

April 2021

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publications

# MRO

**CFM56**  
Pandemic  
tests engine  
market

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## On the road to recovery

**O**liver Wyman's latest research paper for the aircraft maintenance industry points out some interesting outcomes. The report rightly highlights that for the MRO industry, in the time since COVID hit, has focused on the basics – labour and materials cost management.

Once COVID-19 hit, travel dried up almost overnight; the International Air Transport Association (IATA) pegs the total loss for the sector at a staggering \$118 billion through 2020. The MRO industry recovery is underway, and in this edition, we have focused on the North American region where signs of a resurrection have started to show. It is by no means anywhere close to pre-COVID levels, but the upswing is clear based on industry experts we spoke to across the region. I reckon for now; the industry needs to be less focused on clawing back to pre-pandemic numbers but rather focus on rebuilding a damaged industry.

According to another report by ICF, North America and Asia-Pacific will recover the fastest, at approximately four years. The factors driving swifter North American recovery include the presence of a large domestic market, airlines being in good financial shape entering the crisis, an industry that has already undergone consolidation, and the presence of airline bailouts.

American Airlines' announcement in May 2020 that they are moving forward with investment plans at their base maintenance facility in Tulsa was a welcome development, considering the challenges in the market. Referred to as Tech Ops – Tulsa, the facility holds American's largest base maintenance operation. It conducts almost half of the airline's overall maintenance work on nearly 1,000 mainline aircraft. This is the largest investment ever made at a maintenance location in American history, evidently. Read more about MRO developments in Oklahoma State and elsewhere in our Americas regional spotlight.

It is encouraging though that global COVID vaccination programmes are moving ahead, certainly not at the same pace but news of vaccines now being distributed in developing regions too will be crucial for the stability of industries such as aviation.

**Keith Mwanalushi**  
EDITOR



American Airlines is investing at its Tulsa MRO facility.  
*Photo: American*

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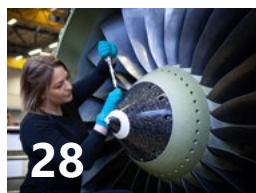


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## GA Telesis receives orders for four additional 737-800 freighter conversions with Aeronautical Engineers

GA Telesis (GAT) has received four additional firm orders for 737-800SF freighter conversions with Aeronautical Engineers (AEI). The contract was executed by GAT's LIFT (Leasing, Investments, Finance and Trading) Group. The first of the two originally contracted passenger-to-freighter (P2F) conversions was completed in March and delivered to Ethiopian Airlines. The second freighter aircraft is expected to be completed in May 2021. The additional order will be comprised of three conversion slots in the second half of 2021, with the remaining conversion slot reserved for early 2022. All work will be performed by authorized AEI Conversion Center, Commercial Jet, in Dothan, Alabama. LIFT will continue to evaluate additional 737SF slots and other freighter aircraft models to support the global air cargo industry's expanding main deck freighter needs.

## TrueAero Asset Management partners with Air Lease Corporation

TrueAero Asset Management (TAAM) has announced the commencement of a leasing and part-out consignment relationship with Air Lease Corporation (ALC). The inaugural aircraft is a CFM56-5B powered A320-200 owned by Air Lease's Thunderbolt managed aircraft platform. One engine will join TAAM's diverse and sizeable fleet of managed lease assets, while the other engine will be dismantled alongside the airframe. TrueAero's materials division will manage the teardown and consignment of ALC's material. TrueAero is a global aviation investment platform offering investors, lessors, and operators a suite of solutions across capital deployment, asset management, technical services, and material consignment. Its corporate headquarters is located in Sebastian, Florida, with sales, marketing, and finance hubs across the Americas, Europe, and Asia.

## AFI KLM E&M unveils MRO services for A220

AFI KLM E&M has developed and launched new A220 maintenance solutions created for operators of the Airbus A220 aircraft. With the first Air France A220 due to fly at the end of 2021, AFI KLM E&M has finalized its supply-chain and industrial development program, positioning itself as a major player in the maintenance of this new aircraft, and is ready to support operators of this type. AFI KLM E&M has already designed and is able to market a complete nose-to-tail components support for A220 operators and has acquired credibility from its expertise and adaptiveness, building long-term win-win partnerships and competitive agreements with OEMs to support the market. The nose-to-tail industrial solutions enable the MRO to deliver unique quality of service to its customers.



Photo: Airbus

## Kellstrom Aerospace partners with Valcor Engineering and its subsidiary Electroid

Kellstrom Aerospace, a global commercial aftermarket OEM distributor, providing a comprehensive range of aircraft lifecycle solutions, has announced an aftermarket partnership with Electroid, a wholly owned subsidiary of Valcor Engineering Corporation, to offer a 100% yield overhaul exchange program for OEM Air Separation Module (ASM) Part Number 2030157-102, which is the original equipment installed on production Boeing 737NG aircraft manufactured after 2008. The Air Separation Module is an integral component of the On-Board Inert Gas Generator System (OBIGGS) for fuel tank inerting to protect against explosions caused by sources of ignition such as electrical shorts, bonding failures, mechanical failures of fuel pumps, and lightning protection. The 100% yield overhaul exchange program on P/N 2030157-102 ASM offers the OEM part number in overhauled condition with a dual release FAA/EASA 8130-3 airworthiness release. This offering represents the best-value solution for continued airworthiness of the Air Separation Module requiring no retrofit of alternative part numbers, no aircraft modifications, and no approval of an FAA/PMA top assembly as opposed to other options being offered in the market, some of which require costly aircraft modifications. P/N 2030157-102 ASM is eligible for installation on all 737NG models including 737-600s, 737-700s, 737-800s, 737-900s, 737-900ERs.

## HAECO Cabin Solutions achieves TSO for Vector Light seat



Vector Light seats

Photo: HAECO Cabin Solutions

HAECO Cabin Solutions, a business unit of the HAECO Group specialized in aircraft seating, interiors, and cabin reconfiguration, has successfully obtained FAA Technical Standard Order (TSO) certification for Vector Light, the newest member of its Vector seating line, setting a new benchmark in weight and comfort onboard single-aisle

aircraft. Doug Rasmussen, President and Group Director of HAECO Cabin Solutions, said: "Vector Light, with a weight of 7.9 kg per passenger for a fully equipped seat, has achieved significant weight savings, best-in-class passenger comfort, and low-cost of ownership without compromising on the quality and reliability, which define our Vector seating line." Utilizing a patent-pending primary structure and making intelligent use of advanced materials, such as titanium and flexible, slotted, body-contouring carbon fiber, this "design-forward" seat maximizes available cabin space and enhances passenger comfort through a comprehensive ergonomic approach and offers industry-leading living space at a narrow pitch.

## ITS and TAG Aero finalize definitive strategic partnership agreement

TAG Aero and ITS have finalized the definitive strategic partnership agreement to support the 737 New Gen and A320 market with 131-9B and -9A APU solutions. ITS' strategic fleet retirement solutions combined with TAG Aero's extensive APU repair and overhaul capabilities will establish reliable, global support for 737 New Gen and A320 operators. Together, TAG Aero and ITS will provide solutions for 131-9 series maintenance, leases, flat-rate exchanges and outright APU sales. "We could not be more pleased to have now completed this joint venture with TAG Aero and be able to fully support the global market on 131-9B/9A APU solutions," commented Bo Lump, Vice President of Sales for ITS. ITS, located in Arizona, offers a wide range of custom solutions to airlines, leasing companies, MROs, OEMs, and resellers worldwide from fleet retirement, contractual-based component support, rotatable exchange pools, leasing, and repair management. This global support has established them as a trusted supply chain partner in the air transport industry. TAG Aero is a 145 certified repair station specializing in auxiliary power units and related material. Between two state-of-the-art facilities in Florida and South Carolina, TAG provides customers comprehensive APU solutions including sales, procurement, leasing, exchanges, and LRU repairs.

## Vallair widens MRO proficiency, adding A330 aerostructure repair capabilities



PW4000 TR workshop

Photo: Vallair

Vallair, the multi-faceted aviation business dedicated to the support of aircraft operators and lessors, has increased its MRO offering to include A330 aerostructure repair capabilities. The capability will be offered at its facility in Châteauroux, France where it currently repairs a variety of parts, including nacelles, inlet cowls, fan cowls, thrust reversers and flight controls. "We are always seeking new ways to support our customers, and by constantly assessing and reacting to the demands of the market Vallair is able to fine tune our capabilities," comments Malcolm Chandler, Head of Commercial & Marketing at Vallair. "To date our aerostructure capability has focused on narrow-body aircraft such as the B737 and the A321, so this will be a new path for Vallair. We

have upskilled our current workforce to accommodate these additional services and work on A330 thrust reversers and inlet cowls will begin this month. Currently our turn-around times for narrow-body thrust reversers are four to five weeks, with five to six weeks for outer worksopes, and we will maintain these efficient TATs for the A330." Vallair has recently been awarded a ten-year lease for a new state-of-the-art full-service aircraft maintenance, repair, overhaul and cargo conversion hangar which is being constructed adjacent to its existing aerostructures repair and logistics facility. This significant project in partnership with the Centre Val de Loire Region and the Chateauroux Airport Establishment further establishes Vallair's MRO footprint in central France, and further complements its MRO & painting facilities in Montpellier. Vallair will introduce new repair worksopes for A330 aerostructure components in Q2, 2021.



## Qatar Airways opens new state-of-the-art engine facility



Official opening of Qatar Airways' new engine facility

Photo: Qatar Airways

Qatar Airways has opened a new state-of-the-art engine facility as part of the vision to streamline the cost of its technical maintenance operations by more than US\$2.2 million per year, further supporting the airline's growth despite the challenges of the COVID-19 pandemic. Located in the Qatar Airways Technical Maintenance complex, the new 9,000 ft<sup>2</sup> engine facility was officially opened on April 7, 2021. It is estimated the new facility will enable the airline to improve workflow by over 1,800-man hours per month, or 23,400-man hours per year, by centralizing its engine production and engine parts storage processes, increasing the number of its engine production lines from four to eight covering a variety of aircraft engine types. In addition to this, the ultramodern facility is able to house a total of 80 engines of varying sizes in a temperature- and humidity-controlled environment, with two special 'dust control' rooms to limit the presence of dust and harmful particles, as well as a dedicated supply chain area to minimize waiting times for the ordering and transportation of spare parts.

## Farsound signs lease on new facility in Toronto, Canada

As part of its international growth program, Farsound's Canadian team has signed a lease on a larger facility in Toronto, Ontario, Canada. The company will lease close to 20,000 ft<sup>2</sup> of premises starting in the fourth quarter of 2021 that will better serve and represent Farsound in the Americas. The new facility is nearer to the airport, has more public transport accessibility, closer access to ancillary operations, and is better purposed to meet Farsound's corporate and environmental objectives. Curtis Pump, President of Farsound, commented: "After spending close to thirty years in our current facility with expansions that were not really fit for purpose, this new facility is a much better fit for us, both in terms of layout and scale. It will help provide a breath of fresh air and invigorate our team, which is an added bonus given the current global landscape. Even during the pandemic however, we have been growing our customer base and this new facility will set us up to better serve our customers."



