



Summer 2020

AT-10 WICHITA

Cadet Air Corps Museum AT-10 Wichita Restoration

by Chuck Cravens



AIRCORPS AVIATION



Erik and Aaron look over the fuselage frame structure.



Update

It has been quite a while since we've updated the AT-10 restoration. Past updates have emphasized the historical aspects of the AT-10, so it is a pleasure to highlight progress on the wooden main airframe this time.

Restoration on a rare airplane like the AT-10 involves a great deal of parts fabrication, which has been ongoing, and parts making doesn't always make for interesting photos. But recently, some visually significant progress has been made, so it's a good time to produce an update on the restoration.

Most of what has been done until now was the restoration of the metal cockpit area and the aforementioned parts accumulation and fabrication. Now for the first time, we can show some new progress on the primary wooden airframe.



Cockpit area of Beech AT-10 41-27322



Fixture

The first step in building a straight airframe is creating a fixture to hold components in alignment as work progresses.





This view of the fixture is from the forward end.



A thick aluminum fixture bulkhead will form the forward end of the fixture.



Here is the forward fixture frame positioner in place.



The fixture is solidly braced to ensure continued alignment as components are added.



This detail of the fixture structure shows the robust nature of the structure.



An aluminum gusset plate, allen bolts, and the diagonal brace all go together to make up this fixture joint.



Wooden upright fixture extensions are where the actual frames will attach. Cutouts in the uprights are sized to allow for the taper of the fuselage. This view is from the aft end of the fuselage.



The last three stations on the fixture are encompassed in this heavy aluminum frame because they are positioned high above the fixture table and include mounting points for the horizontal stabilizer, three frames, and the tail wheel.



The rise in the fuselage underside is apparent in the way the attachment points sweep upward.



The two crossmembers hanging under the top frame hold the horizontal stabilizer attachment points on each end.



Here the stabilizer attach points extend out to the side of the rear fixture structure.



Materials



Brian Barkholtz, a skilled wood craftsman, has been hired to help our restoration specialists with the wooden airframe work.



These wooden AT-10 bulkheads were milled on the AirCorps CNC routers. They are good examples of the parts that have been fabricated since our last update.



Precision milled parts are necessary to build a precise airframe.



Rear fuselage bulkheads await their stage of assembly.



