



Williams International

AIN Product Support Survey

Readers rate turbine engine manufacturers on their product support efforts during the past year.

by Jerry Siebenmark

Williams International was the sole OEM to hold the first place slot in the turbofan segment in this year's AIN Engine Product Support Survey after sharing it with Pratt & Whitney and Rolls-Royce last year. Williams recorded an Overall Average of 8.8 (out of a possible 10), up from 8.2 last year. Meanwhile three engine manufacturers, GE Aviation, Pratt & Whitney, and Rolls-Royce, tied for second, each with

Overall Average ratings of 8.5. Honeywell followed with an Overall Average of 8.2. All five OEMs in the turbofan segment saw their Overall Average scores increase this year by between 0.6 and 0.2.

In this year's survey, Honeywell finished first with an Overall Average of 9.0 in the turboprop segment, up from 8.1 in the 2020 survey. Pratt & Whitney had an Overall

Average of 8.5, which was up from 8.0.

And in the turboshaft segment, Pratt & Whitney finished at the top with an Overall Average of 8.7, which was up from 8.0 last year. Safran Helicopter Engines followed with an 8.0 Overall Average, a score that was unchanged from 2020. Rolls-Royce came in third with an Overall Average of 7.6. The UK-based OEM was not rated in the turboshaft segment last year.

Williams International

The Results

In addition to receiving the top Overall Average among engine OEMs in this year's survey, Williams International received top marks from AIN readers for Cost per Hour Programs (8.5), Cost of Parts (7.9), AOG Response (8.8), Warranty Fulfillment (9.3), and Technical Manuals (8.6).

Williams's FJ44 also led the turbofan category with an Overall Average of 8.8. AIN readers also liked Williams's turbofan Cost per Hour Programs (8.5), Parts Availability (8.8), Cost of Parts (7.9), AOG Response (8.8), Warranty Fulfillment (9.3), and Technical Manuals (8.6).

The Improvements

Williams International's installed base of turbofan engines continues to grow at what senior v-p of product support Steve Shettler told AIN is an "increasing pace." Its fleet of FJ44 and FJ33 engines is approaching 6,700 and 16 million hours of flight time, he said.

In the past year, the Pontiac, Michigan-based OEM has focused on educating customers about the responsibilities of assuring proper maintenance on their engines through quali-

fied personnel by promoting its TAP Blue hourly engine maintenance program. Not only does TAP Blue allow customers to budget for maintenance events, it also ensures that work is done through approved centers with trained technicians, he said. Shettler added that 90 percent of Williams customers enroll their engines in TAP Blue upon delivery of their new aircraft. What's more, nearly all of its legacy hourly maintenance program enrollees have upgraded to TAP Blue.

The company's product support enhancements over the past year have included an updated payment system on its website to work with current browsers and mobile devices, which also enables Williams to accept all major credit cards. "This foundation will allow for future enhancements such as eWallet, stored payment profiles, and others that will allow for a faster checkout process on our customer portal," Shettler said.

In addition, Williams is implementing a new system for its technical publications, which will utilize the S100D format and, according to Shettler, "provide numerous enhanced features." "These new manuals should simplify access to information that technicians need to maintain our engines," he said.

Survey Rules and Methodology

The objective of the annual Product Support Survey is to obtain from the users of business jets, pressurized turboprop airplanes, and turbine-powered helicopters statistically valid information about the product support provided by manufacturers over the last year and to report this information to AIN readers. The goal is to encourage continuous improvement in product support throughout the industry.

NEW SURVEY TOOL

This year, the survey was conducted via a newly designed questionnaire, developed in partnership with Rolland Vincent Associates, a Texas-based consultancy focused on aviation market research, strategy, and forecasting. The redesigned survey was created to provide improved ease of use and to encourage more participants to complete the entire survey.

