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AviTrader
AVIATION NEWS PUBLICATIONS

MRO
Aerospace Magazine

North America:

Huge demand amidst a sluggish supply chain

Narrowbody Aircraft
Demand is on the rise for maintenance services

EirTrade Aviation
Building a case for new aircraft USM supply

Partnerships
Etihad Airways Engineering and AMROS explore one-stop solutions

There were signs of international cargo capacity recovery in March.
© *United Cargo*

Cargo trends show an improvement in demand

Following several months of depressed figures coming from the air cargo sector, there is now a glimmer of hope for a resurgence as witnessed by the improved data in February and March, which will be welcome news for cargo support services.

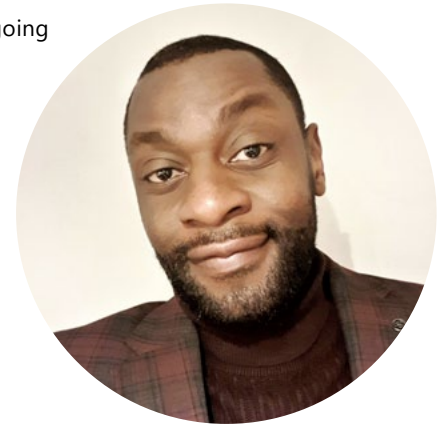
IATA say February demand was half the rate of annual decline seen in the previous two months and demand for air cargo was 2.9% higher than pre-pandemic levels in February 2019—the first time it has surpassed pre-pandemic levels in eight months. It's been an optimistic scenario for international cargo capacity recovery in March which saw the largest increase of 16% from a year earlier, according to analysts at CLIVE Data services.

Willie Walsh, IATA's director general said the story of air cargo is one of slowing declines which is a slight relief and perhaps indicating that a sense of return to normalcy is on the horizon.

As many in our industry head to MRO Americas in Atlanta this month we are seeing data indicating that cargo demand realised by North American carriers is lingering above 2019 numbers. Industry experts we have spoken to say even though demand softened towards the latter half of 2022, the number of conversions only satiated an increase of 8.2% in capacity.

Although cargo demand had cooled recently, there are still a great number of aircraft undergoing passenger to cargo conversions for both narrowbody and widebody aircraft that will extend the product life cycle for many aircraft types like the B757, B767, B737 NGs. Creative material solutions for supporting cargo operators will be required going forward and interestingly, we just saw AAR acquire nine B757-200 passenger aircraft with 18 Rolls-Royce RB211 engines going to support the cargo market.

And with supply chain problems battering the aftermarket, these conditions will likely force operators to focus on cost effective maintenance solutions and seek alternatives to OEM strategies.



Keith Mwanalushi
EDITOR

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Airbus

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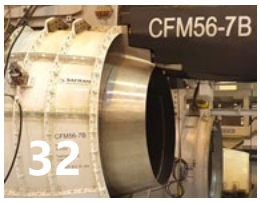

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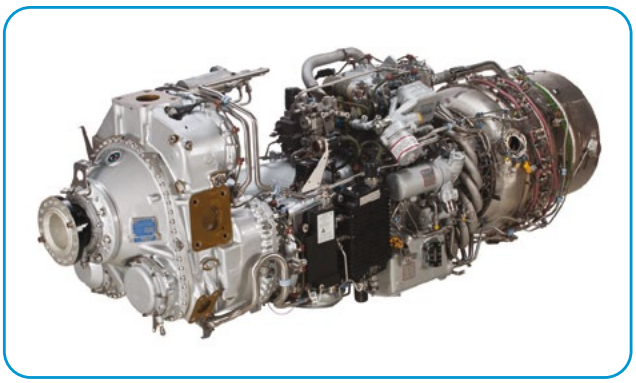

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Lufthansa Technik Turbine Shannon opens new engine parts repair facility

Official opening of LTTS' new facility in Shannon, Ireland © *LTSS*

Lufthansa Technik Turbine Shannon (LTTS) is continuing its rapid growth trajectory in Ireland with the official opening of its new Engine Parts & Accessories Repair (EPAR) facility in Shannon. The new 2,000 m^2 state-of-the-art facility brings LTTS' total capacity for aircraft engine maintenance and repair in the region to 10,000 m^2. This development enables LTTS to expand its portfolio by including Engine Manifolds among its specialist services. The primary function of Engine Manifolds is to distribute air or fluids for optimal engine performance. When manifolds become damaged or worn, it can diminish engine performance and lead to increased emissions. LTTS has been operating in Ireland since 1992. In the past two years alone, the company has added an additional 106 people to its workforce and now employs more than 300 people across its operations in Shannon, Kildare and Dublin. The new Shannon facility has already resulted in the creation of 25 additional jobs and LTTS CEO, Michael Malewski said that as the company continues to grow and diversify, recruitment remains a priority. He highlighted a particular need for more experienced aviation engineers as well as qualified mechanics and engineers from any field interested in moving into the aviation industry. This latest announcement comes on the back of the recent launch of Lufthansa Technik's Mobile Engine Services facility in Kildare.

J&C Aero will provide CAMO support for Heston Airlines' A320 and A330 aircraft

J&C Aero to support 30 Heston Airlines' aircraft with CAMO © *J&C Aero*

J&C Aero, an international aviation design and production company, has signed a three-year contract with Heston Airlines on continuous airworthiness management of the European charter air carrier's current and upcoming Airbus A320s and A330s. The new agreement also covers line maintenance, aircraft delivery, and cabin refurbishment services for the carrier's growing fleet. The new agreement expands the existing cooperation between J&C Aero and Heston Airlines under which J&C Aero's team already provides CAMO support to the carrier's nine Airbus A320s, as well as supports the airline with line maintenance, cabin interior design and production services. Over the next three years, Heston Airlines plans to gradually increase its Airbus fleet to 30 narrow- and wide-body aircraft the delivery, refurbishment and maintenance of which will be provided by or with the support of J&C Aero.

Vortex Aviation to open new facility in Chicago (Roselle), Illinois

Vortex Aviation will open its new facility in Chicago (Roselle), Illinois, on May 1 *© Vortex Aviation*

Vortex Aviation, a global leader in quick turn commercial aviation engine maintenance, repair, and overhaul (MRO) services, has announced the opening of its new facility in Chicago (Roselle), Illinois (USA), to provide support for engine asset owners, airlines, lessors and cargo operators. This will be Vortex Aviation's fourth strategic FAA and EASA approved facility, expanding the capabilities of the Hospital Shop and Field Services, which provide efficient and customised repair solutions for mature and next-generation turbine engines. These services aim to minimise customers' downtime and reduce direct maintenance costs. The new facility scheduled to open on May 1, 2023, provides comprehensive on-wing and on-site maintenance services, including:

Hospital Shop Services: specialising in quick-turn surgical strike maintenance to get the engine back in service with minimal impact to operations and cost effectively extending the on-wing life of the engine. The Chicago facility will provide top case repair and inspections, boroblend capability, borescope inspections, QEC and stand swaps, engine lease return work scopes and evaluations among other services to include long-term and short-term storage.

Field Service: Vortex Aviation's experienced "on-wing" support team of field service technicians will be available to travel to customers' locations, providing global AOG quick-turn engine maintenance, repairs, and inspections. The Chicago facility will extend the reach of these services throughout the Midwest, offering rapid response to minimise downtime and keep aircraft flying.

AELS acquires first Boeing 777 end-of-life aircraft

AELS has acquired its first Boeing 777 end-of-life aircraft © *AELS*

AELS has bought its first Boeing 777 aircraft for tear-down. The acquisition was realised in partnership with MTU Maintenance Lease Services, which bought the engines, type GE90-115B. The aircraft had its final touch-down at Twente Airport in Enschede, the Netherlands, and will be disassembled and dismantled at the AELS premises by the professional AELS team. By purchasing end-of-life aircraft, dismantling them and serving the global aviation industry with aircraft parts, AELS is uniquely positioned in the circular aviation industry. Now that AELS can add Boeing 777 parts to its inventory, the company is able to serve their customers even better. Since 2006 AELS has been buying end-of-life Boeing and Airbus aircraft that the company disassembles at its own facility. AELS is the only company in Europe that handles the entire supply chain for aircraft that reach end-of-life, from disassembly and dismantling, component management to material recycling. The company is fully AFRA (Aircraft Fleet Recycling Association) accredited for dismantling and recycling of aircraft and holds an ASA-100 accreditation for component management.

Farsound Aviation moves into new UK headquarters

Farsound Aviation's new headquarters in Brentwood Essex, UK © *Farsound Aviation*

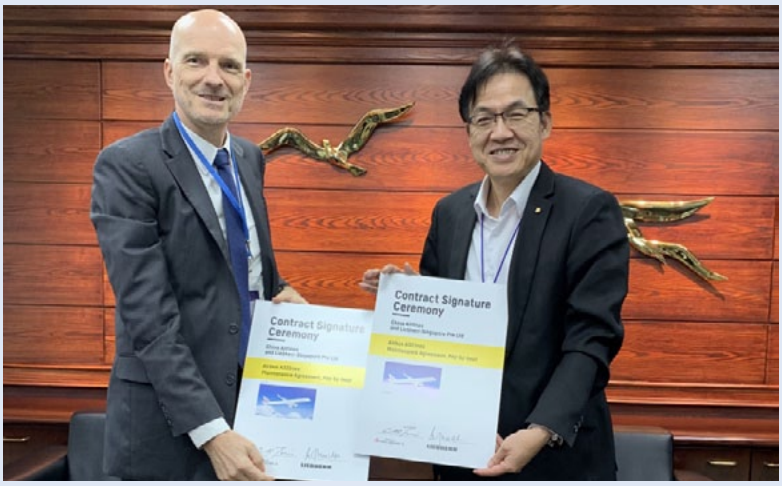
The Farsound Aviation team has moved into their new 58,000 ft² headquarters in Brentwood Essex, UK. The state-of-the art facility is located close to Farsound's old HQ building and has been designed and built entirely from scratch. The building, which is considerably bigger than Farsound's previous HQ, has capacity for expansion, with scope to add mezzanine floors and additional facilities as the company grows and recruits more people across all departments and disciplines. The new HQ building has been designed with sustainability and eco-friendly construction at its heart. Solar panels on the roof provide electricity for power and lighting, EV charge points are installed in the car park for electric vehicles, and reclaimed greywater will be used for flushing toilets. Meanwhile, staff comfort and good-quality working conditions are also key factors, with many aspects of the new building designed to encourage a collaborative culture. Inside, the layout is open plan to allow for flexible working. An on-site canteen provides nutritious meals, while relaxation spaces, games rooms, gym facilities, yoga areas and attractive décor are all designed to enhance the working experience and support the health and wellbeing of Farsound staff. Technology also plays a large part in the new facility with a focus on the latest IT and logistics systems. For example, the operations area in the new headquarter building includes a £1.2 million robotic system for the automatic picking of aerospace parts.

