AIN’s PRODUCT SUPPORT SURVEY

Part 3: Engines

GE leads in turbofans, Honeywell tops among turboprop OEMs

Data compiled by David Leach; text by Nigel Moll

AIN readers rank GE as the top provider of product support among turbofan makers this year, a distinction the company earned once previously in the past 10 years when it shared the top spot with Rolls-Royce in 2012. Williams has been king of the hill for eight of the past 10 years (sharing that honor once, with Rolls, in 2014). Rolls-Royce takes third place among turbofan makers this year, followed by Honeywell, Pratt & Whitney Canada and CFE. It should be noted, however, that the top four placers this year are each separated by only one tenth of a point.

By a much wider margin, Honeywell takes the top spot among manufacturers of turboprops and turboshafts, outscoring second-place finisher Pratt & Whitney Canada by 1.2 points. Safran Helicopter Engines (née Turbomeca) takes third place. Rolls-Royce (manufacturer of the ubiquitous 250 helicopter turboshaft) did not receive enough responses to qualify for inclusion in the survey report.

Among turbofans, the engine with the highest overall average score this year is the Rolls-Royce AE3007, besting the Williams FJ44, with which it tied for first last year. The GE CF34 ranks highest in overall reliability this year with a score of 9.6.

Among turboprops, the Honeywell TPE331 takes top honors in every single category, bar none.

General Electric

GE says that in the past year it has revitalized its Business & General Aviation (BGA) Customer Centric Technical Training, which is available to all GE customers and authorized service centers. The company has conducted six classes, two-thirds of them at customer locations, and says it received 100-percent satisfaction ratings from all attendees. A new web portal, myGEAviation.com, is now live. Operators now have direct access to all their related documents such as technical publications, fleet highlights and diagnostics.
GE Honda Aero Engines (GHAE) is the 50/50 joint venture between GE Aviation and Honda Aero that developed, produces and supports the HF120 engine that powers the HA-420 HondaJet. The aircraft entered service only late last year and is therefore not included in AIN’s 2016 Product Support Survey. However, GHAE enters the ring with grand ambitions for product support, and it is included here to show operators of the new engines what they should expect from the manufacturer.

“From day one,” says GHAE’s Mike Tarantino, “we had key support goals we wanted to provide to our customers: make it easy to do everything; allow the engine to go anywhere and receive consistent high-quality support regardless of geographical location; and provide state-of-the-art engine diagnostics/management. To accomplish these, we developed a worldwide support network, web-based systems and digital engine health monitoring.”

GHAE has partnered with 11 factory-trained authorized service providers (ASPs) to support the HF120. Each ASP provides owner/operators with line maintenance, parts, authorized service program and warranty work and technical support. GHAE has provided each ASP with access to any engine’s data so the facility can manage any HF120 that requires support regardless of location and the engine’s home base.

“GHAE has worked hard to be ready for entry into service and to provide ‘no stress’ support for the engine from day one. We have deployed dedicated field technical managers (FTMs) to support any technical need of owners and ASPs. Each ASP has a dedicated Customer Team Manager (CTM) to help manage logistics and commercial items such as warranty. GHAE has launched a support center to handle any support needs 24/7/365. A full support website was developed allowing owners full access to technical documents, AOG support and ASP contacts with one click. We have full capability to monitor engine health trends, with alerts and automated notifications. Our maintenance training facility has a fully functional HA-420 mock-up to provide as realistic a training experience as possible,” added Tarantino.

GE Honda is offering a by-the-hour
engine maintenance plan for the HF120 called Engine Maintenance Care: EMC Comprehensive (EMC2) is a full program that covers all line and shop maintenance (labor and parts) as well as training, engine health, rental engines, Service Bulletins, training and tech pubs; EMC Basic caters to customers that want a materials-only program.

“The GHAE support program is differentiating itself as a premier engine supplier to the industry, making support as easy as possible and providing unsurpassed engine availability to our customers. The GHAE support network has been operational since the fall of last year, ahead of EIS. All aspects of the support systems and functions have been tested and exercised; the results are exceeding our goals,” concluded Tarantino.