The Ubiquitous Scarf Joint

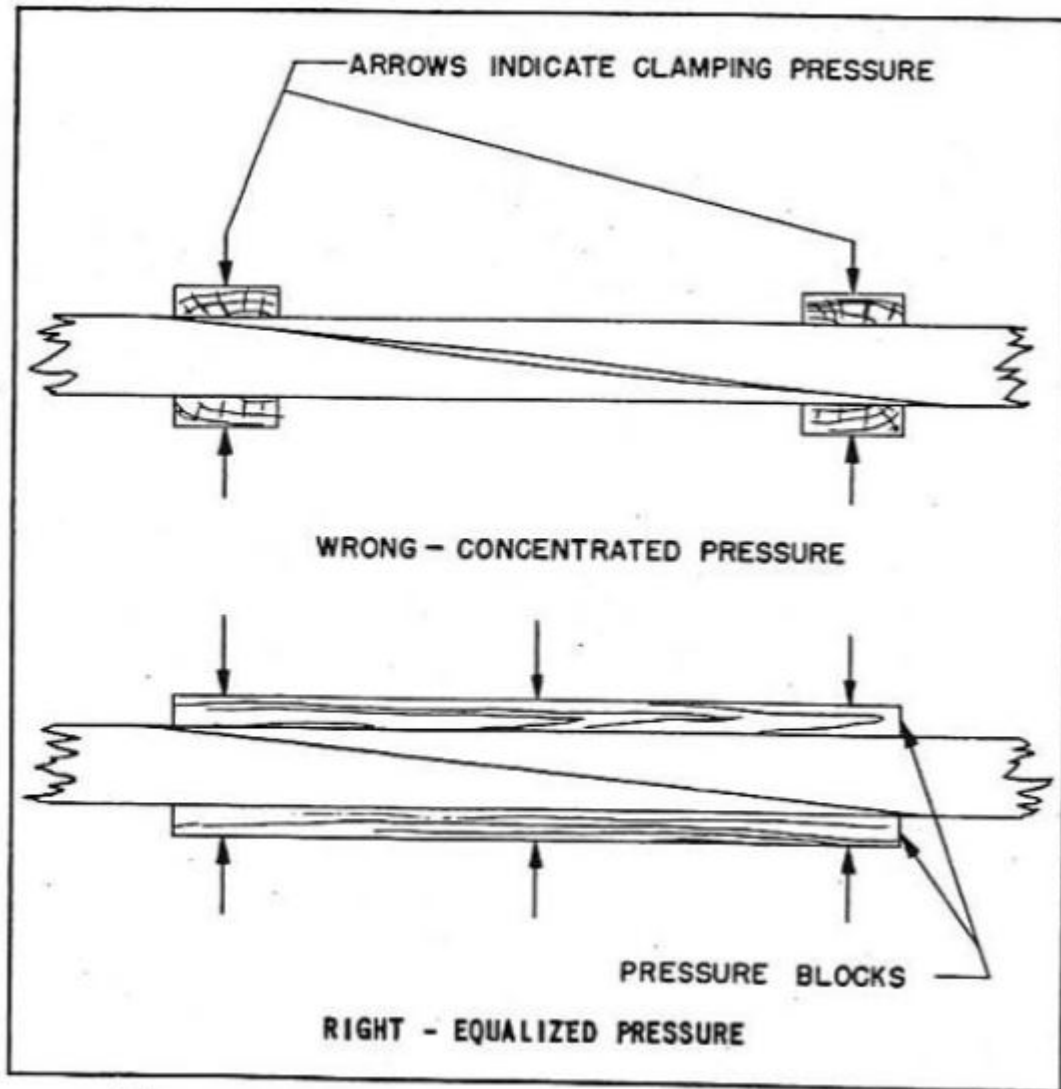


Figure 10 - Applying Pressure for Gluing

Scarf joint diagram,
from the AT-10 Structural
Repair Manual, p11.

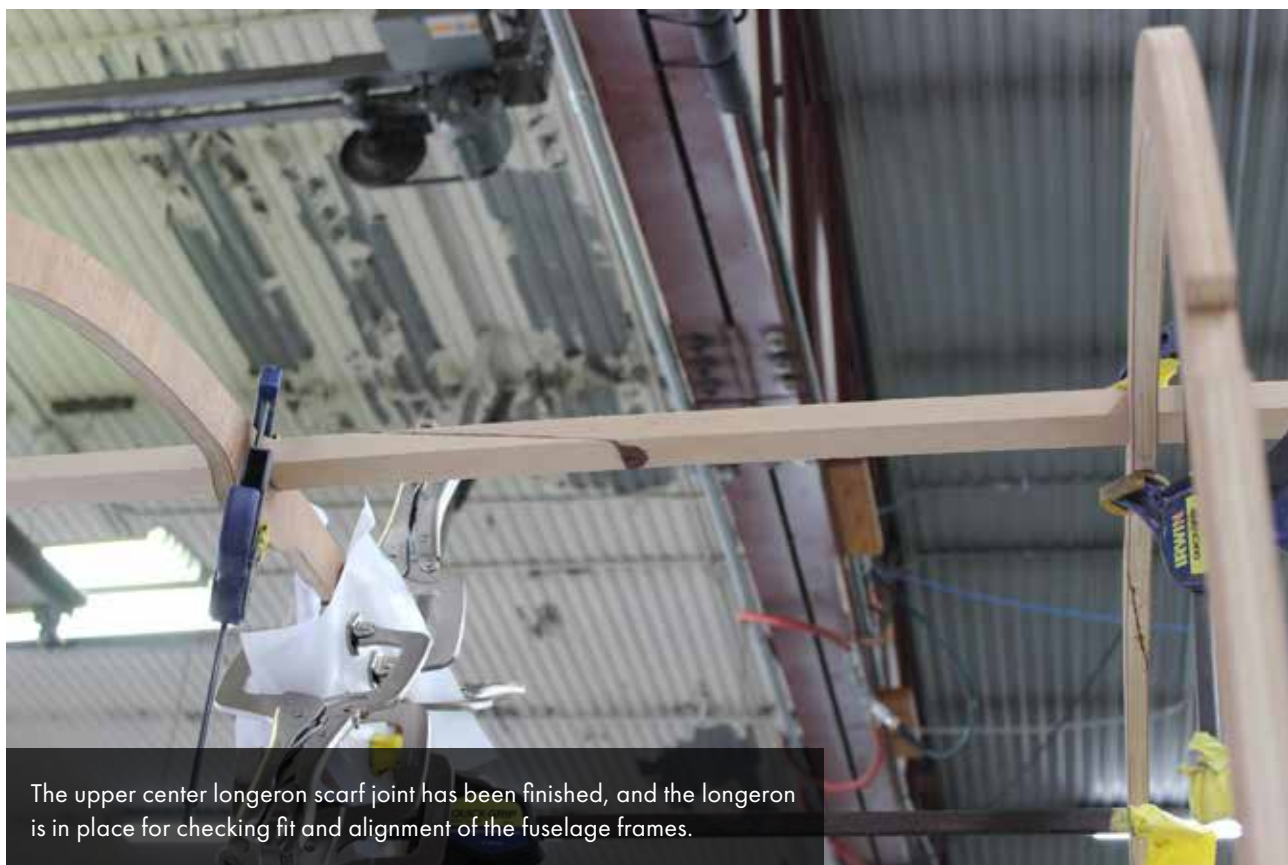
Many components on an airplane like the AT-10 were longer or wider than the available wood material. In those cases, tapered joints called scarf joints were used to increase the gluing area of the joint and create a nearly seamless appearing joint that had far more strength than a simple butt joint would have had.