The new survey tool:

- » Included Spanish and Portuguese versions for the first time.
- » Asked respondents to evaluate one full aircraft at a time including airframe, engines, and avionics.
- » Included clearer language and imagery around the individual categories and the evaluation scale.

METHODOLOGY

AIN emailed qualified readers a link to the password-protected survey website. The survey website was open from May 3 to June 11. 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 estimate vs. actual, scheduling process, on-time service, service experience
- » Authorized Service Centers—same as above
- » Cost per Hour Programs—Value for price paid, completeness of coverage, response time, quality of service, communication effectiveness, transferability of coverage, perception of residual value effect
- » Parts Availability—In stock vs. backlog, reasonable shipping time, parts available
- » Cost of Parts—Value for price paid when outside of warranty or cost-per-hour program
- » AOG Response—OEM speed of response, accuracy, cost, communication
- » Warranty Fulfillment—Ease of paperwork, extent of coverage
- » Technical Manuals—Ease of use, formats available, digital access, timely updating
- » Technical Reps—Response time, knowledge, effectiveness
- » Overall Engine Reliability—Satisfaction with reliability over last 12 months for this aircraft model

THE RESULTS

In total the survey collected 858 engine platform evaluations. Rolland Vincent Associates reviewed the data to ensure accurate and valid responses. They also compiled the final survey results in close coordination with AIN. In consultation with Rolland Vincent Associates we decided to separate turboprop and turboshaft engines in the tabulated results.

RESULTS ANALYSIS

In analyzing the results of this survey vs. prior years, this year's scores were generally higher. Our thoughts on this are:

- » Higher scores reflect the OEMs' continuous improvement and focus on the customer experience.
- » Certain segments of business aviation did fly considerably less from May 2020-May 2021. Fewer cycles may have led to fewer scheduled and unscheduled maintenance events.
- » The new survey tool certainly could have played a part in scores tending to be higher. The switch from a drop-down to radio buttons reduced the chance of a mistaken score.
- » This year's strong results could establish a new benchmark of excellence for OEMs as flight activity rebounds globally.

The 2021 AIN Product Support Survey results for aircraft appeared in the August issue while flight deck avionics, cabin electronics and connectivity were featured last month.



Category & Overall Average Ratings for Engine OEMs	Overall Average 2021	Overall Average 2020	Rating Change from 2020 to 2021	Factory Owned Service Centers	Authorized Service Centers	Cost per Hour Programs	Parts Availability	Cost of Parts	AOG Response	Warranty Fulfillment	Technical Manuals	Technical Reps	Overall Engine Reliability
Turbofan Engines													
Williams International	8.8	8.2	0.6	8.8	8.8	8.5	8.8	7.9	8.8	9.3	8.6	8.8	9.3
Pratt & Whitney	8.5	8.2	0.3	8.6	8.9	8.0	8.5	7.6	8.5	8.9	8.5	8.6	9.2
GE Aviation	8.5	7.9	0.6	8.9	8.6	7.9	9.0	7.5	8.3	9.0	8.3	8.0	9.4
Rolls-Royce	8.5	8.2	0.3	8.6	8.6	7.6	8.5	6.9	8.7	8.9	8.2	8.9	9.6
Honeywell	8.2	8.0	0.2	8.7	8.8	7.6	8.1	7.1	7.9	8.6	7.7	8.3	9.0
Turboprop Engines													
Honeywell	9.0	8.1	0.9	9.8	9.6	*	8.8	7.0	9.0	*	9.1	9.5	9.8
Pratt & Whitney	8.5	8.0**	0.5	8.6	8.7	8.1	8.5	6.9	8.3	8.8	8.3	8.7	9.4
Turboshaft Engines													
Pratt & Whitney	8.7	8.0**	0.7	8.8	8.8	8.3	8.8	7.9	8.9	8.9	8.6	8.7	9.0
Safran Helicopter Engines	8.0	8.0	-	7.5	8.2	7.7	7.6	6.7	7.8	*	8.2	8.1	9.3
Rolls-Royce	7.6	NA	NA	*	7.9	7.2	7.1	6.1	7.0	*	7.9	8.7	8.7