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## CSAT to provide Boeing 737 base maintenance for LOT Polish Airlines

Czech Airlines Technics (CSAT) will provide customers with Boeing 737 MAX maintenance. Thanks to the company's new authorization received from the Civil Aviation Authority of the Czech Republic, CSAT has expanded the offer of services provided by its base maintenance division. Overhauls of the most modern version of this aircraft type are thus to be provided in CSAT hangar at Václav Havel Airport Prague. LOT Polish Airlines (LOJ) became the first B737 MAX customer in the middle of April 2021. LOT Polish Airlines is the first customer with whom CSAT has entered into a cooperation agreement after obtaining the new authorization. Since mid-April 2021, CSAT mechanics have been performing the Boeing 737-8 MAX (SP-LVB registration) overhaul for the Polish national carrier. This is the first overhaul of this type of aircraft performed in Hangar F in Prague. In addition, the ex-



pansion of the base maintenance service portfolio will promote long-term cooperation not only with LOT, but also with

other customers from the segment of air carriers and leasing companies.

## GATES expands CFM International MRO partnership to support LEAP-1A/-1B engines

GA Telesis Engine Services (GATES) has signed an agreement with CFM International (CFM) to provide MRO support for LEAP-1A/-1B engines. Through this agreement, GATES will have the rights and licenses to obtain airworthiness authority certification for MRO services on the LEAP-1A, which powers the Airbus A320neo Family, and LEAP-1B, the exclusive powerplant for the Boeing 737 MAX aircraft. GATES has a longstanding relationship with CFM as a licensed overhaul shop for CFM56-5B/-7B engines. The latest agreement builds on that partnership, expanding the suite of MRO offerings to LEAP engines to better support engine maintenance requirements of new-generation narrow-body aircraft. GATES will commence preparations for implementing the LEAP program at its facility in Helsinki, Finland, including reviewing technical documents, employee training, and obtaining necessary aviation authority approvals.

## AeroCentury reports full year 2020 net loss of US\$42.2 million

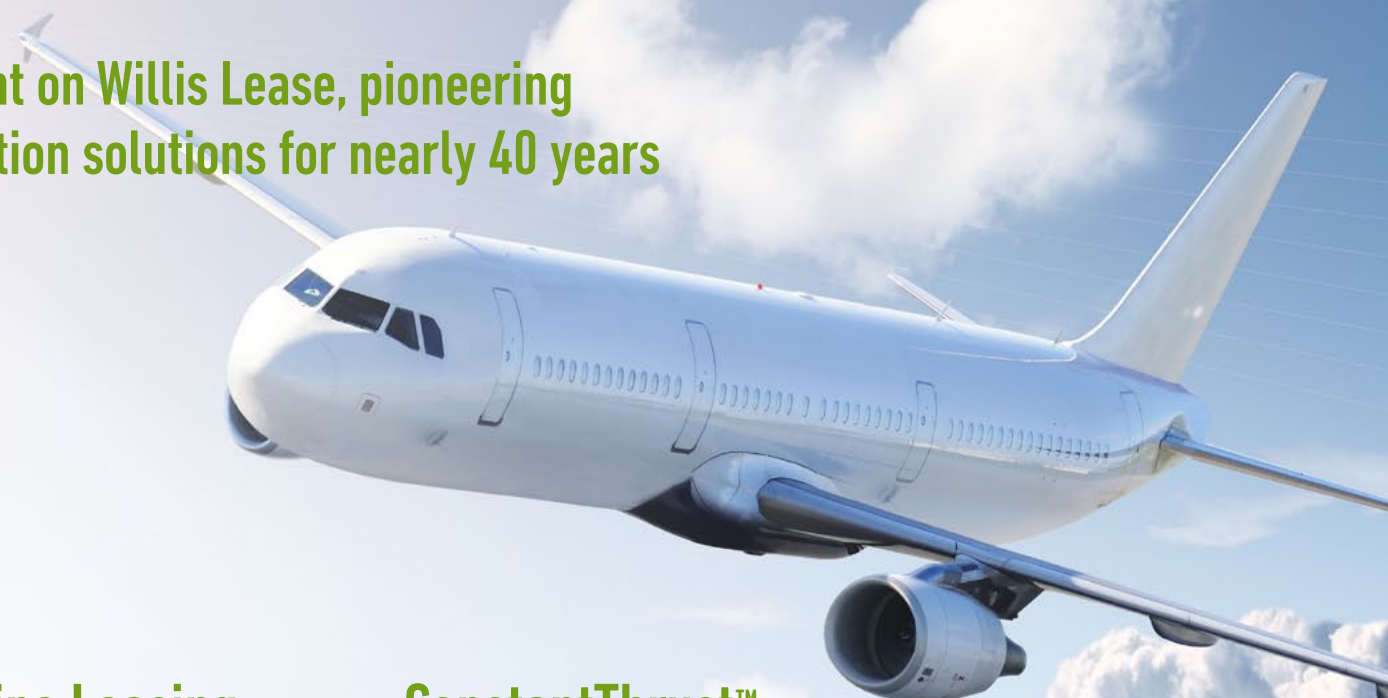
AeroCentury, an independent aircraft leasing company, has posted a fourth quarter 2020 net loss of US\$14.5 million, compared to a net loss of US\$7.0 million for the fourth quarter of 2019. For the full year 2020, the Company reported a net loss of US\$42.2 million, compared to a net loss of US\$16.7 million for the full year 2019. During 2020, the company sold two aircraft that had been leased under operating leases. In addition, two lessees that had leased four aircraft pursuant to sales-type or direct financing leases exercised purchase options for the aircraft. Results for the fourth quarter and the year ended December 31, 2020 included impairment losses on most of the company's aircraft totaling US\$11.9 million and US\$28.8 million, respectively, based on third-party appraised or expected sales proceeds. During the same periods, the Company recorded bad debt expense of US\$0.3 million and US\$1.5 million, respectively, as a result of payment delinquencies and reductions in the appraised value of the company's two

remaining aircraft subject to sales-type leases. In the third quarter of 2019, the company terminated the leases for, and repossessed, four aircraft from one of the company's lessees (repossessed aircraft), which had a substantial adverse impact on the company's 2019 and 2020 results. As a result of those events, the company recognized maintenance reserves revenue of US\$17.0 million at the time of repossession, but also recorded impairment losses for the repossessed aircraft of US\$28.4 million during 2019, based on third-party appraised values or expected sales proceeds. In 2020, the loss of operating lease revenues from those aircraft and an additional US\$10.9 million of impairment losses also negatively impacted earnings. Results for the year ended December 31, 2019 also included impairment losses totaling US\$2.6 million, based on third-party appraised values or expected sales proceeds, for three older turboprop aircraft, a spare engine and an older turboprop aircraft that has been sold in parts.



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“TRAX has attended African MRO industry trade shows and is keeping an eye on this region of the world.”

*Sadiel Parra, eMRO Lead Programmer, TRAX*

NEWS ANALYSIS

## eMRO software deployment in Africa is on **TRAX**



RwandAir is the latest African carrier to opt for eMRO.  
*Photo: Airbus*

**Keith Mwanalushi** speaks to Sadiel Parra the eMRO Lead Programmer at TRAX about expanding airline customers in the African region and positioning for growth post recovery.

**K**igali-based RwandAir and South African airline Airlink are just some of the carriers that have opted for eMRO developed by TRAX, the global provider of aviation maintenance mobile and cloud solutions. More recently, RwandAir selected the TRAX eMRO system in October of 2020 as part of its efforts to enhance its efficiency, lower its costs, and expand its operations. “The airline saw an opportunity to replace its legacy system with a fully integrated technologically advanced web-based MRO software product – and it is accomplishing this goal amidst a turbulent year for aviation,” Sadiel Parra, eMRO Lead Programmer tells *AviTrader MRO*.

Parra explains that the eMRO product enables efficient, reliable communication and dataflow between the various facets of the operation using leading edge technology. He says the airline anticipates that real time data means reduced turnaround times, and increased time to report and repair issues.

“They see the benefits of users being able to stay connected to their key aircraft maintenance management data from anywhere using the device-agnostic eMRO solution. Users can rapidly find spare parts and tools and electronically sign off tasks at any location, such as from the hangar or when carrying out crucial time sensitive line repairs.”



Sadiel Parra the eMRO Lead Programmer, TRAX

Increasingly, air carriers are demanding connectivity and the ability to work from anywhere with their MRO software systems. “We are completely focused on providing solutions that mobilise maintenance since it is an essential requirement in today’s aviation environment. That mobile essentialness has only become magnified within the past year due to the requirements of working remotely or with social distance during the COVID pandemic.” Parra says unlike TRAX eMRO, non-web-based systems keep employees chained to their desks or computer terminals and minimises productivity that can be gained when accessing or capturing real time data.

The TRAX web-based eMRO system and associated suite of eMobility apps supports digital signatures, paperless operations and manuals, RFID-capability for logistics, biometric security, barcode readers, offline capability for apps, and instant access to real-time information. “This is only the tip



of the iceberg in the efficiencies that can be offered to our clients given today's advances in technology. The combination of mobile solutions, data analytics, predictive maintenance, and Artificial Intelligence (AI) takes the potential gains to the next level."

TRAX have a growing customer base in Africa. South African carrier Airlink, now operating independently as Airlink, implemented eMRO software in January of 2019. The airline has expanded its network and now serves over 50 destinations and in January of this year, Airlink became the third largest carrier within Africa by number of seats offered, and second largest by number of flights scheduled. Its fleet of 51 aircraft includes Embraer, BAe Jetstreams, and Cessnas. Parra states: "Airlink is a company that prides itself on its modernisation strategy and it selected the eMRO cloud software product to support its mobilisation of their maintenance operation." He reports that the operator intends to move into phase two of its modernisation plans this year by adopting the TRAX eMobility web-based and iOS apps.

Parra further emphasises on the growing opportunities considering that Africa is the world's second largest and second-most populous continent after Asia, yet it has the smallest number of passengers annually with approximately 2% of global air traffic, but with its rapid population and income growth, there will be significant opportunities. A March 20, 2021 conference of West African government ministers organised by IPADIS (International Partners for Aviation Development, Innovation and Sustainability) affirmed their expectation of the potential to develop into a leading aviation market post pandemic. "Of course, this will require recognition of the potential, along with investment and modernisation of the aviation infrastructure. In a recent list of potential startup airlines, some 44 out of 312 listed were African, indicating a sense of confidence in the market opportunities. TRAX has attended African MRO industry trade shows and is keeping an eye on this region of the world."

After a challenging year for the aviation industry, Parra reckons 2021 will bring slow but steady recovery with the increasing availability of vaccines that is beginning to reignite airline customer confidence in travel. "Yet a major challenge for recovery will be how widespread the distribution of the vaccines will be worldwide, where the purchase and distribution are currently dominated by wealthier countries."

Although 2020 experienced decline and stagnation, some market resilience was evidenced by new airline launchings and mergers amid the challenges of re-organisation and downsizing. "There were some encouraging signs of strength in the cargo sector, an increase in cabin modifications work, and utilisation of new technology such as remote inspections, that were made necessary due to the pandemic. Additional government stimulus and support packages for airline operators continue to be under discussion as interim losses continue to mount," he says.