De Havilland Canada enters into new service agreement with Fokker Services

De Havilland Aircraft of Canada (De Havilland Canada) has entered into a new agreement with Fokker Services Group (Fokker Services), extending the existing De Havilland component solutions arrangement for an additional five-year term through December 2027. Fokker Services will continue to offer its expertise and services during this extended period. Fokker Services has consistently proved to be a valuable strategic partner and, in further developing this partnership, De Havilland Canada has announced that Fokker Services is providing third-party logistical (3PL) services to support De Havilland Canada's aftermarket business. Under the terms of the agreement, Fokker Services provides a 2,550 m^2 (27,000 ft^2) warehouse in Amsterdam and 3PL operations to support De Havilland Canada's hub and spoke parts distribution model. The warehousing services provided by Fokker Services include inbound receiving, put-away, picking, packaging and shipping, as well as quality control. These partnerships ensure the delivery of enhanced services to De Havilland Canada's operators. Combining the distribution centre and component solutions in a single location will enable the company to deliver a more efficient and effective customer service experience. De Havilland Canada has established four distribution centres to support the global fleet of more than 1,100 Dash 8 aircraft. In addition to the depot in Amsterdam, distribution centres are located in Calgary, Singapore and Sydney.

Model-based AI company **Aerogility** is accelerating its expansion into the Americas and forming a strategic partnership with major Connecticut-based aerospace solutions provider **Tsunami Tsolutions**. With Aerogility gaining traction among airlines across the Americas, Tsunami Tsolutions was identified as the ideal implementation partner. Tsunami's strong industry presence, an established partner of partners, and excellence in software implementation and data migration will allow customers to rapidly and successfully adopt the Aerogility solution. Mark Lewis, Airline Partnership Manager, Aerogility, says: "With Aerogility growing rapidly within the U.S. and across the Americas, it was clear we needed an implementation partner to respond to significant interest in our solution. Tsunami proved a perfect fit, with an exceptional reputation and customer base. This partnership is a real vote of confidence in Aerogility's technology from a company that has a strong track record in enabling airlines to generate real value from their data." Joseph LeVasseur, Executive Vice President Sales and Marketing, Tsunami Tsolutions, says: "We're big believers in the Aerogility solution – it's already a well-established technology and our partnership will support Aerogility in achieving its significant potential and realising its strategic goal to build its presence throughout the Americas."

Liebherr and China Airlines sign agreement on A321neo component support



Contract signing ceremony between China Airlines and Liebherr Aerospace © *Liebherr*

Liebherr Aerospace (Liebherr) and China Airlines have entered into a long-term agreement, under which the OEM Liebherr-Aerospace will provide repair support services for a wide range of air conditioning and bleed system components installed on China Airlines' fleet of 25 Airbus A321neo. All material support and component maintenance services will be provided by Liebherr-Singapore, Liebherr-Aerospace's dedicated service centre for the Asia-Pacific region. Liebherr-Aerospace and China Airlines signed a contract that underlines the close relationship that China Airlines has built up with Liebherr-Aerospace since many years. "We really appreciate Liebherr's service and place our trust and confidence in the company. We want to continue our long-term partnership and thus decided to choose Liebherr as our service provider for the component support on our new Airbus A321neo fleet", commented Jason Tsai, Vice President Engineering at China Airlines. China Airlines is the largest airline in Taiwan, headquartered in Taoyuan International Airport. It operates short, medium, and long-haul services to international and intercontinental destinations across Asia, Europe, North America, and Oceania. Further subsidiaries of the China Airlines group of airlines include Tigerair Taiwan as well as Mandarin Airlines.

VistaQuote now uses the power of Artificial Intelligence (AI) © *Ambry Hill Technologies*

Ambry Hill Technologies has announced that **VistaQuote** now uses the power of Artificial Intelligence (AI) to automatically understand and process human-typed, freeform emails into the www.Vista-Quote.com platform just like any other RFQ. This capability is available right now in VistaQuote and is a shining example of putting the power of AI directly in the hands of end-users to create real-world and practical benefits. The gap in technology, where AI is a perfect fit as a solution, is in the recognition and processing of the non-marketplace and non-listing service RFQs. VistaQuote has been great for processing marketplace and listing service RFQs, but what about the random RFQ emails typed by a human that is asking for availability and pricing? Cole Davisson, Vice President of Software Innovation at Ambry Hill Technologies explains: "VistaQuote already had the ability to auto-quote RFQs based on a feature-rich selection of customisable parameters. Now imagine pairing the auto-quoting with our AI recognition of human-typed RFQ emails. This exciting combination of AI and auto-quoting means that RFQ emails are recognised, interpreted, have the data extracted, are made into an RFQ within VistaQuote, and within seconds the customer will receive a quote without a human shepherding it throughout the entire process." When the AI in VistaQuote successfully extracts the information from an email, VistaQuote can kick off a variety of automations like dispatching it to the appropriate salesperson, executing an export compliance check through Descartes 700+ restricted third-party databases, or check inventory availability. All this is to stage the RFQ/RFP for immediate action.

TUI Airline, a European leisure airline, has selected AVIATAR, **Lufthansa Technik's** innovative digital platform for its Boeing aircraft health management requirements. TUI's five airlines from the United Kingdom, Scandinavia, Belgium, the Netherlands and Germany are using AVIATAR's Condition Monitoring application to manage its fleet of around 130 aircraft. TUI's decision was made following a project for proof-of-concept to foster system alignment across its maintenance operations, which has proven the advantages of AVIATAR solutions for TUI Airline. Focusing on Technical Operations (Tech Ops), AVIATAR digital solutions for Boeing 787, 737-800 and 737-8 aircraft enable TUI's MOC (Maintenance Operations Control) engineers to monitor and predict the technical condition of the airline's fleet. Building on latest technology and customer centric developments, the new partnership allows TUI and AVIATAR to deliver future-proof solutions. The MOC called "Maintrol" at TUI is located at its UK headquarters at Luton Airport. "Working closely and hands-on with our engineering and maintenance teams, the AVIATAR team supported the transition from the previous system. They have been able to facilitate the transition by providing a straightforward and dynamic system for in-service defect troubleshooting. With the AVIATAR team's continued cooperation on how to tailor and adapt the Interfaces to TUI's evolving system landscape, we have built a strong and trusted relationship in just a few months," said Niklas Kropp, Project Manager E&M, Transformation & Change, TUI Airline. "With AVIATAR we are able to enter a future-proof, innovative relationship characterized with short, agile development cycles and providing our people access to state-of-the-art digital technology."

TUI has opted for LHT's AVIATAR health management solution © *Lufthansa Technik*

StandardAero to provide Brazilian Air Force with comprehensive Rolls-Royce AE 3007 MRO services

StandardAero has been selected by the Brazilian Air Force (Força Aérea Brasileira or FAB) to provide comprehensive MRO services for the Rolls-Royce AE 3007 engines powering its fleet of Embraer ERJ-145 aircraft. Under the exclusive multi-year agreement, StandardAero will provide MRO services for FAB's AE 3007A-equipped fleet from its Maryville, TN location, which is an OEM-approved Authorized Maintenance Centre (AMC) for the AE 3007 family of engines. StandardAero's 154,000 ft^2. Maryville facility has supported the AE 3007 since 1997, and today supports more AE 3007 engines than any other company worldwide. The Brazilian Air Force utilised the locally made ERJ-145 for a number of different operational platforms, including liaison transport (C-99A) and VIP transport (VC-99A/B/C). StandardAero is the only U.S.-based AE 3007 AMC, with full approval for all variants including the AE 3007A (ERJ-145 family), AE 3007 (Citation X) and the AE 3007H (supporting the U.S. Government's Global Hawk family). The company has extensive in-house repair capabilities for the engine, which enables it to provide customers with industry-leading turn-times, lower engine operating costs and world-class customer support. StandardAero supports all three members of the Rolls-Royce AE engine family: the Maryville facility also services the AE 1107 turboshaft engine, which powers the Bell-Boeing V-22 Osprey tiltrotor aircraft, and in conjunction with the company's Winnipeg, MB facility, supports the AE 2100 turboprop, which powers the Leonardo C-27 Spartan, the Lockheed Martin C-130 J / LM-100J Super Hercules and the Saab 2000 regional aircraft. In addition, the Maryville facility also supports the MT7 marine gas turbine for the U.S. Government, which powers the Textron LCAC 100-class-Ship-to-Shore Connector (SSC).

Turkish Technic will perform base maintenance services on five Boeing 777s of the Emirates fleet
© *Turkish Technic*

Turkish Technic, the Istanbul-based maintenance, repair and overhaul (MRO) provider, has signed a base maintenance agreement with **Emirates**, one of the largest Boeing 777 fleet operators. Under the terms of the agreement, Turkish Technic will perform base maintenance services on five Boeing 777s of the Emirates fleet. The base maintenance operation of the first Boeing 777 commenced at Turkish Technic's Istanbul Ataturk Airport facilities on April 1. The other aircraft within the scope of the agreement will undergo base maintenance operations in the upcoming months. Turkish Technic, an association of the Turkish Airlines Group companies, is one of the leading aviation services providers, where comprehensive maintenance, repair, overhaul, modification and reconfiguration services are performed with a highly qualified workforce of 9,350 staff within Istanbul Ataturk Airport, Sabiha Gokcen Airport and Istanbul Airport facilities on two separate continents. Aside from its engineering and maintenance activities, Turkish Technic supports aircraft operators and owners globally with encompassing component pooling, design, certification and production services.

