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Summer 2022

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ENGINE LEASING

How This Niche Navigated To The New Normal

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A FRESH LOOK AT PMA PARTS AND HOW THEY HELP SAVE MONEY

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Back to Normal… Whatever That Is!

BY JOY FINNEGAN
EDITOR-IN-CHIEF

The cyclical nature of our industry has been borne out again with the last two — almost three — years of crisis and rebound. For those "youngins" who are experiencing their first taste of the way aviation works, I say, welcome to the most interesting industry in the world. It has been impressive to watch the industry cope with the dire nature of the past years — almost as if they have figured out a few things or remembered what worked in previous crises.

The industry survived an almost complete shut down for months and to me that shows one thing is for sure, aviation will survive anything. We have gone from pilot and mechanic shortages and intense hiring to layoffs and early retirement offers to get those close to that milestone to leave and now back to worries about shortages in the seeming blink of an eye. It's enough to make your head spin.

For those who took the packages and retired just a bit early, I hope you are enjoying your time now and have no regrets. Those offers to end lifelong careers in aviation early were tempting enough to lure thousands of people at all the airlines to leave. 17,000 employees, or 20% of its workforce, took buyout packages or early retirement, Delta reported in August of 2020. Thousands also took deals at United and American.

Now, we are back to worries about not having enough mechanics (not to mention pilot crew shortages that are limiting full recovery schedules at the airlines). As AIA puts it in one of their policy statements, "A highly skilled and robust aerospace workforce is essential to our national security and economic prosperity. Yet today the industry faces impending retirements and a shortage of trained technical graduates, which is a situation that is forecasted to worsen within the decade." There are just no easy answers to the radical impacts to flying like those of the COVID crisis.

But now that we are through the worst of it, most folks are vaccinated and we are moving on as a nation and industry, we wanted to take a look at a few things that can help and see how some niche areas of our industry navigated through the troubled waters of the past several years.

In our cover story we examine how the engine leasing sector survived a near shutdown of operations. This crucial sector has a bird's eye view of the industry and often sees the impact of the economy before others. These folks are eminently able to comment on the impacts of both the downturns and the recoveries.

We asked engine leasing experts not only how they managed through these times, but what they are seeing now that times are better. Tadhg Dillon, chief commercial officer at Shannon Engine Support, Patrick Biebel, managing director of MTU Maintenance Lease Services, Oliver James, VP Commercial Trading at AerFin and Anthony Spaulding, EVP at Magellan Aviation Group gave us an insider look at what happened and where we are headed. In short, Spaulding says the recovery has been "substantial" and that prices are rebounding. See more in this feature story starting on page 28.

Next, we got an update about PMA parts from several key manufacturers of these replacement parts. They are more important than ever with the ongoing supply chain challenges facing the entire aviation and wider world economy. PMA parts can be a saving grace when parts are needed quickly and with competitive pricing.

"PMA parts, by their nature, are a natural mitigation strategy for airlines. As a direct replacement for OEM parts, by including PMA parts in their maintenance programs, airlines are immediately opening up a second FAA-Approved source," HEICO's Pat Markham, VP of Technical Services for HEICO Parts Group, said in the story, specifically referring to airline supply chain challenges.

You can learn more from the PMA experts, including the Modification and Replacement Parts Association (MARPA) president, Jason Dickstein, quoted in this feature story starting on page 16. By the way, if your company is not a member of MARPA already, please contact them to join ASAP.

We also had a great opportunity recently to speak with Johann Bordais, president and CEO of Embraer Services and Support. Bordais is one of those rare eternal optimists who always sees the bright side — a perfect outlook for the leader of Embraer's efforts to keep their customers in the air and happy. See Ian Harbison's story resulting from his sit down with this global leader.

That interview also led us to learn more about Beacon. Beacon is the EmbraerX (a disruptive innovation subsidiary of the Embraer Group) new web-based system that offers the potential for substantially reduced maintenance delays. The product started out in the executive aviation sector but is rapidly expanding and has achieved considerable success with airlines in the last nine months. Learn more from Bordais and about Beacon in stories starting on page 24 and 26.

One final standout story in this issue is safety expert Jeff Guzzetti's On Guard series entry. Guzzetti usually highlights an aircraft incident or accident that has a specific lesson for maintainers. And that holds true for his latest piece. But in this case, the tale, entitled "The Day the Nine-O-Nine Died," has a personal twist that left me hoping the remaining B-17s of the world continue to survive and filled me with pride for our WWII veterans. Read more starting on page 48.

Finally, we invite you to join us soon for Aerospace Tech Week Americas which takes place in Atlanta, Georgia on 8-9th November 2022. The event provides a unique opportunity for the aerospace industry to focus on eight core technology areas like MRO and MRO IT, Avionics, Flight Ops IT, Testing and more. There is a main conference track for each sector which you can mix and match as well as a free central exhibition. Registration is open now at www.aerospacetechweek.com/americas/register. The early bird savings on the main conferences as well as a 3 for 1 offer make it a great value for groups. We are inviting all airlines, military/defense and government to attend for free. Airlines can also can apply for a hosted place including free accommodation. You can see excerpts from the official pre-show guide starting on page 33. We hope to see you there as an attendee, sponsor or exhibitor! AVM

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Lufthansa Technik Redoubles Apprentice Training Efforts as Need for Technicians Grows

Since the pandemic, Lufthansa Technik's apprentice training program this year has returned in terms of numbers to roughly where it was in 2020: 186 young people will begin their apprenticeship at the German locations of the company. Furthermore, a total of 23 dual students were taken on. These students are school graduates who combine their degree courses with practical applications.

"We need reinforcements for the decade ahead; mechanics and engineers for the production divisions, we need young staff members for logistics and also the commercial sector," says Barbara Koerner, head of training and dual studies at Lufthansa Technik. "We are competing with many other companies that are preparing for the changes brought about by the upcoming generation change and increasing digitization. The job market has changed a great deal. In a constantly evolving world, we increasingly find ourselves in the situation of no longer being able to choose but having to be chosen as an attractive employer. In this respect, vocational training of highly qualified workers remains one of our most important measures for securing the future."

In view of an increasingly tight HR market, Lufthansa Technik is using a number of new methods in addition to tried-and-tested measures in personnel marketing in order to reach young people who are suitable both personally and professionally. The company is using the slogan "We are Aviationeers" in printed and online advertising formats as well as social channels. It is also advertising for new employees in Hamburg and Frankfurt with campaigns in public transport and in fast-food restaurants. Presence at trade fairs will also be intensified again, as will cooperation projects with schools and universities.

Of the altogether 209 new training positions or places to study, 122 are directly attributable to Lufthansa Technik, 36 for the first time to the technical operations of Lufthansa Airlines, and the remainder to the companies of the Lufthansa Technik Group (see listing below). The percentage of women in this year is reported to be 14 percent. The inclusion of people with physical disabilities also remains a declared goal of the company. In Hamburg, two hearing-impaired people will start their training as tool mechanics this year.

Precision Aviation Group Enters Definitive Agreement to Acquire PTB Group

Atlanta-based Precision Aviation Group (PAG), a provider of products and value-added services to the aerospace and defense industries, has entered into a definitive agreement to acquire PTB Group (PTB).

PTB provides maintenance, repair, and overhaul services (MRO) on Pratt & Whitney PT6 and Honeywell TPE331 engines, leases engines and airframes, and provides aviation supply chain services. PTB is made up of the following entities: Pacific Turbine USA Group (a/k/a Prime Turbines) with locations in Texas, Arizona, Florida, and Pennsylvania, Pacific Turbine Brisbane and Pacific Turbine Leasing, both in Brisbane, Australia and International Air Parts located in Sydney, Australia. The agreement is subject to shareholder approval and is currently scheduled to close in the 4th quarter of 2022.

"We are excited about adding PTB to the Precision Aviation Group of Companies. The addition of PTB increases PAG's repair stations to 20 worldwide, expands our Engine Services Division with the addition of the PT6 and TPE331 engines, and significantly enlarges our Supply Chain Services business. Stephen Smith and his team – like PAG – are focused on exceptional customer service and exceeding customer expectations – we look forward to this partnership," said David Mast, president and CEO of PAG.

Stephen Smith, PTB's managing director and CEO said, "We are pleased to be entering into this binding transaction with PAG and believe they will be a good future owner of the Company who will be committed to continuing to expand our products and services and ensuring continued opportunities for our workforce of approximately 150 people. PAG has a shared vision with PTB, and I see an exciting future ahead."

AvAir Invests in Sustainability Efforts, Partners with WM

Aviation aftermarket inventory solutions provider, AvAir, is now working with WM to improve its sustainability efforts. WM is the leading environmental service and solutions provider in North America and will provide an extensive evaluation and recommendations on how AvAir can improve its operations to reduce its environmental impact.

"From how we serve our customers and employees to how our operations are run on a daily basis, we are always trying to improve our processes and services," said Mike Bianco, CEO of AvAir. "Assessing our operations to improve efficiency and reduce environmental impacts is something my team and I care deeply about. We look forward to working hand-in-hand with the sustainability team at WM."

WM will review AvAir's processes and data to benchmark procurement, waste, water, energy, fuel, transportation, and other potential contributors to greenhouse gas emissions. After a thorough evaluation, WM will deliver a summary of AvAir operations, environmental impacts, and improvement recommendations. Following that, AvAir will establish goals and initiatives to improve its environmental impact across all channels of the company.