Ties listed alphabetically; * Not reportable due to sample size; ** 2020 Overall Average includes both Turboprop & Turboshaft



Pratt & Whitney

The Results

Among engine OEMs, Pratt & Whitney (P&W) was recognized for its Authorized Service Centers (8.9) in addition to its second-place tie with Rolls-Royce and GE Aviation. And among turboshaft OEMs, it was singled out for its Factory Owned Service Centers (8.8), Authorized Service Centers (8.8), Cost per Hour Programs (8.3), Parts Availability (8.8), Cost of Parts (7.9), AOG Response (8.9), Warranty Fulfillment (8.9), Technical Manuals (8.6),

Technical Reps (8.7), and Overall Engine Reliability (9.0).

Its PW300 series engines tied Rolls-Royce's AE3007 and Tay engines for second place in the turbofan category with an Overall Average of 8.6, up from 8.2. The engine series received high marks for Authorized Service Centers (8.9) and AOG Response (8.8). Continuing in that category, the Canadian OEM's PW500 series engines finished at third with an 8.5 Overall Average, tying Rolls-Royce's BR700-series engines and GE Aviation's CF34

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GE Aviation

The Results

Besides its second-place Overall Average tie with Pratt & Whitney and Rolls-Royce in the turbofan category of engine OEMs, GE Aviation was singled out for its Factory Owned Service Centers (8.9) and Parts Availability (9.0).

Its CF34 engines also tied Rolls-Royce's BR700-series and Pratt & Whitney's PW500-series engines for third in the turbofan category of aircraft engines with an Overall Average of 8.5, up from 7.9 in the prior year's survey. The CF34 received high marks for Parts Availability (8.8).

The Improvements

Navigating the Covid-19 pandemic while improving support was the biggest challenge in the past 12 months for GE Aviation's business jet services operation, which supports the CF34 engine that powers the Bombardier Challenger 600-series and the Global 7500's Passport engine. "We really dug deep during the pandemic to make sure that not only did we not lower that customer service level but in fact increased it and were able to expand our offerings to make sure that we're providing that top level of customer service," GE Aviation business operations executive Tony Culic told **AIN**. "So, we're really trying to enhance and strengthen our services infrastructure." For example, the company did not cut its mobile repair teams nor its field service engineers during the pandemic, he said. During that time, GE Aviation completed more than 100 customer service events/touchpoints since the pandemic began. "For us, maintaining that level of service, making sure that availability is high in facilitating that, is a primary objective," he added.

More recently the company added another field service engineer, bringing its total to 17, and

