GE Aerospace image.

The Engines Capacity Crunch

By Mario Pierobon

The widespread adoption of new generation narrowbody engines has driven significant efficiency improvements across commercial aviation, but the maturation of these fleets is now placing substantial demand on global MRO infrastructure. As these engine programs transition to mature operational phases, operators are encountering the realities of maintaining advanced powerplants at scale: longer turnaround times driven by material constraints, growing shop visit volumes and the need for specialized repair capabilities.

The MRO sector is responding through coordinated infrastructure expansion, with engine manufacturers and their partners investing in new facilities and upgrading existing sites to handle increasing workload complexity. Geographic positioning of repair capacity is shifting closer to fleet concentrations, reducing transportation delays and improving responsiveness to regional operators.

Workforce development has emerged as equally critical as physical infrastructure expansion. The specialized skills required to maintain advanced turbofan architectures demand structured training pipelines and partnerships with technical education institutions. Simultaneously, automation technologies are being deployed selectively to improve process repeatability, reduce risk of injury and free experienced technicians for higher-complexity diagnostic and assembly tasks that require human judgment.

This article examines how capacity expansion strategies, workforce development initiatives and automation integration are shaping the MRO response to demand growth driven by the operational success of new generation narrowbody engine programs.

Turnaround Time Increases

GE Aerospace points out that customers have selected CFM LEAP-1A engines to power more than 60% of Airbus A320neo aircraft (for which they have selected engines). "And this is just part of the engine program's extraordinary success. With over 3,700 LEAP-powered aircraft in service with more than 150 operators worldwide, 60 million flight hours logged, and over 10,000 engine orders in hand, the company

Pratt & Whitney image.

With 3,700 LEAP-powered aircraft in service, 150 operators worldwide and 10,000 engine orders in hand, GE Aerospace faces a growing challenge to keep all those engines in peak condition. GE Aerospace image.

Rob Griffiths

Iain Rodger

faces a growing challenge, how to keep all these engines in peak condition, they say. "Indeed, due to the large number of engines in service, LEAP engine overhauls are expected to increase significantly by the end of this decade."

Pratt & Whitney continues to see strong demand for the GTF engine, with more than 13,000 engine orders and commitments from 90+ customers worldwide, and over 1,500 orders in 2025. The fleet size is now over 2,600 aircraft across the Airbus A320neo family and A220, and Embraer E2, with 50 million hours flown.

Pratt & Whitney

Material constraints remain the primary driver of lead times, but significant progress is being made, Rob Griffiths, senior vice president commercial engines operations at Pratt & Whitney, observes. "MRO production of the PW1100G-JM GTF increased 26% in 2025 compared to 2024, despite a 40% year-over-year increase in heavy shop visits for more complex repairs. We ended the year particularly strongly, with MRO production increasing 39% in the fourth quarter, thanks in part to a 16% reduction in lead times and a significant increase in component repair volumes, which relieves pressure on the need for new materials, he says. "This puts us in a position to increase MRO production to a similar level in 2026. We are also integrating durability upgrades into the GTF engine that increase in-flight uptime, thus reducing the need for shop visits."

Closing the Capacity Gap

GE Aerospace has announced a $300 million, multi-year investment plan to enhance its engine component repair capabilities in Singapore by 2029, reaffirming the company's commitment to strengthening its presence in the Asia-Pacific region. "Supported by the Singapore Economic Development Board, the investment will transform engine repair operations, enabling faster response times, improved connectivity, and a more seamless customer service experience. We plan to establish an AI Center of Excellence to develop automated, AI-enhanced digital inspection solutions, as well as a new registration, evaluation, and authorisation of chemicals (REACH), compliant coatings facility and for the industrialization of such coatings, and a regional centre for critical shaft repair, GE Aerospace says. "The company's multi-year investment plan is already taking shape with the opening of a new module repair facility at Seletar Aerospace Park. The facility is dedicated to supporting the growth of operations for CFM LEAP-1A and LEAP-1B high-pressure turbine (HPT) modules. This investment is significant for the global engine fleet, allowing the company to perform service closer to operators in the Asia-Pacific and Middle East regions."