Bianco is a member of the Thunderbirds, a Phoenix-based nonprofit that distributes monies raised through the WM Phoenix Open golf tournament. WM implemented its sustainability efforts at the tournament in 2013. Since then, WM has engaged over 100 vendors and sponsors with annual sustainability requirements,

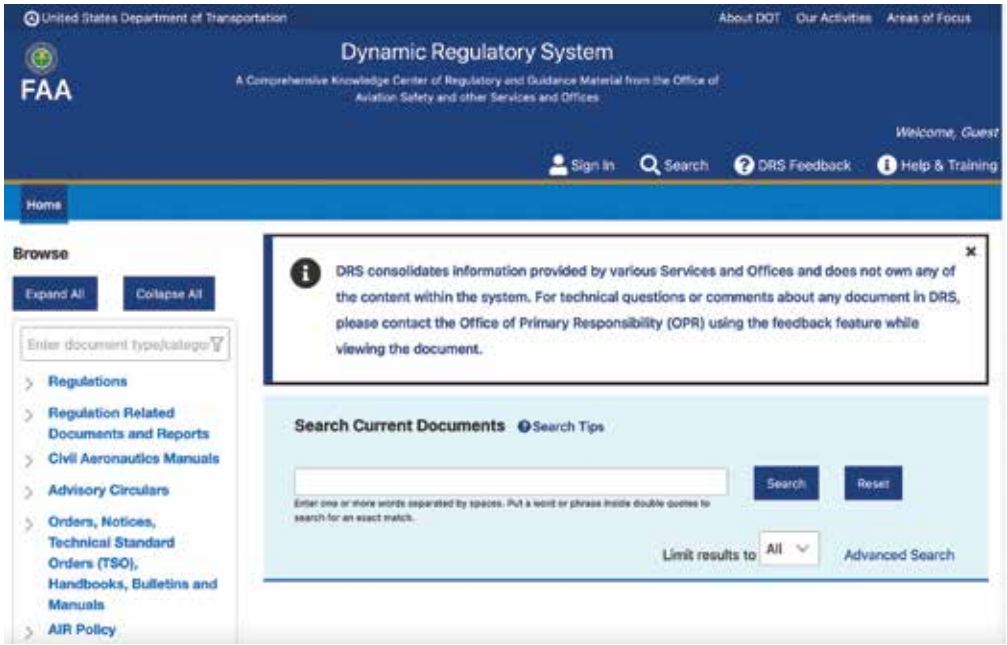
developed greenhouse gas and water reduction strategies to balance the tournament footprint, and more. Resulting in zero waste – all materials are recycled, repurposed, composted, donated, or sent to create energy, an incredible feat. Through Bianco's participation in the nonprofit and golf tournament, he saw the impressive impact WM had on the event and was motivated to make a difference. Bianco says he knew AvAir could lead the way to effect changes in the aviation industry.

FAA's RGL Has Been Decommissioned, Replaced with Dynamic Regulatory System

FAA's Regulatory and Guidance Library is undergoing a phased decommissioning and is expected to be completely retired no later than the end of summer 2022. All information is currently accessible on the Dynamic Regulatory System (DRS) which will replace RGL. The FAA is encouraging users to start exploring the new site at drs.faa.gov.

For those who desire a tutorial guide for the new system, FAA officials say that PDF tutorial guides are available by contacting them via email at 9-AVS-AIR-Regulatory-and-Guidance-Library@FAA.gov.

Beginning Aug. 17, the AD documents will only be available on the newly developed Dynamic Regulatory System (DRS) at https://drs.faa.gov/browse.



The following databases were decommissioned after Aug. 16, 2022, in the Regulatory Guidance Library, including:

- Emergency Airworthiness Directives (EAD)
- Airworthiness Directives (AD)
- Airworthiness Directives: Biweekly (AD Biweekly)

To subscribe to ADs and SAIBs go to the FAA GovDelivery Service. If you are already subscribed to these notifications, your subscription should continue, according to the FAA.

The AD Biweekly, a paid subscription of all ADs issued in the Federal Register over the previous two-week period, will continue to be mailed as well.

StarterGenerator.com Announces Global Distribution Agreement with Wesco for PMA Parts

StarterGenerator.com has signed a global distributorship agreement with Wesco Manufacturing of Deer Park, New York. The newly developed and FAA Approved MRO ADVANTAGE Precision Maintenance Kits are now available for ordering. This PMA product is designed for eligible 150-400 amp Skurka-APC starter generators and features OEM designated expendable hardware items typically replaced at standard TBO intervals or other repairs. The company says the kit is a combination of value and convenience that make this product a compelling aftermarket solution – enabling MRO's to perform a thorough overhaul without having to deal with persistent supply chain delays, inflationary pricing and multiple source costs.

"We are thrilled to announce a PMA approved and enhanced alternative solution for APC starter generator MRO expendable hardware. Thank you to everyone involved and for their intense focus to deliver this exciting new product in a timely manner," commented Garrett W. Schwarz, president of StarterGenerator.com. "With the inherent convenience and value offered by these kits, and considering current inflationary pressure and supply chain delays — kits have never made more sense. We are enthusiastic about offering this new solution to our customers very soon," continued Schwarz.

Aircraft Exterior Maintenance in Danger with Heat Waves Blanketing Europe

With the extreme temperatures becoming a usual summer occurrence for Europe — some regions reaching as high as 45°C (113°F) — the now long-lasting and more frequent sweltering temperatures are a rather new problem for European airlines, as well as maintenance, repair, and overhaul (MRO) service providers are facing. Damage is being done to aircraft fuselages. How should European-based aviation solve the issue?

While temperatures that are two times higher than the ones currently in Europe are old news for such regions like the Middle East, this has become a fresh issue for the old continent. The extreme heat has become the main culprit in damaging the surface paint of aircraft fuselages, resulting in potential safety risks and grounded aircraft.

Jan Brunstedt, CEO of Aviator Robotics and the creator of Nordic Dino, the leading aircraft exterior cleaning robot, says that to prevent such intense consequences, more frequent aircraft exterior upkeep should be a top priority.

"No one wants to have their aircraft damaged so severely it needs to be grounded and its fuselage completely repainted. That can be, unfortunately, the end result of extreme heat affecting aircraft. It does seem that these types of heat waves might well be a reoccurring thing for Europe. Carriers, MRO providers, and manufacturers will have to learn how to deal with the situation. The first line of defense is a more regular aircraft exterior washing."

Brunstedt notes that the traditional way of cleaning the exterior of an aircraft — which means involving a sizeable crew of washers, equipment, and more —could only add to the problem. Manually washing an aircraft means a bigger chance for human errors and additional damage to the paint, for example, by a scissor lift. An alternative are semi-automatic washing solutions that only require one person to manage and operate the washing robot. The option is more cost-effective and saves time and personnel needed to wash one aircraft.

With the heat waves covering Europe, there have been resurging discussions around the role of exterior paints in the airworthiness aspect of the aircraft. While some manufacturers attribute chipping and cracking paints to the cosmetics and don't necessarily see it as a risk, a number of carriers, on the other hand, treat it as that.

"It's truly an interesting discussion and a very relevant one at that," Brunstedt reflects on the topic. "While it's a rather tough call how much does cracked paint affect airworthiness and whether it should only be seen as a part of aesthetics, one thing is for certain — unkept and untreated, the lifted parts of paint absorb dirt, humidity, which, in turn, can cause problems as serious as corrosion. It is very much of a snowball effect when it comes to properly take care of the exterior of the aircraft. One small oversight can lead to another bigger one until it becomes a very serious problem."

As the high summer temperatures don't seem to be subsiding anytime soon and coming back next year as well, airlines and MRO service providers in Europe will have to start making decisions and implementing solutions in order to prevent any serious problems that can arise from the lifted exterior paints.

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APOC Appoints Wall Chief Commercial Officer

APOC has promoted Kevin Wall to take on the role of chief commercial officer. Previously senior vice president of business development across the Americas, his new remit will focus on shaping future growth, consolidating market share and nurturing a team of success-driven people. "Driving the unique company culture at APOC and building upon the fresh approach that has seen the business expand exponentially in just seven years is both a challenge and an exciting opportunity," Wall says.

Wall will be running APOC's global commercial operations from the new Miami office which opened earlier this year. This expansion has been met with great enthusiasm from APOC's airline and lessor customers throughout the Americas, as well as the organization's MRO business partners and audited workshops throughout the region. "We continue to believe as a truly global player that further expansion into other markets is a logical development," explains Wall. "Over the next 12 months we will be exploring the next direction for APOC's global footprint."

Alongside many other after-market specialists post-COVID, APOC is experiencing an aviation industry on a rapid road to recovery. According to Wall, airlines are struggling to meet the increasing demands and supply chains are finding it hard to cope. "The used serviceable material (USM) sector is becoming increasingly important to sustain the supply chain and underpin flight service as capacity builds. APOC's expertise in providing USM (Used Serviceable Material) solutions is market leading."