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Category & Overall Average Ratings for Aircraft Engines	Engine Model	Overall Average 2021	Overall Average 2020	Rating Change from 2020 to 2021	Factory Owned Service Centers	Authorized Service Centers	Cost per Hour Programs	Parts Availability	Cost of Parts	AOG Response	Warranty Fulfillment	Technical Manuals	Technical Reps	Overall Engine Reliability
Turbofan Engines														
Williams International	FJ44	8.8	8.3	0.5	8.8	8.8	8.5	8.8	7.9	8.8	9.3	8.6	8.8	9.3
Rolls-Royce	AE3007	8.6	8.4	0.2	8.7	8.8	8.2	8.6	7.9	8.5	9.1	8.4	8.6	9.5
Pratt & Whitney	PW300 series	8.6	8.2	0.4	8.4	8.9	8.1	8.6	7.8	8.8	8.8	8.4	8.7	9.1
Rolls-Royce	Tay	8.6	8.4	0.2	9.1	8.6	7.6	8.8	7.3	8.8	8.6	8.4	8.5	9.8
Rolls-Royce	BR700 series	8.5	8.1	0.4	8.6	8.7	7.7	8.5	7.0	8.7	8.9	8.2	9.0	9.5
GE Aviation	CF34	8.5	7.9	0.6	8.9	8.7	8.0	8.8	7.5	8.1	8.8	8.1	7.9	9.5
Pratt & Whitney	PW500 series	8.5	8.2	0.3	8.5	8.7	7.7	8.4	7.2	8.3	9.0	8.4	8.5	9.4
Honeywell	TFE731	8.3	8.0	0.3	8.6	8.8	7.5	8.3	7.0	8.0	8.7	7.9	8.3	9.2
Honeywell	HTF7000	8.1	8.1	-	8.7	8.9	7.8	7.8	7.2	7.8	8.6	7.6	8.1	8.8
Pratt & Whitney	PW600 series**	8.5	8.5	-	8.8**	9.0	8.4	8.7	6.0	8.1	8.2	8.8	8.5	9.5
Turboprop Engines														
Honeywell	TPE331	9.0	8.1	0.9	9.8	9.6	*	8.8	7.0	9.0	*	9.1	9.5	9.8
Pratt & Whitney	PT6A	8.5	8.1	0.4	8.7	8.7	8.2	8.6	7.0	8.3	8.9	8.4	8.8	9.5
Turboshaft Engines														
Pratt & Whitney	PT6T/B/C	9.0	8.2	0.8	9.0	9.2	8.6	9.0	8.3	9.1	9.1	9.0	9.1	9.2
Pratt & Whitney	PW200 series	8.6	8.2	0.4	8.9	8.9	8.5	8.9	7.9	8.8	8.9	8.4	8.2	8.9
Rolls-Royce	250	8.4	NA	NA	*	7.9	7.8	7.2	6.4	7.4	*	7.6	8.6	8.4
Safran Helicopter Engines	Arriel	7.7	8.0	(0.3)	7.2	8.5	6.7	8.1	5.8	7.5	*	7.9	8.1	9.4

Ties listed alphabetically by engine model; * Not reportable due to sample size; ** Number of responses just below our threshold for direct comparison with other engines models

Pratt & Whitney continued

engine. The company's PW600-series turboprops finished at sixth—with a smaller respondent sample—with an Overall Average of 8.5, which was unchanged from last year.

In the turboprop category, Pratt & Whitney's PT6A had an Overall Average of 8.5, up from 8.1.

Among turboshafts, the company led with the PT6T/B/C and an Overall Average of 9.0, up from 8.2. Readers gave that engine high marks for Factory Owned Service Centers (9.0), Authorized Service Centers (9.2), Cost per Hour Programs (8.6), Parts Availability (9.0), Cost of Parts (8.3), AOG Response (9.1), Warranty Fulfillment (9.1), Technical Manuals (9.0), and Technical Reps (9.1). Pratt & Whitney also came in second place with the PW200-series turboshaft, with an Overall Average of 8.6 compared with 8.2 in the prior year.

The Improvements

Being closer to customers was the mission for P&W's product support organization in the past year, v-p of customer service Satheshkumar Kumarasingam told AIN, which was accomplished through a two-pronged strategy: improving access to the company through the enhancement of digital connectivity and expanding its designated maintenance facility (DMF) network. "Whether the aircraft is parked or coming

in or out, that's where the touchpoints are," he said of the maintenance facility network expansion.

In terms of improving customer access digitally, the company went to a system where its customer portal only requires a single sign-on. The single sign-on, which can be assigned to an owner or a designated person such as a director of maintenance, enables the user to access technical publications, purchase parts, reserve a rental engine, and access P&W's pay-by-the-hour Eagle service plan (ESP). The single sign-on replaces a system in which customers had to provide such information as their specific engine, name, and address, Kumarasingam explained. And if they wanted to reserve a rental engine or purchase parts, that required inputting additional information such as for credit verification. The single sign-on ensures an "agile and quick" experience, he added. Two thousand customers have taken advantage of the single sign-on in the past year. "It speaks volumes in terms of the enhancements and people feeling comfortable to be able to do that," he said.

