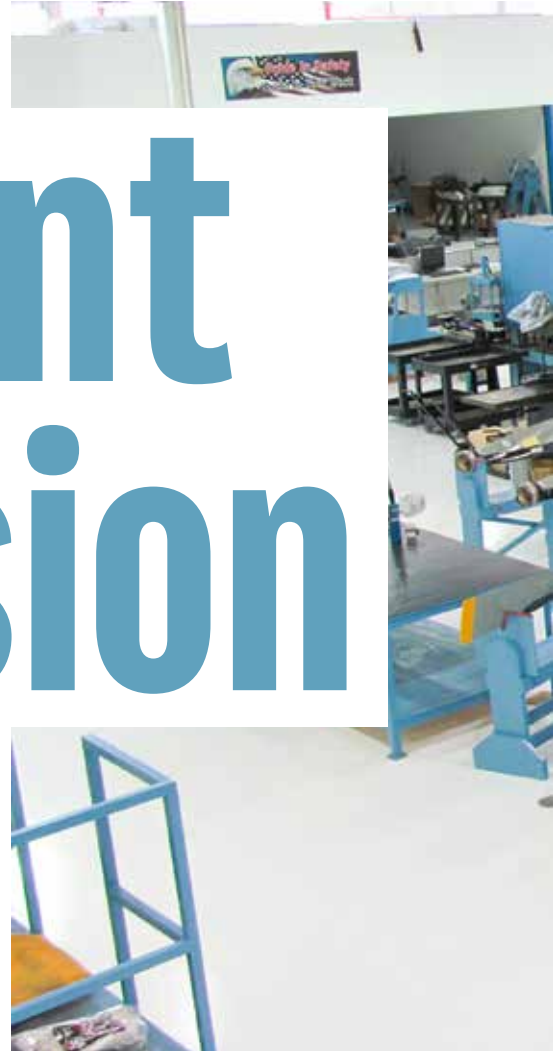




Piedmont Propulsion

Provides Quick Turns for T-6



Piedmont Propulsion Systems maintains and overhauls the propellers for the US Air Force and Navy's T-6 turboprop trainers, managing tight turn times and strict government regulations in the process.

by Walker Jaroch

Piedmont Propulsion Systems has supported the US Air Force and Navy's T-6 turboprop trainers for over four years. The aircraft sport a Hartzell four-blade metal propeller, which Piedmont Propulsion is contracted to maintain and overhaul.

Paul Bolton, chief operating officer at Piedmont Propulsion Systems, said they service around 740

aircraft between the Navy and Air Force combined. All the work is done at their Winston-Salem, North Carolina, facility.

Piedmont Propulsion has made considerable investments to ensure they meet the military's requirements, as the government requires a 30-day turn time.

"We made a big investment in bulk inventory. We'll hold over a million dollars' worth of inventory



Piedmont Propulsion overhauls sometimes up to 20 or more propellers at a time.

PIEDMONT PROPULSION

to ensure we don't have any turn-time issues. We also have two dedicated trucks with trailers and racks that can carry up to 18 props on each truck," said Bolton.

One of their trucks is on the road each week minimum, picking up and returning propellers to nine major facilities spanning from Texas and Florida to Mississippi and Oklahoma. Bolton estimates they're overhauling 15 to 20 propellers a month on average.

Corrosion Concerns

The overhaul cycle for the T-6 propellers is 3,500 flight hours or 72 calendar months.

Bolton estimates unscheduled maintenance makes up roughly 30 percent of the work they see. Corrosion is the leading cause of it.

"The environments they're flying in are fairly harsh. From Whiting Field, Pensacola, Corpus Christi Naval, all those naval facilities, they're

flying straight out over saltwater. So, lots of corrosion issues that we have to look at," Bolton said.

Piedmont Propulsion has worked with Hartzell and the Navy on reducing these corrosion issues. They've explored using different corrosion inhibitors and different surface preparation where dissimilar metals on the blades and counterweights come in contact.