CFM International and ST Engineering sign CFM-branded business partnership

CFM LEAP-1B engine at ST Engineering's engine MRO facility in Singapore
© *ST Engineering*

CFM International and ST Engineering's Commercial Aerospace business have signed a CFM-branded service agreement (CBSA) for LEAP-1A and LEAP-1B engines. Under the terms of the CBSA, ST Engineering will provide the full scope of LEAP maintenance, repair & overhaul (MRO) services for operators worldwide. ST Engineering is the first provider in Asia to join the LEAP MRO network under a CBSA agreement. Comprehensive MRO services will be provided at its engine MRO facility in Singapore. ST Engineering has been a LEAP MRO network provider since 2020, providing quick-turn services for the LEAP-1A and LEAP-1B engines. The group will also add test cell capabilities for LEAP-1B engines this year. This CBSA agreement further expands its scope to provide a full range of maintenance solutions for LEAP engines to the highest standards. CBSA licence holders are conferred the highest level of CFM support and training, as well as expanded access to proprietary overhaul and repair technology as they work with CFM customers globally to provide comprehensive maintenance solutions. Given the commercial success of the LEAP engine family that entered commercial service in 2016, the demand for LEAP MRO services will grow rapidly in the coming years. More than 5,000 LEAP engines have been delivered to customers worldwide, with over 10,000 engines still in the backlog. The advanced CFM LEAP engines continue to set industry standards for fuel efficiency and high asset utilisation rate and have accumulated more than 29 million engine flight hours and over 13 million cycles in commercial operation. The engines provide up to 20% better fuel consumption and lower CO2 emissions, as well as a significant improvement in noise compared to previous-generation engines. Since its entry into service in 2016, the LEAP engine has enabled operators to save more than 20 million tonnes of CO2 compared to previous-generation engines.

Two 10-year-old 787-8s have been disassembled simultaneously.
© EirTrade

Value propositions create opportunities for part outs

Keith Mwanalushi speaks to Lee Carey, Vice President, Asset Management at EirTrade Aviation about the first disassembly of the Boeing 787 and the market trends for used serviceable materials for newer aircraft.

In February, Dublin-based EirTrade Aviation unveiled the first known disassembly of the Boeing 787 – two 10-year-old aircraft have been disassembled simultaneously off-site, with parts expected to be available by the time of this publication.

Online sources have suggested the B787s were previously in storage and operated by Norwegian.

The first two 787-8s to be retired marked a milestone for the industry but are not entirely surprising considering the market shocks that have hit the aviation industry in the last few years. For the B787, Lee Carey Vice President, Asset Management at EirTrade says the value proposition and supplying the market with more options for used serviceable materials (USM) were the key factors in deciding to pursue the project.

Lee Carey Vice President, Asset Management at EirTrade

"The driver of those aircraft going into teardown was very much to do with the value proposition in terms of part out, and the value of those aircraft as a teardown versus other alternatives like putting the aircraft back into service," he tells *AviTrader MRO*.

Carey believes some of the reasons the value proposition is so strong is the timing relating to the first deliveries of the B787-8 aircraft which are expected to go in for the first 12-year heavy checks this year, same as the overhaul interval on the landing gear which is also at 12 years and lined up with the heavy maintenance checks. These factors will likely create significant opportunities for material consumption for the market.

Obviously, the B787s are still new aircraft, so there is very little used serviceable material on the market and EirTrade project a significant amount of

demand for material coming down the pipeline because of the lack of material and supply chain issues. "Many operators don't have much option over the supply of new material now, there is perhaps some serviceable material that is being supplied by the OEMs currently through exchange programmes. So, this is the first large source of independent material for the 787s that is available and will hopefully contribute towards reducing maintenance events somewhat for those aircraft owners," he anticipates.

Carey is mindful that the disassembly of just two aircraft will not make a huge overall impact in terms of supporting the demand for B787 material, but it's certainly a start. He says issues around the supply chain with new material will only increase the demand for the USM coming off these aircraft.

Aircraft OEMs will tend to keep a strong grip on spares and pricing especially where there is limited supply so EirTrade will be studying this closely. "Currently we are just entering the market and our strategy is to discount what is currently available for operators to give a more economical solution for their maintenance events."

Carey adds that the company is keen to establish itself as the leader in terms of serviceable material for the B787.

Back in February 2020 EirTrade took delivery of an A380 aircraft for part out following the Covid crisis that saw them enter early retirement. Several operators have now returned their A380s back to service. "We disassembled the Ex. Air France A380 aircraft but I think that aircraft is a very different product and the B787 will have a very different lifecycle."

While a lot of operators have brought the A380 back, many in the industry question how long they will continue operating them and besides the big flag carriers in the Middle East, it's hard to see those flying for a long period of time.

Carey comments: "But with those aircraft going back into service, we have seen an uptick in demand for that material, however they are two very different products and we see them entering a tear down process for very different reasons."

In terms of feedstock supply for future B787 disassembles Carey indicates that EirTrade will continue to examine future opportunities to acquire more B787 aircraft. "I think it's a case of having to identify a unique scenario where the value proposition makes sense and certainly it's something we are looking at because we want to cement ourselves as the USM market leader on the Boeing 787." Despite the demand, Carey acknowledges that future acquisitions may not be easy to come by.

Over the last several months EirTrade have worked on building relationships with shops that might have repair capability on this aircraft and Carey reports that things are looking positive. "We are very excited to be the first to market with the B787 following our involvement with the first A380s to go to tear down and we were one of the first companies to disassemble the CFM56-7BE so we are no strangers to being the first to market on a product."

EirTrade has been ramping up its aircraft disassembly activities at its facility in Knock, Ireland West, focusing on Airbus and Boeing aircraft. Carey, believes that the company's proven track record and global network were pivotal in securing the B787 deal and says the targeted relationships with airlines, MROs and OEMs on the B787 platform were crucial to securing this project and maximising the value of the two aircraft.

EirTrade project a significant amount of USM demand from 787 operators. © *EirTrade*

> **"Currently we are just entering the market and our strategy is to discount what is currently available for operators to give a more economical solution for their maintenance events."**
>
> *Lee Carey, EirTrade Aviation*

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> **"We are also supporting fleet transitions as one of the areas in demand in the MRO market currently."**
>
> *David Doherty, Etihad Airways Engineering*

Etihad Airways Engineering are expanding capacity to meet global demand for MRO services.
© *Etihad Airways Engineering*

Partnerships pave the way for one-stop solutions

Etihad Airways Engineering are expanding capacity to meet global demand for MRO services including collaborating with industry players likes AMROS Global for value added services such as aircraft transition solutions as *AviTrader MRO* reports.

Etihad Airways Engineering announced a string of new developments and partnerships recently. The Abu Dhabi-based MRO is making big bold moves with plans of to build two new widebody hangars onsite to serve more aircraft at its existing facility.

David Doherty, Acting VP Commercial at Etihad Airways Engineering tells *AviTrader MRO* that heavy maintenance continues to be in high demand due to aircraft returning from storage after the pandemic – "Our hangars are fully utilised, with intensive maintenance checks on the main Airbus and Boeing platforms including 12-year A380 checks." He says the MRO company is working on a range of retrofits outside of the normal C-check requirements as airlines look to consolidate their fleets and standardise their products. "We are seeing a high demand for aircraft painting as aircraft parked for an extended period are returning to operation, and many rebranding projects are being undertaken by large airlines. We are also supporting fleet transitions as one of the areas in demand in the MRO market currently," Doherty observes.

In March, the company announced an ambitious project to expand the capacity of its 500,000 sqm aircraft maintenance facility adjacent to Abu Dhabi International Airport in collaboration with Aircraft Support Industries. The new hangars include extending the existing 2-bay A380 hangar 6 with one more bay, and a new 2-bay hangar 7. As Doherty explains, hangar 7 will predominantly support an upcoming passenger-to-freighter (P2F) conversion programme while hangar 6 will expand capacity for third party operators.

David Doherty, Acting VP Commercial at Etihad Airways Engineering.

According to Doherty, hangar 7 is being constructed specifically to support the P2F conversion programme. He says it is equipped with the requisite infrastructure to support such a large conversion programme with extensive docking and lifting equipment. In terms of timescale, it's expected to be operational by the end of 2023.

"We have seen an increased demand in the A380 business from our third-party customers as well as internally with Etihad

Airways taking the decision to return its A380s aircraft to service." Doherty noted that with the A380 maintenance business, although there is a short-term market, it remains to be seen how long that market will exist as there are no new aircraft being produced. "Certainly, the market will not grow in terms of fleet size and as aircraft operators find alternate solutions in terms of aircraft type that fit their business model, we would expect the A380 to be retired from fleets over the next six to ten years."

Etihad Airways Engineering have teamed up with the AMROS Group, to offer transition Continuing Airworthiness Management Organisation (CAMO) services as a part of its comprehensive suite of aircraft maintenance and engineering solutions. Giuseppe Renga, Group CEO at AMROS explains that transition CAMO emerges from the requirements from aircraft owners to maintain their assets in a controlled environment, for instance during lease transitions or parking and storage periods to manage its airworthiness – "The goal should be to facilitate the asset transfer to various operators or owners and make sure the aircraft has all the maintenance tasks performed for redelivery."

Renga indicates that one of the benefits of an independent transition CAMO such as AMROS Global is having established and proper procedures, IT systems, and connections with aviation authorities all in place. He also stresses the importance of having the same goals in mind with partner MROs. "By having an exclusive CAMO partner, it benefits the MRO be relying on deep mutual understanding, established quality systems and short communication channels, which ultimately benefits the joint goal towards the customer," he states.

Giuseppe Renga, Group CEO at AMROS Global

Etihad Airways Engineering and AMROS teams at MRO Middle East. © *Etihad Airways Engineering*

Change of lease transactions can be problematic if not managed effectively and as Renga highlights, a good redelivery starts with the phase-in of an aircraft into the fleet with proper planning before redelivery – "If the phase-in is done properly, risk at redelivery can be reduced substantially. Frequently, lease agreements are not properly integrated into asset management of aircraft, which results in substantial expenditures at redelivery of aircraft." Renga adds, for operators, this could mean redelivery delays, penalty fees, unplanned components, material purchases and maintenance fees and for aircraft lessors, the costs could easily lead to the delay in delivering the aircraft to new customers, as with a potential asset value reduction due to missing documentation, data for example.

Renga reckons the combination of Etihad Airways Engineering as a Part-145 MRO and AMROS Global as Part-CAMO, is a win-win scenario with an established role in the parts and material supply-chain. Despite that, the global industry has been struggling from supply chain disruptions and Doherty recognises the nature of the challenges. "Each aircraft type seems to have different challenges in terms of specific components that MROs are finding challenging to obtain. Also, we see that there are certain components that don't seem to be as well supported as others."