In addition to improving digital access for product support, P&W has added two more DMFs in the past year, in Chile and Qatar. That brings its network of DMFs to 17 in North and South America, Europe, and Asia. The DMF con-

cept was first introduced by the company in 2017 in Brazil and has proven to be "very positive," Kumarasingam said. "It gives reach to our customers and we get information about what line items are causing the biggest pain." Those pain points also help P&W determine whether it needs to make product or service improvements, he added. DMFs provide line maintenance and are supported by a network of company-owned overhaul and designated overhaul facilities, as well as more than 100 field service managers positioned around the world.

Lastly, P&W has enhanced offerings with its ESP on the PT6 family of turboprop engines to include offering insurance gap coverage for foreign object damage and providing engine health monitoring and analysis on its newest PT6E turboprop engine to provide proactive maintenance support to those customers. Also, the company has added a dedicated customer account manager for every PW800 customer enrolled in ESP. PW800 customers would include those who own/operate the Gulfstream G500/600 and Dassault's new Falcon 6X, "a different category of customers," Kumarasingam said. "It's less about 'let me manage your event in the shop' but rather 'let me make sure that you are served properly in whatever.'"

Rolls-Royce

The Results

In the engine OEM category, Rolls-Royce received high marks for Technical Reps (8.9) and Overall Engine Reliability (9.6) for turbofans. Readers also gave the company high marks among turboshaft manufacturers for Technical Reps (8.7).

The company's AE3007 and Tay turbofans tied Pratt & Whitney's PW300-series engines for second place in this year's survey, each with Overall Averages of 8.6, up from 8.4 last year. Its AE3007 was noted for Cost of Parts (7.9), while the Tay received high marks for Factory Owned Service Centers (9.1), Parts Availability (8.8), AOG Response (8.8), and Overall Engine Reliability (9.8). Its BR700-series engines also tied for third with GE Aviation's CF34 and Pratt & Whitney's PW500-series turbofans with an Overall Average of 8.5. The BR700-series was also credited by readers with a 9.0 for Technical Reps.

The company's 250 engine placed third in the turboshaft category with a smaller respondent sample, recording an Overall Average of 8.4.

The Improvements

Despite the challenges posed by Covid-19 in the past year, UK-based engine maker Rolls-Royce was able to achieve its 99 percent averted missed trip goal as well as another to recover any AOG aircraft within 24 hours anywhere in the world, senior v-p of business aviation customers and services Andy Robinson told **AIN**. Also on the product support side, Rolls-Royce continued its work developing interactive technical publications that include 3D graphics and text instructions that can be downloaded or accessed via Wi-Fi on any device. In a related move, it continued development of its virtual reality training for maintenance crews, the timing of which couldn't have been more ideal, Robinson explained. "As you can imagine, being able to continue training people remotely with the lockdowns was hugely successful," he said.

The entry into service of the Pearl 15 with the Bombardier Global 6500 in late 2019 followed by the 5500 in mid-2020 has meant a "step change in engine health monitoring capability" for Rolls Royce. "It's taken us from being able to monitor around 2,000 engine parameters to closer to 10,000 engine parameters," Robinson said. More importantly, the engine vibration health monitoring unit (EVHMU) included on the Pearl 15 also allows it to monitor engine accessories, which he said are typically what cause engine disruptions. "The fuel pump, or fuel metering unit, or the starter motor, those are the things that historically have never been able to be monitored for health," he added. "Yet with the EVHMU we can. [It is a] step forward for us to ensure an aircraft is available 100 percent of the time."

Rolls-Royce also opened a customer support facility earlier this year in Savannah, Georgia, adjacent to the new Gulfstream Service Center East. The 62,000-sq-ft facility supports G550s and G650s powered by Rolls-Royce's BR710 and BR725 engines, respectively. It will also support the Pearl 700 engine on the new G700 once that ultra-long-range twin enters service.