From a general outlook, TRAX has seen some of its customers take measures to position themselves in place for the future aviation industry upturn. Parra stipulates that these steps include right sizing their company for current utilisation and preparing to meet future increased demand. "Many are turning crisis into opportunities with plans to invest in technology and managing projects to build a more efficient, digital, and paperless operation. Although

2021 is not without its own challenges, there is reason for cautious optimism for continued market recovery, especially for those companies that are foresighted about digital transformation, creating efficiencies, and evolving non-contact working processes where possible."

At TRAX, they are developing new software solutions that Parra believes will give users of their solutions an edge in the market, for instance, due to the COVID environment and its impact on aviation, aircraft were increasingly being parked or returned from lease. "In response to our customers' practical needs, TRAX developed the eContent Control web application to facilitate easy access to aircraft records. It is a robust tool for aircraft records management, lease returns, airworthiness verification, and aircraft or engine sales."

TRAX sees that MRO software can employ new concepts to take advantage of all the data that is being generated systemwide, as well as technological progress. This is extremely useful in today's environment of temporarily limited travel for remote inspection. An example of this is remote digital visual inspection (RDVI) which allows an inspector to look at objects that are at an outstation or perhaps at an aircraft parking location.



eMobility task card on iPad.  
Photo: TRAX



Air Corsica MRO includes complex scheduled base maintenance checks and repairs.  
All photos: CSAT

## Air Corsica signs maintenance Czech list

Czech Airlines Technics recently signed a new base maintenance agreement with Air Corsica. **Keith Mwanalushi** speaks to Pavel Hales, the Chief Executive, about business continuity during this challenging period in the MRO industry.

**A**t the start of the year, Czech Airlines Technics (CSAT) launched a cooperation campaign with Air Corsica and by March CSAT announced that following a successful tender, two Airbus A320 aircraft would undergo overhauls in the hangar located at Václav Havel Airport Prague during the first quarter of 2021.

The entire aviation industry was ravaged with difficulties last year including the MRO sector. Pavel Hales, CEO and Chairman of the Board of Directors at Czech Airlines Technics looks back over the year saying the business had to face major changes, uncertainties on the part of airlines and cancellations or postponements of certain job orders across all their divisions. "Despite all these challenges, we have managed to conclude agreements with new customers and thus secure additional orders in our main base maintenance division," he tells *AviTrader MRO*.

The agreement with the French air carrier includes the performance of complex scheduled base maintenance checks and re-

pairs based on the manufacturer and operator guidelines. Specifically, two narrow-body Airbus A320 aircraft, which Air Corsica uses mainly on its direct flights to various destinations across Europe, to undergo base maintenance in hangar F located at Prague Airport premises in the first quarter of 2021. This year, CSAT has also extended cooperation with Finnair and worked on projects for new customers, namely Jet2.com, Austrian Airlines and clients from both the government and private sectors. In addition to Air Corsica, other projects started in 2021 include CargoLogic Germany and with aircraft leasing companies.

"Our strategy for the base maintenance division remains to provide the best and most complex services and to offer flexible options for our customers with the best possible turnaround times. To attract more clients, we are ready to provide base maintenance to new generation aircraft types, including the Boeing 737 MAX and Airbus A320neo family aircraft. New certifications are a great opportunity for us in the future as well," states Hales.



Regular mandatory checks, more demanding repairs, modifications to aircraft systems and structures, cabin modifications, engine exchanges and exchanges and repairs of landing gear and other aircraft components are a part of aircraft base maintenance services provided.

Ensuring that MROs maintain adequate technical skills during the past year has been a crucial element across the industry. At start of the pandemic, Hales activated the CSAT's business continuity plan which guaranteed customers the same service level standards as before without any restrictions. "Our teams are trained in the same way they were in the pre-covid times, only with protective measure in place. Moreover, we have used the current situation and decided to invest in a new certification within the line maintenance division."

CSAT has now added the Boeing 787 to its portfolio of line maintenance ca-

pabilities. Hales reports that mechanics and engineers completed both the theoretical and practical training in 2020. He says the 787 is becoming an important part of the global fleet and the new certificate provides CSAT with another future competitive advantage. "Moreover, we are currently working to receive the EASA Part 147 Approval which will allow us to run maintenance training for both our CSAT employees and external companies."

As the aviation recovery phase begins, demand for MRO services is expected to increase especially for aircraft in temporary storage. Last autumn, CSAT decided to offer customers ranging from airlines, manufacturers, and leasing companies a new service of short-term and long-term aircraft storage, both at Prague Airport and at other airports in the Czech Republic and Slovakia. "It is an interesting segment which fits perfectly

into our structure and builds on the current comprehensive range of services we provide." Hales explains that the package deal combines aircraft storage options with the provision of high-quality base maintenance checks in the hangars, including landing gear overhaul, CAMO support, spare part replacements and other services. "Moreover, we are currently negotiating with many potential clients to become their MRO partner the within base maintenance division.

"We believe that the aviation industry will return to good condition sooner than expected. Therefore, we continue to offer full capacity in all our divisions also during the current summer season, and we can support leasing companies or airlines during their gradual return to operation." Hales concludes. Last year, CSAT completed over 70 base maintenance checks within its main division.

“Despite all these challenges, we have managed to conclude agreements with new customers and thus secure additional orders.”

**Pavel Hales, CEO & Chairman of the Board, Czech Airlines Technics**



Pavel Hales, CEO and Chairman of the Board of Directors at Czech Airlines Technics

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# Direction of travel puts **recovery** in motion

As the aviation MRO community gathered in Orlando, Florida, **Keith Mwanalushi** examines how the North America region is moving forward after a particularly challenging year.

**A**t the end of April, and for the first time, the aviation MRO community were able to meet in person since the COVID onslaught over a year ago. This year's instalment of MRO Americas was a hybrid event that was also accessible virtually.

A report released during the event by aviation analysts Oliver Wyman indicates that the impacts of the crisis remain severe, but recovery does now appear to be underway. Notably, the report reveals that airlines generally expect a slightly earlier recovery than MROs and regionally, Western European was more pessimistic than North America and other parts of the world on how long recovery will take.

"In the early days of the pandemic, we saw a significant drop in sales of USM material sales, as airlines were burning down their inventory levels and also harvesting materials from idle or retired aircraft in order to minimise their daily cash burn," recalls Robert Suhs, VP Airframe Parts Sales at Magellan Aviation Group, speaking on the status of MRO related supply and demand in North America. "Despite remarkable levels of government support here in the US, our conversations with numerous airlines have revealed that cash preservation is still of critical importance until demand returns."

As the Oliver Wyman report shows, carriers outside of North America were forced to cut capacity much more severely than North American airlines and while load factors and flight schedules in North American are not at pre-COVID levels, the recent passenger traffic data published by



Robert Suhs, VP Airframe Parts Sales at Magellan

TSA showing 10+ consecutive days of 1M+ passengers are encouraging for the industry. "We have seen an increase in the request for USM material as airlines and MROs are preparing for what looks to be shaping up as a busy summer travel season and the second half of 2021," says Suhs.

Across the Kellstrom Aerospace Group they are seeing differing trends in each of the markets they serve. MRO activity has been adversely impacted by a lack of aircraft utilisation due to travel restrictions; however, there are signs in the North America region that demand for MRO services is increasing,

“The oversupply of new aircraft has created an imbalance in the typical supply-demand curve in normal years.”

*Robert Suhs, Magellan Aviation Group*



MRO Americas 2021 opened its doors in April.  
Photo: Global Exhibit

driven by the growing confidence of North American air passengers to travel by air.

For example, Jeff Lund, CEO at Kellstrom Aerospace Group says in their aftermarket parts business, demand for NEW and USM has been increasing month over month as maintenance rates improve. "For engine maintenance we notice a change in limiting the scope of maintenance to targeted worksopes to avoid significant financial exposure. Vortex Aviation [a division of the Kellstrom Group] is benefitting from the shift of airlines using large MROs to seeking more flexible, targeted repair facilities that offer solutions to extend the time on wing of engines without going through an expensive heavy maintenance event."

As Lund recalls after the global travel restrictions were imposed, several air-

lines grounded fleets of aircraft and placed into storage. "As the demand for air travel increases, we are also seeing a surge in demand for technical services to return aircraft from storage back into service. The Aircraft Group has been engaged in a much higher number of aircraft transitions between airline to lessor and vice versa."



Jeff Lund, CEO at Kellstrom Aerospace Group.

AFI KLM E&M has developed a dedicated commercial offering and a local industrial base to provide a reliable alternative and bring an airline-MRO spirit on this market, says Franck Becker, AFI KLM E&M Vice President Sales Americas. He mentions the reliance on a strong global network in the Americas with Barfield, based in Miami. Becker ex-

“The North America supply chain was faced with financial uncertainty that posed the biggest challenge to companies in the supply chain.”

*Jeff Lund, Kellstrom Aerospace Group*

plains that the Barfield Components in Miami is of strategic importance to serve airlines in the region in terms of both T&M and PBH. "Moreover, we recently announced a definitive agreement with Triumph Group to overhaul nacelles for next generation aircraft. Based at Triumph's Hot Springs, Arkansas repair facility, we will offer the combined experience of a global airline-MRO that operates and maintains new generation aircraft with that of a trusted and established MRO service provider in the Americas."

### Aftermarket braces for impact

As the global and regional economies emerge from the shock of COVID-19, the aviation industry is in the middle of an unprecedented storm of economic, technological, consumer, and environmental transformation, as Suhs from Magellan observes. He says the oversupply of new aircraft has





American is moving forward with investment plans at their base maintenance facility in Tulsa.  
Photo: American

created an imbalance in the typical supply-demand curve in normal years and disrupting historical retirement trends. "This imbalance has encouraged many lessors and airlines to up gauge to newer aircraft like the NEO and MAX for increased reliability, fuel savings, ESG, and streamlined fleet profiles."

Suhs also feels this same activity has accelerated the retirement or sale of many older and mid-life aircraft (CEO/NGs), resulting in an unprecedented level of USM material coming to the market. "With that as a backdrop, Magellan is closely watching global fleet trends and the specific fleet composition within geographic regions to try and plan for future MRO and USM demand." He adds that initial indications show that there will be a more uniform and concentrated fleet of A320 and B737 aircraft types along with CFM56-5/7B and V2500-A5 engines once emerged from this event. Magellan is well aligned to support the USM needs for operators, lessors, and MROs of these fleet types, with inventory positioned at the US, EMEA, and APAC ware-

houses accompanied by around the clock AOG support.

As Lund highlights, the North America supply chain was faced with financial uncertainty that posed the biggest challenge to companies in the supply chain. Aftermarket parts demand for NEW and USM was impacted significantly with the fall in commercial flights. Fortunately for the aviation industry, he says the reduction in available "belly freight" or freight in the cargo hold of commercial airplanes, meant that dedicated cargo aircraft were utilised much more and created their own demand within the supply chain.

Lund adds: "As global confidence has grown, so too has the demand for spare parts been increasing month over month, since the lows of 2020, as maintenance rates improve. As a result, ensuring continuous business planning has been a key focus for us."

The Kellstrom Aerospace Group team has used this information to create flexible al-

ternative inventory strategies and develop cost-saving support solutions across all its divisions, allowing to execute decisions faster and create stronger short and long-term strategies for clients and partners during the economic downturn caused by the pandemic, explains Lund.