Highlights of HF120 product support: ASP network in place; support website launched; 24/7 support center operational; Engine Maintenance Care (EMC) program available; MRO is established and co-located with new engine production; parts warehouse established; online warranty/EMC claim process established; online 3D manuals linked to aircraft maintenance manuals; support/field personnel in place; engine health and trend monitoring in place; rental engine pool established; LRU rotatable pool established; co-located—new spares, MRO, rotatable LRUs and rental engine pool; training facility with aircraft mock-up; online parts ordering; and mobile repair teams in place.

**Williams**

Occupying second place in this year’s survey, Williams focuses on “ensuring proper maintenance practices are followed, responding quickly to our customers’ needs, and providing the highest value for our engines,” according to the company’s Steve Shettler. “All authorized service centers are required to have technicians trained by us at our facility so we can be sure the people working on our engines know the correct maintenance procedures. We have recently added to our website various training videos and answers to common questions to help maintainers refresh themselves on specific maintenance actions before accomplishing them.”

To supplement training of authorized service center mechanics at Williams’s facility, the company has developed a training course to familiarize owners and operators with the maintenance requirements of their engines. “Educating owners and operators helps ensure maintenance is completed at appropriate intervals, and gives owners and operators confidence in what is being done to their engines, which minimizes expenses and downtime,” said Shettler, adding that in the past year “we have reduced AOG downtime by 3 percent. Average hold time of customers waiting to talk to an advisor has been reduced by 9 percent, to the point that most callers experience no hold time.”

The company says its TAP Blue maintenance program provides not only “reasonable and predictable operating cost to our customers” but also raises the resale value of the aircraft, providing peace of mind for owners on two fronts. “TAP Blue simplifies ownership, and enables owners to operate our engines confidently and with no surprises. Some key program coverage: major and minor scheduled inspections; unscheduled repair; all Service Bulletins (mandatory, recommended and optional); foreign object debris (FOD) damage; corrosion; and forgiveness of minimum annual utilization.”

**Rolls-Royce**

Rolls-Royce created the Corporate Customer Council, an initiative that links customers directly to R-R Customer teams responsible for delivering services. The Council engages in “focused discussion on how to evolve and optimize customers’ service experience. This drove
improvements, including the following global developments for lease engines, spares parts, On-Wing Care, EHM, 24/7 Operational Service Desk, Rolls-Royce Care, and 3D Technical Publications.”

R-R augmented its pool of lease engines to 150 for the BR710, AE3007A2/C2, BR725 and Tay 611-8C. “As the fleet grows, R-R will continue to add engines to ensure it meets demand. We also established lease engine storage locations in four sites across the USA in Los Angeles, Atlanta, Savannah and Indianapolis, and we have engines in Amsterdam, Dubai and Singapore,” said Andrew Robinson, senior v-p services for business aviation. “Additionally, we significantly streamlined the leasing process, enabling us to respond to customers’ needs more efficiently.”

To return customers’ aircraft to service faster when an event occurs, R-R added parts locations to complement existing U.S. and UK stores. The company opened its facility at Los Angeles LAX in 2013 and brought Dubai, Frankfurt and Singapore on line last year. It has plans to add “a significant number of additional sites globally in the coming year.

“Engine-specific expertise is required around the globe, which is why we increased our investment in factory-trained technicians and specialized tooling to more than $2 million.” This investment includes capability to perform engine manual repairs, boroblending techniques and video borescope equipment. The On-Wing Care team expanded its

SURVEY RULES AND METHODOLOGY

As with AIN Publications’ previous annual Product Support Surveys, the objective this year was to obtain from the users of business jets, turboprop airplanes and turboshaft-powered helicopters statistically valid information about the product support provided by manufacturers of business aircraft, avionics and engines over the last year and to report this information to our readers. The ultimate goal of the survey is to encourage continuous improvement in product support throughout the industry.

The survey was conducted via a dedicated website, created by AIN from the ground up to provide improved ease of use and to encourage greater reader participation. AIN emailed qualified readers a link to the survey website and also sent a postcard invitation with login credentials to the survey website.