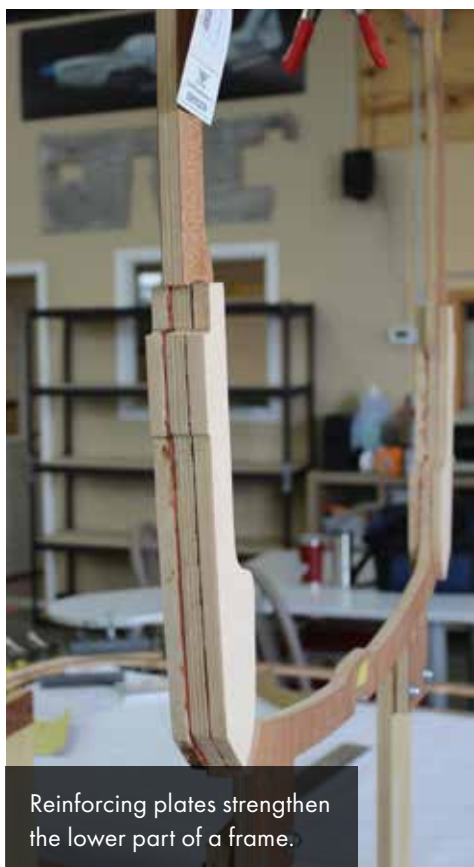
Many joints will be necessary in the wooden components of the AT-10 restoration. Tapered joints like this scarf joint are used because of their strength, and must be precisely tapered to make a strong joint when they are assembled with resorcinol glue.



Here a scarf joint is glued, assembled, and clamping pressure is applied while it cures.



The upper center longeron scarf joint has been finished, and the longeron is in place for checking fit and alignment of the fuselage frames.



Reinforcing plates strengthen the lower part of a frame.



Aaron and Brian work on gluing and clamping scarf joints to create a complete frame.



Clamps are being applied to a joint.



Brian works on a longeron scarf joint.



Fuselage Frame Structure

With a solid, straight fixture, and the parts fabricated to build an AT-10 fuselage, assembly of the structural frame has begun.