Becker, form AFI KLM E&M notices that companies have reduced headcount to meet business decreases with some employees leaving the industry due to the uncertainty of the business. "Parts suppliers slowed down due to the fact they had to reserve their cash and to reduce their invests. The current context puts strong pressure on operators to deliver higher performance in terms of aircraft availability and profitability. As an airline-MRO, AFI KLM E&M knows what is needed to provide optimal service by proposing an adaptive offer," he says.

### Supporting the cargo sector

Passenger to cargo conversions will likely increase in demand even after the pandemic reaches manageable levels. At Magellan they see a clear trend of speculative investment driving demand for both single and twin-aisle P2F feedstock as near-term belly cargo space remains limited. The trend can be confirmed by the increase of announcements and quantity of aircraft committed to cargo conversion programmes in recent months. "The 737NG and A321 are especially hot candidates now. We are excited about the growth in the P2F market space, as we will continue to support the expanding fleets of our long-standing cargo customers, but also extend our products and services to a whole host of new operators and lessors," states Suhs.

Kellstrom Aerospace Group provides support for the passenger to cargo sector in a variety of ways across all divisions throughout North America and globally. Jeff Lund explains that the technical services team at Kellstrom Aerospace Technical Services (KATS) and The Aircraft Group were heavily involved in the cargo conversions leading up to 2020 and have every intention of supporting this sector going forward via technical service support, parts supply, and supervised engineering demand orders.

He says the Aircraft Group is working closely with cargo operators and investors conduct-

ing the speculative conversions with onsite representation, Supplemental Type Certificate (STC) assistance, and project management oversight. "The variety of options Kellstrom Aerospace Group provides customers allows for technical expertise to ensure quality technical support while leveraging the supply chain solutions to monetise and lower overall costs. The aftermarket parts team have been helping operators monetise the engines from parked aircraft and strategically sourcing it to the cargo carriers as needed."

Lund is certain that Kellstrom is well-provisioned with key expendable material for A321, A330, 737 Classic, 737NG, 757, 767, 777, 747 aircraft and all engine options for these aircraft, and Kellstrom's distribution team is looking for creative ways to partner with cargo carriers to provision the material they need as well as develop cost-saving solutions that provide savings, enhanced reliability, resolve in-service issues and reduce cost of ownership. Lund: "Sometimes it's as simple as Kellstrom holding the right inventory with guaranteed just in time availability allowing operators to hold less inventory providing balance sheet relief. In other cases, Kellstrom, through our extensive distribution network, is able to provide engineered solutions that help our cargo operators avoid costly alternatives."

### Bringing it home to Oklahoma

Despite the challenges that have ravaged the MRO industry over the past year, things have looked rather upbeat for the MRO sector in the State of Oklahoma. Over the past year, Oklahoma had over 116 companies looking to relocate to the State; of those more than 20 were aerospace and defence focused (MRO, UAS, R&D and innovation technologies) and so far, four have established new operations in Oklahoma – according to the Oklahoma Department of Commerce.

Looking at all the figures, clearly Oklahoma's aerospace and defence industry has fared well these last 18 months. Geoffrey Camp, Director of Aerospace & defence at the Oklahoma Department of Commerce tells *AviTrader MRO* that certainly, they have had some companies, primarily focused on the commercial sector, that experienced a downturn in business from both the 737 MAX grounding and COVID 19 pandemic. "That said, thanks to our well-diversified aerospace industry with both DoD and commercial work, a large percentage of our over 1,100 aerospace businesses were thankfully minimally affected. The aerospace and defence team that I lead within the Oklahoma Department of Commerce is dedicated to growing and supporting the industry and when COVID broke we immediately mobilised to support our businesses with supply chain issues, diversification efforts and other challenges."

Camp informs that during the pandemic the State reacted quickly and initiated three business assistance programmes last year specifically designed to stimulate economic growth and combat the negative effects the COVID-19 pandemic had on the State's economy. "Two programmes assisted Oklahoma businesses retool to develop new products and expand current capabilities. A third programme provided

relief funds for businesses who suffered a 25% decrease in revenue from 2019 to 2020."

To help diversify the revenue streams of Oklahoma based companies during the economic downturn, the State contracted with Source Approval Packaging and Aerospace Consultation (SAPAC) to help companies identify and win DoD supplier opportunities resulting in over \$30 million in opportunities to Oklahoma aerospace businesses, especially those engaged in commercial MRO work. Camp says the state also unveiled a new supply chain Oklahoma portal, "Connex Oklahoma" which allows OEM manufacturers to link to new suppliers, identify alternate suppliers, explore production capabilities, and view their supply chain visually.

Camp also praises pro-business government policies such as the Oklahoma Quality Jobs Incentive programme and reports that several Oklahoma aerospace companies have recently announced plans to expand the size of their workforce over the next five years.



Geoffrey Camp, Director of Aerospace and Defence, Oklahoma Department of Commerce



Oklahoma Department of Commerce at MRO Americas 2021.  
Photo: Avtrak





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# CFM56 Engine Special Report



# Turning challenges into opportunities

The CFM56 engine market is showing signs of recovery from the worst effects of the COVID 19 downturn and with changes in the supply chain, **Keith Mwanalushi** observes that the nature of opportunities in the market have also changed.

There will be several different factors influencing CFM56 MRO demand.  
Photo: AFI KLM E&M



Industry experts at aviation consultancy firm IBA recently said the aircraft engine market is now well established on the path to recovery, but specific factors such as the ability of MRO providers to build back capacity will significantly affect its timeframe.

Figures released by IBA show that the number of engine flight hours (as of March 2021) was plateauing at around 1.4 million per month, having plunged from around 2.8 million at the end of 2019 to less than 600,000 in April 2020. The reports indicate that full scope engine shop visits were down by 70% compared to pre-COVID levels and engine MRO revenue by 50%. However, IBA is now seeing three-month lead times for some shop visits, indicating that engine MRO providers have re-structured their operations to better match capacity to demand.

In fact, CFM56 engine MRO specialists Aero Norway changed their business model

rapidly at the onset of the pandemic. "We re-forecasted early on in 2020 and predicted that there would be a shift towards hospital worksopes rather than full engine inductions," recalls Glenford Marston, Aero Norway's CEO. And, for their apprentices, Marston says COVID enhanced their training and enabled them to progress quicker than they would have done in a theoretical environment. "For each apprentice working on an engine, there is a dedicated senior mechanic supervising them. This has actually made our shop more versatile as we were practicing this right

across the field and moving our apprentices from core performance to LPT to fan, but it was also essential as we needed a multi skilled workforce to man our additional repair bays."



Glenford Marston, CEO, Aero Norway

Marston says Aero Norway are fortunate to have a loyal and dedicated team on the shop floor, many of whom have been with the MRO since they were apprenticed themselves. "Although they did not require any additional training, we did have to undertake this for the inspection department as we had to redistribute our bench





GA Telesis' engine overhaul facility in Helsinki, Finland.  
Photo: GA Telesis

inspectors across all repair bays to fulfil the demand of our customers. The reality of this was instead of the parts going to the inspectors once they had been cleaned, and subjected to NDT, the inspectors were required to go to the repair bays to carry out their duties as we were endeavouring to complete the surgical strikes as quickly as possible."

In terms of the COVID-19 pandemic and how it has changed current and projected MRO market for the CFM56 platform, Russell Shelton, President Engine Strategy Group at GA Telesis observes that the nature of the opportunities in the market has changed. He says regular maintenance has been replaced by a set of minimums required to operate the aircraft in service. "Restorative shop visits have been set aside for now in favour of lighter workscopes and shop visit substitutes such as engine exchanges or the rotation of green time alternatives within fleets."

Shelton has also seen the supply chain alter – "Gone for now are the days when the OEM could use their macro-level models to predict the number of full shop visits growing or contracting by X% per year. They are now attempting to have individual MROs provide orders with quite long lead times to satisfy future parts demand. The consequences of this change in posture are masked today by the depressed market. The real fear comes when demand returns, and there is not a sufficient supply of critical parts such as turbine blades and LLO."

Like some other engine platforms, the COVID pandemic resulted in a notable reduction in CFM56-7B demand during 2020, with a gradual market recovery now anticipated through 2023 or beyond. "The pandemic's impact has varied on a regional basis: the Chinese domestic market has seen the smallest impact, with the domestic U.S. market also faring relatively well. By comparison, the European and Asian markets – especially for intra-regional travel – have been hard hit, in large part because of national travel restrictions," notes David Green, VP/GM CFM56/CF34 at StandardAero.

There will be several different factors influencing CFM56-7B MRO demand in the coming years. Green points to the retirement of some 737 NG aircraft – especially older or high-time jets – is expected, although as Safran itself has already noted, the number of CFM56-5B/7B-powered aircraft retirements witnessed in 2020 (60 aircraft) was below the level seen in 2019 (108 aircraft).

"Several major operators have stated that they expect to downsize their fleets, in anticipation of a multi-year recovery, and this will



Russell Shelton, President Engine Strategy Group at GA Telesis





David Green , VP and GM CFM56, CF34, StandardAero

inevitably have some impact on the aftermarket, notes Green. He adds: "Conversely, while MRO demand traditionally lags aircraft activity we do anticipate an early recovery in MRO work, given the high degree of 'deferred' maintenance over the past year

associated with operators moving to avoid capital outlays wherever possible. We also expect to see the impact of early retirements somewhat offset by the 737 NG's increasing popularity in the cargo market, where converted passenger aircraft are replacing older 737 Classics previously operated."

Unlike airframe maintenance, engine maintenance depends on cycles, not on the calendar, resulting in lower global shop visits. Prior to the pandemic, SR Technics were seeing an annual increase in shop visit inductions and had a record first quarter in 2020. "During the pandemic, shop visits dropped, but since January 2021, there has been a steady flow of inductions again, particularly among customers in regions with large domestic markets where flying has increased since the spring of 2020," reports Caroline Vandedrinck, Senior Vice President Business Development at SR Technics.

In discussions with customers, SR Technics are hearing that the demand for shop visits will begin to increase again. "Customers are



Caroline Vandedrinck SVP Business Development at SR Technics

still looking for alternatives such as engine exchanges, green-time engine leasing, or lighter shop visits. We believe the recovery will take some time and will depend on vaccine rollout and the easing of lockdowns," continues Vandedrinck.



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SR Technics expect a decline in CFM-powered aircraft as airframe OEMs entice airlines to buy new LEAP and GTF-powered aircraft, but the sheer number of CFM-powered aircraft delivered over time gives confidence that there will still be a demand for CFM56 shop visits. "Some parked aircraft will be retired, and green-time engines will be harvested before they are torn down. The teardown will result in used serviceable material, which will help reduce the cost of shop visits in the future." However, Vandendrinck notes the need to be realistic about the supply of such material. She says airfoils and Life Limited Parts (LLPs), the most interesting used serviceable material from a cost standpoint, will not be available in large quantities as they will be used up before the engine is retired.