"We did a very big program with the Navy, specifically. They were a lot more hit with it. And we've seen the benefits of that now, where we have seen a reduction in the corrosion coming in through the overhaul propellers and having to change fewer components," Bolton said.

Foreign object damage (FOD) is another cause of concern. A chipped blade can allow corrosion to set in if it's not detected and repaired during field inspections.

Overhaul Process

Whether in for scheduled or unscheduled maintenance, the maintenance process begins with removing paint from the blades.

“Our goal is to get them torn down and blasted, remove any paint so that we can do a full inspection including NDT [nondestructive testing] within the first five days,” Bolton described.

At that point, Piedmont Propulsion will send out any parts that require cadmium plating – the only work Piedmont Propulsion doesn’t do in-house.



Piedmont has made great investments to support the T-6 contract.
PIEDMONT PROPULSION

While parts are out for cadmium plating, a detailed inspection is done on the larger components, such as the blades and the hubs.

“The blades, we put them through the air scanner, which checks the profile, the thicknesses and essentially the airfoil profile of the blades. We’ll then grind the blade to remove any damages as required within the OEM/CMM specifications,” Bolton said.

Next, the blades will be rechecked to ensure they’re within the requirements and all that data will be provided within the inspection and the condition reports. Hubs and springs also will be checked.

“We go through the inspection and repair process on all of the parts. We should have everything back then from cadmium plating and carry out any final inspection. Then blades and hubs are painted. And then final assembly will usually take a couple of days, tops,” Bolton said.

Throughout the process, quality control (QC) oversees the work with various signoffs along the way before ultimately performing the final inspection.

Work Management

Bolton said the most challenging process of maintaining the T-6 propellers is managing the turn times, especially when the shop is doing close to 20 propellers at a time.

To help, they’ve invested in production planning software to schedule work throughout the shop.

“We have a schedule every day. We run the schedule and it provides the work requirements for the technicians every day at a task level. So each morning they’ll come in, and it provides them a printout of their requirements for the day,” Bolton said.

Piedmont Propulsion hired six additional technicians when they were awarded the T-6 contract to help with the increased workload, along with additional QC.

The investment Piedmont Propulsion made to their inventory upon being awarded the contract means they keep a great bulk of parts and supplies on hand, easing the supply chain constraints the entire aviation industry has faced of late.

“I think we saw it coming. And what we have done is ensure that we hold probably six months’ worth of inventory on the shelf based on what our requirements are. And then we have a lot of triggers within our ERP [enterprise resource planning] system that show us if we see a part that the delivery data is being pushed out or a certain resin or glue or paint or something where the OEM has changed the delivery a couple of times, then it’s a bit of a flag to say, ‘Right, we need to keep an eye on this,’” Bolton explained.

He also credits Hartzell with doing a great job of staying on top of part demand. **AMT**



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70 Years of Prop Repairs

Aircraft Propeller Service has been serving the general aviation market for 70 years, seeing advancements in propellers and the way they're maintained over the decades.

by Walker Jaroch

In their 70th year of operation, Aircraft Propeller Service has decades of propeller repair experience under their belts. Originally focusing solely on the general aviation (GA) market, Aircraft Propeller Service has grown over the decades to service a wide range of aircraft types.

"Back in the '90s, we started doing a lot more work with Hamilton on the ATRs and that relationship has grown over the last 25 years to the point now where we

have a couple of proprietary licenses with Hamilton, now Collins obviously, to do their proprietary repairs on the ATR and the CASA propellers, said Daniel Colbert, president and CEO of Aircraft Propeller Service.

This work is done in Lake Zurich, Illinois. The company also has a facility in Brazil and is in the process of identifying and opening another in Kuala Lumpur.

Their licenses with Collins are in the Americas and Asia, but Aircraft Propeller Service is also active in Europe to a degree.

"We service a lot of the legacy fleets in Europe beyond what we just do in the Americas and Asia. We also have a little bit of a presence in our Brazil shop doing helicopter actuation. We continue to broaden our portfolio and as most do, grow well beyond that GA origin," Colbert said.