In terms of business development over the next 18 months, Wall says that APOC will be focusing on its program of narrowbody aircraft teardown and on the rapidly expanding leasing and trading of both engines and landing gear. These are key areas of growth for the business and are fully supported by a solid investment strategy. "I anticipate that with APOC's innovative business model and secure financial status we will be able to not only take advantage of investment opportunities in engines, landing gear and airframe assets, but also to wisely shape our support programs as airlines evolve and explore new ways to operate."

Looking ahead over the next year Wall predicts further changes in the aviation sector. "Mergers & acquisitions are on the rise. Not just airlines themselves but the aftermarket MRO sector is attracting a lot of interest from investors. The industry continues to consolidate and evolve and APOC will shape our services accordingly. Teamwork and technology are what makes us different at APOC and our ambition is to provide top-quality innovative USM solutions where our customers need it and within their budget. We are seeing a surge in demand as airlines are increasingly turning to USM to effectively stretch maintenance budgets while preserving operational availability."

Max Lutje Wooldrik, CEO at APOC, said Wall's background and expertise are a perfect match for a fast-growing company like APOC. "Kevin is a highly respected member of the aviation community with a reputation for team motivation and commercial success and we have benefitted from his knowledge over the past year. I know that he will bring the energy and dynamism needed to take APOC to the next level," Wooldrik said.

Bonus Tech Appoints Lamoureux as new CEO

Effective beginning the 1st of July, David Lamoureux has assumed the role of chief executive officer at Bonus Tech, an Air France Industries KLM Engineering & Maintenance joint venture based in Miami and an engine teardown expert. Engine teardown facilitates the generation of used serviceable and repairable material from end-of-life engines and is a key enabler of circularity in engine materials, contributing to the drive for sustainability in the aviation industry.

Lamoureux succeeds Aurélie Kergoat, who in her five years as Bonus Tech's CEO has led its development into the company it is today. Kergoat drove growth in Bonus Tech's engine portfolio, increased turnover and profitability, and launched the development of complementary services for its customers, for example, engine inspection to be offered through Bonus Tech Engine Services, including Part 145 Approval.

"I want to warmly thank and commend Aurélie for the leadership she has demonstrated, for her tireless efforts and for the fantastic shape in which she hands over Bonus Tech Inc. into David's hands," Michael Grootenboer, AFI KLM E&M SVP group engines product and Bonus Tech Inc. "I want to welcome David to the Bonus Tech family. I am fully confident that with his extensive knowledge and experience he will continue the development and success of the company."

Lamoureux arrives with 15 years of experience in the MRO Engine business at AFI KLM E&M, from dedicated logistics, asset lifecycle management, engine maintenance operations and most recently served as technical sales director for CFM56-5 and GE90 Engine maintenance services worldwide. He also brings project and change management experience as a Six Sigma Black Belt.

SmartSky Networks Completes STC for Cessna Citation X

Inflight ATG connectivity provider, SmartSky Networks, announced the completion of an STC for the installation of SmartSky hardware on the Cessna Citation X series business jets. With more than 300 aircraft in operation, the Citation X series joins a growing list of aircraft types that have already been granted STCs for SmartSky's patented air-to-ground connectivity service.

FlyExclusive, the fourth largest private jet fleet operator globally, performed the installation at its Kinston, N. C. facilities. With the hardware installed, the Citation X aircraft made its inaugural flights using SmartSky's enhanced air-to-ground (ATG) network in June and the FAA supplemental type certification was issued on August 12, 2022.

"It has been a pleasure partnering with flyExclusive to welcome the Citation X to the ever-growing roster of aircraft that have received STC approval," said Dave Helfgott, CEO, SmartSky Networks. "We aim to make high-performance, reliable inflight connectivity available for everyone in business aviation and this successful certification with a key customer is an important step towards achieving that goal."

The Citation X certification comes after SmartSky's announcement in July that its ATG connectivity is now available nationwide for aircraft flying on routes across the continental United States.

SmartSky has previously been awarded STCs for many of the world's most popular business aircraft, including aircraft from major manufactures such as Textron Aviation, Gulfstream Aerospace, Bombardier and Embraer. The company says additional STCs are in progress that will make the service available for those in business aviation who need reliable, consistent, and responsive inflight connectivity.

Wencor Announces Extension of Purchase Agreement with ALP Aviation through 2027

Wencor and Alp Aviation have announced the signing of a multi-year Purchase Agreement. In the agreement, Wencor will provide consumable and expendable (C&E) parts to support ALP Aviation's production requirements. The parties held a signature ceremony at the Farnborough Airshow.

Alp Aviation and Wencor have partnered for 20 years. The new MY10 Sikorsky contract will extend this relationship through 2027. Wencor will support ALP's requirements through its many OEM authorized distributorships, demand planning and JIT supply chain services through its local stocking facilities.

"We are thrilled to expand our relationship with ALP that we have enjoyed for over two decades," said Wencor CEO, Shawn Trogdon. "We look forward to utilizing our broad product offerings and best-in-class service levels to support ALP Aviation and their customers for years to come."

"We would like to thank Wencor for their excellent service to our organization. We are impressed by the timely support that the team has been providing us. This has helped us greatly to complete our projects on time and achieving customer satisfaction." said Senay idil, Alp Aviation's general manager.

OGMA Delivers C295 Aircraft to Portuguese Air Force

Under the General Terms of Agreement (GTA) with Airbus Defence and Space, for the maintenance of the C-295 aircraft, OGMA has delivered a C-295 aircraft to the Portuguese Air Force. The aircraft carried on an inspection (4Y+2Y+C+6M+600H+300H+SBs), defects repair and additional maintenance services.

Virgin Galactic Appoints Moore as EVP, Spaceline Technical Operations

Virgin Galactic announced that former Delta Air Lines executive Mike Moore has been appointed executive vice president, Spaceline Technical Operations, effective August 22.

Moore will lead Virgin Galactic's technical operations and maintenance team in charge of ensuring the company's vehicles are ready for flight. As part of this new position, he will help design and implement the operational model and technical infrastructure needed to support high cadence spaceflights during commercial service. Moore will report to CEO Michael Colglazier.

"A major part of delivering the Astronaut experience at Virgin Galactic sits with our technical operations team, which ensures our Spaceflight system is fit and ready to fly," said Colglazier. "I am thrilled that Mike is joining us to lead the expansion of our talented technical operations team at Spaceport America as we develop our capabilities in preparation for commercial service. Mike has more than 28 years of experience overseeing daily aerospace operations, and his expertise and steadfast dedication to safety, quality, and process improvement will be indispensable as we enter this chapter."

Moore joins the company following a decade-long career at Delta Air Lines, where he led Delta's TechOps Services Group. While at Delta, Moore supported the introduction of two major next-generation engine maintenance partnerships with Rolls-Royce and Pratt & Whitney. After beginning his aviation career as a mechanic in the U.S. Air Force, Moore also worked at Chromalloy Georgia, Northwest Airlines and TIMCO Aviation Services, and has served as a partner to TeamSAI.

"Joining the world's first commercial spaceline during this pivotal period of expansion is an honor," said Moore. "Virgin Galactic is an industry pioneer with a distinctive product and an exceptionally talented team. Entering high frequency commercial service will see a step-change in their day-to-day technical needs, and I look forward to working with the team to expand, build on their cutting-edge operations and meet their goals."

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AJW Group Expands PBH Contract with Air Transat

AJW Group signed a new Power-by-the-Hour (PBH) support contract with Canadian airline, Air Transat. The support contract will see the business manage the complete supply, repair, overhaul, and warranty of major components for the operator's expanding fleet of Airbus A321 NEO and CEO aircraft at Air Transat's primary base of operations in Montreal, Quebec as well as from bases in Toronto and Vancouver.

Air Transat has recently renewed its fleet with A321NEO aircraft, the greenest aircraft in their category as part of a commitment to a healthier environment, and are included in the support contract.

AJW Group has supported Air Transat with PBH service contracts for nearly 10 years, originally for their Airbus A330 fleet. The signing of this contract is a testament to the overall quality, support, and customer service delivered by the Group. Today's announcement reinforces AJW's position as the market leader for end-to-end supply chain solutions for the A320 family of aircraft.

"We are pleased to have renewed our power-by-the-hour agreement with AJW Group for our fleet of A321 CEO and our new A321 NEO aircraft," said Mario Lafrance, vice president, technical operations of Air Transat. "We have worked with the Group for many years and are confident that our maintenance needs are

always supported with knowledge and experience so we can focus on dispatch reliability and excellent customer experience."

Sajedah Rustom, CEO of AJW Technique, commented: "We are proud that AJW has signed the power-by-the-hour contract with Air Transat. This is a testament to our strong partnership and commitment to excellence in the Canadian and global supply chain. The partnership cements AJW's position as market leader on the A320 CEO and NEO family with world-class, in-house maintenance support coming from AJW Technique, our flagship MRO operation in Montreal."

Bluetail Launches First Nationwide Onsite Aviation Records Scanning Coverage Via Crowdsourcing

Bluetail announced a fully operational and scalable onsite scanning network. The new nationwide network was built using the crowdsourcing technique that has been proven in many other industries. Since March 2022, Bluetail has been building the network, technology and service and, since that time, it says it has successfully scanned near 100 jobs onsite at customer locations.

Bluetail has also now opened up a crowdsourcing portal to provide opportunities for experienced A&P technicians, aircraft records specialists and aviation techies who want to travel to customer locations and provide on-site logbook scanning services.