The survey website was open from May 2 to June 15. Respondents were asked to rate individual aircraft and provide the tail number, age (less than 10 years old or more than 10), primary region of service and whether they used factory-owned or authorized service centers or both. Respondents were also asked to rate, on a scale from 1 to 10, the quality of service they received during the previous 12 months in the following categories:

• Factory-owned Service Centers—cost estimates versus actual time, on-time performance, scheduling ease, service experience.
• Authorized Service Centers—same as above.
• Parts Availability—in stock versus back order, shipping time.
• Cost of Parts—value for price paid.
• AOG Response—speed, accuracy, cost.
• Warranty Fulfillment—easiness of paperwork, extent of coverage.
• Technical Manuals—ease of use, formats available, timeliness of updating.
• Technical Reps—response time, knowledge, effectiveness.
• Cost-per-Hour Programs—cost versus benefits, ease of administration.
• Overall Product Reliability—how the product’s reliability and quality stack up against the competition.

Respondents were also asked to recognize individuals who have provided them with exceptional product support and service. The full list of these people is available online at www.ainonline.com/above-beyond-2016.

The 2016 AIN Product Support Survey results for aircraft were published in the August issue, and the avionics results were featured last month.
international capability to Luton, Dubai and Singapore and now employs 55 technicians worldwide.

Last year R-R worked with OEMs to develop an automatic download capability for engine health monitoring data. “This removes the burden of manually downloading and transmitting data monthly,” said Robinson. “While allowing us to be more proactive in monitoring engines, and enabling us to identify trends before they may cause operational issues.”

Launched in September 2013, the 24/7 operational service desk has “significantly reduced AOG recovery times. Progress has been excellent—three years ago, averted missed trips were at 56 percent and AOG resolution time was 256 hours,” Robinson said. “Today we are at 98 percent averted missed trips and resolve AOG issues within 24 hours.”

Replacing Aeromanager, the Rolls-Royce Care portal was launched in June last year to address frustrations customers voiced regarding access to critical customer communications and other online services. “R-R will continue to develop and add features to Rolls-Royce Care throughout the year.”

“We assembled a focus group to gain crucial insights and preferences to develop content in our technical publications,” Robinson said. “We emphasize publications that offer the user a simple layout of instructions, required materials and tools. R-R customers can look forward to integration of current 3D pubs technology with the ability to access multiple operating systems in the near future.”

**Honeywell**

The company introduced Aerospace Remote Connect (ARC), a screen connect tool that gives Honeywell engineers remote access to the computers of operators’ technicians for maintenance support anywhere the internet is available. ARC enables remote viewing and control of PCs, which allows for instant and accurate technical support and large file transfers. The ability to see and control exactly what is displayed on a customer’s screen allows Honeywell engineers to diagnose issues and reconfigure systems without the need to be on site.

The 1,400 HTF7000-series engines now in service have logged 2.6 million hours and achieved 99.9-percent dispatch reliability, according to Honeywell. Cessna chose the HTF7700L to power the Citation Longitude.

This year marks the 40th anniversary of Motorola’s by-condition engine maintenance plan implemented by 180 service centers across 30 countries. The plan has provided coverage for 80 aircraft types. Honeywell chooses not to reveal how many aircraft are currently enrolled, citing “anti-trust and competitive” issues.

The HTF7000 was designed to achieve lower operating costs than previous generations of engines by the adoption of on-condition maintenance with no hard intervals. “Periodic inspections are performed on wing, so we stay on wing longer and avoid aircraft down time. LRUs can be changed without specialized tools.”

As the number of aircraft powered by the HTF7000 series grows, Honeywell continues to expand its regional support of the engine. Dallas Airmotive was recently authorized as an HTF line service center to support engines in Brazil. In addition, StandardAero has been authorized by Honeywell as an HTF7000 major and minor maintenance provider for repair and overhaul services. StandardAero’s facility in Augusta, Ga., will offer major overhaul, beginning in March next year, for HTF7000s on the Challenger 300/350, Legacy 450/500, G280 and the future Citation Longitude. StandardAero’s support of the HTF7000 extends internationally to Europe, the Middle East and Africa with minor repair capabilities.

Honeywell Aerospace recently selected FlightSafety as its exclusive training provider. The two companies are working to certify engine courses for the HTS900 and LTS101 under Transport Canada and will also add EASA-approved engine maintenance training courses.

“Garrett grown and Honeywell honed,” the TPE331 turboprop recently turned 50 and now comes in 18 models and 106 configurations. North of 13,500 engines have been delivered to date, and Honeywell (facing new competition in the segment from GE) says it is focused on what advancements the next 50 years will bring.

