Power Profit

Airline maintenance group moves into engine OEM territory in search of growth

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As engines become increasingly reliable and stay longer on-wing, the battle over spare parts is becoming a sensitive sparring ground as manufacturers try to guard a traditional source of income and maintenance-savvy airlines try to cut costs.

The stand-off is set to become more intense in the U.S. where Delta Airlines' Technical Operations maintenance arm is exploring a raft of new technologies for engine overhaul and repair, some of which is currently performed by the original manufacturers, as part of efforts to cut costs and boost revenue.

"There is a consistent tug and pull between users and original equipment manufacturers (OEMs) these days, and airlines like Delta are investing in the ability to do more of this [sophisticated engine inspection and repair] on their own," says Delta Tech Ops engine and component maintenance managing director David Garrison.

Delta's current total maintenance expenses are around $1.8 billion per year divided roughly equally between materials costs and outside repairs. Engines account for the lion's share —$1.1 billion—while components such as line replaceable units make up $300 million. Base ops and line maintenance account for the balance.

With Delta placing extra focus on reducing outside expenses as part of initiatives to offset rising fuel prices, Tech Ops is evaluating new ways of reducing engine maintenance costs. "Let's break some of the ... traditional ways of working through the OEMs," says Garrison speaking at the recent Joint Propulsion Conference in Atlanta. "We've invested in [how we] inspect blades and perform other tasks. Some airlines ... prefer to deal with OEMs on everything, but I encourage looking at options."

Delta Tech Ops runs the largest engine shop in North America, and one of the largest in the world, with more than 700 repair events on 12 engine types from four engine OEMs. "We put through roughly 700 engines per year for Delta and other customers," says Garrison, who adds that improvements in parts flow control and management have seen Pratt & Whitney JT8D-219 overhaul and repair turn time reduced to almost 10 days versus 33 in early 2008. Overall engine repair and support turn time has similarly been reduced from 14 days in 2008 to an average of 7.5 days now—virtually a 50% improvement. "By increasing turn time we saved more than $100 million over three years."

The airline is looking to increase these savings via spare engines "that we created using this extra turn-time speed and parting them out for spares," says Garrison. Instead of stocking additional spares, or even buying in additional engines, "we feed ourselves rather than bringing in new spares."

New technology initiatives include the introduction of a technique called process-compensated resonance testing, which helps to detect potential flaws in turbine blades ahead of in-service failures. The system uses bench testing to excite parts to known frequencies and compares the results against a database derived from earlier tests of OEM parts. "We've taken brand-new OEM parts with no defects to get a good baseline, then we run parts which we know have been through events such as over [heat] temps. This is used to develop a database and that gives the mechanic a 'go/no-go' response."

Garrison says Tech Ops is "looking at implementing [the system] on the Pratt & Whitney PW4000 and PW2000 turbine because we've had some issues." So far, the system had helped the airline dramatically decrease the inflight shutdown and other failure rates of the JT8D fleet on the MD-80. "The resonance response was applied to the JT8D-219 first-stage T1 turbine blades after we had a rash of failures," he adds.

The airline is also considering a low-plasticity burnishing process which "allows us to apply stress compressing of parts," says Garrison. The system uses a high hardness ball rolled under pressure to increase the fatigue life of a damaged surface to more than 10 times that of the undamaged baseline. The treatment provides a layer of compressive residual stress to counter the effects of daily operational issues such as foreign object damage and stress corrosion.

TechOps received the first FAA supplemental type certificate for the process this year, and is using it initially to mitigate fretting-induced fatigue cracking in the high-pressure compressor of the CFM56-7B powering the airline's fleet of Boeing 737-700/-800s. The engine will also power the 737-900ERs due to enter service starting in 2013 and running through to 2018.

Tech Ops also uses a Barkhausen noise inspection system to improve inlet reliability, and is discussing new erosion-resistant coating treatments for compressor airfoils with the OEMs.

"It creates an interesting conversation with General Electric," says Garrison, who adds that repair and replacement costs for a 13-stage compressor "can add up quickly." The treatment provides an exhaust gas turbine margin benefit, reduces scrap rates and generates up to a 0.5% specific fuel consumption improvement, but takes away a source of valuable after-market revenue for the OEM.

Delta had a net income of $1.2 billion in 2011 after losing $1.1 billion in 2009.

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Delta's TechOps wants to increase its in-house engine work, including specialized components of the CFM56 that powers Delta Air Lines' 737s.