"With the unprecedented growth of business aircraft usage, our ever-expanding customer base requires that their aircraft logbooks and related records be digitized as quickly, efficiently, and with the greatest degree of security as possible," explained Bluetail vice president, Roy Gioconda. "Simply put, some operators just don't want to take the risk of their highly valuable documents leaving their hangar," he added. "The only way to solve the issue is to have more trained people available to go to them. That's exactly what our crowdsourcing effort accomplishes. Customers have been extremely receptive to this new approach."

The launch of the community, which the company says has numerous participants, represents a milestone in Bluetail's ongoing mission to also help A&P's, aircraft records consultants, even retired maintenance pros.

"By crowdsourcing a team of experienced aircraft maintenance professionals, we can scale to all major aviation hubs, unlike others which can only do one job at a time," said Roy Gioconda. "We have always offered the on-site scanning option, but with our expanding customer base driving increasing demand, we want to ensure we provide rapid nationwide response times."

Gioconda further explained that anyone interested in joining Bluetail's "mobile scanning team" must first visit the online portal and fill out all their information. Those who qualify as contractors will be trained to Bluetail's digitalization protocol and ethical conduct standards.

Reliable Robotics Achieves Certification Milestone with G-1 Issue Paper Acceptance

Autonomous aircraft systems pioneer, Reliable Robotics, announced that the certification basis of its advanced navigation and autoflight system has been accepted by the FAA. The final G-1 issue paper defines the certification basis for the company's Supplemental Type Certification (STC) on the Cessna 208 Caravan, a popular cargo aircraft. This STC will enhance safety by enabling continuous autopilot engagement through all phases of aircraft operation, including taxi, takeoff, cruise, landing, braking and rollout, with a single pilot on board for abnormal procedures.

"We are very appreciative of the FAA's noteworthy attention to detail and ongoing support," said Mark Mondt, director of certification at Reliable Robotics. "This certification basis is the culmination of years of work with the FAA and represents a key step towards bringing advanced navigation and autoflight systems to normal category aircraft. We look forward to continuing our work together as we move into the next phase of the certification process."

The FAA uses issue papers to provide a structured means of describing and tracking the resolution of significant technical and regulatory issues that occur during a certification project. The signed G-1 issue paper represents formal agreement between Reliable Robotics and the FAA on the applicable airworthiness and

environmental requirements for the company's advanced automation system.

Currently, controlled flight into terrain and loss of control are the top two causes of fatal accidents in small aircraft. Reliable hopes their advanced automation systems will reduce the occurrence of these accidents and bring a new level of safety to commercial aviation through precision navigation, sophisticated flight planning and robust flight controls, the company says.

Strong Rebound In Pax Traffic From Korea Boosts Philippines MRO Dornier Technology

Philippine maintenance, repair and overhaul firm Dornier Technology has benefited from the sudden recovery in inbound passenger traffic from Korea. Dornier Technology has won contracts for line maintenance from three Korean low-cost carriers that have resumed services to the Philippines, namely: Air Busan, Air Seoul and Jeju Air.

Air Busan is operating from Seoul Incheon to Kalibo, the gateway to the Philippines' famous resort island of Boracay, using Airbus A320s and A321s. Air Seoul is also serving the route, using A321s; while Jeju Air is operating from Seoul Incheon to Bohol's Panglao International Airport using Boeing 737-800s.

Dornier Technology, chief operating officer, Joseph Espiritu, says the Philippine market is very strong for Korean carriers, because it is a popular leisure destination in close proximity to peninsula Korea.

There are also many Koreans living in the Philippines, so the airlines benefit from having a mix of leisure and visit friends and relatives (VFR) traffic, he says. VFR traffic was the first segment to recover from the pandemic.

Korea's close proximity to the Philippines means Korean carriers are mostly serving the Philippines using short-haul narrowbody aircraft such as A320s and 737s, says Espiritu.

He says Dornier Technology is popular with foreign carriers, because it is the Philippines' largest independent MRO organization.

"We serve multiple international and domestic airline customers. We have achieved cost savings through 'economies of scale' and are able to pass on those savings to our customers, making us a very price competitive line maintenance organization," says Espiritu.

"Dornier Technology has a depth and breadth of experience, which means we can serve airlines that operate different aircraft types. We can also provide value-added services, such as

Air Busan

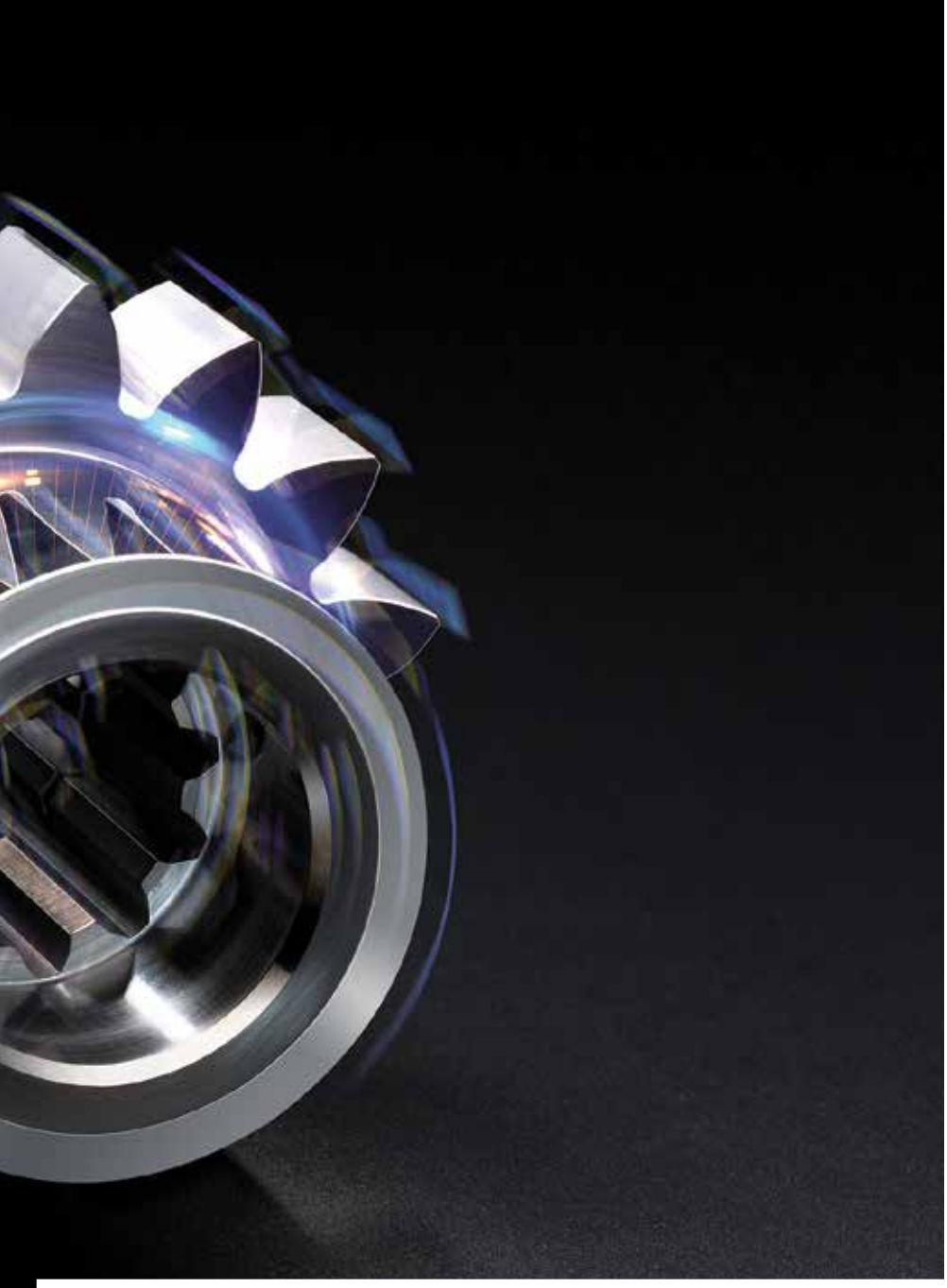
Dornier Technology Philippines crew with Jeju Air aircraft.

warehousing and logistics for aircraft spare parts," says Espiritu.

Dornier Technology has nearly 200 employees and plans to increase its workforce to 250 by year-end to meet the growth of its line and base maintenance business. The company does airframe heavy maintenance, otherwise known as base maintenance, at Clark International Airport outside Manila. It also has nine line maintenance stations: Bohol, Caticlan, Cebu, Clark, Davao, Iloilo, Kalibo, Manila and Puerto Princesa.

PMA Parts Industry
Mastering COVID Fallout

James Careless



PMA manufacturer Core Parts says it works hard to always have parts available on the shelf. Core Parts image. Shown above are gears from a Heico fuel pump. HEICO image.

Forget the COVID-19 economic downturn: Sales in the global commercial aircraft Parts Manufacturer Approval (PMA) aircraft parts market are surging ahead post-pandemic.

According to ReportLinker.com's June 2022 report, the global commercial aircraft PMA market was worth $10.5 billion in 2020, with sales being depressed due to reductions in air travel. With airlines back in business, this market is now projected to grow to $14 billion by 2026, which represents a compound annual growth rate (CAGR) of 4.7% annually.