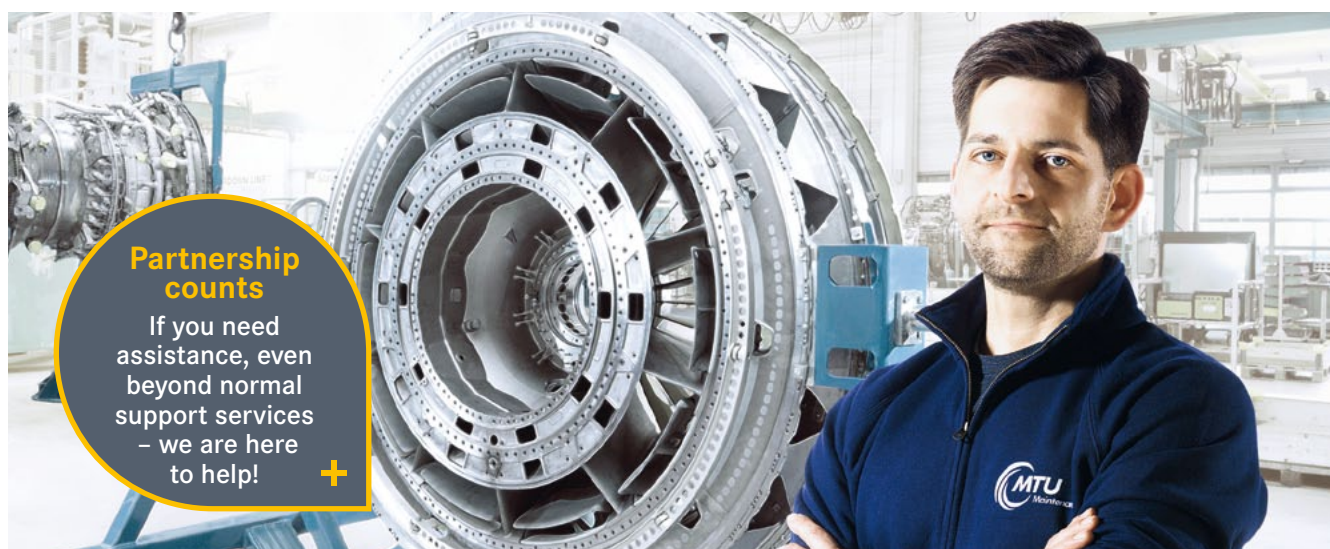
Anthony Spaulding, Executive Vice President at Magellan looks back during the height of the pandemic whilst many aircraft



Anthony Spaulding, Executive Vice President at Magellan

were parked, Magellan kept proactive repair of material that supports airlines and MROs to a minimum. "We have seen an uptick in the request for material as airlines are reactivating aircraft and MROs

are restarting pre-COVID WIP or preparing for post-COVID work being planned. With these requests, we have been reviewing our inventory to meter out material for repair to meet the gradual uptick in demand for the CFM56 as well as other narrow-body and regional engine types." Spaulding stresses that this is especially important to consider as engine MRO picks up the capacity build-up in available personnel to turn the wrenches and repair the piece parts, this will take time to reach pre-COVID levels. "Therefore, we don't want to be fighting for available capacity especially in the piece-part repair space when MRO's will be flooding those outside repair shops. We would expect some pressure on operator-affiliated MROs as they manage man-hours and the fleet reactivations of their associated airline(s). There may be some unpredictability on shop lead-times as a result so a having diverse repair network really helps."



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“Customers are still looking for alternatives such as engine exchanges, green-time engine leasing, or lighter shop visits.”  
*Caroline Vandedrinck, SR Technics*

Demand for shop visits will begin to increase again.  
 Photo: SR Technics

Considering that airlines have deferred engine maintenance activity to assist with cash preservation because of the current environment, naturally this has had a direct impact on demand for USM and the purchasing behaviours of material planners, remarks James Bennett, Commercial Director at AerFin. “We have therefore been extremely proactive in aligning our repair activity with the reduced demands of our customers to ensure that fast-moving, high quality parts are available in overhauled condition and ready for immediate dispatch. With our principal focus remaining the regional and narrow-body markets, along with our portfolio of cargo customers we have managed a reliable and steady USM supply chain, without any major impacts to our trading activity,” he states.

Despite the predicted increase in early retirements of CFM56 equipped aircraft, Bennett does not expect this to necessarily reflect a drop in USM spend. He explains: “We are seeing a number of airlines now

delay new aircraft orders and extending the life of their current fleets, as a result we expect to see a significant spike in MRO activity, with demand for USM increasing in line with this. So, whilst overall aftermarket spend may drop, the demand for USM will increase in a more cost-conscious environment.”

At Vortex Aviation [a division of Kellstrom Aerospace Group] the customer base is mainly airlines and lessors that have a need for specific, targeted workscopes to return an engine back to service without the associated workscope creep typically experienced at larger MRO facilities. “Our customers, like the entire aviation industry, have become much more cash conscious and look to minimise expenditure as much as possible whilst maintaining strict quality needs; therefore, we saw increased pressure to have very targeted workscope, use of USM and performing material exchanges where possible to keep overall costs to a minimum,” tells Jeff Lund, CEO.

In normalised operating conditions, almost 40% of Vortex Aviation revenue originated from on wing services, which have been significantly impacted due to the travel restrictions imposed by governments around the globe limiting the company’s ability to send mechanics to remote aircraft locations. In responses to this, Vortex Aviation established other methods of providing support to its customer base utilising technology to offer remote and virtual services for on wing troubleshooting.

Along with the engine maintenance, Vortex saw engine storage and preservation triple as operators ceased operations and lessors took back aircraft. “This enables Vortex to be in a strategic position to provide support across our global network of locations in the United States, Europe, and Asia.

“In the future, Vortex anticipates an even higher demand for on-wing and hospital MRO support for the aircraft and engine market as operators and lessors take their



Jamil Diwan, EVP Sales and Business Development at HAECO.

aircraft out of storage to current and new operators globally," states Lund.

HAECO Global Engine Support (GES)'s business in the US is mainly quick turn hospital visits, lease returns, engine maintenance, field service and engine/component storage. GES has noticed that higher time CFM engines have been removed and replaced with lower time engines to push out expensive shop visits. "With post bow wave lease returns and repossessions experienced during 2020, we expect to see fewer lease returns in 2021 than at the start of the pandemic," says Jamil Diwan, EVP Sales and Business Development at HAECO.

For the CFM56-5B engines, Diwan observes this has been a somewhat steadier market even with all the impacts of the COVID-19 pandemic being considered. "We think this is mainly due to fewer engines in the market, including spares, as compared to the CFM56-7B. Again, from our standpoint, the CFM56-5B market is not as bad as it could have been.

"MROs that focus on engine shop visits are suffering, again due to high time engines being removed and kept as spares, as well as significant reductions in utilisation rates," Diwan highlights.

On mature -5B engines (A320 family application) and -7B engines (737NG application) at Magnetic MRO, they do expect significant number of engines to appear on the market

due to retirement of their aircraft platforms. In 2020 some 180 A320 and 737NG were retired bringing 360 engines to the market and its likely 2021 will bring even more engines according to Alexey Ivanov, Executive Sales Director at Magnetic Engines.

"Certainly, not all those engines will go for teardown as some of them will continue flying as green time engines but still the amount of material appearing on the market from those engines will push the price down. Moreover, we are now in a situation where the number of heavy shop visits dropped by some 30-40% compared to pre-pandemic times and demand for the spare parts dropped as well." Ivanov has

heard industry talks that mention all those shop visits will come back and he anticipates another wave of -5B / -7B repairs (like what happened in 2018-2020) assuming the market settles down with COVID and aircraft return to service, but ultimately it may still take 2-3 years for it to come.

However, CFM56 is still the most popular engine in the aviation history and sooner or later demand for repairs will return states Ivanov. "It's very hard to make some quantitative estimates but I'd say general price of USM for those engine types will go down by 15-30% and it depends on the type of material."



"We are now in a situation where the number of heavy shop visits dropped by some 30-40% compared to pre-pandemic times."

*Alexey Ivanov,  
Magnetic Engines*

Alexey Ivanov, Executive Sales Director at Magnetic Engines.





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# Aftermarket solutions key to **engine** market recovery



There will be a conscious drop in initial MRO spend as airlines recover.  
Photo: Safran

**Keith Mwanalushi** continues the analysis on the CFM56 market looking at the trends in aftermarket spending, the availability of green time engines and the impact on maintenance activities.

**W**ith the COVID-19 pandemic on-going, experts at HAECO reckon the global market will take a longer time to return to pre-pandemic levels, especially for twin aisle aircraft. However, in the US and the Chinese mainland, they are seeing a resurgence of the narrowbody fleets correlated with increasing air travel.

And as far as early retirement goes at aftermarket specialists Magellan, they do not anticipate that we will see 2009 or later built aircraft on the block for retirement unless it is a distressed airline or lessor trying to liquidate assets that could be parted out or find new homes. David Rushe, Aviation Group Director – Sales and Marketing, EMEA at Magellan notes that 2004 to 2008 assets could be ideal freighter candidates based upon acquisition costs and mod standard while aircraft older than 2004 would be targeted as being replaced by NEO's or MAX's

–“If you look at the orders that took place for the NEO and MAX, they were not one-for-one replacements for CEO's and NG's but, to meet capacity growth prior to COVID.”

Regarding the engine MRO segment for the CFM56, Rushe looks at the over 6,900 CEO/NG aircraft under 10 years of age where close to 75% of those engines have yet to have their first SV. “That next bow wave of engine MRO will move to the right due to limited operations during COVID and the gradual increase in utilisation but, SV will happen. There will be a conscious drop in initial MRO spend as airlines recover but, not a general drop. We are also likely to see some M&A activity among airlines which will lead to batches of aircraft being surplus to requirement, however, a low-fuel price and investor-heavy commercial environment should lead to significant start-up opportunities for short-mid haul operators.”



David Rushe, Sales and Marketing Director - EMEA at Magellan Aviation Group





Some MRO's are experiencing little fluctuation in volume of CFM56 shop visits.  
Photo: Aero Norway

Looking at the long-term impact of the COVID pandemic on the CFM56 engine market, particularly for the 5B and 7B variants, Jeff Lund, CEO of Kellstrom Aerospace Group (speaking for Vortex Aviation) does not anticipate a significant change to aftermarket spending despite some aircraft retirements. He says the CFM56-5B and CFM56-7B variants have proved much more reliable than anticipated which has delayed the expected first shop visit schedule. "Prior to the COVID pandemic there was speculation that a significant bow wave of CFM engine maintenance was expected, the pandemic may have removed some of this demand for older engines requiring heavy maintenance, but our view at Vortex Aviation is that once airlines resume normalised aircraft utilisation, we should not experience any significant decrease in the core 5B/7B market."

However, Vortex do anticipate that other CFM56 variants such as the CFM56-3, CFM56-5A and the CFM56-5C will experience a general drop in aftermarket spending as the economics most likely lead to aircraft retirement rather than heavy maintenance, however for operators looking to keep the older variants operating, Vortex Aviation is likely to benefit from the lower cost, flexible workscope solutions over full performance restorations and overhauls.

At Aero Norway, they have not witnessed a drastic turn of retirements within the shop, and we also must consider that the MAX has faced setbacks during this period too, and this would have been a replace-



“Vortex Aviation is likely to benefit from the lower cost, flexible workscope solutions over full performance restorations and overhauls.”  
Jeff Lund, Kellstrom Aerospace / Vortex Aviation

Jeff Lund, Kellstrom Aerospace and Vortex Aviation Group CEO

ment for the CFM56. Chief Executive Glenford Marston sees that retirement will not be as fast as most suspect as CFM56's mostly fly regional routes rather than international routes and going forward the consensus is that short haul will not be as affected as long haul.

