AIN Product Support Survey

AIN readers rate turbine engine manufacturers' support

Pratt & Whitney, Rolls-Royce, and Williams International tied for first place in the turbofan segment in this year's **AIN** Engine Product Support Survey, with Pratt & Whitney climbing from its No. 2 spot last year with an Overall Average of 8.2 (out of a possible 10), up from 8.0. Rolls-Royce and Williams retained their first-place positions with an Overall Average of 8.2 that was unchanged from a year ago. Meanwhile, Honeywell moved up to second place with an Overall Average of 8.0. GE Aviation was in third place with an Overall Average of 7.9 compared with second place a year ago and an Overall Average of 8.0. Among turboprops and turboshafts, Honeywell held onto last year's first place with an Overall Average of 8.1, down from 8.4. It was followed by Pratt & Whitney and Safran Helicopter Engines, both of which tied for second place with an Overall Average of 8.0. Both engine makers improved their Overall Averages from last year, which were 7.6 for Pratt & Whitney at second place and 7.4 for Safran Helicopter Engines at third place.

2020 Overall Average Ratings of Engine Manufacturers

	Overall Average 2020	Overall Average 2019	Ratings Change from 2019 to 2020
Turbofan			
Pratt & Whitney	8.2	8.0	0.2
Rolls-Royce	8.2	8.2	0.0
Williams International	8.2	8.2	0.0
Honeywell	8.0	7.9	0.1
GE Aviation	7.9	8.0	-0.1
Turboprop/Turboshaft			
Honeywell	8.1	8.4	-0.3
Pratt & Whitney	8.0	7.6	0.4
Safran Helicopter Engines	8.0	7.4	0.6

Companies listed in order of 2020 overall aveage. Ties listed alphabetically by manufacturer.

PRATT & WHITNEY

The Results

Pratt & Whitney continued its first-place rating from 2019 in the Turbofan category with the PW600 series engine on the Cessna Citation Mustang, Embraer Phenom 100, and Eclipse 500 and 550. Its Overall Average was 8.5, the same as last year's rating. The engine series received top marks for Authorized Service Centers (9.1), AOG Response (8.9), Technical Reps (9.1), and Cost-per-hour Programs (8.3).

Coming in the fourth spot for Turbofans were the PW300 and PW500 series engines, each with an Overall Average of 8.2, scores of which both climbed from Overall Averages of 8.0 and 7.9, respectively, last year. The PW500 saw top ratings for Warranty Fulfillment (8.9) and Technical Manuals (8.7).

In the Turboprop/Turboshaft category, Pratt & Whitney saw a noteworthy increase for its PW200 series and PT6T/B/C turboshafts, both of which shared top billing in this year's survey, and both with an Overall Average of 8.2, up from 7.2 and 7.7 and third and second place, respectively, in 2019.

The PW200 received high ratings for Factory Service Centers (8.4) and Overall Engine Reliability (9.8). Garnering even more high ratings was the PT6T/B/C: Authorized Service Centers (9.3), Cost of Parts (7.3), Warranty Fulfillment (9.3), Technical Reps (8.9), Cost-per-hour Programs (8.8), and Overall Engine Reliability (9.8).

Among turboprops, Pratt & Whitney's PT6A turboprop improved its Overall Average with a 7.9, up from 7.7 in 2019. Of particular note among **AIN** readers was Parts Availability, at 8.2.

The Improvements

Since last year, Pratt & Whitney has made a number of improvements to its service offerings and network. "We continue to look at other ways to support our customers and help drive the industry," said Pratt & Whitney Canada (PWC) v-p of customer service Satheeshkumar Kumarasingam. "We must also continue to build flexibly into our products and services, as well as our internal process—we do this through listening to customer feedback and data and then apply it to our offerings."

One of the biggest changes has been the launch of a spare engines program. Kumarasingam said this is a response to the increasing number of operators leasing their aircraft as well as the rising number of operators looking for customized solutions to extend the life of their aircraft with options that match their budget and operating need.

The first option is a long-term lease that provides an engine for 12 months or more while a second option is an on-wing lease program in which PWC buys back the operator's engine and leases another engine back to them. A third option is a lease-to-own program in which the operator can lease an engine with the

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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, pressurized turboprop airplanes, and turbine-powered helicopters statistically valid information about the product support provided by engine manufacturers over the last year and to report this information to our readers. The goal is to encourage continuous improvement in engine product support throughout the industry.

This 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.