This being said, the fact that PMA parts sales are rebounding doesn't mean that the pandemic's disruptive impact on this market has passed. Like other parts of the global aviation industry, PMA parts manufacturers are still dealing with the pandemic's fallout, which is hindering their efforts to fully satisfy their customers' demands. This being said, many of these companies are finding creative ways to turn COVID's pain into financial gain, and aim the PMA parts industry towards a strong future.

Turning Pain Into Gain

As is the case with industries around the world, PMA parts manufacturers are struggling with a supply chain that is experiencing ongoing material shortfalls, labor shortages, and delivery delays.

This is a case of shared supply chain pain, according to Jason Dickstein, president of the Modification and Replacement Parts Association (MARPA). "I don't think it's going to be a surprise to anyone to say that COVID has adversely affected the entire aviation supply chain," he said. "PMA companies have tried to be there for the air carriers, but it's been hard."

Thinking of airline supply chain challenges, Pat Markham, VP of Technical Services for HEICO Parts Group, shared, "PMA parts, by their nature, are a natural mitigation strategy for airlines. As a direct replacement for OEM parts, by including PMA parts in their maintenance programs, airlines are immediately opening up a second FAA-Approved source."

Matters have only been made more challenging by the revival of commercial air travel. As airlines try to return more aircraft to service, their need for PMA parts is going up. So are the airlines' orders for PMA parts, which can be difficult for PMA manufacturers to fulfill.

"The supply chain issues have really increased our supplier lead times driven by both staffing issues as well as raw material

Certex says they have been able to grow by manufacturing products for competitors (under contract) while investing in new products for themselves. Shown here are flaptrack fairing bushings. Certex image.

availability," said Chris Hinkle, engineering manager at Core Parts. "Core Parts works hard to always have parts available on the shelf, but sudden increased lead times has made that challenging." One saving grace: "COVID did not have any direct negative effects on Core Parts' business as our aviation customer base is primarily in small turboprop driven aircraft and not the large commercial airline industry," he said.

Core Parts isn't the only PMA parts manufacturer to find the silver lining in COVID's cloud. A case in point: "COVID is slowing down companies' ability to produce new parts because of raw materials, labor, and recovery from the downturn in 2020 and 2021 where airplanes were not flying as much and requiring less maintenance," said James Brooks, owner of Prime Propulsion, a certification company that helps manufacturers navigate the PMA approval process. The upside? "Thanks to the increased cost of doing business due to inflation, companies who were against using PMA parts in the past are now coming to realize the benefits and now buying them," he said.

This assessment is endorsed by Alan Voeller, VP of sales and business development at PMA parts manufacturer Jet Parts Engineering. "COVID has obviously caused chaos with the global supply chain, especially in the manufacturing sector," said Voeller. "As part availability has always been a key component of PMAs' benefits to airlines and MROs, the supply chain challenges have had a positive influence on the acceptance of PMA parts by airlines. As global supply chain difficulties caused part availability issues, PMA companies that have been able to maintain stock on their shelves have had opportunities to solve supply chain woes at airlines and MROs further showing the value PMA can provide to operators."

PMA parts manufacturer Certex Aviation is also finding opportunities in the post-pandemic market, but in a slightly different way. "Getting raw material has not been a problem for us, although prices are climbing," said Tim Feeney, the company's president. The result: "When the airlines started flying again and demand increased rapidly, we were able to grow by manufacturing our competitors' products (for them, under contract) while investing in new products for ourselves."

Business Coping Skills

Across the American PMA industry, a decision to use domestically-made materials is shielding many US manufacturers from international procurement/shipping delays, at least in those areas where they've been able to find what they need in-country. "While I don't know every company's supply chain issues, I do know that a fair number of MARPA members were very proud of the fact before COVID that their supply chain was all US-based, and they were proud to purchase from US sources," Dickstein said. "I think that for them, these US sources have been a lot easier to continue to obtain materials from than some non-US sources."

This being said, not everything that PMA parts manufacturers can be sourced domestically. Managing these supply chain issues successfully requires flexible, comprehensive and panic-fee coping skills, which these manufacturers appear to have in abundance.

"Not all fleets and airlines were affected equally, and the recovery has been far from smooth or even. HEICO has an interesting challenge," Markham noted. "With 12,000 PMA approvals spread across multiple fleets and various regions/airlines, planning for the recovery requires constant attention, communication, and flexibility as we adjust for airlines' changing plans."

At Jet Parts Engineering, "we have not been immune to the supply chain disruptions: We mostly see issues on the raw material side such as plastics and specialty alloys," said Voeller. To cope, this company has adjusted its Reorder Planning to account for these delays, along with "dual sourcing" materials from two or more suppliers and modifying its Scheduling systems to factor in delays.

Fortunately, "our customers are going through the same challenges, so they are understanding if delays occur," Voeller said. To maintain goodwill with its client base and ensure repeat business, "the most important thing for us is to stay in close contact with our customers and our vendors to ensure we're all working together to make things happen

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Jet Parts Engineering says the current ongoing supply chain challenges have had a positive influence on the continued acceptance of PMA parts by airlines. Shown here are an array of PMA parts that company produces. Jet Parts Engineering image.

and eliminate any surprises."

Jet Parts Engineering isn't alone in accepting the realities of a COVID-battered supply chain and making allowances to cope with it. "Recently Core Parts has reviewed our entire catalog of parts and generated re-supply purchase orders from our manufacturers as much as six months prior to when our typical order window would otherwise normally be," said Hinkle.

Certex Aviation is also adjusting its workflow to account for supply chain delays, while accepting an increasing number of post-pandemic PMA parts orders. "The growth we've seen is not always seamless, and we do sometimes have challenges with our promise dates," Feeney acknowledged. "However, based on customer feedback, we seem to be doing much better than our OEM counterparts on lead times. Nevertheless, if there are issues, we manage customer expectations as early as possible and stay in constant communication with them with respect to our status in filling their orders."

Helping Customers

By its very nature, the PMA parts industry is built to help airlines and other aircraft operators find the parts they need when they need them. This has always been the case, even before the global supply chain was thrown into chaos by the pandemic. It is even truer today in COVID's wake.

"Even before COVID, one of the PMA industry's chief selling points is always having FAA-approved aircraft parts on the shelf so that air carriers and others could get them quickly whenever they needed them," said Dickstein. "During COVID, many PMA parts companies took special care to make sure their shelves were fully stocked, because they anticipated that air carriers would start flying again and would need those parts fast."

"That's actually one of the things that I've heard from air carriers that they really appreciate about the PMA industry," he continued. "Sometimes they go back to the production certificate holder and say, 'I need this part' and the production certificate holder quotes a long lead time. Meanwhile, the PMA companies offer FAA-approved alternatives that are drop-in replacements and are available today."

HEICO's Markham concurs. "Whether it is providing that FAA-approved replacement part for today's AOG, or helping an airline with long term maintenance cost savings, the PMA industry is here to help," said Markham. "The stress that the pandemic put on airlines has encouraged them to look beyond their 'usual solutions'. We have had an abundance of new customers come to HEICO looking for tactical and/or strategic solutions through alternative parts programs."

Solving customer problems is a top priority at Jet Parts Engineering (JPE). During and after the COVID, the company has been trying to be as communicative as possible with its client base, so that its staff understands which pain points its customers are experiencing due to their supply chain issues. With this knowledge, Jet Parts Engineering can step in with useful solutions in a fast and timely manner.

"Sometimes we've solved problems quickly by providing a PMA data package and part for a new approval for immediate use," said Voeller. "Other times we've set up long term plans where we schedule blanket orders over the course of a year, so we can plan for the customer's known demand. Where possible, to best serve our customers, JPE works to hold excess inventory in stock, so not only do our parts reduce maintenance costs on a per part basis but they're also readily available. It's these times that being flexible and creative really help."

At Certex Aviation, helping customers

cope is all a matter of inventory management. "Since we don't have a long history of orders, our inventory levels may be higher than others," Feeney said. "We also plan our reorder levels with a comfortable cushion to ensure there will always be parts when needed."

Prime Propulsion is making a difference by helping customers who have their own PMA parts innovations achieve FAA certification in an efficient and expeditious manner. "Time to the market is critical," Brooks explained. "We address our customers' concerns with costs by keeping their certification process expenses down while maintaining their schedules."

Finally, Core Parts is doing what it can to keep PMA prices down at a time of inflation-driven cost increases. "Many of our competitors raise their product prices each new calendar year because everywhere operating costs are rising," said Hinkle. "At Core Parts, once we publish a price of a part, we will work to keep that the same price year after year so that our customers never need to feel like we are taking advantage of them."

Looking Past the Fallout

As the old saying goes, "all things must pass." This includes the current pandemic-driven problems in the global supply chain. Eventually, the scarcity dogging the availability of aircraft parts will ease, although they may not be resolved entirely.

