



Maine Air National Guard Uses Essentium Technology to Increase Readiness

101ST AIR REFUELING WING PRINTS FLIGHT CONTROL REPAIR TRAINING AIDS TO HELP MAINTAIN PROFICIENCY FOR GUARDSMEN

EXECUTIVE SUMMARY

Using the Essentium High-Speed Extrusion (HSE™) 3D Printing Platform and Essentium PCTG, the 101st Air Refueling Wing (ARW), Maine Air National Guard printed flight control repair training aids to help maintain proficiency for traditional guardsmen. These training aids:

- Provide rapid and repeatable access to rare parts
- Reduce instances of downed aircraft through increased training
- Improve safety of flight critical repairs



SITUATION OVERVIEW

At the 101st ARW, traditional guardsmen attend aircraft maintenance training one weekend per month. On those days they focus on career training, which includes walking through the repair process for various components to increase their proficiency and experience.

“You can’t put a value on having proficiently trained guardsmen,” explained Master Sgt. Jason Howes. “The confidence they get from being able to put their hands on the product, understand what the result will look like, and the gain muscle memory is simply invaluable.”

When traditional guardsmen are not proficiently trained, the consequences can be critical. An incorrect repair can permanently destroy an aircraft part, requiring a replacement. If it is not available in the supply chain, it can result in a downed aircraft. In the worst-case scenario, if the part is not repaired correctly and it is a safety of flight issue, you could have a loss of aircraft or even loss of life.

THE CHALLENGE

Unfortunately, maintenance cycles and aircraft repairs do not always line up with training weekends. On days when there are no aircraft repairs available, the traditional guardsmen must read technical data to understand the guidance, and then carry out the process on stock material instead of the actual parts. While this method goes a long way in preparing guardsmen, training on actual parts gives them the confidence to repair parts accurately and quickly.

One of the parts that traditional guardsmen train with is the outboard aileron balance tab. This part is a critical flight control component with several hinge points that are attached to aircraft hardware. Those attachment points frequently wear out and to repair them, guardsmen must machine new holes, install bushings, inspect for accuracies, and install them, to get the outboard aileron balance tab back to original factory specs. However, access to spare aileron balance tabs is extremely limited and is often reserved only for real-world repair needs. Combined with personnel turnover common in military units, the retention of experienced professionals in aileron balance tabs can be difficult to maintain.

THE SOLUTION

To ensure that current guardsmen maintain proficiency in repairing outboard aileron balance tabs, the 101st ARW created a training aid. Using this scale model of the part, guardsmen can use technical data that applies to the component to repair it, the same way they would if they had the actual part.

Using the Essentium HSE 180 ST 3D Printer, the engineers at the 101st ARW created the training aid in one weekend. The only requirement for the part was that it must maintain its dimension when aluminum components are pressed into it. Due to the low cost, excellent surface finish, and impact strength, the engineers at the 101st ARW chose to use Essentium PCTG.

“For this application, we chose Essentium over other printers because it can print faster and can be more accurate with external dimensions,” explained Howes. “The material cost is also quite a bit less.”

BUSINESS OUTCOMES

Since the training aid has been in use, the guardsmen that have used the aids have given positive feedback. Since it is a replica, the training on the aid translates well to the actual component. This valuable tool has also caught the attention of other local military components, such as the Maine Army National Guard, who began requesting similar training aids for their rotary aircraft. The HSE is currently being used as a cross-functional force multiplier that can shape the future of readiness across the joint force.

Proficiently trained guardsmen can increase the lifespan of aircraft parts, reduce instances of downed aircraft, eliminate safety of flight issues, and even prevent loss of life. Training aids like outboard aileron balance tab aid can have that value, and for the engineers at the 101st ARW, it is just the beginning.

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