GE Aerospace Component Repair

By expanding the repair of LEAP engine HPT modules locally, GE Aerospace expects to reduce downtime and improve engine flow within its global MRO network. "With the addition of Building 8 to our Seletar campus, we are not only expanding our physical presence but also our capabilities, moving from individual engine component repair to engine module repair on LEAP-1A/1B high-pressure turbine modules, says Iain Rodger, managing director of GE Aerospace Component Repair in Singapore. "As the first of our specialized module repair shops, this facility offers improved connectivity within our engine overhaul supply chains, initially for MRO activities in Asia and the Middle East. Many of the components currently repaired in Singapore will be used in these modules, and the shaft repair capability announced later will also be integrated into these modules, significantly reducing downtime for our customers."

In early 2026, Pratt & Whitney announced a memorandum of understanding with the Singapore Economic Development Board to add GTF fan drive gear system (FDGS) repair capacity in Singapore, affirms Griffiths. "Additionally, the recent opening of a USD 70 million 81,000-square-foot GTF MRO expansion at our Columbus Engine Center in Georgia that will increase that facility's annual capacity by more than 25%. We anticipate further expansion of the GTF engine MRO network with the commissioning of the Christchurch and KHI engine centres expected later this year, he says. "In addition to our global engine centres, we have approximately 40 component repair facilities in the GTF engine MRO network. The ability to develop and execute innovative repairs at the individual component level is critical to optimising material flow."

Over the past decade, CFM and GE Aerospace have continued to expand their MRO shop network worldwide, both by increasing the number and size of their own facilities and by partnering with other top-tier MRO providers, according to GE Aerospace. "Now, with the opening of a shop in Poland and a new partnership with MTU Maintenance in Texas, they are doing the same again. GE Aerospace announced its most recent MRO capacity increase two weeks before MRO Americas, with the inauguration of XEOS, a 35,000-square-meter (375,000-square-foot) facility near Wroclaw, Poland. GE Aerospace operates the facility in a joint venture with Lufthansa Technik, GE Aerospace says. "MTU Maintenance Fort Worth will also service GEnx engines under a GE Aerospace-branded service agreement (GBSA). Thanks to this new partnership, MTU Maintenance will perform

MTU Maintenance Fort Worth is being expanded from an on-site service center to a full-fledged maintenance facility — with full disassembly, assembly and testing capabilities for LEAP-1A/-1B and GEnx engines. MTU Maintenance image.

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Pratt & Whintey announced an expanded agreement with Delta TechOps for a more than 30% increase in annual GTF overhaul capacity for the PW1500G engine powering the A220. Delta TechOps image.

performance restoration work and industrialize extensive repair capabilities for the CFM LEAP-1A and -1B engines, as well as for the GEnx-1B engines."

In Germany, MTU Maintenance Berlin-Brandenburg has expanded its PW800 engine program from a focus on low-pressure turbines to a comprehensive engine MRO service, explains MTU Maintenance. "Additionally, the Ludwigsfelde location is expanding its capacity in the industrial gas turbine (IGT) segment, building a new production facility to achieve its goal of a 30% increase in workshop volume over the coming years. EME Aero, MTU's joint venture with Lufthansa Technik specializing in the MRO of the GTF engine family, delivered its 1,000th engine to its plant in Jasionka, Poland and inaugurated a second test cell, with plans to increase its operating volume to 500 maintenance interventions per year starting in 2028, MTU Maintenance says. "In the Asia-Pacific region, MTU Maintenance Zhuhai opened a second production facility in nearby Jinwan for MRO of the PW1100G-JM program, creating greater overall maintenance capacity for its portfolio, which also includes the CFM56, LEAP, and V2500 engines at the original Zhuhai site. Once the Jinwan workshop is fully operational, the two sites will have a combined annual capacity of more than 700 maintenance interventions. In São Paulo, MTU Maintenance do Brasil has moved to a larger facility to meet the growing demand for on-site maintenance of aircraft engines and IGTs in South America."

Pratt & Whitney and its network of workshops continue to invest in the GTF MRO network, consisting of 21 global service centers, to support the growing GTF fleet, and the network will continue to expand, Griffiths affirms. "In 2025, we announced the addition of Sanad to the GTF MRO network, representing the first GTF workshop in the South Asia, Middle East, and North Africa region, with the first induction scheduled for 2028. This workshop will be able to overhaul all three GTF models. In addition, we announced an expanded agreement with Delta TechOps for a more than 30% increase in annual GTF overhaul capacity for the PW1500G engine powering the A220, he says. "Also in 2025, we finalized an agreement to expand GTF overhaul capacity at MTU facilities, increasing MTU's annual capacity to 600 repairs on all GTF models; ITP joined the GTF MRO network as our 21st workshop and EME Aero announced a USD 37 million expansion of its facility in Poland to service more than 500 GTF engines annually starting in 2028."