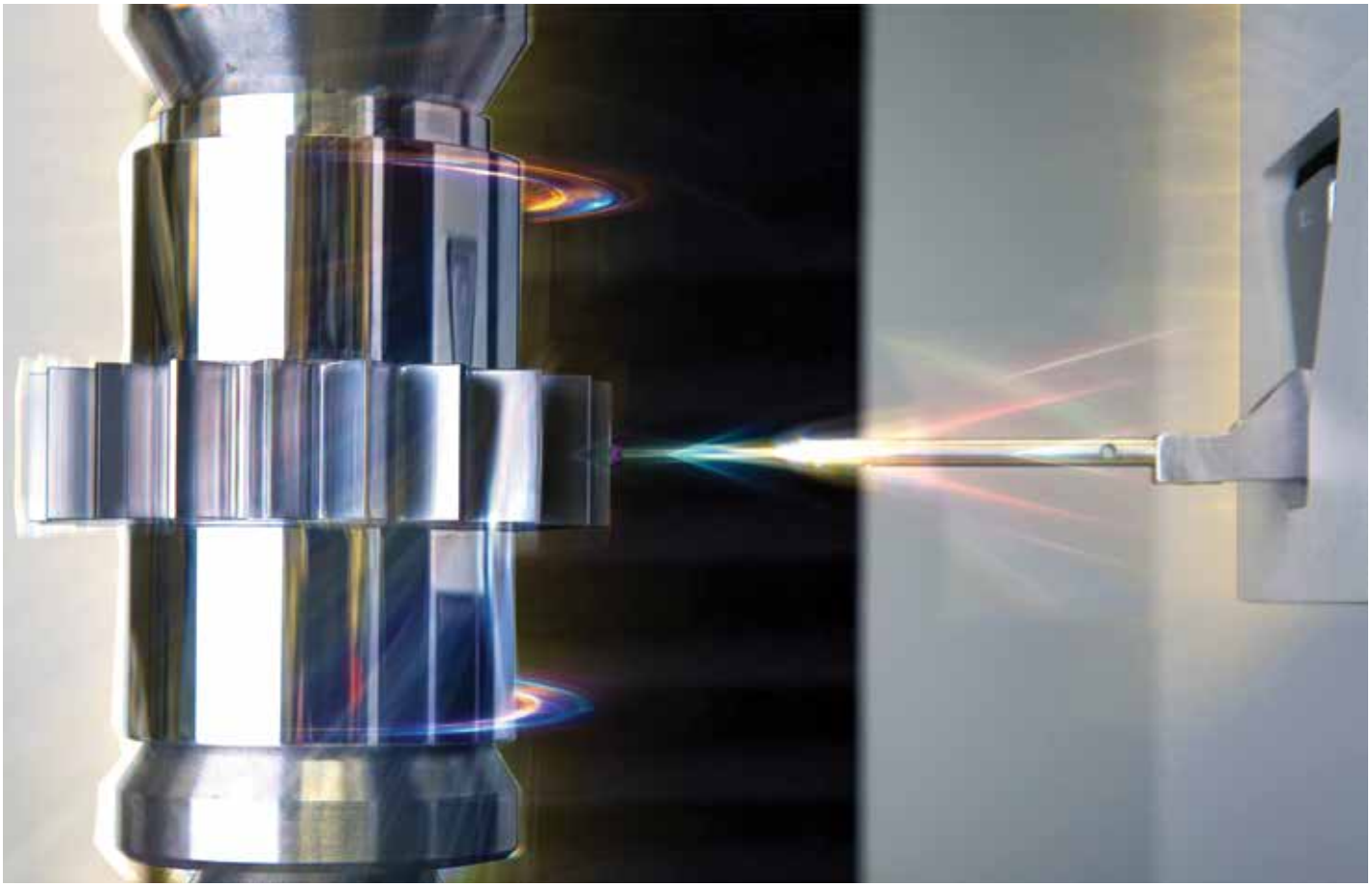
With this reality in mind, the PMA parts manufacturers interviewed for this article are busy working on their plans for the future.

HEICO's Markham is bullish on the future. "Throughout the pandemic we continued to fund our R&D, and kept up the tempo of 400 plus new PMA parts each year. Having experienced downturns before, we knew that the market would return and we needed to be prepared not only to service our customers' current needs, but also those of an evolving fleet."

Certex Aviation's Feeney is circumspect in describing his company's upcoming PMA parts. "One area we've focused our attention on is the Embraer 170/175 aircraft: They're coming up on 20 year heavy overhauls and we're looking at the areas that previously didn't need attention," he said. "In terms of other possibilities, I think the PMA market will enjoy continued growth. Cost pressure is heavy on the aviation industry as fuel prices rise, so the airlines are looking for opportunities like new PMA parts to save money on. As one airline customer said to me, 'it's a big airplane' — meaning that there's always new places to find nuggets of ideas for new PMA parts."

As for Prime Propulsion? "As a Certification company we are currently working on a range of PMAs for companies, engine, cargo nets, filters, valves and more," said Brooks. "Over the next two years, I see the PMA market continuing to grow thanks to companies who were previously hesitant to start to use PMA parts to keep their costs in line."

At Core Parts, future PMA product development will continue to be driven by customer input. "We work with our customers and listen to their requests," Hinkle said. "If a requested product fits within our capabilities for the right cost, we will add it to our product development queue. This being said, mandatory replacement



HEICO says they continued to fund R&D and kept producing more than 400 new PMA parts each year. Shown above is a PMA part in the process of fit-testing. HEICO image.

turbine engine components during regularly scheduled overhauls are commonly our targeted products."

The Time is Always Right for PMA Parts

There's another old saying that applies to the PMA parts industry in the wake of COVID-19: 'It's an ill wind that blows no good'. This saying, which alludes to the winds used by sailing ships to reach their destinations, points out that being in the worst of situations offer opportunities for some good to arise. When it comes to the pandemic, the opportunity for acceptance of PMA parts by cash-strapped aviation customers who avoided them before the current supply chain crunch hit.

We have touched on this point throughout this article, but it is of such significance that it deserves spotlighting: The aftereffects of COVID-19 have created very favorable market conditions for PMA parts manufacturers. "Airline costs such as fuel, labor, cost of capital, and maintenance are increasing rapidly and saving money is becoming more and more critical," said Voeller. "As a result, PMA is becoming a 'need' item, not a 'nice- to-have' and we are seeing more airlines factoring PMA into their cost reduction strategies. Additionally, while many global markets are more open and accustomed to using PMA parts, other areas of the world that were closed to this option are now beginning to adopt these practices and putting resources toward implementing PMA programs."

The result? "The PMA market will continue to grow, both in overall share of material being consumed in aircraft maintenance and in the acceptance within more aircraft systems," Voeller predicted. "Initial PMA programs at airlines who have never used PMA will typically start with interior parts, then expand into airframe, components, and engine parts. We're seeing new airlines chasing PMA benefits their competitors may already enjoy and jumping in head-first by accepting any, and all, parts without limitations to specific aircraft systems. This will likely continue, which will be a nice tailwind for the PMA market."

"Going forward, I think that the market for PMA is going to be very good," MARPA's Dickstein concluded. "In my experience, when there are troubles in aviation and the PMA industry steps up and supports the MROs and the air carriers, the MROs and air carriers recognize and remember it. As well, the fact that the PMA industry has provided that full level of support and customer service in the past and is providing it to their customers today is something that's going to help them cement relationships that will lead to future business." AVM

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JOHANN | Bordais

LEADING THE WAY TO CUSTOMER HAPPINESS:

Embraer Services & Support's Johann Bordais

August marked the fifth anniversary of the launch of Embraer Services & Support. Ian Harbison caught up with Johann Bordais, its president and CEO.

Ian Harbison

Johann Bordais says it is all well and good to design, manufacture and deliver an aircraft but it is support for the customer afterwards that is the best way to establish a good reputation in the industry. He feels that Embraer Services & Support (ES&S) has achieved this, coming at the top of a number of independent aviation surveys. The company has manufactured more than 8,000 aircraft and still supports one very early EMB 110 Bandeirante, now some 45 years old.

Following the abortive deal with Boeing, ES&S has refocused and now works across all divisions of the company – Commercial and Executive Aviation, Defense & Security and Agricultural Aviation. That means good ideas from one sector can be quickly adopted and adapted by another to suit its customer base.

A good example of this intra-company cooperation is the Sorocaba Service Center, just over 100 miles west of the company's main facility at São José dos Campos. This was established in 2014 and has been operated primarily for the Executive Jets division, providing maintenance, interior refurbishment, hangarage, airport services, stopover assistance and aircraft preservation. In addition, it has workshops for component overhaul and the capability to perform aircraft modifications, such as the conversion of Legacy 450 jets into Praetor 500 jets.

The Center recently doubled its capacity from 20,000 m² to 40,000 m² and now has four hangars, three of which are dedicated to MRO services and one to support fixed-base operator (FBO) operations. The extra space will not only cater for the expansion of business aviation in Brazil but can be used for commercial and defense aviation customers.

Another example is an MoU signed with Fokker Services and Fokker Techniek in October 2021, to explore opportunities in the defense, commercial and support markets. Bordais says there are similarities between Embraer and Fokker Services as both are well-known and reputable aerospace companies with roots in building aircraft and supporting aircraft fleets worldwide.

As a result, the MoU the companies announced, in July, the intention to deepen the collaboration in several projects, mainly related to the services and support fields. The companies are looking at aftermarket support topics, such as aircraft modifications and customization, program support, logistics, repair services. Looking further in the future, conversion and completion of Special Mission and Special Transportation aircraft in Defense, including collaboration for the C-390 multi-mission aircraft, whilst for the Commercial aviation market, engineering, repair, and logistics support will be key elements to be explored, in addition to Hydrogen Powered Aircraft development.