The survey website was open from May 1 to June 17. Respondents were asked to rate individual aircraft, engines, and avionics 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 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, 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—ease of paperwork, extent of coverage.
- Technical Manuals—ease of use, formats available, timeliness of updating.
- Cost-per-hour Programs—cost versus benefits, ease of administration
- Technical Reps—response time, knowledge, effectiveness.
- Overall Engine Reliability—how the product's reliability and quality stack up against the competition.

The 2020 **AIN** Product Support Survey results for aircraft appeared in the August issue while flight deck avionics and cabin electronics were featured last month. ■

Part 3: Engines

2020 Overall Average Ratings by Individual Engine

		Overall Average 2020	Overall Average 2019	Ratings Change from 2019 to 2020	Factory Service Centers	Auth. Service Centers	Parts Availability	Cost of Parts	AOG Response	Warranty Fulfillment	Technical Manuals	Technical Reps	Cost per Hour Programs	Overall Engine Reliability
Turbofan														
Pratt & Whitney	PW600 series	**8.5**	8.5	0.0	8.5	**9.1**	8.7	6.1	**8.9**	8.7	8.6	**9.1**	**8.3**	9.1
Rolls-Royce	AE3007	8.4	8.2	0.2	8.3	8.6	8.6	**7.5**	8.6	8.5	8.4	8.9	7.9	8.8
Rolls-Royce	Tay	8.4	8.3	0.1	**8.7**	8.7	**9.0**	6.5	8.7	**8.9**	8.0	8.2	7.9	**9.8**
Williams International	FJ44	8.3	8.2	0.1	7.8	7.9	8.3	7.4	8.6	8.2	8.2	8.9	8.1	9.4
Pratt & Whitney	PW300 series	8.2	8.0	0.2	7.8	8.5	8.0	7.3	8.2	8.5	8.3	8.6	7.5	9.1
Pratt & Whitney	PW500 series	8.2	7.9	0.3	7.5	8.2	8.1	6.5	8.1	**8.9**	**8.7**	9.0	7.4	9.2
Rolls-Royce	BR700 series	8.1	8.1	0.0	8.4	8.3	8.3	6.6	8.3	8.4	7.4	8.5	6.9	9.3
Honeywell	HTF7000	8.1	7.8	0.3	8.3	8.9	7.3	7.1	8.1	8.4	8.1	8.3	7.6	8.6
Honeywell	TFE731	8.0	8.0	0.0	8.2	7.9	8.2	7.4	8.2	8.6	7.6	8.0	7.6	8.7
GE Aviation	CF34	7.9	8.1	-0.2	7.0	7.5	8.4	7.2	8.6	8.0	7.5	8.0	8.0	9.0
Turboprop/Turboshaft														
Pratt & Whitney	PW200 series turboshaft	**8.2**	7.2	1.0	**8.4**	7.3	8.1	6.0	8.4	9.1	8.2	8.1	7.9	**9.8**
Pratt & Whitney	PT6T/B/C turboshaft	**8.2**	7.7	0.5	6.8	**9.3**	7.7	**7.3**	7.4	**9.3**	7.6	**8.9**	**8.8**	**9.8**
Honeywell	TPE331 turboprop	8.1	8.4	-0.3	7.9	8.5	7.8	6.3	8.4	9.0	**9.0**	8.6	5.7	9.0
Safran Helicopter Engines	Arriel	8.0	7.2	0.8	7.0	7.7	**8.2**	5.8	**8.5**	8.3	8.4	8.5	8.0	8.9
Pratt & Whitney	PT6A turboprop	7.9	7.7	0.2	7.4	7.7	**8.2**	6.2	7.4	7.9	8.3	8.6	6.9	9.5

Companies listed in order of 2020 overall average. Ties listed alphabetically by manufacturer.

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option to purchase it at the end of the program's term. All of the leases cover overhauls, hot section inspections, and other off-wing maintenance.

Also, Pratt & Whitney has changed Eagle Service Plan (ESP) coverage levels for most of its engine models to a standard package with Gold and Platinum options. The company has also simplified the terms and conditions of ESP to be more customer friendly, shorter, and standardized across all models and coverage.

In addition, ESP Flex allows customers with preowned aircraft to defer at least 50 percent of the buy-in when they enroll, yet still receive 100 percent coverage. They can defer the remainder of the buy-in until scheduled shop visits or the sale of their aircraft, whichever is first. With the new PT6 E-Series engine for the Pilatus PC-12 NGX, Pratt & Whitney is offering an ESP that includes engine data trend monitoring and coverage for foreign object damage repair and environmental protection. Additionally, the company has developed multilingual engine maintenance manuals for PT6A-34AG, PT6A-114, and PT6A-140 engines in Portuguese, Chinese, and Spanish.