"During 2020, we witnessed operators forced to resize their fleets due to changes in demand, however despite this, we have still seen start-ups during this period – in fact, there were more start-ups in 2020 than 2019. Although passenger operators have diversified into freighters, the start-ups which we are seeing coming into the shop are passenger focused; due to the forced reductions in fleet size by some operators, there is more available space in the market, so we are experiencing little fluctuation in volume of shop visits," states Marston.

Jamil Diwan, EVP Sales and Business Development at HAECO notes that with the reapproval of the Boeing 737 MAX, there is still an aftermarket for CFM56-7 engines. "However, with the amount of high time engines being removed, lease engines being returned and substantially lower utilisation, aftermarket spending on the -7 engines will be slow to return outside of hospital shop visits and field repairs. Furthermore, with the number of retirements planned as well as high time engines that will most likely be torn down, there is a potential for the market to become flooded with -7 engines, and as a result driving prices down. With the Boeing 737 MAX going back into service, new delivery aircraft coming out of storage and rising fuel prices, we could anticipate a reduced time frame for retirements, meaning what we thought the retirement time of the 737NG fleet could be, is now moved forward.

For the CFM56-5B engines, HAECO GES does not anticipate as much of a drop as the -7 engines. However, as operators take more deliveries of Airbus A320 NEO, the -5 engines will follow a similar trajectory as the CFM56-7 engines but at a slower rate, Diwan believes.

History shows that as out-of-production engines age, there is a corresponding increase in the amount of available used hardware, according to GA Telesis. This accounts for a general decline in the revenue per shop visit and the according reduction of spending. Early aircraft retirement would accelerate this process. The production and/return to service of the MAX and the NEO are likely driving this scenario.

At Magnetic MRO, what they are hearing from customers and from the engine shops around

Europe is that most customers as well as asset owners are postponing expensive shop visits or reducing the workscopes to perform lighter repair or quick fixes to return the engine to service with minimum possible investments.

Alexey Ivanov, Executive Sales Director at Magnetic Engines states: "On the other hand, we see that general number of light and hospital shop visits is not going down and as such repairs become much more popular, and operators and asset owners might sacrifice long term repair plans to make sure they spend now as little as possible on the engines repair. And the same reasons are driving the demand for green time lease as it allows to postpone expensive repair and just pay very moderate lease rate for using of the engine."

Industry experts at Oliver Wyman suggest availability and use of green time engines to replace or defer work will reduce the number of shop visits by a further 5% through 2024.

James Bennett, Commercial Director at AerFin feels that the engine-green time leasing market remains particularly buoyant, especially on the CFM56 platform. He says while there has been a reduction in high-cost purchases, AerFin have seen an increase in engine exchange activity as operators continue to seek engines with green-time remaining, allowing them to support their return to service while avoiding costly engine overhaul and maintenance

A photograph of James Bennett, a man in a dark blue suit and tie, standing with his hands clasped in front of a large, detailed CFM56 jet engine. The engine's fan blades and internal components are visible in the background.

“We have seen an increase in engine exchange activity as operators continue to seek engines with green time remaining.”  
*James Bennett,  
AerFin*

James Bennett, Commercial Director at AerFin



events –“As a direct consequence of cancelled or deferred MRO activity caused by green-time engines, industry experts predict a total a loss \$1.5bn, which represents a displacement of only 1% of overall shop visits. This should be easily offset by the anticipated surge in demand for USM,” Bennett specifies.

Russell Shelton, President Engine Strategy Group at GA Telesis reminds that consuming usable life is the fundamental concept of green time. “It is not always possible to plug and play one engine for another. Additionally, the amount of green time available is also a function of the number of aircraft parked or out of service within a given fleet. Aircraft returning to service will have some impact on green time availability.

“My best guess is that the number of maintenance events will return to pre-pandemic levels more quickly than most anticipate. However, there will be a much heavier bias towards light worksopes and the introduction of far more used hardware, leading me to conclude that Oliver Wyman is likely on the right economic track,” states Shelton.

David Green, StandardAero’s Vice President and General Manager CFM56/CF34 also comments saying the retirement and subsequent parting out of some older 737 NGs will make some used serviceable material available to the market, though the age and TSO (Time Since Overhaul) of most of these aircraft will likely limit the value of their engines as green time assets – “This is reflected in the relatively limited impact projected by Oliver Wyman. It remains to be seen how long prospective sellers continue to wait until making their assets available, and whether the market recovers quickly enough to keep some of these potential donor aircraft

in service through renewed demand.”

Airlines are no doubt postponing maintenance and using green time engines on a short-term basis to preserve cash. Caroline Vandedrinck, Senior Vice President Business Development at SR Technics also sees a need for lease engines as part of postponing engine maintenance. She emphasises that this would not be a long-term solution and shop visits would continue to be needed. “We anticipate that these shop visits will be deferred for 12-18 months and will return starting in 2022, though there may be slightly fewer of them. At SR Technics, we have a flexible workforce whose work hours can be adjusted to meet customer demand. We are also using the reduced workload to develop shop improvements so that we are ready for the uptick in engine shop visits we expect to see in the second half of 2021.”

Vortex Aviation works with Kellstrom Aerospace Asset Management (KAAM) who manages a portfolio of green time engines to support customers with alternatives to full performance restoration shop visits. Mr Lund reports they have seen a significant increase in customers evaluating all options to achieve the lowest cost of operations over the short term as they get to grips with the consequences of the pandemic. “At Vortex Aviation, we see many drivers for maintenance including lease transition repair work. We estimate that green time leasing will be a viable option for many clients, but the overall magnitude will be dependent upon the terms of lease agreements etc. that may require engines continue to be inducted to meet return conditions. We feel that the largest impact for deferred engine maintenance will be with the major MRO facilities offering engine overhauls and performance restorations, where operators will prefer target surgical strike worksopes to keep existing aircraft operating.”



Some CFM56 variants may experience a general drop in aftermarket spending.  
Photo: Vortex Aviation

At AFI KLM E&M they are seeing the speed of recovery of domestic traffic in China, even a slower recovery in the rest of the world will still require the majority of CFM56 powered aircraft to be returned to service. Michael Grootenboer, VP AFI KLM E&M Engine Product says depending on the speed of recovery and the numbers of retirements, green time might offer some modest opportunities to defer maintenance but given the size of the overall market this effect is likely to be limited.

There have been deferrals and reductions in shop visits throughout the covid period, however engine worksopes cannot be put off indefinitely. With the roll out of the vaccine programme and as we all become more adept at living with the new rules around social distancing, Marston from Aero Norway anticipates that we should see more buoyancy in the market as evidence of a recovery begins to emerge. He says several companies are gauging the recovery by when we will get back to 2019 levels. "That's unrealistic – the levels of 2019 are

history now and we must look forward not back. Green time cannot carry on forever, however I can see that in order for operators to reduce costs, they will continue to use hospital visits where possible to ensure they can still fly the engine."

For example, Marston hints that normally with LLPs a shop visit would be called after 2000 cycles; in today's market operators and lessors are looking for ways to prolong the flying time by one or two thousand cycles through these surgical strikes. In terms of engines on the shop floor at Aero Norway today, they have around 40% -3s with the remainder -5s and 7's, however back in 2019, the ratio would have been 30% -3s to 70% 5s and 7s. Recently, Aero Norway further expanded its capabilities with the addition of a new plasma spraying machine.







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## Pandemic puts a heavy load on **cabin** interiors

Cabin interiors have adapted to changes in the market.  
Photo: Airbus

Airlines have adapted aircraft interiors to meet changing demands and its likely they will look at cost effective cabin maintenance options during the road to recovery, as **Keith Mwanalushi** finds.

**T**he grounding of aircraft fleets caused by COVID-19 has had a negative impact on the cabin interiors market, but experts believe the dip in demand will be short-term with signs of a slow recovery from the Q1 of 2021. The road to recovery will involve OEM's, aftermarket, and MRO service providers upping their game to gain the passenger confidence in flying back to normal conditions.

In the current environment, the main challenges are minimal requests and low demand for interior maintenance overhaul, comments Marko Männiste, Managing Director at UK-based MAC Aero Interiors. "Also, understanding the current market trends to predict the summer



Marko Männiste, Managing Director, MAC Aero Interiors

season requirements and volumes based on the current world pandemic situation – as well as reviewing our pending projects with clients, and managing their expectations," he says.

Alexandre Tahbaz, AFI KLM E&M Cabin Modification Business Development Manager reckons the main challenges regarding cabin interior maintenance is giving confidence back to passengers. He explains that in the current environment when looking at ticket price, passengers were primarily more concerned with safety and cabin appearance than for instance, live internet services or the number of movies available, when choosing an airline. "We see a lot of work going towards developing touch-





“Airlines will need to continue adapting the cabin configuration in response to the passenger demand during this recovery period.”

*Alexandre Tahbaz, AFI KLM E&M*

The industry has seen modifications of cabin components to support cargo operations.  
Photo: Air France KLM Martinair Cargo

less technologies and all airlines are also rethinking their operations and their cabin maintenance process to make sure they provide the best-in-class virus-free cleaning environment for their crew and their customers. Lavatories, folding tables, galleys are the most concerning zones for airlines,” he highlights.

Due to the disruption caused by the pandemic, various aviation stakeholders along with the IATA Advisory Medical Group worked together to set up additional new cabin and disinfectant measures to reinstall passenger's confidence in travelling and to assure the passengers that the risk of the transmission of communicable diseases is minimal.

Alia Al Qalam, Manager, Development Engineering at Oman Air notes that all the new cabin cleaning measures that have been introduced in the market have potentially contributed significantly to additional maintenance cost and workload, and she mentions concerns of some cleaning

materials that could cause corrosion to the plastic parts of the cabin interior, damage to the leather seats, scratches to the IFE seat display units, and passenger control units. “The disinfectants might seep into the IFE seat electronic boxes, plastic seat tracks and in turn compromise IFE serviceability or seat control mechanisms which in turn will increase maintenance costs at such difficult times,” Al Qalam cautions. However, she stresses that this has contributed to improved cleaning and disinfecting tasks in the cabin, flight deck and cargo compartments.



Alia Al Qalam, Manager, Development Engineering at Oman Air

Given the current circumstances in the airline industry, it is not surprising that airlines' financial constraints are the biggest challenge currently affecting the cabin interior maintenance sector. “We as an organisation, have had to be innovative in the way we work, and have capitalised on all opportunities, such as offering loyal customers incentives and flexible payment solutions, to help drive business,” says Ali Jamal, Head of Aircraft Maintenance at Etihad Engineering.

Currently, it is likely that some airlines have put a pause on interior cabin work and refurbishment plans altogether but

“We as an organisation, have had to be innovative in the way we work, and have capitalised on all opportunities.”

*Ali Jamal, Etihad Engineering*



Ali Jamal, Head of Aircraft Maintenance, Etihad Engineering

MROs must be prepared for pent up demand when it happens. Jamal from Etihad Engineering argues that although some airlines have paused their interior cabin work, others are seizing the opportunity of having their aircraft on the ground to upgrade and refurbish their cabins to the highest of standards in preparation for the rebound. “We project that airlines will continue with cabin refurbishments, perhaps looking at cost effective maintenance options rather than total refurbishments or introducing new cabins. We are using this opportunity to develop as many capabilities as possible,

to serve not only our current customers but potential customers in the future.”