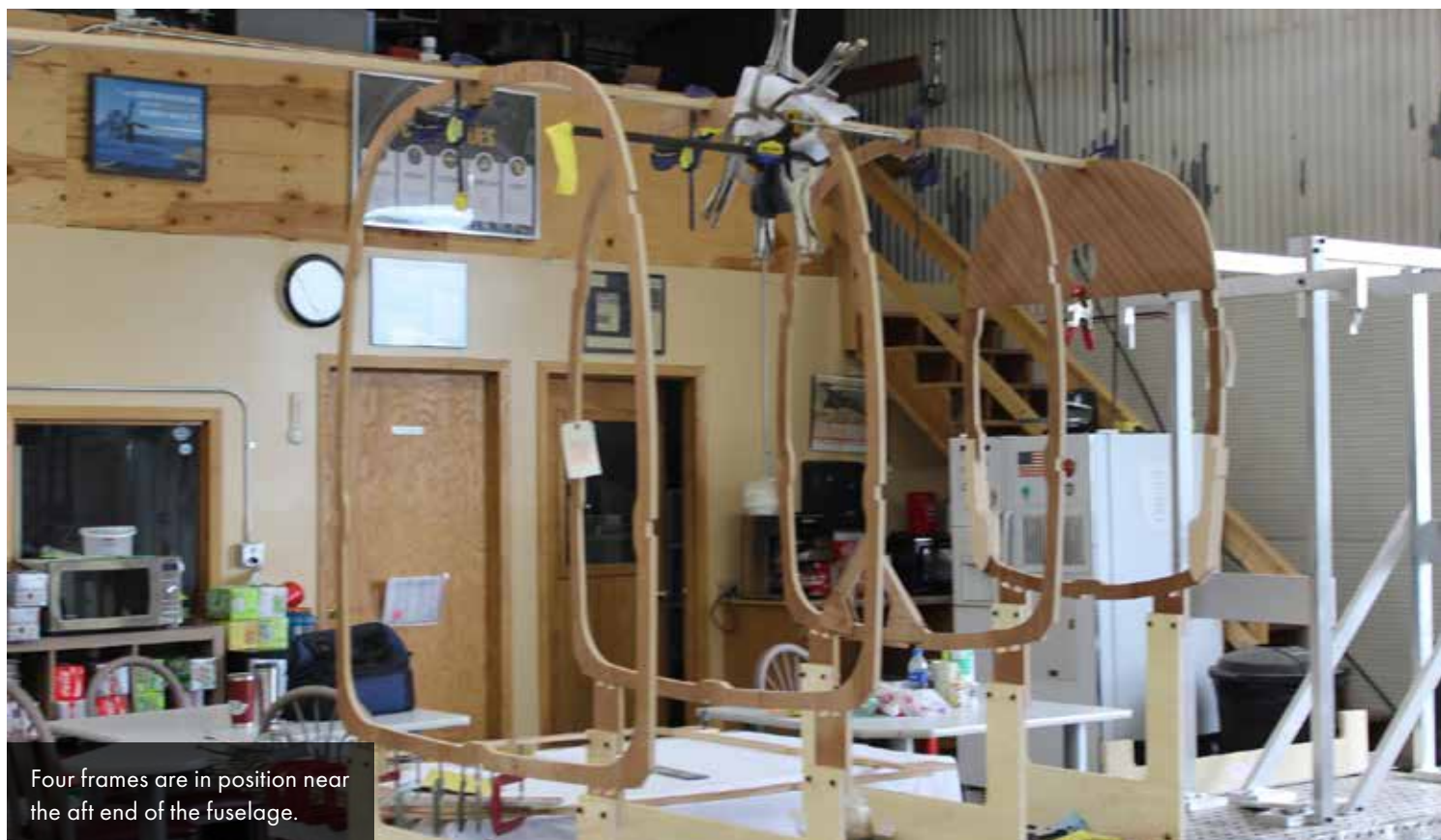
Many clamps are necessary to provide even gluing pressure.



Here is one of the first frames to be mounted to the fixture.



Brian and Aaron prepare more frames.