For its service network, Pratt & Whitney added eight designated maintenance facilities (DMF) in Russia, Panama, Mexico, the Netherlands, Italy, Colombia, and China in the past 12 months. Additionally, it invested $30 million in its engine services facility in Bridgeport, West Virginia for MRO of PW814GA and PW815GA turbofans and brought online its new facility in Belo Horizonte, Brazil. Belo Horizonte is providing MRO services for PT6A and PW200 engines and complements DMFs ABA Manutenção, Rico Táxi Aéreo, and Helipark Manutenção, which were appointed in 2017. "Our expansion in Brazil allows us to best meet the evolving needs of our operators, providing them with more personalized, timely and cost-effective engine service whether they are located in Brazil or in other South American countries," Kumarasingam said.


Rolls-Royce

ROLLS-ROYCE

The Results

Powered by the support of its AE3007 and Tay engines, Rolls-Royce retained its No. 2 ranking in the Turbofan category from last year each with an Overall Average of 8.4, which was higher from Overall Averages of 8.2 and 8.3, respectively, in the 2019 survey. The AE3007 that powers such jets as the Cessna Citation X+ and Embraer Legacy 600 received top ratings for Cost of Parts (7.5), while the Tay received high rankings for Factory Service Centers (8.7), Parts Availability (9.0), Warranty Fulfilment (8.9), and Overall Engine Reliability (9.8). Falling one spot to fifth was Rolls-Royce's BR700 Series engines with an Overall Average of 8.1, representing a tie with Honeywell's HTF7000.

The Improvements

Nineteen months ago, Rolls-Royce launched its Corporate Care Enhanced fixed-cost maintenance program and has "outperformed expectations" with sales of 470 contracts, Rolls-Royce senior v-p of customers and services for business aviation Andy Robinson told **AIN**.

The program is unique, he said, in that it also covers the nacelles—thrust reverser, inlet, cowl doors, and the apron—of the BR710, BR725, and Pearl 15 engines.

Over the past 12 months, the engine maker has worked to increase its capacity and capability to make all those nacelle parts available in its global stores as well as train staff known as on-wing technicians to perform the work of repairing those nacelles in addition to the

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company's engines. "That's been a big piece of work that's been well received by our customers," Robinson added.

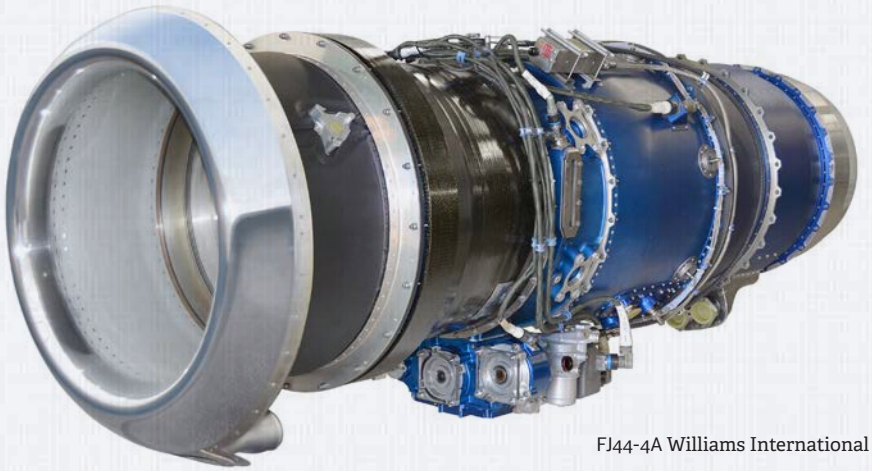
An on-wing services technician has also been added in Singapore with another recently hired in Hong Kong that will bring the total to 63 specialists at 16 sites worldwide. "Those guys are specialists in business aviation engines, but they do the highly complex, low-volume type work that the service center network can't do," Robinson explained.

On the training front, Rolls-Royce has introduced in the past year fully immersive virtual reality (VR) training for both company and authorized service center technicians on the BR725 engine. This will be expanded to include the BR710 and troubleshooting, Robinson said. Developed last year but launched beginning this June, the VR training "has proved to be extremely successful" especially in light of the Covid-19 pandemic because it allows the training to be conducted remotely.