“As an example, we recently added the capability to upgrade older TPE331s to the TPE331-10 configuration to expand engine power while saving customers money on fuel and operations. The entire turbine section is replaced with new-generation hardware. The -10 conversion improves time-to-climb by 10 percent, cruise speed goes up by an average of 25 knots and hourly total cost, including reserves, can be reduced by as much as 11 percent. It adds value to the aircraft that nearly matches the cost of the conversion. HSI and TBO are extended to 2,500 hours and 5,000 hours, respectively, contributing to a significant reduction in cost of ownership.”

On the CFE738 (a joint Honeywell GE engine program), Honeywell says it has worked with Dassault to extend the under-cowl inspection interval (to 1,600 flight hours from 1,200 flight hours to coincide with other scheduled checks), reduced turn-around-times for repair events, continues to participate on the Dassault Customer Advisory Board to align priorities important to Falcon 2000 operators, and “continues to collaborate...”
with GE on the CFE Company to make sure we are accurately forecasting spares needs maintaining appropriate stock level. We have a pool of 32 rental engines stationed at various locations across Europe and North America, providing worldwide AOG support. Rental assets can be stationed in Africa, Asia and South America as market conditions warrant.”

**Pratt & Whitney Canada**

P&WC says it is making “step-change progress in preventive maintenance through its advanced diagnostics and prognostics solutions that provide near-real-time situational awareness about engine health, usage and trends.” Today, P&W’s Fast (flight, acquisition, storage and transmission) system is installed on 600 P&W-powered aircraft (including those operated by 20 regional airlines) and downloading 120,000 files per month—providing “critical data for deep analytics that are sent electronically to the customer within 15 minutes of landing.” The Fast system automates the capture and analysis of engine and aircraft parameters and can provide wireless access to encrypted and secure FDR data. “It is helping customers move toward fully planned and predictive maintenance such as on-condition programs, thereby increasing availability, lowering costs and optimizing operations.”

P&W’s “oil analysis technology program” provides on-wing monitoring for preventive maintenance. With 2,000 engines already enrolled in a customer trial since its launch in May this year, “the new technology has demonstrated in tests its potential to be hundreds of times more precise than oil analysis methods currently in use. The highly sensitive technology detects minute particles within engine oil, providing early and precise exposure of the deterioration in oil-wetted components well before a potential event occurs.”

The company says its “first-call” resolution rate now consistently surpasses 80 percent and first-call technical recommendations are delivered in less than one hour. “We have also added 100 new rental engines to what is considered the largest rental inventory in the industry, with more than 850 engines deployed worldwide. Additionally, having made significant increases in our parts inventory over the past year, P&WC is able to respond to customer needs swiftly and effectively through its seven parts distribution centers around the world.”

P&W this year completed the progressive rollout of a new service portal, MyP&WC Power, to 20,000 users. “MyP&WC Power delivers several time-saving improvements over the previous portal, including full e-commerce capability on every device. Using MyP&W Power, customers can easily search for and purchase parts across multiple trade publications, access their Eagle Service Plan (ESP) pay-per-hour maintenance entitlements, pay invoices online, request rental engines and register warranties.”

The company says it has “transformed and enhanced its warranty services to increase the speed and agility in claim processing. To ease the claim submission process, every new P&W engine warranty is now automatically activated, and we have reduced the authorization time for warranty exceptions 10-fold for special commercial support eligibility.”

The company has added 12 new P&WSmart features for general aviation, regional airlines and turboshaft customers, taking the number of offerings under the program beyond 30. P&WSmart simplifies engine maintenance and extends the life and value of aircraft while reducing operators’ direct maintenance costs. “As a testament to the program’s value, the number of customers has tripled in the past year, driving a two-fold increase in transactions. Given that guaranteed pricing is a business imperative for operators, the P&WSmart program will expand, and we expect customer adoption to double in the next 12 months.”
In July this year, P&W launched a new pay-per-hour Eagle Service Plan (ESP) offering—called ESPrimerily for Your PT6—that provides up to the first 400 hours or two years of coverage under the maintenance plan at no cost to customers of new PT6s. “The new offer represents a value of up to $50,000 of coverage toward future engine maintenance events (depending on the PT6A model).”