At Etihad Airways Engineering, it all comes down to the relationships with suppliers and customers and careful planning while keeping the possible challenges in mind. "With proper planning, we can circumnavigate many of the problems by being prepared beforehand, knowing the materials we would require and letting the supplier know in good time to meet our schedule. As one of the very few MROs with an onsite additive manufacturing facility producing 3D printed aircraft cabin parts, we are able to produce and install cabin parts that may not be easily available in the market or have very long lead times. We are also expanding our additive manufacturing capability to fill in the supply chain gaps and meet the high demand for aircraft parts from our customers across the globe," Doherty states.

Meanwhile, in terms of the current and medium-term outlook for fleet technical services especially from the Middle East region, Renga reports that AMROS are well established in the region and with the collaboration with Etihad Airways Engineering, that will lead to a further expansion of capabilities and network, which is crucial in responding to the strong increase in demand in the Middle East and Asia region, including India.

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Demand for narrowbody work has reached sky high.
© CSAT

Narrowbodies bounce back but all trails lead to more costly maintenance

Narrowbody aircraft will lead in MRO demand and spend over the next 10 years but in the meantime, trends indicate the cost of maintenance is rising and pressure from the supply chain is mounting.

By Keith Mwanalushi

Industry forecasts are indicting that narrowbody jets will consume an ever-increasing share of total spend in every commercial MRO segment. This is clearly evidenced by the ongoing delivery trends from the major aircraft OEMs post pandemic that show the A320/A321 Neo and B737MAX families are leading the delivery tally. These will be the most predominant narrowbody aircraft by 2032.

New narrowbody aircraft supply and deliveries are recovering, but with the continuing lagging supply chain issue, there are multiple impacts to aftermarket services, considers Waleed Sirrag, Director of Technical Services at The Aircraft Group (TAG One Inc.) He says this contributes to delays in the delivery of new aircraft, forcing older assets to remain in service longer than their forecasted retirement. "Older aircraft require more extensive maintenance and aftermarket care, which usually means higher material demand during maintenance and increased turn time during HMV due to the higher MRO manhours that need to be applied during HMVs."

Performing that maintenance is also impacted by delays in delivery of components and parts required for repairs while in maintenance, further

> **"The post pandemic recovery of demand for new narrowbody aircraft is undoubtedly a positive development for the aviation industry, as it signals a strong return to production growth and expansion but with that come challenges."**
>
> *Waleed Sirrag, The Aircraft Group*

Waleed Sirrag - Director of Technical Services, The Aircraft Group

OEM piece part shortages are an issue on some new build narrowbodies.
© Ascent Aviation

delaying redelivery and increasing aircraft downtime. When factoring in the increased competition for limited available parts, Sirrag sees that prices are driven up increasing the overall cost of the maintenance visit.

"It is a compounding cycle. That said, the post pandemic recovery of demand for new narrowbody aircraft is undoubtedly a positive development for the aviation industry, as it signals a strong return to production growth and expansion but with that come challenges that need solutions," suggests Sirrag.

At Ascent Aviation Services, they are seeing a lot more maintenance on classic aircraft that operators may have intended to retire, but cannot be due to newer generation issues, and Scott Butler, Chief Commercial Officer says these larger checks are causing their own capacity crunches across the industry.

Butler sees plenty of aircraft going beyond their expected retirements – "These checks are usually quite large and may have a lot of findings, so we need to be careful in our planning to make sure these large checks don't impact other projects," he states. There is also demand for traditional heavy maintenance work and in addition, Ascent are trying to keep some MRO capacity available for storage and transition operators so that the aircraft can leave with as much green time as possible.

However, Butler observes that all trends are leading to more costly maintenance. "Supply chains are lagging; labour rates keep increasing and capacity is strained, and I don't foresee a slowdown in rate increases in the near term either."

Scott Butler, Chief Commercial Officer, Ascent Aviation Services

Speaking to experts at Iberia Maintenance, they believe in the short term, the new aircraft deliveries don't seem to impact heavy maintenance services, apart from OEM piece part shortages, which is an issue they face currently. Stock levels have not yet recovered and parts demand for both, new aircraft and aftermarket services, could add more pressure on providers, delaying new deliveries and extending maintenance TATs.

It's worth highlighting two key factors that can make a difference in reducing supply chain issues' according to revelations from Iberia Maintenance; these being expertise and deep in-house capabilities and the Madrid-based MRO stands out in both. The expertise allows the early prediction of resources and key materials required for aircraft maintenance or repair. In the coming years, Iberia Maintenance anticipates that AI-driven solutions will also improve this, but right now, this is one of the best assets to tackle the current supply chain

Many aircraft previously in storage are coming out for refurbishment and painting. © *Vallair*

Malcolm Chandler, Head of Commercial and Marketing at Vallair

issues. Meanwhile, the deep capabilities for in-house repairs make the MRO less dependent on market changes.

Vallair, the specialists in mature aircraft support are actively working on several aircraft that were scheduled to be phased out and like all MROs are managing delays in the supply chain. Malcolm Chandler, Head of Commercial and Marketing says the company is working around these issues by developing flexible workscopes that enable Vallair to meet turnaround times.

As Chandler observes, aircraft previously in storage are coming out for refurbishment and painting, and Airbus repossessions are arriving from China ready for lessor transitions. "Yet, more are being placed in temporary storage due to engine problems. There is a lot of movement with new aircraft as well as older models," he says.

At Vallair, they are seeing A320/A321 ceos that were scheduled to be phased out coming into their MRO centre in Montpellier for major modifications and reconfigurations. Chandler says operators are seeking an extra four years of life. Galleys, lavatories, bulkheads and other heavy-duty areas are all being replaced – "We anticipate that this variety of work will continue for a while."

In terms of hangar space, Vallair have received plenty of late requests but there is no extra capacity. "Any delays with MRO inductions just exacerbate the problem. This situation is not stopping any time soon and it will cause operators to compromise on quality of skilled services like aircraft painting, just to get their aircraft flying," Chandler continues.

The experience at Czech Airlines Technics (CSAT) echoes much of the industry momentum. Chief Executive, Petr Doberský mentions lagging supply chains and long delivery dates as some of the challenges currently.

"Because these aircraft are getting older, it creates both opportunity and pain on the MRO side. Older aircraft need more maintenance which is better for MRO but concurrently, the probability of unexpected findings rises potentially causing problems in the effectivity of the

> "The cost of material, electricity, workforce, and so on have risen strongly and cannot be fully absorbed by higher efficiency or profit margins."
>
> *Petr Doberský, Czech Airlines Technics*

Petr Dobersky, CEO at Czech Airlines Technics

repair performance and meeting TAT," Doberský comments.

Currently, the observation at Iberia Maintenance is that supply chain issues are slowing down aircraft deliveries, which is causing an unexpected lack of aircraft to match the forecasted demand, and consequently, some airlines have decided to extend the lease contracts for some older aircraft that were originally planned to undertake end of lease process. Although this solution can solve part of the challenge, increasing the fleet availability and rising workload for the MRO, the industry must consider that the major risks are the findings associated with ageing fleets and the potential impact on TATs due to supply chain shortages.

Sirrag from The Aircraft Group notes that aftermarket service specialists and used serviceable material providers focused on older fleets can leverage their expertise in servicing older aircraft and provide cost-effective "sunset fleet" solutions. Kellstrom Technical Services Group (KTSG) for example, has a strong reputation in the industry for its expertise across broad base of MRO services like aftermarket material supply, engine repair, and MRO and HMV management through The Aircraft Group.

KTSG has developed a range of innovative solutions to extend the lifespan of older aircraft and reduce maintenance costs. Offering those types of innovative solutions, as Kellstrom does, should bring needed opportunities to provide those specialty services and help operators and MROs as the industry continues its recovery and return to per-pandemic levels.

Dealing with hangar and MRO capacity

Some airlines are still pulling aircraft out of storage following the pandemic but not seeing enough hangar and MRO capacity to meet the demand to return aircraft to service (RTS),

As aircraft re-enter service, the already stressed MRO HMV capacity situation has become even more critical, and labour challenges at MROs to perform RTS work continues to put additional pressure on

Iberia Maintenance are supporting operators to return aircraft back to service. © *Iberia Maintenance*

MROs. Sirrag says the combination of increased demand to bring aircraft back into service, especially narrowbodies where the highest post pandemic demands remain, and continuing MRO capacity (slot) constraints created a backlog for RTS and HMV services.

"To address the continuing strain on MRO capacity and labour constraints, one trend has been to independently source maintenance teams from third-party providers focused on RTS work to augment available MRO labour," Sirrag suggests. "The goal is to return their aircraft to service quicker and get them moved into maintenance sooner, wherever there is a slot. That said, even where an MRO may have room for the aircraft, they struggle to apply the needed labour in enough quantity to achieve turn times to clear the current backlog."

It's worth noting that most operators are already flying at pre-pandemic levels or even above, but there are still a few aircraft in park and storage conditions waiting for an available slot to be returned to operation. At Iberia Maintenance they have seen trends in heavy maintenance in Europe showing demand for MRO services is above the capacity in the market. "In our case, we always try to adapt to the needs of our customers. Last winter season, Iberia Maintenance supported its customers to increase the number of operating aircraft in their fleets and returned into operation 38 Airbus A320 family aircraft to our customer base," a spokesperson in Madrid revealed.

MRO costs and external influences

The macroeconomic pressures, especially inflation, has seen a significant effect on cost at CSAT and Doberský believes that's the case at other MROs. "The cost of material, electricity, workforce, and so on have risen strongly and cannot be fully absorbed by higher efficiency or profit margins," he says. Sirrag also notices costs of heavy maintenance rising. He says there is pricing pressure from every aspect that impacts MRO services; labour, material, shipping, compliance, everything that influences cost of performing heavy maintenance and from a macrocosmic basis, he does not see those easing for some time to come.

"Ultimately it is the passengers that will pay the price," comments Chandler. "From an MRO perspective we are under pressure from airlines and lessors to keep prices steady, but we do have escalation clauses in our contracts and can always refuse the work if it is not economically viable," he states. However, Chandler highlights that customers will often be realistic about managing the situation – "At Vallair we do our best to remain flexible and always look to find ways that we can deliver greater efficiencies and better value."


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Strong resurgence sparks increased demand for MRO in the **Americas**

There is a strong resurgence in demand for airframe and engine material. © *DFW*

By Keith Mwanalushi

By all indications, the North American MRO sector is seeing a strong comeback but pressures on the supply chain, material availability and technical labour shortages are just some of the key areas that will require smart solutions.