Workforce Pipeline and AI-Assisted Diagnostics

Celma's new MRO facility in Três Rios in Brazil is expected to usher in a new chapter, nearly doubling its maintenance capacity from 600 to 1,000 engines per year, GE Aerospace points out. "This new growth is expected to create another 400 jobs, bringing the total number of employees at the Brazilian operation to nearly 4,000 in the state of Rio de Janeiro. Many of these new hires will be MRO technicians. This represents many positions to fill, but Celma management is confident in their approach," GE Aerospace says. "The Celma team's partnership with the Serviço Nacional de Aprendizagem Industrial (SENAI), a training academy established by Brazilian industrial companies, has been crucial to Celma' success. The continued collaboration with SENAI will ensure that GE Aerospace employees are well-prepared to address new technical needs."

"GE Aerospace has historically hired a high percentage of SENAI graduates, affirms Julio Talon, GE Aerospace's MRO leader for Brazil. "The program provides students with a solid foundation in aerospace technology, and we offer opportunities to develop advanced skills as our

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technicians gain experience. LEAP engine maintenance will be one of these important career growth opportunities."

Pratt & Whitney is investing in automation support to improve safety, efficiency and productivity. "Key benefits include safer operations with lower risk of injury, greater repeatability and reliability, reduced rework, shorter process times, and less waste, as well as customized equipment that integrates software and hardware while minimising space requirements, says Griffiths. "In addition to expanding our footprint, we are equipping our MRO facilities with cutting-edge technologies, including automation and robotics, to meet demand while increasing the speed and productivity of MRO operations. For example, at our Eagle Services Asia (ESA) MRO facility in Singapore, our 'Alfred' robotic system assembles the rotors of the GTF's high-pressure compressor, maintaining tight assembly tolerances in a repetitive manner, while recording and analysing key process quality data."

'Alfred' has allowed ESA to halve process times and reduce man-hours by 85%, freeing up three operators for more complex tasks such as rotor balancing, according to Griffiths. "In addition, ESA also uses a collaborative robot (cobot) to assist technicians in photographically documenting external engine components, demonstrating their condition before and after overhaul, he says. "This system replaces the photographic documentation routine previously performed by ESA technicians and enhances their operational skills. At the same time, it has helped ensure process integrity, reducing man-hours by 90%. This level of MRO automation is industry-leading, and we are evaluating the possibility of implementing ESA's robotic innovations in other shops within the GTF MRO network."

Summing Up

The narrowbody engine MRO sector is responding to increased demand through coordinated capacity expansion, workforce development, and selective automation deployment. Geographic repositioning of MRO capacity closer to concentrated fleets in Asia-Pacific and Middle East regions reflects strategic infrastructure investment, while network expansion through partnerships continues to broaden overhaul capability distribution. Component repair volume increases and lead time reductions are addressing material constraints that have historically driven turnaround delays.

The GE Aerospace Celma facility in Três Rios, Brazil provides MRO services to more than 30 commercial airlines. GE Aerospace image

Workforce pipeline development remains critical to capacity execution, with established partnerships between MRO providers and technical training institutions supporting planned expansion requirements. Automation integration at advanced facilities demonstrates measurable efficiency improvements in repetitive assembly processes and documentation tasks, prioritising repeatability, safety improvement, and operator reallocation to higher-complexity work rather than workforce reduction.

The industry trajectory points toward continued MRO network expansion through the remainder of the decade. Material flow optimisation through component-level repair capability development and durability upgrades designed to reduce shop visit frequency will influence whether capacity additions keep pace with projected overhaul demand as installed fleets mature. The combination of geographic network expansion, process automation, and workforce development represents the sector's integrated response to demand growth driven by the operational success of new generation narrowbody engine programs. AVM

Pratt & Whitney says MRO automation is reducing man-hours dramatically and is investing in automation support to improve safety, efficiency and productivity. Shown here is the Pratt & Whitney GTF. Pratt & Whitney image.

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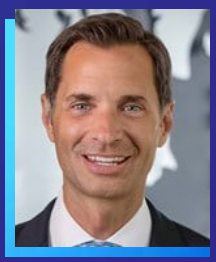

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