Rolls-Royce also has strived to improve its technical publications in the past year. It outsourced the publications to "someone who is recognized as one of the best in the industry" and began a slow roll out starting late last year of the revamped publications, which so far encompass the BR710, BR725, and Pearl 15. "The new technical publications, it's a much more modern, intuitive system, and customer feedback we've received so far has been excellent," he said. "We've still got a little bit of work to do to get fully rolled out for all of our engine programs but that's been a big effort."

Lastly, the company has further developed its engine health monitoring. Specifically, it's created the engine vibration health monitoring unit (EVHMU), capable of delivering 10,000 data points, "which is a step change from the earlier technology," Robinson said. Currently only available with the Pearl 15 engine, the EVHMU also is able to monitor accessories on the outside of the engine such as the fuel metering unit. "With the additional parameters and capabilities of the EVHMU, we're able to look at responsiveness of external units on the engine," he noted. "It becomes a much more proactive service where we can avoid disruption and avoid the typical type of AOG caused by the externals of the engine."

The EVHMU monitoring comes as part of Corporate Care Enhanced. It will also be available with the Pearl 700 but is not retrofittable to older aircraft. However, he said Rolls-Royce has been working with airframe and avionics OEMs to transmit data from its older engine health monitoring units. That will eliminate the need for customers with that older technology from having to download the data and then send it to Rolls-Royce.



FJ44-4A Williams International

WILLIAMS INTERNATIONAL

The Results

Williams International continues to hold a firm position among **AIN** readers on the strength of its FJ44 engine, which powers the Cessna Citation M2 and CJ4 as well as the Pilatus PC-24 and many other active but out-of-production business jets. In the Turbofan category, the FJ44 ranked third with an Overall Average of 8.3. That's up from last year's Overall Average of 8.2.

The Improvements

With nearly 6,300 FJ44 and FJ33 engines in the fleet, accounting for 15 million hours of flight time, Williams International senior v-p of product support Steve Shettler said responsiveness continues to be the key to supporting customers. "We are diligent about responding quickly to customers' needs and focus on making their ownership of our engines simple and satisfying," he said.

The focus at Williams in recent months has been on the effects of the Covid-19 pandemic and ensuring the safety and wellness of employees and customers. It has experienced issues with supply chain disruptions, state stay-at-home orders, and other related measures, Shettler said, "but we have been able to ensure continued support during this pandemic with minimal impact to our customer while protecting the health of our workforce."

Two efforts to support its customers and products since the onset of the pandemic include offering a means for customers to keep their aircraft free of pathogens as well as financial options for the Williams Total Assurance Plus (TAP) engine maintenance programs.

On the pathogen front, Williams is offering the TurboClear Process, which is an aviation-grade product that fills an aircraft cabin with gas that kills pathogens in the air and on surfaces and can be used by crew and/or pilots and owners. In terms of its TAP programs, Shettler said Williams suspended any rate increases until June 2021. He also noted that the company has continued to see a high enrollment rate in its TAP Blue program, "even during this pandemic."

HONEYWELL

The Results

In the turbofan category, Honeywell's HTF7000, the powerplant for Bombardier's Challenger 300 and 350, Gulfstream's G280, and Cessna's Citation Longitude, improved its Overall Average, climbing from 7.8 to 8.1 and moving from seventh place to fifth. The Overall Average for the TFE731 found on out-of-production business jets such as the Hawker 900XP and in-production aircraft including the Dassault Falcon 900LX was flat at 8.0. Honeywell scored an Overall Average of 8.1 in the Turboprop/Turboshaft category in this year's survey. Its TPE331 turboprop engine that powers the out-of-production Cessna 441 and Mitsubishi MU-2 came in at the No. 2 spot, edged out from last year's No. 1 spot by Pratt & Whitney's PW200 series and PT6T/B/C turboshaft engines. The TPE331's Overall Average was 8.1, down from 8.4. **AIN** readers did give the Phoenix-based engine manufacturer higher marks this year for Technical Manuals at 9.0.

The Improvements

One of the biggest changes Honeywell has made to its product support function is merging its AOG team with its global tech ops organization and co-locating AOG "agents" with product support engineers. This is designed "to help our customers do some troubleshooting and help them kind of diagnose as they're calling in to get a replacement part for dispatch overnight or same day," said Todd Owens, Honeywell v-p of customer and product support for the Americas aftermarket.

Through customer feedback and surveys, Owens said Honeywell has learned that when a customer calls its AOG team they are often looking for validation

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that they are ordering the correct part for their airplane engine. "This is something we think will really improve the end-customer experience by ensuring they get the right part dispatched to them but then also have some reassurance that we can answer their technical questions while they're on the phone." The project is expected to be complete by the beginning of October.