Demands for MRO and aftermarket services are high especially for materials. Aircraft hangars are operating at full or near-full capacity at most MROs in the North American region. Presently, both MRO and USM aftermarket sectors are performing above pre-COVID levels, suggests James Roché, Vice President of Procurement at Setna iO, indicating a full recovery in the Americas region. He says with 98% of the fleet now in service, the significant increase in volume and prices are expected to continue to rise at a commensurate rate.

"The lucrative opportunities this presents for the aftermarket can be throttled by the pressure on supply chains and OEMs are struggling to produce enough components and piece parts to satisfy demand." Roché indicates that historically, USM has been a cost-effective solution to alleviate new material demand, but a lack of piece part production and safety stock available to repair these materials has held up many components at MROs.

As Roché observes, constrained and limited material availability has led consumers to seek alternatives to OEM

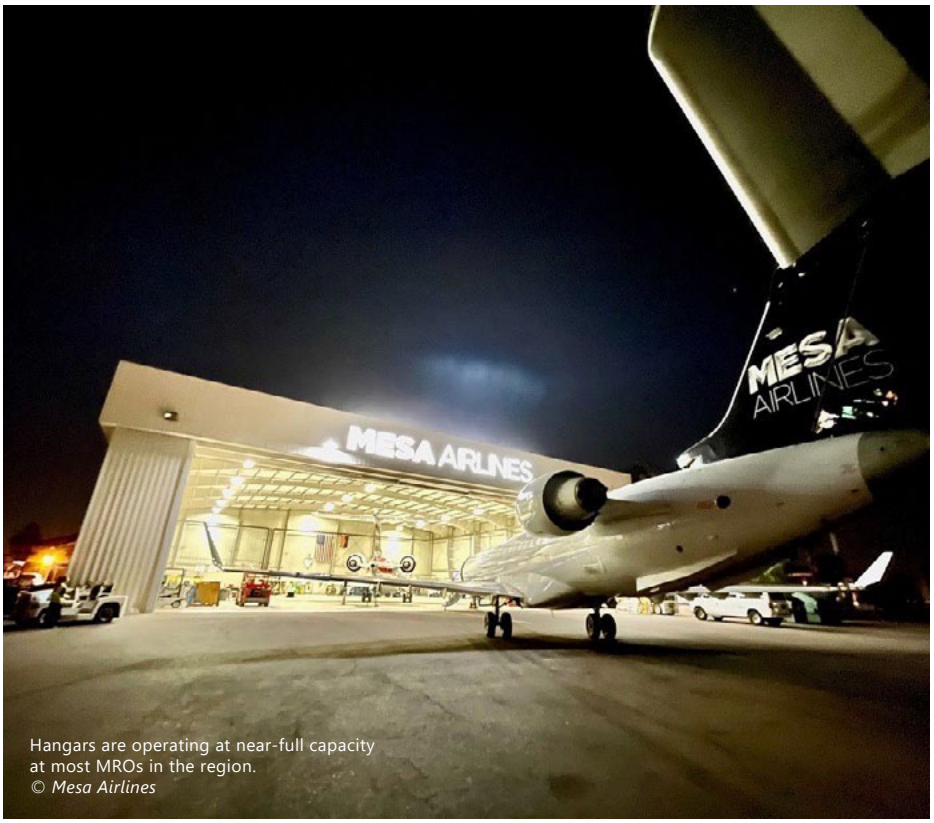
> **"USM has been a cost-effective solution to alleviate new material demand, but a lack of piece part production and safety stock available to repair these materials has held up many components at MROs."**
>
> *James Roché, Setna iO*

products, such as PMA parts and DER repairs. "While both have been around a while, many end-users and lessors have been reluctant to install them on their airframes or engines. OEM material shortages, coupled with some manufactures implementing fourth quarter price increases has helped the marketability of these products due to being cost effective and in stock. Annual catalogue price increases will continue to increase the attractiveness of the alternative options to the OEM," he says.

Also, the industry is seeing ongoing acquisitions and mergers in response to the underscored shortcomings in supply chains, as revealed by the pandemic. Roché believes this innovative vertical integration can lead to better line of sight of material planning, streamlined operational efficiency, economies of scale in purchasing power, reduction of redundancy, and increased global reach – "Many companies, including Setna iO, have founded MROs such as Setnix to bolster their competitive advantage and shorten lead-times for critical components."

Anthony Spaulding, the CEO and President at Magellan Aviation Group indicates that presently, there is a two-fold demand taking place for engines in the narrowbody and widebody space. The CFM56-7B in the narrowbody and GE90-115B in the widebody space is looking for lease or exchange assets to backfill engines removed for performance or LLP expiry due to extended TAT's the MROs are facing. He points to engine demand being exacerbated by new delivery delays for the MAX/NEO/777X aircraft meaning operators are keeping or extending lease terms of aircraft. "This is an excellent opportunity for those in the USM space to trade out of mid-life lease assets in their portfolio to acquire runout exchange assets to support USM demand while managing piece part repair post teardown," says Spaulding.

Anthony Spaulding, CEO and President at Magellan Aviation Group



Hangars are operating at near-full capacity at most MROs in the region.
© Mesa Airlines

He comments that the sustainability question is demand based; when the number of new aircraft deliveries and MRO TAT return to pre-2020 levels by supply chain and labour issues correcting themselves, then end of life asset retirement trading will resume.

Spaulding reckons engines will be in demand until the stabilisation of MRO TAT's and new aircraft deliveries return to pre-2020 levels. "We witnessed the airlines harvesting engines from parked aircraft while pushing off maintenance events to save cash while storing the unserviceable engines until passenger demand returned. Passenger demand has long returned which has now caused the mad dash for SV slots over the past nine to twelve months because the airlines now have the breathing room on their balance sheets to SV engines that have been on hold."

Spaulding says greentime demand is currently at a finite timeframe and until labour and supply chain issues are finally solved, the industry cannot point to a month on the calendar to say "okay, on this date we are back to typical engine lease support."

At EirTrade Aviation, they are seeing a strong resurgence in demand for airframe and engine material needed by both airline and independent MRO facilities in the Americas region that is being driven by increased induction of engine shop visits and airframe maintenance. "The demand for material in support of narrowbody engine shop visits has increased exponentially as well

Bill Thompson - Director, EirTrade USA

> **"We expect that supply chain disruptions will be most evident in extended component TATs from both independent and OEM-sponsored facilities and longer lead times from OEMs for new replacement material."**
>
> *Bill Thompson, EirTrade USA*

as components for widebody-related engine shop visits that have compatibility with cargo aircraft," notes Bill Thompson, Director at EirTrade USA.

Thompson adds that both OEM and independent component repair facilities conversely are struggling to keep up with this increased demand for services from MROs as evidenced by extended TATs that they continue to experience on components that have been routed for repair.

Recent visits by EirTrade personnel to two airline-sponsored engine MRO facilities confirmed that both are operating at or near full capacity with both shops forecasting continued strong demand through the remainder of 2023, with one of the entities expected to exceed the total number of engine shop visits ever achieved based on their current product mix.

"Since we also provide surplus material to MRO facilities in other regions of the world, primarily Europe, and to a lesser extent Asia, we are seeing similar trends with engine shop visits steadily increasing in these regions as well," comments Thompson. He says given the strong demand and current scarce shop capacity in most regions of the world, many of the operators and lessors that EirTrade support are having difficulty securing engine induction slots on certain high-demand engine product lines.

There is hope on the horizon, Scott Butler, Chief Commercial Officer at Ascent Aviation Services notices seeing some improved TATs on routine parts in the aftermarket like consumables and paint. However, he still observes large delays in the engine MROs, safety equipment as well as OEM material.

Post-pandemic, shop capacity at North American MROs looks scare due to high demand but Butler highlights that capacity is being crunched all over, not just North America. "There is a lot of localisation efforts within North America, but EU and Asia have both opened more and this is also becoming fuller. We are also seeing more long-range planning and slot securitisation from the operators," he notes.

Scott Butler, Chief Commercial Officer, Ascent Aviation Services

Butler feels the supply chains will continue to linger as OEMs and MROs are ramping up. He mentions that skilled labour will also continue to be a headwind for the industry in the coming years.

Bill Collins, President MRO Services at HAECO Americas remarks that demand is strong and growing. "Like other regions around the world, we have experienced greater demand since 2020 and we expect that trend to continue."

Collins speaks of the biggest challenge being the lack of skilled technicians and certified airframe and powerplant mechanics. "As that lag continues, we have ramped up our efforts to train and mentor new talents at our facilities to continue providing our partners a safe, reliable airplane. We are focused on retaining a sustainable workforce as heavy demand persists, and internal initiatives like new apprenticeship programmes and training classes are getting us there," he says.

In terms of the limited capacity at MROs, Collins reports that HAECO partners are finding it more difficult to find placement, and flexibility is paramount – "Airlines are planning projects further in advance than we have seen previously, and we will continue to deploy new technology that helps keep our team's planeside to maximise efficiency," he says.

The impact on the supply chain is evident even at HAECO. To stay ahead of potential delays in procurement and delivery, Collins stresses that long range forecasting has never been more important. "We have planned further down the line and continued to buy in larger quantities to ensure supplies are supporting demand despite the challenges," he adds.

Its suggested that engines will be in demand until the stabilisation of MRO TAT's.
© HAECO Americas

Bill Collins, President MRO Services, HAECO Americas.

Exposure to economic headwinds

Much has been discussed about macroeconomic headwinds battering the global aviation industry in conjunction with supply chain problems in 2023. Roché from Setna iO is of the opinion that the largest headwind could be sustained inflation which squeezes the consumer, slowing both passenger and cargo demand. He explains: "Although interest rate hikes by the Federal Reserve are slowing as CPI is reined in, asset prices, material and labour costs, and costs of capital will remain elevated. Juxtaposed to the suppressed ranges we have seen in recent years; inflation presents a noteworthy barrier."

Roché feels that companies like Setna iO who have invested heavily in inventory, personnel, and capacity are better positioned to outpace these headwinds. "Going forward, every node in the supply chain is adversely impacted from aircraft acquisitions and OEM resource procurement to MRO component repair costs and USM sales."