Previously, in May, Embraer announced a multi-year agreement for Fokker Services to provide MRO services covering 60-part numbers of engine line replaceable units (LRUs) enrolled in Embraer's Pool Program. The Pool Program, which supports Embraer's first-generation E-Jets aircraft, now covers 700 E170, E175, E190 and E195 aircraft flying with more than 50 airlines worldwide. The latest contract announced was with LOT Polish Airlines, which, at Farnborough, renewed and added seven E-Jets to the original contract, with the Pool now covering a total of 44 aircraft and over 300 components.

A major project for ES&S is the E-Jets Passenger to Freight (P2F) conversion, which was launched in March this year. This will be based on the E190 and the E195 and is intended to fill the gap between turboprops and narrowbodies while replacing less fuel-efficient regional jet freighters.

Bordais says the timing is perfect as the e-commerce market is still expanding and the aircraft's field performance means it can utilise a range of smaller airports than larger narrowbody freighters, reducing delivery times. Feedstock is available as many earlier E-Jets that entered service around 10-15 years ago are now emerging from long term leases and being replaced. The conversion should extend their life by another 10-15 years. The company sees a requirement for 700 aircraft over the next 20 years and is aiming for a 20% market share.

The initial conversions will be carried out at São José dos Campos. This will include a main deck front cargo door; cargo handling system; floor reinforcement; 9G Rigid Cargo Barrier with access door; cargo smoke detection system, including Class E extinguishers in the upper cargo compartment; Air Management System changes (cooling, pressurization, etc); interior removal and provisions for hazardous material transportation. The company is currently evaluating the work package and looking at where the expertise of outside suppliers might offer advantages.

The first conversion should take seven to eight months and be completed and certified in 2024, but this should reduce to three months as production ramps up to five a year in 2025 and eventually to 10-12 per year. If there is sufficient demand, further conversion could be added, based on customer location.

The program kicked off in May with an agreement with Nordic Aviation Capital (NAC) for 10 conversions. At Farnborough, in July, NAC announced an MoU to place the first two E190F conversions with Astral Aviation, based in Nairobi, Kenya, while Embraer signed a firm order for a further 10 Embraer conversions with an undisclosed customer. AM

See related story on Embraer's Beacon product next page.

RAY OF HOPE

As Beacon knows how long a repair typically takes, maintenance control can alert flight operations if a significant delay is likely. That avoids potentially costly passenger compensation and reputational damage. Embraer image.

If an aircraft encounters a technical fault, there is a complex process to be followed to ensure its resolution and a return to operational service. Unfortunately, it is so complex that there are systemic inefficiencies built in. There are so many different departments involved, along with lack of systemized resources, communication tools and data overload, that delays are inevitable. The knock on effect of these include delays to scheduled maintenance, grounded aircraft, the need for spare aircraft, crew rescheduling because of duty times, passenger compensation and airline reputational damage.

Back in 2016, EmbraerX, the OEM's innovation accelerator, decided to take a look and see if a new approach could be developed, launching a new concept now called Beacon. Starting out in the executive aviation sector, it has achieved considerable success with airlines in the last nine months.

By applying a human-centric approach and a web-based solution, Beacon brought together all the resources and people that are necessary to resolve a problem. These can be tailored to the requirements of individual operators. Once a problem is raised, it is assigned a case number and everyone is alerted. In addition, Beacon looks at maintenance records and pulls together the repair procedure for the mechanic and the parts required to complete the work. That drawdown can also be passed to the inventory management section of the company's ERP system. Crucially, it also brings up the average repair time. This early warning allows maintenance control to contact flight operations if a lengthy delay is likely, allowing them find a replacement aircraft and avoid all the crew and passenger issues outlined above.

Once a problem is raised using Beacon, it is assigned a case number and everyone is alerted. Embraer image.

The size of the problem, says Marco Cesarino, director of product, can be judged from the fact that, in 2019, 24 million flights in the U. S. that were delayed or cancelled cost the industry $33 billion. He adds that 80% of the time needed to resolve a problem in the traditional way is devoted to coordination rather than to the actual fix.

In October 2021, EmbraerX signed a multi-year agreement with Republic Airways for the use of Beacon, which is supporting the airline's digital

Beacon, a new web-based system from Embraer X, offers the potential for substantially reduced maintenance delays.

Ian Harbison

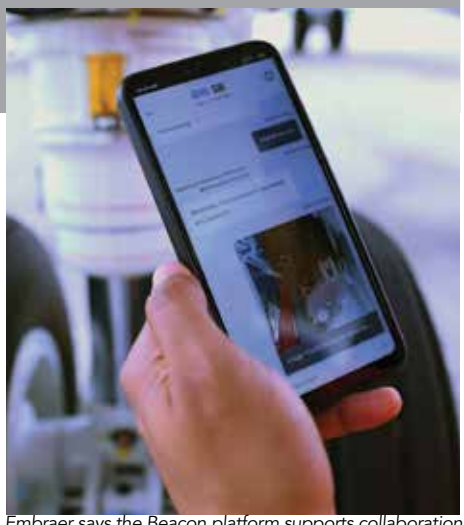
transformation and a fleet of over 200 Embraer E170/175 aircraft. The relationship with Republic actually started in January 2020, when the company partnered with Beacon as its launch customer for the commercial aviation segment in the U. S. By implementing Beacon, Republic and their whole suite of maintenance service partners gained a competitive advantage thanks to the platform's efficiencies in resolving maintenance cases. As an early adopter of Beacon, Republic has been validating and testing Beacon's product features with its users in the large regional independent operators' segment.

Over the first six months of 2021, Republic saw an average delay decrease as they adopted Beacon at their base stations. As traveling took off and Republic flight volume increased, their overall out-of-service delay time held steady, making a case for Beacon's technology in managing interruptions and accelerating return-to-service time.

In June, Aeromexico Connect started to test the Beacon platform, supporting a fleet of more than 40 E190/195 aircraft. Beacon will be integrated into the airline's line stations with further tests including the airline's on-call maintenance providers.

Farnborough saw two announcements – JetBlue and Binter Canarias. The JetBlue trial will be based in New York and Boston, with over 50 E190s, and gradually expand to other airports and routes, however, the Binter trial is possibly the most interesting.

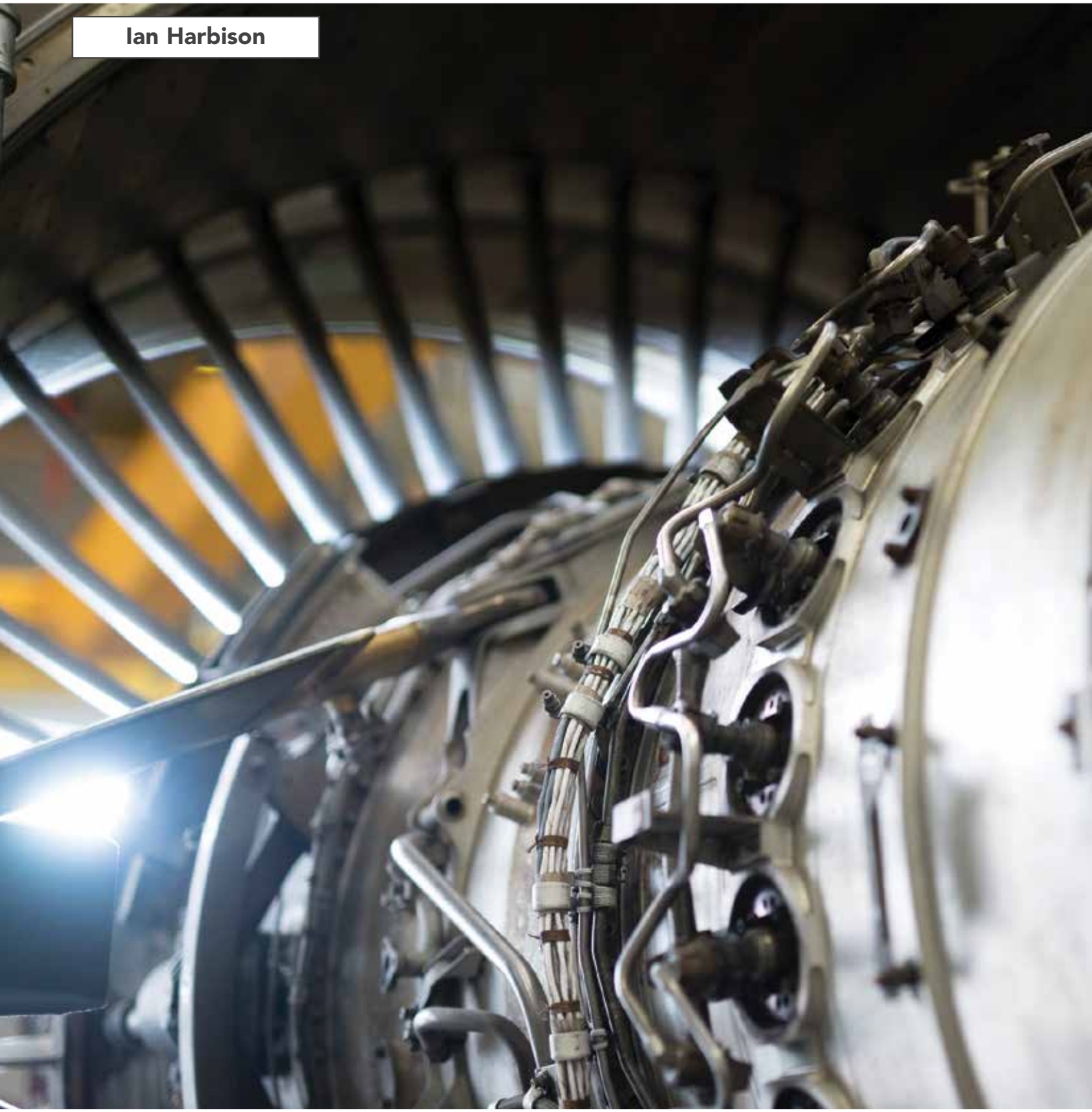
This will start in September, with five E195s, but, because Beacon is agnostic, the airline's 26 ATR 72s can be included later. The airline operates in the Canary Islands, over 1,000 miles southwest of Madrid, with the E195s providing links to Europe while the ATR 72s operate essential air services throughout the archipelago. Obviously, a technical defect on any of the islands can present a logistical nightmare, so a fast return to service using Beacon offers major advantages. AM