Prop Advancements and Maintenance

Props themselves are starting to get a lot more advanced, said Chris Hutchings, director of sales and market development.

MT Propeller, for example, is adding more and more blades to their propeller assembly.

"The deicing elements that go inside it, the construction of the blades themselves, that's all become way more advanced," he said.

Comparing Hartzell's composite propellers with a nickel sheeting bonded onto the design to wooden, fixed pitch propellers shows how far propellers have evolved, Hutchings said.

"The people that are really pushing the envelope for GA are the Hartzells, the MTs and the McCauleys of the world. They're coming up with newer, more technical designs every single year," he continued.

Foreign object damage (FOD) is a major culprit of propeller damages at GA airstrips, Colbert said. Paved and unpaved fields will have different FOD concerns. An unpaved strip, for example, will have stones.

When a prop comes in for repair, the process starts with cleaning and disassembly then based on the component maintenance

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manuals (CMM) that are provided by the OEMs, Aircraft Propeller Service walks through the repair step by step from the tip of the blade down to the base.

“If there’s a taper bore, we walk into the taper bore as well and we do a full inspection. That can include any current mag particle, fluorescent penetrant inspections – so we come up with what exactly needs to be done. Sometimes the blades need straightening, they need to be re-pitched or resealed. That’s what our technicians in the shop do,” explained Hutchings.

Props can sit idle for quite a long time and develop corrosion, he commented. Something that they see a lot with regional aircraft, which can also affect GA, is not rotating the props.

“If somebody has their plane parked and they’re not flying for a month or two months, those propellers should be rotated 180 degrees every 30 days. It basically distributes the hub oil over all the components and dramatically reduces your incidents of corrosion,” Colbert said.

He said people tend to forget to perform that simple maintenance procedure.

It’s a very simple thing to do, but some things are just like that, easy to forget about, but they make a world of difference, Colbert said.

Another thing they see in the shop: “people don’t replace engine oil enough, which also leads to corrosion,” said Hutchings.

On the other end is over-greasing.

“A lot of the times, people go around and they see grease nipples on a prop and they just pound it in there and put as much grease in as they can, and that basically just seizes the prop and stops it from actuating properly,” said Hutchings.

To best keep propellers well maintained, Colbert suggests follow the recommended guidelines provided by the OEM.

“The operators that have solid maintenance practices that invest in training that make it a priority have much lower maintenance costs and overall cost of ownership. On the other end of the spectrum are the people that just ride it hard and put it away wet and then are surprised when their maintenance bills are very high. To me,



Aircraft Propeller Service witnessed the evolution of propellers and the way they’re maintained over their 70 years of experience.
AIRCRAFT PROPELLER SERVICE

the basic is just follow the recommended practices,” he said.

Prop Challenges

Supply chain issues have been the greatest challenge for Aircraft Propeller Service of late.

“When you think about a lot of these blades and even if it’s a composite blade, you have a metal shank and a lot of those metal components are exotic alloys and the issues in Ukraine and in Russia impacted that metal supply chain, especially for those alloys. It was a multitude of factors that it all contributed to the supply chain having issues ramping back up for the small OEMs and big OEMs,” said Colbert.

He added that they see the difficulties in the supply chain continuing, but expect them to be fully back to normal, hopefully, by the end of this year or early next year.

“We’re by no means out of the woods in terms of that,” Colbert noted.

Another issue is the age of the GA fleet.

“The general aviation market specifically, the other big issue is obsolescence. A lot of these aircraft were made from the ’50s to the ’70s, there was a huge bulk of planes that were manufactured in that time and larger OEMs are no longer supporting 40-year-old aircraft anymore,” said Hutchings.

Finding some items is like trying to find gold dust on the market, Hutchings added.

“Typically, at overhaul, they send in the propeller and they’ll send in the governor at the same time for inspection. A lot of times that’s where we just flip it out and sell them our unit,” described Hutchings.

Aircraft Propeller Service has stepped up to mitigate the issue by developing their own Parts Manufacturer Approval (PMA) for obsolete propeller governors that are associated with prop. **AMT**