Until inflation subsides, or is mitigated, Roché expects that discretionary travel will decrease for several households and businesses. "In addition, geopolitical uncertainty and supply line disruptions will perpetuate fluctuation in all commodity prices such as jet fuel, crude oil, and various metals utilised in manufacturing, which will continue to strain airline finances and supply chains."

Now, picture the scenario as described by Spaulding at Magellan: If you find yourself as an asset manager with a lease asset that needs a hospital visit, test run or any type of minor maintenance not addressable on the line, then you are in the same situation as the airline customer you are trying to support asking, "when is my induction slot?"

Spaulding states that the parts supply chain would also need to be split into two value streams: engine core material and engine LRU/Accessories. "If your engine needs core material blades, vanes, shrouds and the like for a hospital visit your probably going to see TAT's that

used to be for typical restoration visits. While LRU's can usually be found without too much difficulty, it still requires some work to find the right part in the condition desired."

Spaulding adds that the supply chain has been an equal opportunity offender to every aspect of the engine leasing space that has necessitated the need for creative work scoping to keep engines on lease or available for trade.

Thompson has noticed that many of the component repair facilities, especially the engine-related facilities in the Americas that EirTrade inducts components have not fully recovered from high pre-pandemic production levels as many talented aviation professionals with extensive experience either opted for early retirement or left to work in other industries. "The situation has left several engine component shops with fewer and less experienced technicians."

Thompson says while supply chain problems and delays in the supply of new engine material are typically good for EirTrade given that operators then seek more surplus material, these overall issues do not usually bode well for the overall aftermarket industry given the disruption they cause. He continues: "We expect that supply chain disruptions will be most evident in extended component TATs from both independent and OEM-sponsored facilities and longer lead times from OEMs for new replacement material. Both factors will likely increase engine TATs at MRO facilities further until the situation improves."

Ultimately, the shortage of shop capacity has exacerbated ongoing supply chain disruptions caused by lockdowns, alongside a 14% shortfall of aviation mechanic labour, according to figures given by Setna iO and these two factors have been driving forces behind material shortages in the aftermarket.

As more fleets return to service globally, postponed heavy maintenance checks will be required and as Roché sums up, this directly results in increased shop backlogs and component demand beyond normal levels. "As shop capacity diminishes, the overall life cycle of USM from teardowns is being protracted, creating shortages of supply in the aftermarket with increased demand and this is observed by the increased pricing for most platforms."

Skilled labour will continue to be a headwind for the industry for years to come.
© *Ascent Aviation*

Indications are showing a full recovery in the Americas region.
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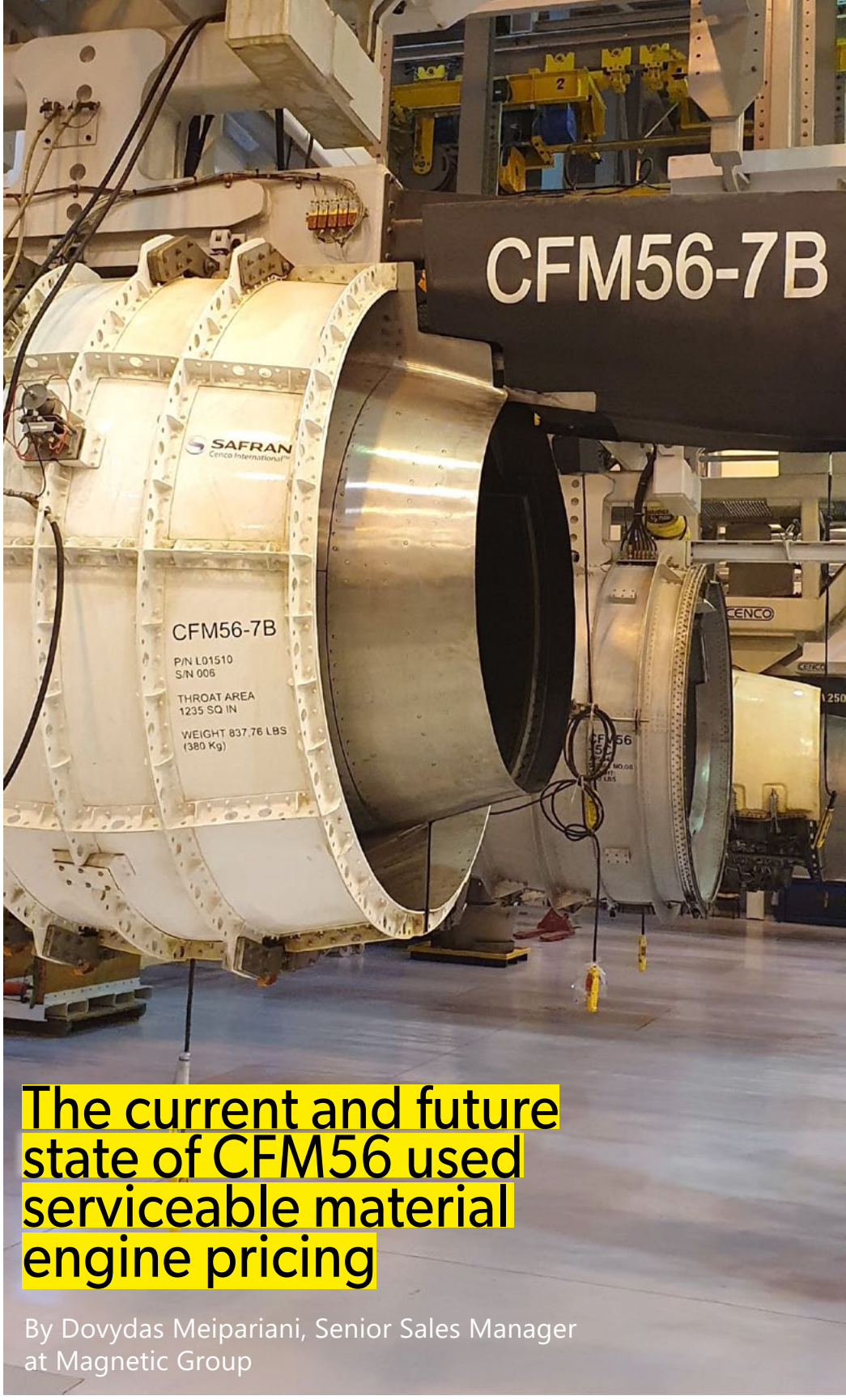


The current and future state of CFM56 used serviceable material engine pricing

By Dovydas Meipariani, Senior Sales Manager at Magnetic Group

Not many -7B engines are available for teardowns. © *Keith Mwanalushi*

The CFM56 USM market had a slow start in 2022. However, as the year progressed, there was a substantial pick-up, especially in the parts market. When analysing our 48 months of data, with insights gathered based on demand and pricing, these two signals indicate a considerable increase in certain parts.

Since the prorated value of LLPs (life-limited parts) with an increase of CLP (catalogue list price) stayed stable, the value of most demanded airfoils in HPC (high-pressure compressor), HPT (high-pressure turbine) and LPT (low-pressure turbine) sections grew substantially.

Growing prices of parts increased significantly throughout 2022 compared to the yearly growth of prices during pre-Covid times. The factors that had the most considerable impact were analysed — concluding with predictions of what the industry can expect in the upcoming 1-2 years for each engine type. For data analysis, we picked the most requested part numbers and compared the average price change per part to the previous year. Due to the large number of part numbers analysed (≈ 150), the parts were assigned to corresponding engine modules and reflect a percentage of the change in comparison with the previous year per module.

Fluctuation in CFM56-5B/-7B pricing

Looking closer at CFM56's most demanded USM (used serviceable material) data, unlike in most scenarios, average prices for 5B fan blades did not increase to pre-Covid levels. On the contrary – the average price per blade experienced a reduction of 13.9% each year, with 2021 showing the most prominent difference.

In 2019, the introduction of SB 72-1080 hiked up the prices even more. In some cases, the pair part number of the blades had a lower CLP than a single overhauled blade in the market. A primary reason for the price change was reduced flight traffic during 2020 due to COVID-19. It increased blade availability in the market,

and businesses trying to get a return on investment and an inflow of cash.

Another dominant reason for the recent price change is the continuation of the saturated market. Comparing the availability of 5B fan blades throughout these years, it became much easier to purchase them, making the competition sharper, hence the slight price drop.

Consequently, it is expected that the price of the fan blades for the -5B engine will moderately rise due to Airbus A321 P2F (passenger to freight) conversion, and TATs (turnaround time) in repair shops, which are higher because of staff shortages and large USM quantities received.

Whilst the price for 7B fan blades grew in the past 2 years, during the start of this year prices lowered slightly, so we expect prices of 7B fan blades to further increase due to not many 7B engines available for teardowns, meaning supply shortages and increased prices.

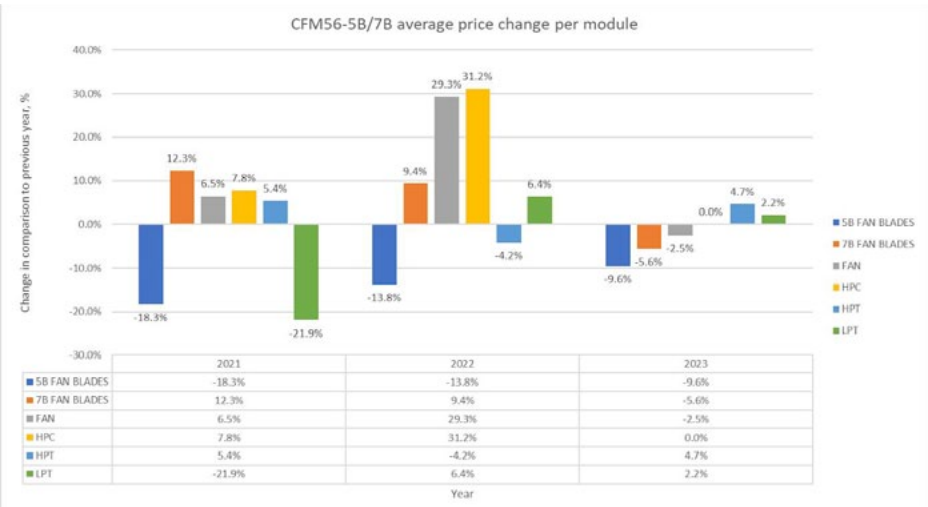
Prices increasing in fan module market

The overall outlook of fan module USM, excluding fan blades, shows a significant increase in average pricing during 2022, with OGVs making the most substantial impact due to a rise in CLP. Historically CLP increase on average is 5-8% each year; however, for OGVs, it increased almost 30% each year, reflecting current market pricing. Unlike -5B/-7B fan blades, -3 fan blades returned to a pre-Covid price level due to repair price growth and scarcity of older tags in the market. The recent prices will likely stay stable with occasional drops, at least until the end of the year. Then, it will slowly start decreasing due to more businesses shifting their focus towards 5B and 7Bs and exiting the -3 market altogether.