At AFI KLM E&M, Tahbaz reports that demand for cabin interior refresh projects reduced in 2020 compared to 2019 but he has confidence in the market for interior cabin work to increase with the recovery. “The recovery is probably not going to be at the same pace for leisure and business passengers, airlines will need to continue adapting the cabin configuration in response to the passenger demand during this recovery period. We also see a lot of end of lease

and some additional long storage aircraft; lessors are struggling to remarket these aircraft in this period. However, we see a few airlines putting aircraft in-service again, depending on the operator regions, so we anticipate seeing new cabin work requests for the near future.”

MAC Aero Interiors are currently reviewing their long-term availability and scheduling customer requirements for 2021 and beyond around their availability. Männiste says the ability to react to the predicted rebound demand is strategized to support the operator’s needs on demand, especially shaped by the current global situation. He adds that staying flexible in this climate is key, and the clients appreciated the ongoing support. “We have strong resources and a skilled workforce continually demonstrating our capability.”

Clearly, airlines are focused on conserving cash and Al Qalam from Oman Air sees that currently airline operators might not invest in cabin innovative projects for in-service fleets until the pandemic situation improves. However, she stresses that several airlines are assessing retrofitting their commercial aircraft to support cargo operations to diversify their ancillary revenue. “I believe production aircraft might have a better opportunity to have more innovative solutions endorsed in the cabin to improve onboard hygiene like touchless door handles, UV light for cabin surface disinfection and galley dividers if aircraft OEMs, cabin suppliers offer the new technology at a reasonable cost as a standard fit and speed up the certification process.”

In fact, a 2020 report by Markets & Markets reveals the process of obtaining certifications for IFE systems for instance is quite exhaustive, owing to the long approval process and the high cost of IFE systems. For example, an IFE system needs to be connected to an electrical bus to ensure safe landing. This procedure requires approval from the Federal Aviation Administration (FAA). Thus, regulatory frameworks and certifications act as restraints to the growth of the in-flight entertainment and connectivity market.

### **Cargo is the cash king**

For the air cargo market, the industry has seen increased demand to support interior



reconfiguration retrofits and modifications of cabin components to support cargo operations. Lufthansa Technik has been a major player in this area and in March, the MRO specialist announced the development of new onboard patient transport units for air transport of patients in intensive medical care.

The specification and airworthiness certification were performed by Lufthansa Technik. The specialised Swiss medical device manufacturer Aerolite has been contracted to develop and manufacture the system. For installation in different aircraft types, the partners have also developed a special concept that allows electrical connection to various on-board power systems with direct and alternating current. Installation requires no tools and takes only a few minutes according to Lufthansa Technik.

Airlines globally have continued to see the attractiveness of temporal conversion

of the aircraft cabin to cater for increased international cargo during the pandemic. Last year IAG Cargo focused on the fight against the pandemic, transporting over 20,000 tonnes of PPE and large quantities of sanitiser, ventilators, and COVID-19 testing kits, much of that in the cabin of passenger aircraft. In 2021, COVID-19 vaccine shipments are a priority shipment at IAG Cargo, and the business had already transported over one million doses by the end of January and has joined the UNICEF Humanitarian Airfreight Initiative to support the COVAX initiative.

Jamal at Etihad observes the demand in cargo operations that has risen as countries across the globe race to distribute medical supplies and vaccines. He says this has resulted in an increased demand for cabin reconfigurations, as well as cabin repairs. "The encouraging news for MRO's is that whilst we can initially reconfigure an aircraft to allow for additional cargo space, when passenger demand begins increasing, the majority of these aircraft will then need to come back to the

hangar to be reconfigured back to passenger cabins."

Airlines are continuously assessing the possibilities of converting commercial aircraft cabins to support air freight in the cabin, however Al Qalam highlights some challenges that persist for airlines looking to pursue such options, for instance, STC retrofit costs and the restrictions to transport certain types of goods which might have specific transport requirements. That considered Al Qalam anticipates high demand on the cargo in passenger cabins, especially with the EASA having revised its guidelines for the transport of cargo in passenger cabins which includes the removal of section 5.2.1 allowing reclassification to "minor change" for transport of medical supplies. This allows carriers to transport some pharma goods more easily. "I believe airlines would certainly take that opportunity to diversify their revenue source," Al Qalam states.

KLM has responded to the new reality by operating cargo in the cabin flights carrying medical relief goods and PPE material on seats secured with plastic sheeting and straps. Initially, these flights were deployed on the airline's remaining three KLM Boeing 747 Combis. Now that these aircraft have been retired the Boeing 777s have taken over.

KLM Cargo has partnered with its long-time cargo equipment supplier Trip & Co to design a new Cargo Seat Bag (CSB) innovation. KLM has stated that the bags not only protect the interior, but also double loading capacity on the seats, they reduce physical strain during handling and prevent plastic waste. KLM received the first set of 172 bags on 8 April and undertook its first operational flight using CSBs on 13 April 2021 carrying about 950 boxes (10 tonnes) of medical relief goods and COVID-19 test kits from Shanghai to Amsterdam.



KLM has introduced a new cargo seat bag innovation in the cabin.  
Photo: Air France KLM Martinair Cargo

INDUSTRY INTERVIEW

# Q & A

IN THE  
HOT SEAT.....

**James Boccarossa**  
Founder & CEO  
ProvenAir Technologies  
and CEO Air Spares Unlimited

Boccarossa says MROs leverage ProvenAir  
to ensure all material complies with BtB.



### James, tell us about your connection with ProvenAir and Air Spares?

My wife, Stephanie Boccarossa, is the owner and founder of Air Spares Unlimited (ASU). She has been in the aviation industry for over 20 years and has a strong sense for the market and excellent strategic deal making abilities. But she needed an experienced business leader to run her company, so she recruited me to be the CEO and to help build out the team, set the vision, execute the strategy, and launch Air Spares Unlimited on a growth trajectory path.

ASU's focus is chapter 32 material. Landing gear is such an emphasis for the business, ASU constantly reviews trace records. It is a very time consuming and manual process to prove BtB completeness. My background is in enterprise software development, so I saw this antiquated process as a perfect problem to solve with automation. I scoped out a solution and I started ProvenAir Technologies (PAT) as a separate company to help ease this pain.

Ed Sobota has been promoted to the role of President for ASU and he now handles all day-to-day activities for ASU and I focus 100% of my time on ProvenAir. Stephanie is the CIO (Chief Innovation Officer) and is responsible for creating new business concepts that continue to move our family of companies forward across ASU, PAT and our new MRO that will launch this year.

### Briefly, tell us about ProvenAir and the key capabilities and solutions?

ProvenAir is a cloud-based system to analyse and dynamically generate Back-to-Birth (BtB) trace history for Life Limited Parts (LLPs). What sets ProvenAir apart is that ProvenAir has a dynamic trace engine that uses a trace algorithm. This algorithm powers the automation and creation of a genealogy of parts across time. These relationships allow ProvenAir to point out exceptions in the full BtB of an LLP or assembly. This all happens automatically so the user does not have to do any manual matching, organising, or comparison.

A customer just uploads their documents. ProvenAir reads any file and identifies the documents. Then PAT digitises and extracts all necessary data and information. This data is verified for accuracy. Once complete, PAT looks for potential data issues through an integrity quality process. Finally, a PAT analyst reviews the timeline and provides any comments that would help in remediation of issues.

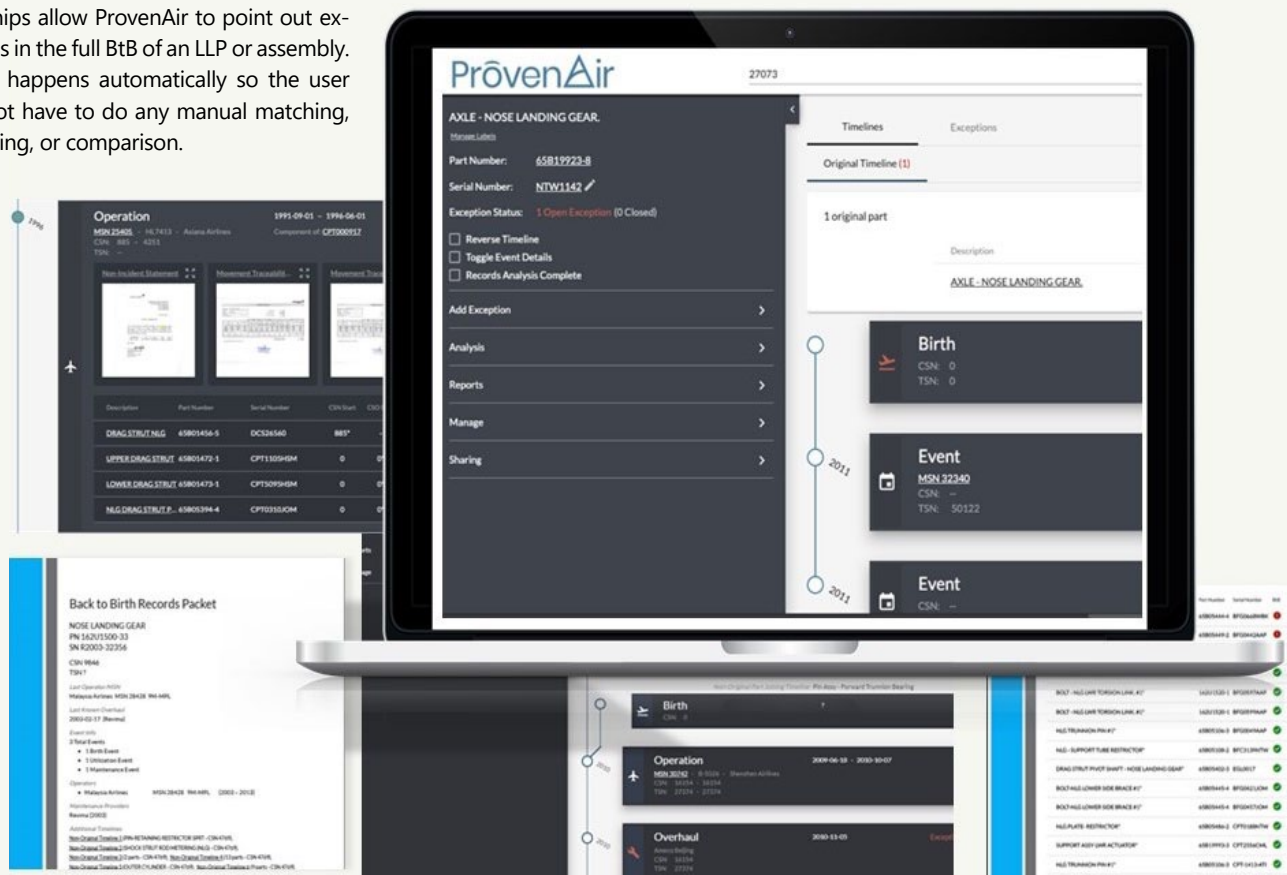
Customers can search part or serial numbers, files, and documents. They can also see the relationships of parts to airframes and operators. Data can be shared, which alleviates huge document downloads and emailing. The information is shared between colleagues, vendors, and customers directly inside the PAT engine. ProvenAir also lets users collaborate on exceptions.