Owens said based on past customer surveys and face-to-face visits in the field, eliminating the handoff of customers from one department to another was an issue and led to the merging of AOG teams with global tech ops.

Garnering customer feedback has also been a bigger priority recently at Honeywell, said Megan Towne, director of customer and product support for Honeywell Americas aftermarket business and general aviation. To that end, and prior to the Covid-19 pandemic, Honeywell had begun "customer connect visits" in which Honeywell staff in the field go out and meet directly with customers to, among other things, learn of their concerns. Once the pandemic eases, "our plan is to go back to having a lot of proactive engagement with those customers in the field to ask the questions that pertain to what works well, where is it easy to deal with Honeywell, where could it be easier, whether that be on the customer support side as well as the product and technical support side," she said, "and then to bring that in and leverage it into the projects that go on within Honeywell, the improvements."

Owens said Honeywell has made a number of other improvements to its customer and product support in the past year, including in the area of notifying customers of reliability and product improvement enhancements. To that end, the company added a section on its Honeywell MyAerospace customer web portal in August to track the status of product improvements and when they will be made available. "We really think this is a big step forward in being transparent with our customers; here's an issue you brought to our attention or this is something that's developed with our product over time and here's what we're doing to fix it," he said. "And we're giving you monthly updates on where we're at with a timeline, a schedule, and when they'll be able to experience that."

In terms of product-specific improvements, Honeywell has created an extended service plan for nacelles on its HTF7000 that it said will help owners with the cost of ownership. The company also completed interval extensions on TFE731 Next Gen turbofans that will increase the time between inspections. "We've really looked to...how do we make it really easy to own and operate and maintain an aircraft that's got Honeywell [products] on it," Towne said. "We take pride in being able to make that customer experience easy."

SAFRAN HELICOPTER ENGINES

The Results

Safran Helicopter Engines' Arriel turboshaft on the Sikorsky S-76 and Airbus Helicopters H145 and H155 maintained its third-place position with an Overall Average of 8.0, a significant increase from its Overall Average a year ago of 7.2. Customers also gave the Arriel high marks for Parts Availability (8.2) and AOG Response (8.5).

The Improvements

Sébastien Jaulerry, Safran Helicopter Engines v-p of support and services, noted that the company's health monitoring and support-by-the-hour (SBH) online programs have "seen a lot of success with customers."

More than 580 customers use Safran's health monitoring for 4,100 engines. And 50 percent of its customer base has either an SBH contract or Global Support Package maintenance plan with budget stability and fixed price per engine flying hour. Also, the company continues to work on improving its technical publications, an effort begun two years ago, including improving the technical content, simplifying layouts, and adding more intuitive and visual aids in the online technical publications. In addition, Safran Helicopter Engines has been successful with continuous time-between-overhaul extensions on many of its engine variants.

More recently, a lack of available parts has led Safran Helicopter Engines to develop a transformation plan that is expected to alleviate those issues beginning this year. Blades were one of the parts that were impacted, and production on them has been increased by 50 percent through millions in new investment in production machines in Bordes, France, Jaulerry noted.

Lastly, the company has undertaken an effort to repair more parts instead of using new whenever possible, which it said reduces cycles and cost for the customer. "This has a direct and positive impact on the overall cost of the repair or overhaul," Jaulerry said. "Our internal repair capabilities in France have benefited from a €50 million investment, modernizing our Tarnos plant with a state-of-the art building and machines."

Safran Helicopter Engines

GE AVIATION

The Results

GE Aviation's CF34, the powerplant for Bombardier's Challenger 650 and Embraer's Lineage bizliner, moved lower in this year's survey from the fourth spot and an Overall Average of 8.1 in 2019 to an Overall Average of 7.9.

The Improvements

GE Aviation services product manager Jim Stoker noted that improvements in product support and customer service in the past year have mostly been focused on the company's new Passport engine that powers the Bombardier Global 7500. But at the same time the build out of a support network numbering 45 authorized service centers over the past few years has allowed GE Aviation to continue to provide needed services by its engine customers during the Covid-19 pandemic, including not only for Passport but also the CF34.

"One of the biggest challenges was managing through the logistics of what regions are closed, what regions are open, what borders are closed, if we send in teams here are they going to have to come back and be quarantined for 14 days?" Stoker said. "Being able to utilize the breadth of our support network allowed us to cover all those regions, all those areas, when we had a customer that needed help," he said. "And I saw no drop in our ability to support them during Covid."