But let's delve deeper into the engines, particularly the high-pressure compressor (HPC) USM. For analysis, the most demanded stages of 6 to 9 blades (excluding locking ones), vanes and HPC stator cases were selected. Unlike fan blade prices for 5B/7B, pricing for HPC USM increased on average by 13%. –3 blades grew similarly at 15.6%. The most considerable growth was during 2022, by 31.2% and 21.1%, respectively.

Several impactful factors instigated such a notable increase. First, due to the continued staff shortage, CFM could not deliver new LEAP engines for the 737 Max and A320 family Neos. This meant all operators who expected new 737 Max and A320Neo to replace their NGs and A320 family had to squeeze more cycles out of 5Bs and 7Bs, resulting in more top case/ bottom case repairs and higher demand for HPC blades.

Going back to -3 HPC blades, most of those can also be used for -5B in some cases, making up for the shortages of blades. Yet any pre-SB engine needing top/bottom case repair will require the same part numbers, making blades removed from -3 a viable choice. A



	2021	2022	2023
5B FAN BLADES	-18.3%	-13.8%	-9.6%
7B FAN BLADES	12.3%	9.4%	-5.6%
FAN	6.5%	29.3%	-2.5%
HPC	7.8%	31.2%	0.0%
HPT	5.4%	-4.2%	4.7%
LPT	-21.9%	6.4%	2.2%

Source: Magnetic Group

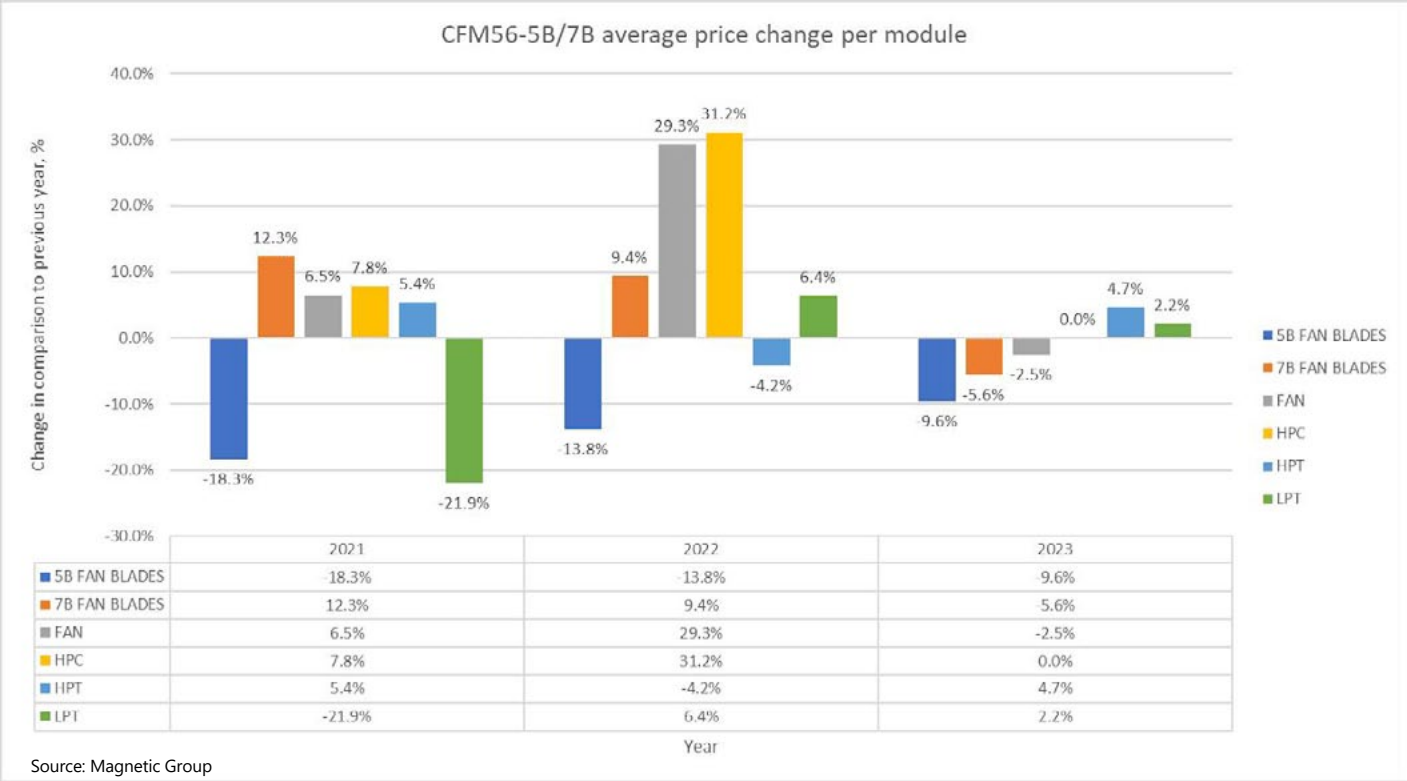
Dovydas Meipariani,
Senior Sales Manager at Magnetic Group

significant repair pricing increase is another reason for the -3 HPC blade pricing growth. The growth of prices is expected to continue and reach a more stable point by the end of the year after the CFMI announced ramping up delivery of new LEAPS to waiting operators.

2023 HPT prices passing 2021 prices

Moving on to the engine's hot section, the high-pressure turbine (HPT), the analysis covers pricing changes of different part numbers of HPT blades, NGVs and shrouds. Interestingly, the data shows a drop in average prices for 5B/7B HPT airfoils, but only in 2022 by 4.2% compared to 2021. The prices have, however, grown throughout the year and by the start of 2023, we already see averages going up to 4.7%, passing the initial price of 2021.

Also, more significant growth numbers for CFM56-3 are seen. The prices for HPT USM grew by 48.64% on average in 2022, with HPT blades making the most notable impact on overall numbers for the -3 HPT section. Based on the gathered data from our engine shop and customers, the analysis shows that throughout 2020-2023 CFM56-3 still occupied quite a few shop slots for major and minor repairs. The most demanded USM are scarce in the



	2021	2022	2023
5B FAN BLADES	-18.3%	-13.8%	-9.6%
7B FAN BLADES	12.3%	9.4%	-5.6%
FAN	6.5%	29.3%	-2.5%
HPC	7.8%	31.2%	0.0%
HPT	5.4%	-4.2%	4.7%
LPT	-21.9%	6.4%	2.2%

Source: Magnetic Group

market with few teardowns happening in 2020-2021, while increasing scrap rates/ repair pricing/TATs drove the prices of the -3 HPT section up.

Predictably, the growth of -3 HPT USM is yet to stabilise by the end of 2023, with quite a few teardowns happening in 2022 and more occurring at the beginning of 2023. As for CFM56-5B/7B, the trend of prices is slowly going up and will likely continue to grow in the upcoming years, especially for HPT blades. The leading cause is them reaching a half and end life of cycles.

An up and down low-pressure turbines market

Lastly, when examining LPT (low-pressure turbine) USM, the most demanded part numbers of LPT blades and NGVs of various stages were discovered. Compared to the HPT module, the picture is a little different, where prices dropped significantly in 2020-2021 by 21.9% for -5B/-7B and 18.14% for -3. However, the market picked up slightly during 2022, with -3 LPT material average prices growing higher than -5B/7B by 14.29%. Prices reached new heights between the end of 2022 and the start of 2023, with an increase of 35.5% compared to 2022. Even though hot section material CLPs have grown by almost 10% on average each year, it did not affect LPT USM the same way it affects most LLP prices due to PRV (prorated value).

As for the -5B/7B LPT material price, the growth is picking up slowly. According to our data, many vendors offer material, so supply usually meets demand. Still, -3 LPT USM is scarcer in comparison, especially for the most demanded part numbers, making it a seller's market. Hence a significant increase in pricing can be observed by the end of 2022 and the first months of 2023.

Both stage 1 LPT blades and NGVs had the most impactful numbers. Steady growth is anticipated for -5B/7B LPT module USM due to more green-time rebuilds taking place. However, we do not expect prices to return to 2018-2019 levels since the -5B/7B USM market is becoming affordable to more businesses. For -3, the expectation is like the HPT module USM, with a slight increase in the top dollar for LPT NGVs and blades.

A promise of recovery in 2023

In the past three years, we have seen the biggest USM market plunge in the last decade, followed by a recovery for specific engines and modules. Among the driving factors are the COVID-19 impact on flight traffic, the inability to use new aircraft (Boeing 737 Max grounding) and the delayed delivery of new engines (CFM LEAP) due to staff shortages caused by the pandemic.

Expectedly, the pandemic was the main contributor to the market dip in 2020-2021, creating a ripple effect which has also affected price recovery/increase for specific materials. Our data suggests that the demand in the 5B/7B USM market will stay approximately the same into this year as -5B/7B is about to reach its maturity – the most profitable phase.

As for -3, it is heading towards the end of its cycle, making a -3 USM a niche market with many businesses turning their attention to 5B/7B USM. As a result, the -3 USM market will start slowly declining in 2023 and reaching its lowest points heading into 2026.