ProvenAir takes the hard work out of finding issues the paperwork and this saves customers time, money, and increases the quality of their work.

### What is the importance of back to birth trace analysis for aircraft components and how can this be done most efficiently?

BtB is important for lessors to preserve the value of their portfolio. BtB reduces concessions and costs that drain maintenance reserves and increases residual value. BtB for airlines helps satisfy compliance, lower lease return penalties, and prevent cost overruns. MROs under strict timelines and must verify paperwork before certifying incoming components. This is time consuming and fraught with error. Suppliers need to provide customers easy to verify BtB. Quality BtB increases the sale opportunity and shortens the sales cycle by making it convenient for customers to review and approve.

There was no efficient way to create BtB before ProvenAir. BtB was being reviewed manually. The term BtB is not even clearly defined nor is one standard fully accepted. To compound the issue, full docu-



mentation was not always tracked for many parts. This does not mean the parts were not high quality, it just meant that more faith must be placed on the previous owner.

To increase efficiency in the market, a reasonable accepted definition of BtB must be adopted and supplemental paths to compliance accepted so as not to orphan good material. Going forward, records must be kept with adherence to a standard. The two leading standards are SAE's ARP6943 and IATA's LLP working group. Finally, an automated system, like ProvenAir, should be used to validate compliance.

**In what way do you work with MROs to ensure the most accurate back to birth trace available?**

MROs leverage ProvenAir to ensure all material complies with BtB. An MRO receives documentation from clients via email or some file sharing system. Most of the time this information is unorganised, incomplete, and inaccurate and this puts additional workload on the MRO. The MRO spends many hours reviewing this paperwork and then spends even more time working with their clients to remediate issues. This causes stress on the MRO, slower TAT, and increases the overall cost. By using ProvenAir, MROs eliminate initial review of paperwork and can spend time repairing documentation directly with their client. This saves MROs time and reduces the overall cost for both the MRO and the customer all while increasing satisfaction, quality, and safety within the industry.

**What solutions does Air Spares Unlimited provide in the aviation aftermarket?**

ASU provides customers solutions for chapter 32. ASU is one of the few companies in the world completely dedicated to landing gear. ASU carries material located in Chicago and offers leases, exchanges, and outright sales. ASU provides component sourcing, repair management services, and liquidity for suppliers and consignment programmes.

**Have you noticed any changes in customer requirements for landing gear, wheel, and brake parts during this COVID pandemic?**

Wheel and brake requirements have lowered. However, we have seen substantial increase in requests for help with landing gear.

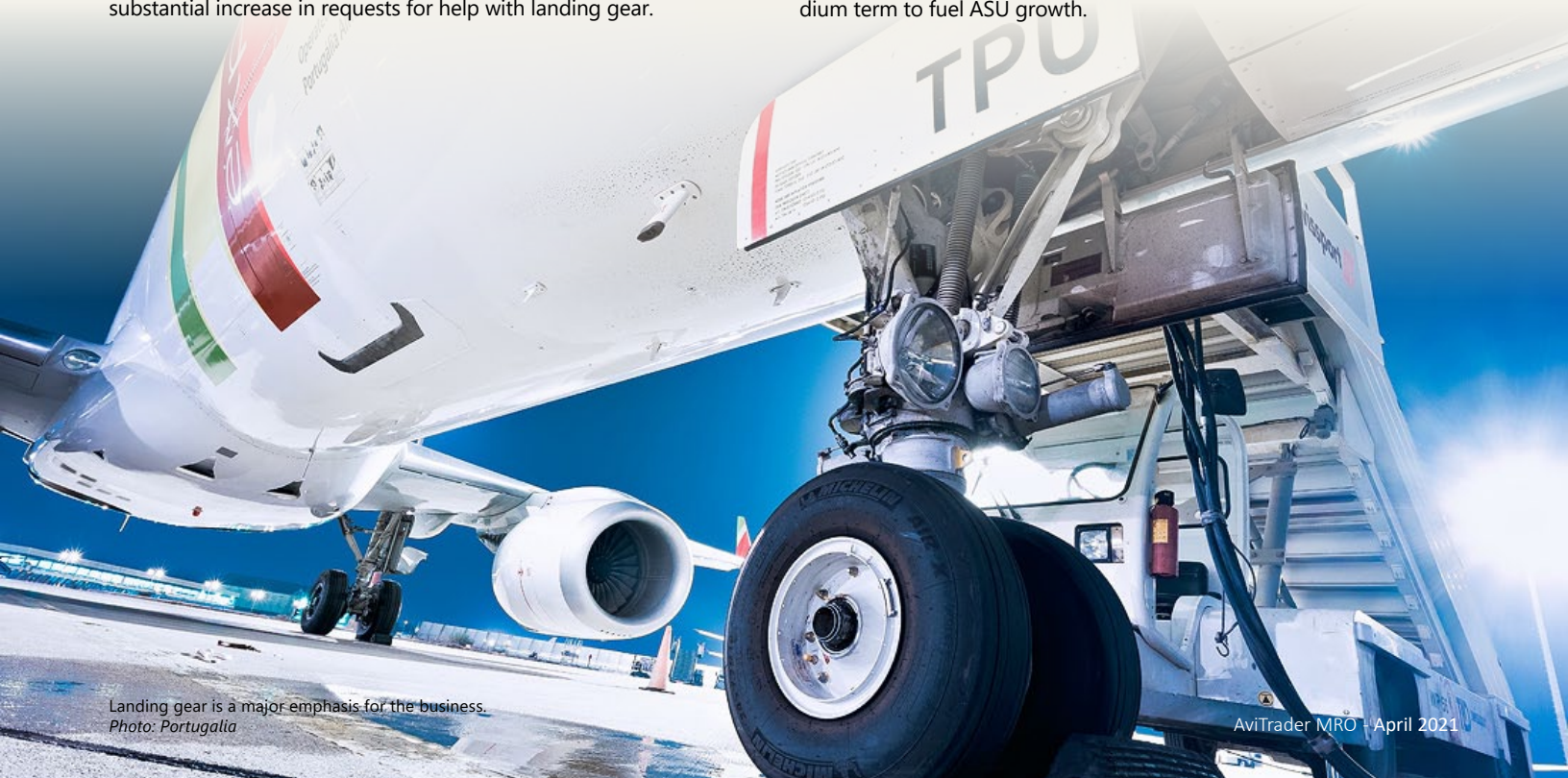
Suppliers who have landing gear stock are looking for liquidity solutions and ASU is able to purchase and stock this material. Our experienced sales teams have been able to help our suppliers find customers for landing gear. Customers have increased their queries for help with landing gear services. Many customers have lost staff or do not have the internal expertise to accurately evaluate the market or need assistance with exchanges and/or repair management. Landing gear has a calendar time limit between repairs so customers must implement a solution. Cost control and speed to deliver are big factors during this crisis and customers come to ASU for help with strategy and assistance.

**How is innovation and technology driving the businesses forward?**

Innovation and technology are core for ASU and PAT. We believe in providing top level services and that is achieved by creating innovative solutions. To implement this, we rely heavily on technology. Examples of this dedication to technology, PAT developed an automated BtB trace solution and ASU built an asset scorecard system. We believe in innovation and technology so much it is in our mission statement and we review our mission at every company meeting. This dedication has enabled both companies to not only survive but grow.

**What are your projections for both businesses in the near and medium term?**

We are seeing increases for both ASU and PAT. As companies learn about the PAT solution, they realise it is a 'no brainer' to automate reviewing records and increase BtB quality. The number of companies looking to automate their BtB process, speed time to market for material, and shorten the sales cycle will increase. In the medium term, companies will be looking to keep their costs down by leveraging technology and PAT will be an integral part of that strategy. ASU continues to grow, and we project this trend to accelerate in the near term. Customers love the service and landing gear expertise that ASU provides. Since landing gear is only replaced every 10 years, many smaller airlines and lessors do not have dedicated expertise in house. They have been outsourcing this capability to ASU. We see this continuing in the medium term to fuel ASU growth.



Landing gear is a major emphasis for the business.  
Photo: Portugalia



## »»»»→ on the move



Soeren Stark

At its meeting on April 22, the Supervisory Board of Lufthansa Technik appointed **Soeren Stark** as Chief Operations Officer (COO) and Accountable Manager of Lufthansa Technik for a further five years until December 31, 2026. Stark has been a member of the Executive Board since January 2019. He is responsible for technical operations, logistics, and IT. As the "accountable manager" within the meaning of EASA Part 145, he is the point of contact for the aviation authorities on all matters relating to the maintenance and manufacturing operations of Lufthansa Technik. Stark has held various positions within Lufthansa Group since 2001. From 2016 until 2018, he was responsible for operations at Lufthansa Cargo as member of the Executive Board.



Maxime Gorsse

Vallair has appointed **Maxime Gorsse** as Director of Investor Relations and Project Financing. Based in Luxembourg, Gorsse will be pivotal in advising Vallair on all capital expenditure decisions as well as sourcing and negotiating financing for Vallair assets and programs. Gorsse has an MA in Finance and Actuarial Science and has accrued his professional experience in the aviation finance sector. Most recently he worked for CHC Helicopter as Senior Manager of Fleet Transactions.



Martin Taylor

Aerogility has released that **Martin Taylor**, a 40-year veteran of BAE Systems, is joining its Board of Directors as a Non-Executive Director. Taylor is, and remains, Managing Director, Future Combat Air Systems (FCAS), at BAE Systems – Air. He began his career as an Aerodynamicist at British Aerospace Military Aircraft Division. During his time at the organization he was promoted to Head of Project

for the Harrier program before moving to Fort Worth, Texas, as the BAE Systems Program Director on the Joint Strike Fighter Program (now known as F-35).



Ellen M. Lord

AAR, a provider of aviation services to commercial and government operators, MROs and OEMs, has released that **Ellen M. Lord**, former Under Secretary of Defense for Acquisition and Sustainment for the United States Department of Defense, has been elected to the company's Board of Directors, effective immediately. Lord served as the Under Secretary of Defense for Acquisition and Sustainment for the United States Department of Defense from August 2017 until January 2021. In this role, she was responsible for all matters pertaining to acquisition, developmental testing, contract administration, logistics and materiel readiness, installations and environment, operational energy, chemical, biological, and nuclear weapons, the acquisition workforce, and the defense industrial base.



Sugato Bhattacharjee

**Sugato Bhattacharjee** has been appointed President of the Nexcelle engine nacelle joint venture of Safran Nacelles (Safran) and Middle River Aerostructure Systems, a subsidiary of ST Engineering. Bhattacharjee is a member of the Middle River Aerostructure Systems (MRAS) leadership team who brings extensive experience in management, design, manufacturing, and engineering – including managerial positions on international jet engine programs and in the joint venture environment. Prior to his appointment as Nexcelle President, Bhattacharjee was MRAS' Senior Product Manager for regional nacelle programs. Bhattacharjee succeeds **Patrice Provost**, a Safran Nacelles employee, who was the president since early 2019. Provost continues his relationship with Nexcelle as one of the joint venture's two Executive Vice Presidents.



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