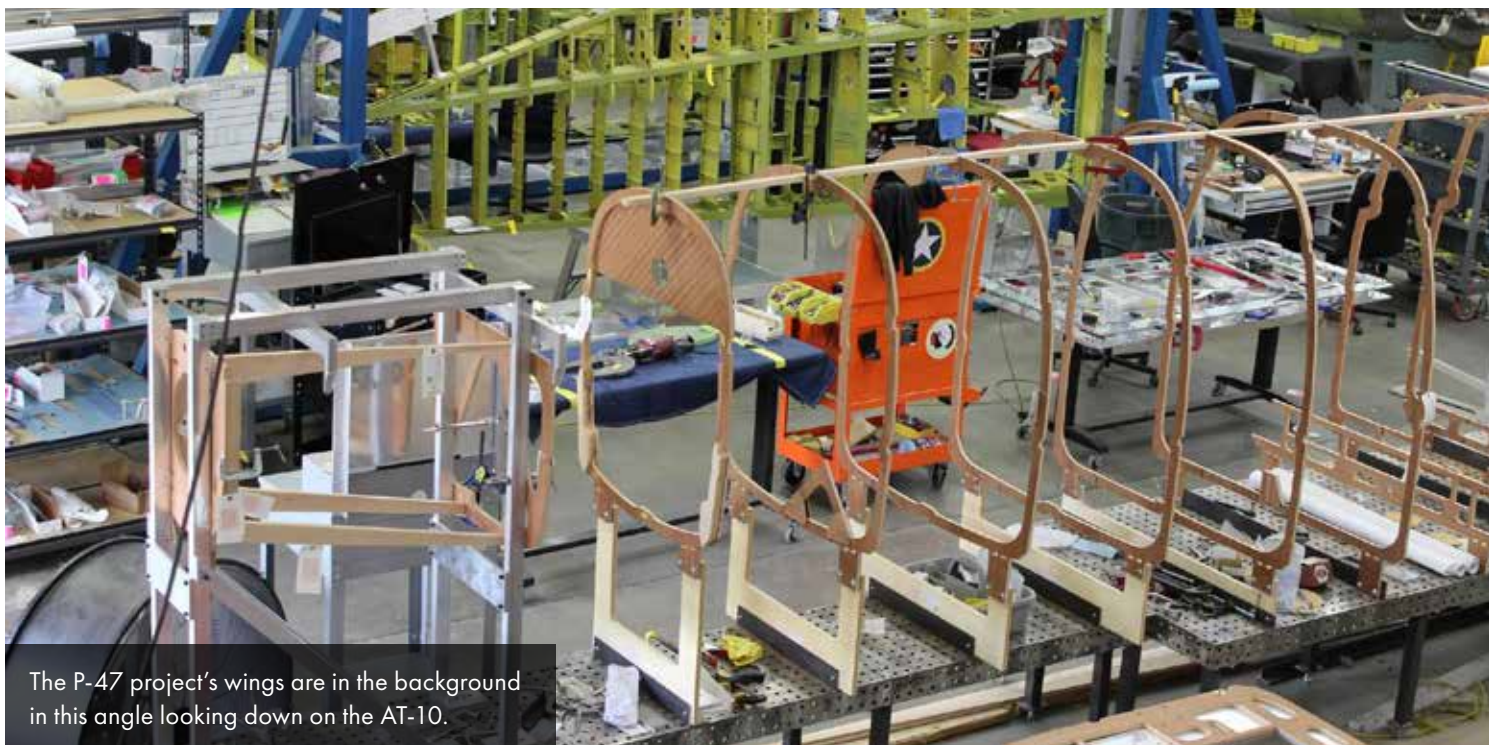
Four frames are in position near the aft end of the fuselage.



It is starting to look like a fuselage is going to be created here!



Five days later, many more frames are in position as the fuselage begins to take shape.



The P-47 project's wings are in the background in this angle looking down on the AT-10.



This angle is from the rear, looking forward through the fuselage structure.



A view from above shows the fixture and structure.