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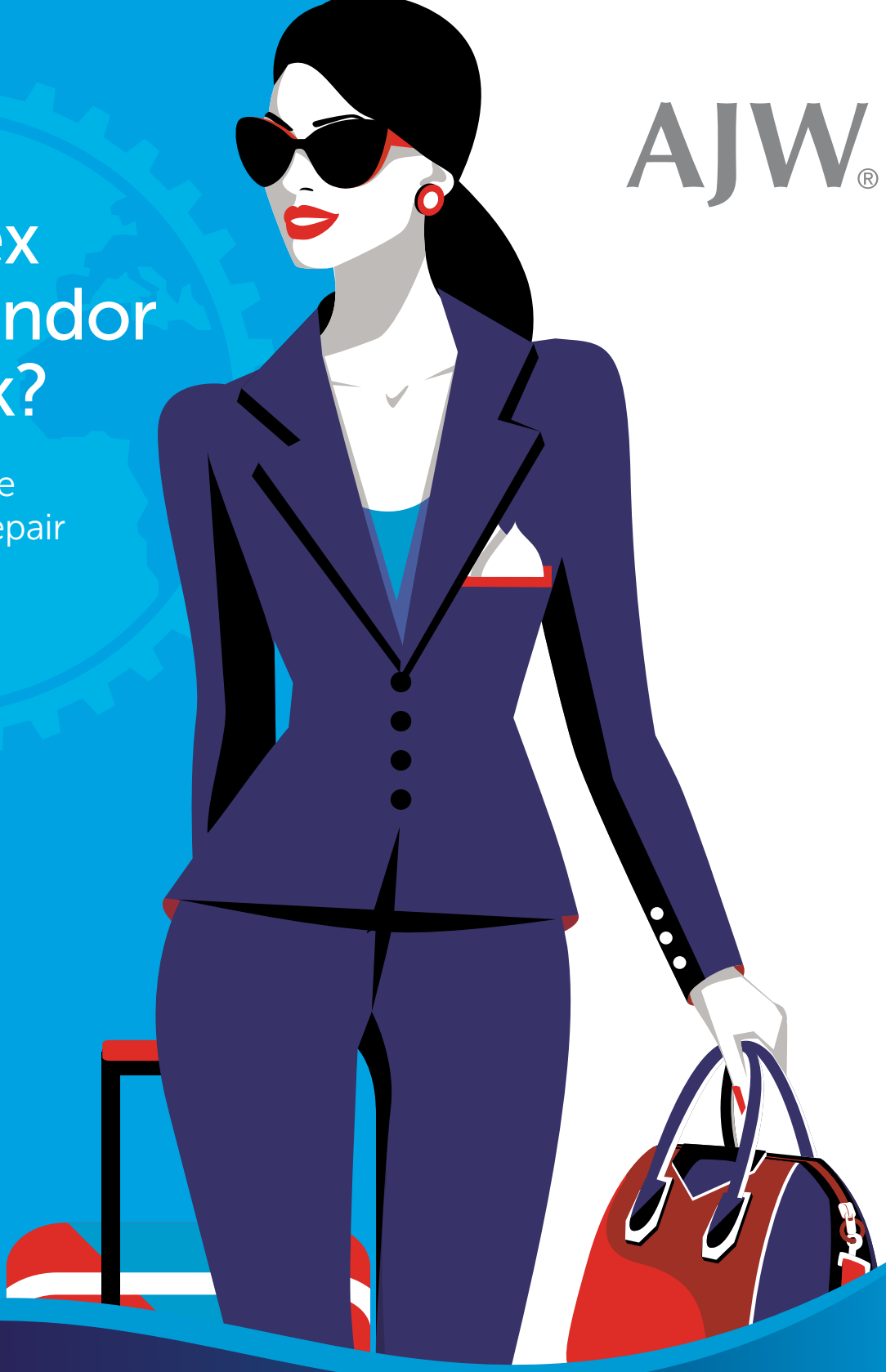

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Q&A

In the hot seat...

John Benscheidt
President
Jet Parts Engineering

John Benscheidt, President at Jet Parts Engineerng

What attracted you to this industry?

Aerospace allows people the opportunity to gain deep knowledge and engage in lifelong learning because of its many aspects and specialties. I'm a person that likes to get into the details and fully understand things, I think that's what initially pulled me into the industry. Our world has benefited from the safety and efficiency of the aerospace industry and I'm proud to be a part of it.

What does a typical day involve in your role?

We are a company with well-defined goals for growth, so I'm often with small groups building out those growth strategies or getting into the details on smaller task-oriented activities. The small stuff rolls up into our larger strategic initiatives, and we make sure to spend the time needed to get the details right and build systems that work for us. The main goal is to keep our customers' needs first and deliver the most value we can with our products and service – that topic gets a lot of focus. The other high focus area is our people. There is plenty of data pointing to how strong workplace environments make or break employee success, so our leadership team is constantly talking about engagement, professional development, and what we can do to foster this. I'm grateful every day for the people I work with and the strength of our team – it makes my days fun!

What are the key services at Jet Parts Engineering?

We are in the business to make aircraft maintenance more affordable for airlines and MROs. We do this by engineering alternatives to OEM parts while maintaining or improving the performance. Our PMA parts and DER repairs are typically focused on solutions to high consumption, high wear, hard to obtain, or high priced OEM parts. Our MRO services focus on pneumatic, hydraulic, electromechanical, and fuel components which fit nicely with the PMA and DER repair offerings. We have a great team of engineers who have developed parts and repairs in most all aircraft systems nose-to-tail. So instead of limiting ourselves to specialised systems, we pursue the pain points the market is experiencing which are typically cost and part availability. These offerings range from complex parts with highly specialised materials and processing to simple gaskets that the OEMs are no longer supporting.

Tell us about your newly approved PMA parts?

We are always coming out with new PMA parts since that's a key driver of our growth. When reverse engineering these parts, we get the advantage to see all of the operational history of the OEM, and use the benefits of hindsight, operator feedback, and the latest technology and materials to develop a replacement. This often leads to improvements in performance over the OEM. One example is a high pressure controller switch for the Boeing 767 which simultaneously satisfies a service bulletin decreasing the number of unnecessary removals while also using a more robust, hermetically-sealed microswitch ultimately increasing reliability. Another interesting group of parts we have released are fuel nozzel gaskets for the LEAP engine; we developed these parts to help our airline partners aleviate the long wait for spare parts while the engine manufacturer works out retrofits due to carbon build up issues they are having.

What's new in terms of DER repairs?

We often see opportunities with electromechanical components such as torque motors, pressure switches, and pushbutton panels since OEMs can tell maintenance to remove and buy new parts without considering a more cost effective repair; this is where DER repairs are a benefit. Within the Jet Parts group of companies, having PMA, DER repairs, and MRO capabilities has been something we have leveraged to provide full package solutions. As an example, the ram air door actuator on the Boeing 737 – we have PMAs on internal components that save cost, a DER repair reducing wear on the housing, and we perform the full overhaul and test of the unit.

What trend are you seeing in terms of part supplies?

There has been a severe backlog of OEM production and support post-pandemic; airlines have been getting squeezed with shortage of supply and are getting creative. PMA parts, DER repairs, and USM have been around for a long time, but we are seeing more operators build these alternative solutions into their supply chain strategies. In the past, the driver was cost avoidance but now operational readiness is a major factor. Its clear airlines are more open to alternatives, however some have been restrained with commercial contracts. Now, they are going back to these contracts and finding they have the right to use alternatives when they are not getting adequate service levels. Its nice to see the power dynamic lean toward the end users since this is what the PMA and DER industry is here for – competition in a free market.

What are you most looking forward to this year?

We have recently acquired two companies – Airline Component Parts and Northeast Aero – to bolster our offerings. Our team sees the value in the acquisitions, and working to fully integrate these companies and uncover more opportunities to better serve customers with comprehensive solutions. More broadly speaking, with the supply chain backlogs and shortages, the benefits of OEM alternatives are being highlighted. Everyone is looking to save money while maintaining the highest level of safety and reliability – we are here to provide that as a leader in the industry.

on the move


Shakespear Nyamande

Joramco, the Amman-based aircraft maintenance, repair, and overhaul (MRO) facility and engineering arm of Dubai Aerospace Enterprise (DAE), has appointed **Shakespear Nyamande** as the new Vice President of Planning. Nyamande is an aviation professional with over 16 years of experience in production control as well as technical and resource planning with prior top positions held in various countries He recently served as the Director of Engineering Finance & Vendor Management at Air Astana, the national carrier of Kazakhstan. At Joramco, he will be leading the Planning department to meet the growth plans designed to give customers a more connected experience. Commenting on Nyamande's appointment, Chief Executive Officer, **Fraser Currie** said, "Joramco is delighted to welcome Shakespear into the senior management team. He will be leading a team of dedicated and experienced colleagues and I look forward to the departments' contribution in delivering against our Vision & Mission statements, especially at a time of significant strategic growth."

Rolls-Royce has announced changes to the Board and Executive Team, adding leaders with proven track records of delivering success and a strong commitment to creating a high-performing, competitive, resilient and growing business.

Helen McCabe will be joining the Board of Rolls-Royce later this year as Chief Financial Officer, bringing more than 25 years of experience in senior finance and performance management roles within complex multinational engineering organisations. She is currently Senior Vice President, Finance for the Customer and Products division of BP.

Rob Watson has been appointed as President – Civil Aerospace with immediate effect. He has spent the past five years building Rolls-Royce's capabilities in electric aviation and during that time has demonstrated his ability to develop new technologies and products within a tight budgetary framework. He joined the Executive Team last year as President – Rolls-Royce Electrical.

As previously announced, **Chris Cholerton** is moving from his position as President – Civil Aerospace to become Group President, having successfully led the Civil Aerospace business through some of the greatest challenges in its history. As part of this role, he will take on executive responsibility for the Group's nuclear operations. This includes Rolls-Royce Submarines, and the role of Interim CEO of Rolls-Royce SMR while a search is conducted for a successor to Tom Samson who, it has been agreed, will be leaving with immediate effect.

Adam Riddle has been appointed President – Defence, and Chairman and CEO – Rolls-Royce North America with immediate effect. Riddle has spent nearly a decade in Defence and played a pivotal role in the recent success of the division in clinching key contracts which will generate multi-year returns. He most recently led its successful global services operations, which account for over half of annual revenues for Defence.


Scott Collier

Chapman Freeborn, the global air charter and leasing specialist, has appointed **Scott Collier** as President – ACMI Leasing to lead the newly formed global ACMI department. Collier brings almost three decades of extensive industry experience to Chapman Freeborn from across all areas of the industry, from airline operations, commercial sectors and tour operating, to running his own successful aircraft leasing company. His breadth of aviation insight has led to his aptitude for identifying potential opportunities in adversity and navigating the more challenging leasing markets globally. In his new role as President – ACMI Leasing, Collier will lead Chapman Freeborn's ACMI teams globally, working closely with them on a daily basis with a key focus on adding value to the company's clients and suppliers and to Chapman Freeborn as a whole. He will also use his wealth of experience to provide advice to Chapman Freeborn's airline partners, building and maintaining open channels of communication across the globe. Collier will report to Eric Erbacher, CEO at Chapman Freeborn.

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