a USAAF photo

Next time we will examine the early combat introduction of the new Merlin Mustangs.