



## Work Continues at Hill AFB to Replace T-38 Aileron Levers

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HILL AIR FORCE BASE, Utah -- To meet the challenge of building more than 1,000 aileron actuator levers for T-38 Talon aircraft, workers in the 532nd Commodities Maintenance Squadron's New Manufacturing and Repair Division literally had to start from scratch.

The levers, which control moveable flaps on the T-38's wings, are being machined by the shop from a solid block of aluminum. The five-step process takes about a week from the initial milling to the final delivery to units in the field.

"In cases where there are shortages of airplane parts, customers come to us and we build these parts," said Tom Henrie, shop foreman. "Not only do we build emergency parts, we build a fill-in quantity to keep them going until the contractor is up and running again."

Hill AFB's 309th Maintenance Wing got the initial workload in July, as did manufacturing shops at Tinker AFB, Okla., Robins AFB, Ga., Edwards AFB, Calif., and the China Lake Naval Air Weapons Station, Calif., to meet the Air Force request for 3,400 levers -- two for each aircraft.

The workload resulted from an April T-38 crash at Columbus AFB, Miss., which killed two pilots and destroyed the airplane. An accident investigation board determined the cause of the mishap was a mechanical failure of the right aileron, which failed in the full down position before takeoff.

The aircraft's original levers were made from a forged series of aluminum alloy -- heated metal pounded into shape.

"The levers we're making are machined from a solid block," Mr. Henrie said. "The material was chosen by the System Program Office and the Weapon System Engineer at Tinker. The new material is considered slightly better than the original material. It's still aluminum, but it's in a solid block."

Building a forged part out of cut material can be challenging, as workers in the 532nd CMMXS found out.

Kent Law, a programmer for the 532nd CMMXS, designed three-dimensional computer model of the levers based on the part's blueprint dimensions.

"My program is certified so that the machine will cut the part accurately," Mr. Law said.

The model was used to create the tool path and cutting programs on the shop's milling machines. Before the milling began, however, a prototype was created and sent to the 309th Maintenance Support Group's Science and Engineering Laboratory to verify that all the features and dimensions would match the requested product. In addition, the first item cut on the shop's machines was also sent to the lab for verification.



Hill works to replace T-38 aileron levers - Three steps in the manufacturing process of T-38 aileron levers are shown as the part is first custom cut (right); numbered and textured (center); and finally painted green and shipped to the customer. (Air Force photo by Bill Orndorff)



Once approved, the design that controls the axis of the cuts was fed into the computers that control the milling machines, allowing five machinists to mill the parts at the same time. The initial milling, which cuts away about 60 percent of the 8-inch long, 2-inch wide, 1-inch thick piece of aluminum, takes 50 minutes.

"The original program to mill the part was running about three hours in order to get the basic geometry and all the definition into the part correct," said Layne Tilby, project engineering support. "After that, the program was adjusted to reduce cut time to one hour."

The levers go through two other processes where broach holes and wire slots are precisely drilled, both by machine and by hand, and another process where the part is "shot peened" or air blasted with cast steel to give it a textured finish.

Before final painting, the levers are checked on a coordinate measuring machine

"The coordinate measuring machine is kept in a climate-controlled room to keep it very stable," Mr. Tilby said. "The probe touches the part and sends the measurements to the computer and that very accurately checks the part. We inspect all the critical features on every single part -- that's our way of detecting from the five different processes, if anything went wrong anywhere."

The levers are then anodized, or coated, painted and given one more visual inspection before they're sent to the customer.

"If we find any variance or problems, this allows us to go back and pull that lot of parts back and make sure everything is good before it hits the field," Mr. Tilby said. "That's the reason for the final inspection -- it's not to revalidate what the employees did, but to just catch any errors or variances between the parts."

The emergency workload involves about 20 Hill employees. These include engineers, planners and schedulers from the 532nd CMMXS, along with machinists from the 309th Electronics Maintenance Group as well as the 532nd.

"We don't often have a workload in the thousands in this shop -- usually we make just one or two parts," Mr. Law said. "This tells the shop it can do what it is set up to do on production. To be able to get this kind of workload to support the Air Force just makes their work worthwhile."

As of Oct. 1, the Air Force had installed the levers into 61 aircraft.

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