P&W is extending the basic TBO for PW210 turboshafts by 500 hours, to 4,000. The new TBO applies to both the PW210A and PW210B and represents a cost saving of 10 percent. P&W also recently extended the basic TBO for the power section of the PT6B-37A by 50 percent, to 4,500 hours from 3,000, and extended the clutch inspection interval for the PT6T-9 by 60 percent, to 2,000 hours from 1,250. The company also extended the fuel nozzles inspection interval on the PW206/PW207 to 900 hours from 800.

PW307 turbofan customers operating with Fast can take advantage of an on-condition ESP rate for all engine maintenance that costs 10- to 20-percent less than what ESP customers without Fast pay. For PW308 customers operating with Fast, hot-section inspections are performed on-condition, allowing for more time on wing and reduced costs.

**Safran Helicopter Engines (formerly Turbomeca)**

The company formerly known as Turbomeca says its 24-hour AOG service rate is at 98 percent for the fourth consecutive year. The parts service rate is over 95 percent for the third consecutive year, “although we now base the service rate on a five-day routine delivery period, instead of 15 days.” Average repair turnaround times are now at 65 days for the Arriel and Arrius (down by 30 to 53 percent since 2013) and the repair service rate for engines, modules and equipment is now better than 95 percent. Pool availability has risen to an on-time dispatch rate of 98 percent for engines, Fadec and fuel pumps (FCU and HMU).

“We have reduced direct maintenance costs (DMC) and direct operating costs (DOC) by many TBO increases. Since last year, the TBO for the Makila 2 has been pushed to 4,000 hours, the Arriel 2S2 to 3,850 hours and the Arrius 2B2 HMU to 3,850 hours. Many reliability improvements have also been achieved: the Arriel 2 MTBF has increased by 25 percent since 2013 and on the Makila 2 the mean time between unscheduled removal (MTBUR) rate is now 50 percent better than it was in 2011.

“Last year and early this year, we have reduced the maintenance burden of the Arrius 2F, Arrius 2B2 and Arriel 1D1 by implementing 3-D printing (for injector nozzles, for example) and new repair processes (for the Makila 2 gas generator turbine ring, for example).” Boost, Safran Helicopter Engines’ online engine maintenance management service, went live this year, and the company launched Cap 2020, “a major expansion project at our Tarnos plant to improve customer support capabilities.”

The company has 48 field representatives and 50 customer support managers (CSM) deployed at 12 “front offices” worldwide. “We endeavor to strengthen our proximity with all customers through our network of certified maintenance centers and distributors. Over the past three years, this network has grown by 40 percent and now counts partners worldwide, serving customers as closely as possible to their operational bases.”

The company held 10 Customer Councils worldwide last year, during which interactive and working sessions were conducted with operators. Agenda topics are driven by operators’ difficulties; “solutions are found together, and the operators regularly participate in the subsequent analyses and trials. The main concerns of our customers, whether they are related to products or services, are brought to the attention of Safran Helicopter Engines top executives through a specific process called the ‘Top 5 irritants process.’ Dedicated resources and budgets are allocated to eradicate these concerns as quickly as possible.

“Last year we solved several product and service irritants, among them Arrius 1 fuel HP pump resolver failure, cracks on Arriel 2S2 torque and temperature conformation cards and spurious fire detections on the Makila 2. We also extended warranty coverage and simplified the process for documenting claims. Since the launch of the ‘Top 5 irritants process’ in 2013, some 15 service irritants and 30 product-related irritants have been successfully addressed.”

Last year Safran established a process, relying on a dedicated team in daily contact with operators, under which specific key performance indicators (KPIs) are calculated “using our front offices’ perception of customer satisfaction and our specific performance measurements for each customer (technical events, service rates, treatment of complaints, warranties and so on). If a trend changes, even slightly, we try to be as proactive as possible by putting into place specific action plans to recover the situation.”

Other new services introduced in the past year: a program that offers services for engines throughout their lifespan, such as warranty extensions and pre-buy inspections; a pickup service that provides transport for engines and components requiring repair or overhaul; “5Star plans” tailored for small fleet operators; and an upgrade of the Tools customer web portal with a personalized dashboard that allows each customer to track the status of all requests and simplifies order requests (AOG, warranties and so on).