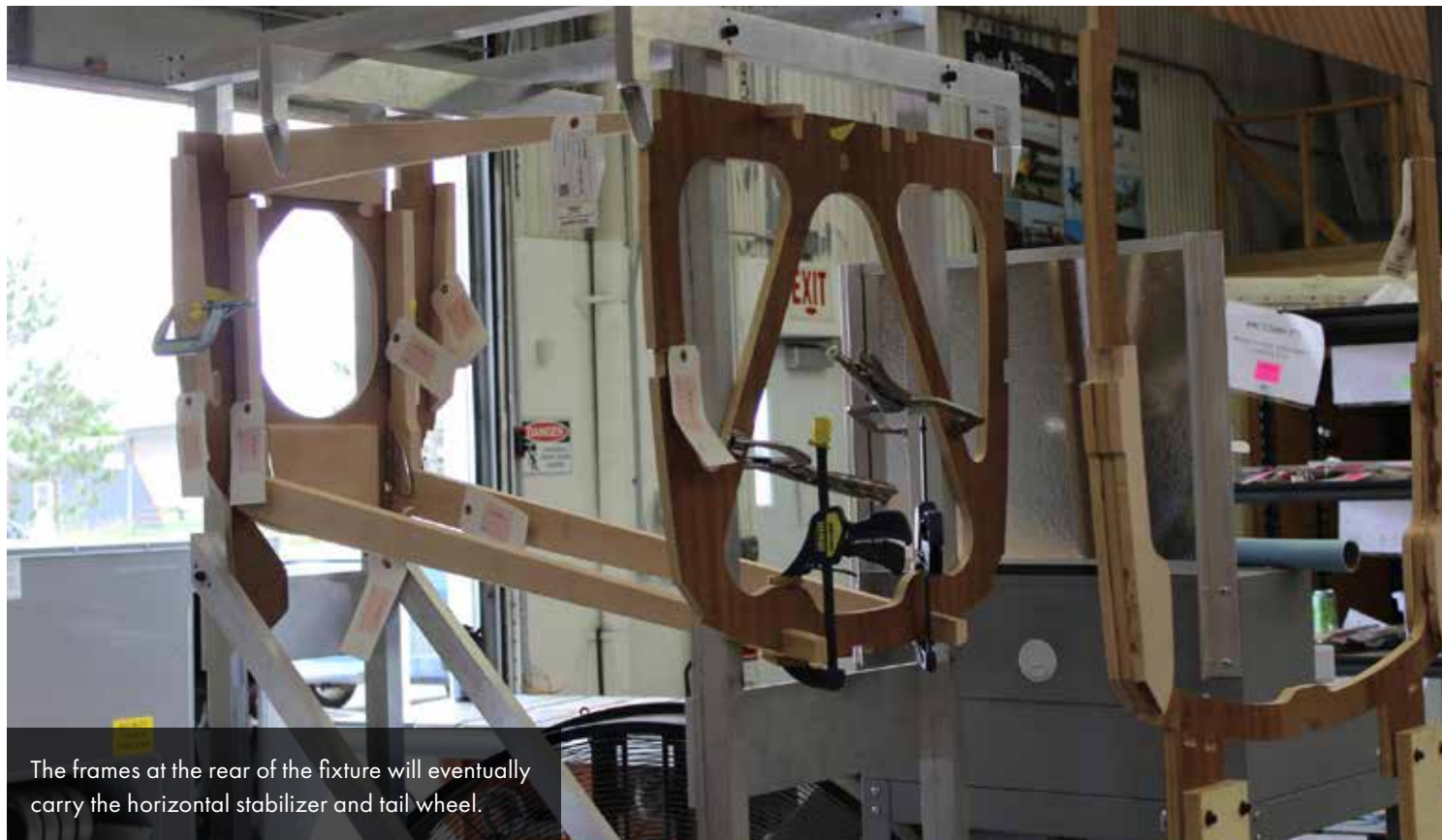
The shorter piece in the center is the bottom part of the frame that will connect to the rear spar.