Robinson said Rolls-Royce also continues to see increasing acceptance of its CorporateCare Enhanced program that builds on its CorporateCare fixed-cost program with more comprehensive coverage. In just the past two years, Rolls-Royce has sold 720 CorporateCare Enhanced contracts.



Rolls-Royce

GE Aviation continued

increased mobile service team members to 18 from 12. "We're doing that again because not only do we see increased utilization on the CF34 side but as the Passport fleet will grow now, we need to make sure we're staffed properly to provide that level of service," Culic said.

The company is also working to expand the number of authorized service centers (ASCs) globally because it's heavily oriented to North America and Europe. That effort includes forward-positioning spare parts. The regions where its service is light are Asia-Pacific and South America. "We're really focusing on those...regions to make sure there's that seamless level of service," he said. In all, the company has 42 ASCs.

A company-wide effort at integrating more lean processes means that the business jet unit is also "looking to apply lean tools more fully and through an entire service process to make sure we're most efficient and reducing our lead times and increasing our responsiveness to drive down AOGs," he said.

Further, Culic explained that GE Aviation is taking lessons learned from the CF34, such as repair processes and turnaround times, and applying them to the Passport. By doing so the company will be better prepared for the time when those engines come in for scheduled and unscheduled main-

tenance and "at a cost we've committed to the customer."

Specifically on the Passport, collaboration with Bombardier's company-owned service centers is especially important because the engine powers the Canadian airframer's flagship Global 7500. "We're definitely looking for a premium, seamless experience. We are well integrated with Bombardier at their service centers such that the customer can bring their aircraft in and of course receive both aircraft and engine maintenance," Culic said.

Looking to the future, GE Aviation is leveraging the prognostic engine health management on its Passport to develop more algorithms and analytics to predict impending failures on the engine and use them to turn an unscheduled maintenance event to a scheduled one. That same effort could also serve to increase the engine's fuel efficiency and reduce carbon emissions, Culic said. Also on the Passport, the company is seeking ways to strengthen Passport maintenance through additional locations, parts availability, and the services those new locations would provide.

In terms of GE Aviation's engine hourly maintenance program, OnPoint, the company also is exploring programs and options to potentially provide a solution on carbon offsets, Culic added.



GE Aviation



Honeywell Aerospace

The Results

Honeywell's TFE731 and HTF7000 came in at fourth and fifth place in the turbofan category with Overall Averages of 8.3 and 8.1, respectively. The TFE731 Overall Average was up by 0.3 from the 2020 survey while the HTF7000 was unchanged. But readers noted the HTF7000 for Authorized Service Centers with a score of 8.9

The company's TPE331 improved its year-over-year Overall Average for a top score in the turboprop category, up by a full point, recording a rating of 9.1.

The Improvements

A key focus for Honeywell over the past 12 months has been support of its HTF-series turbofan engines, Phil Alcock, Honeywell Aerospace senior director of global field service engineering, told AIN. Specifically, the Phoenix-based OEM has introduced a new No. 4 carbon seal on the HTF7000/AS907 series engines on the Challenger 300 and 350, G280, Citation Longitude, and Legacy 450/500 and Praetor 500/600. The new seal is aimed at reducing aft pump events experienced by the fleet, according to Alcock, and allows operators to return to oil filter analysis through normal maintenance intervals.

Another improvement was the introduction of a thermal anti-ice valve through a partnership with GKN. Manufactured by ACS, the new valve is an alternate to the Dukes thermal anti-ice valve that Alcock said was

experiencing reliability issues across the HTF fleet.

For customers of Honeywell's Forge end-to-end flight management platform, the company has rolled out its new E-Engine Interface compatible with Windows 10. Files are viewable via the Honeywell Forge Connected Engines portal and data is sent directly to Camp Systems.

Following implementation of a new MapAero paint system in the production of the HTF-series thrust reverser assembly, Honeywell and its nacelle suppliers have rolled out thrust reverser paint repair for the aftermarket through OEMs Bombardier, Embraer, and Gulfstream and their service center networks.

Alcock noted another improvement, the assignment of a single case number to customer issues. Previously, a customer may have called for a troubleshooting request that's assigned a case number but evolves into a separate case—and number—for Honeywell's spares department to resolve. "All of the details now are entered into one single case with everyone having full visibility and ownership, and that has really streamlined the customer support and made things so much simpler," he said.

Also, as a result of the Covid-19 pandemic and the travel bans that followed, Honeywell partnered with FlightSafety to develop online courses for new and recurrent training for Honeywell customers and their pilots and maintenance staff. "We've had great feedback on those courses," Alcock said.



Safran Helicopter Engines

The Results

Safran Helicopter Engines placed fourth in the turboshaft category with its Arriel engine and an Overall Average of 7.7, which was 0.3 points lower than its 2020 turboshaft Overall Average of 8.0. Readers rated the engine highest for Overall Engine Reliability (9.4).

The Improvements

Safran Helicopter Engines has undertaken a number of improvements over the past year to its product support. That includes "robust" improvement on the Arrius 2B2, which powers the Airbus H135, and on the Arriel 2E, with new software providing more power margin to the H145 that it powers, according to the French en-

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Safran Helicopter Engines

Above & Beyond

Mary Cote (Rolls-Royce) *This person has the most consistent highest level of customer service in this industry.*

Mark Webster (Rolls-Royce) *Consistently excellent support and service.*

Steve Redmond (Pratt & Whitney) *Steve's efforts were critical at times to our initiatives to support Covid 19 testing.*

Steve Strine (Pratt & Whitney) *Goes above and beyond the call of duty. Is doing the work of three people due to the pandemic.*

Troy Lewis (Williams) *Troy oversees customer support and has followed up on every uploaded Fadec report I sent to make sure we are being serviced.*

He also goes out to the various aviation events to talk to customers and answer questions. Very knowledgeable on our engines.

Guy Bonaud (Safran) *We have had a long relationship with him, more than 20 years. He is working between France and us, and he understands both cultures. That is important for us.*

Mark James (Intercontinental Jet Services) *Mark's knowledge of the MU-2 and his management skills at IJSC is keeping the MU-2 alive and well for many more years.*

› Safran Helicopter Engines continued

gine maker. In addition, rates for bare engines have increased by 50 percent over the past decade with the continuous TBO extensions on a number of engine variants, including the Arriel 2D and 2E, which have been extended to 5,000 hours.

Continuing on the MRO side, Safran said customer feedback is incorporated into the design of new engine variants so that from initial development, reparability and costs are part of the framework of the engine design so that it can go so far as guaranteeing a much lower cost of ownership in the future. An example of that is the H160's Arrano 1A, the workload of which will be lightened by five times fewer maintenance tasks and global maintenance time reduced by 40 percent compared with previous engine generations.

Safran modernized its 33,000-sq-m (355,000-sq-ft) plant in Tarnos, France, streamlined workshops, and invested in new machinery to improve turn-around times and costs.

Other efforts taken by Safran Helicopter Engines to improve product support have been the creation of two "quick turn" shops in Canada and the UK for customers of its SBH engine support-by-the-hour program. Those shops can inspect an engine and perform a detailed analysis to determine if it can be repaired at one of those locations or whether it needs to be sent to a facility with greater capabilities. Regarding SBH and the company's other by-the-hour maintenance contracts, 50 percent of Safran's customer base has either an SBH contract or a Global Support Package for military and government operators.

In North America, the company has increased fuel control unit and hydro-mechanical metering unit repair capacity by 30 percent. For equipment such as bleed or electro valves, it is increasing capacity of pre-induction tests to avoid unnecessary repairs.

Safran is also optimizing the ratio of repaired parts to new parts, thus reducing the overall cost of a repair or overhaul.



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