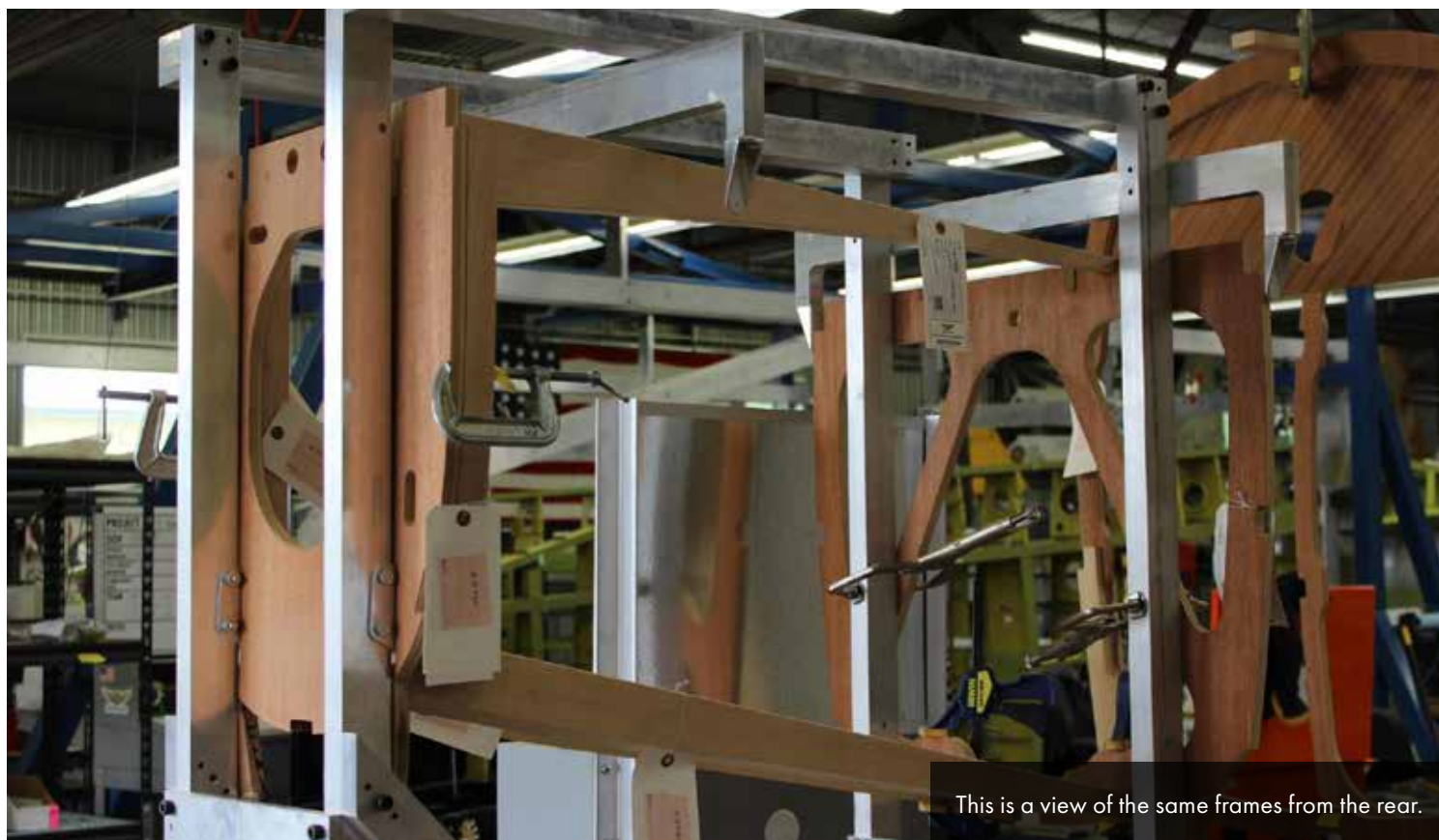
Here is the rear spar carry through frame from the rear.



The wing attachment brackets that eventually mount on the rear spar carry through are visible in this CAD rendering. Plates will be added on both sides of the carry through to strengthen it.



The frames at the rear of the fixture will eventually carry the horizontal stabilizer and tail wheel.



This is a view of the same frames from the rear.



AT-10 painting by Eric Sloane, painted in 1942 and presented to Elmer Graham upon his retirement as crew chief on the AT-10 assembly line, courtesy Bill Graham collection

BEECHCRAFT Army AT-10

Painted by Eric Sloane, 1942