Embraer says the Beacon platform supports collaboration and data insights, facilitating shared knowledge and productivity. Embraer image.

COVID-CREATED ROLLER COASTER RIDE FOR ENGINE LEASING COMPANIES

Ian Harbison



Tadhg Dillon, chief commercial officer at Shannon Engine Support (SES), says the company first noticed pandemic activity in China, its biggest market, in mid-January 2020. Within 30 days, airline operations had fallen significantly. By mid-March, the effect was global and airlines entered survival mode and for the first three months, payment deferrals were the main ask from the customers.

For SES, it switched from an office-based to a home-based company within 24 hours, with associated IT and communication challenges to solve in a very short period of time. With no visits possible, all negotiations were carried out online and contracts transferred electronically.

SES had to review its own cash flow situation before it could start any negotiation on medium term solutions with its customers.

At the same time, airlines returned short term lease engines, there were no lease extensions (normally about 25% of leases are extended) and Early Termination Options were exercised. Unfortunately, there were also some bankruptcies, meaning engines had to be repossessed while working remotely. Global Covid restrictions meant there was no access to the customer site, limited resources and transport options, so it was a very difficult time.

As part of their cash conservation program, airlines also removed long term lease engines and installed them on stored aircraft, keeping the rest of the fleet flying with their own powerplants. In that way, while they had to keep paying the lease rental, they could save on the maintenance reserves, although this had a negative cash impact to SES.

The first signs of recovery came from China in June 2020, which meant they were flying when others were grounded. That lasted until early 2021, when another COVID wave hit.

U. S. Makes a Come Back First, Then Europe

He says recovery was based on vaccine distribution, but, given the numbers, it would take a long time, as well as passengers regaining the confidence to fly. The U. S. came back fast, both through mass vaccination and a political will to restart the economy, and its domestic market is now only marginally down from the high levels in 2019.

Of course, the demand was mainly for domestic flights, which played to the company's strengths, as it specialises in the CFM56 and LEAP series engines, powering the Airbus A320ceo/neo family and Boeing 737NG/MAX.

Tadhg Dillon
Shannon Engine Support

Europe came back next and its single aisle fleet is now 90% of 2019 levels. Asia Pacific, Middle East and Africa have been slower, although there is growth. This is still a recovery situation, he says, and one of the main factors is airline profitability, or lack of it. There is demand and, while prices are suppressed versus 2019, they are trending in the right direction.

However, he adds there are two major regions for SES that are proving to be very challenging. Recent figures from China suggest something of a recovery but, while aircraft are flying, the yields for the airlines is unknown. The other is Russia – and, he says, it won't be back for some time. The company has recovered 20-25% of its engines but there are significant numbers that it has been unable to retrieve.

Taking a broader view, he says that, in 2019, there was massive demand and people were asking when it would peak. From the SES point of view, looking across the aircraft leasing and MRO markets, as well as engine leasing, there were strains on the system. Shop visit (SV) slots were scarce and there were supply chain issues with parts. That reduced the throughput in the shops, which resulted in very high demand for spare engines.

Now, the industry is almost back at the

AerFin says it remains well positioned with a healthy volume of equipment in its acquisition pipeline to support the next phase of growth for the business. AerFin image.

same situation for different reasons. He says a lot of the MROs, airlines and suppliers let go of a huge number of people during the pandemic because of their financial situation. Replacements are difficult to find and are usually much less experienced than the previous staff, as well as increasing turnaround times. Supply chain issues now involve both new parts from OEMs and used serviceable material (USM). There is also a focus on newer generation engines and resolving their technical problems.

He says that, pre-pandemic, the competition was usually other lessors or MROs that might have engines available. That changed as airlines wanted to avoid leasing and maintenance costs, seeing it as negative cash flow. Instead, they would look at alternatives from a financial perspective, such as the need to fly the aircraft and, if they did, the maximum they could pay for an engine, based on passenger demand. They also considered using an engine from another aircraft, using a spare that was on the ground, or leasing an aircraft on a power by the hour basis, Additional competition now came from aircraft lessors with aircraft on the ground, airlines that wanted to lease an engine to another airline and aircraft part out organizations.

It is returning to normal, but the focus is still on cost, each deal being done on a financial basis. He says SES has scale of its operations but also through the provision of customised long-term solutions. This could extend out to 10 years, looking at total demand and developing a structure with the customer that meets all their spare engine needs. It might also cover fleet transitions – A320ceo Family to neo, Boeing 737NG to MAX.

As for the future, interest rates and fuel prices are challenges as they are costs that should be passed on, along with the threat of recession. Perhaps the biggest threat is inflation, as it can have a direct effect on passenger sentiment and associated demand.

Experience Gained

For SES, Dillon credits several factors: the experience gained during the 2009/10 financial crisis; a healthy revenue stream; a resilient and innovative team of people; strong customer relationships; and a global customer presence.

Patrick Biebel, managing director of MTU Maintenance Lease Services, MTU's Amsterdam-based leasing and asset management arm, says his company specializes in a wide range of narrowbody and widebody engines from the CF34 up to the GE90, primarily focusing on short-term leases (up to two years) to support maintenance events. He agrees that before the pandemic hit, the industry was under strain driven by current generation engines approaching their shop visit peaks and phase-in challenges of new engine equipment. This meant older aircraft were staying in service longer than expected.

When COVID hit, MTU Maintenance Lease Services relied on its established risk management strategy with an engine pool made up of three components: owned engines, long-term lease and short-term lease. This approach allowed for a quick response to the changes in demand driven by the ongoing pandemic situation. At the time, airlines were deferring maintenance and often, when faced with a shop visit that might require a multi-million-dollar investment, would swap engines from their parked fleet or opt for a lease engine, taking advantage of more favorable lease rates.

Patrick Biebel
MTU Maintenance Lease Services

As the drivers of demand are evolving, the industry is facing new obstacles. The MRO supply chain is experiencing capacity shortages, while airlines now need to ramp up their operations quickly, but are faced with staffing shortages, deferred maintenance and a need for lease engines. He says engine lessors are positioned to help smooth out the ramp up – he reckons it may take about two years for the industry to fully recover.

The assets most unlikely to recover from COVID, he adds, are engines related to more niche aircraft, such as the A340 and A380, although these are not leasing markets served by MTU. In addition, earlier CFM56 and V2500 models also saw significant value pressure, especially for teardown assets. During uncertain times, many market players focused their maintenance activities on newer

configuration engines with respective effect on used material consumption.

Avoiding Layoffs

In terms of MTU, the company not only avoided layoffs, but also continued with its €500 million ($497 million) investment program into its MRO network to expand capacity at all of its global MRO facilities. Together the company provides holistic approach to support customers with the availability of lease engines and offer alternative solutions to those navigating this COVID recovery period. Furthermore, for lessors and asset owners, MTU Maintenance Lease Services provides a platform to generate value from their under-utilized assets by including them into its lease pool under a managed lease structure, providing a constant revenue stream for the owners. At the end of life, the engine is dismantled and the USM is purchased by MTU to be consumed by one of its over 1,000 shop visit events per year.

Looking at the larger market, he has observed a growing need for aircraft lessors to get more hands on when it comes to engine maintenance activity. Between early returns, customer bankruptcy and deferred or defaulted maintenance reserve payments, the lessors find themselves with engines that are in a good enough condition to be remarketed. This creates a high demand for cost-efficient MRO solutions. He says MTU is ideally placed to help as it offers a wide range of such solutions, including module exchanges, tailored workscopes and green time engine exchanges.

Another sector accelerated by COVID is the P2F market, especially on the narrowbody side, where, he says, conversions are ramping up to more than 80 aircraft/year. Cargo operations typically differ from passenger operations, with many fewer cycles per year, reducing maintenance reserve payments with the respective impact on cash flow. From an investment perspective, often a half-life, high-thrust engine at the right price point is a preferable option. Situations like this are areas where MTU is working closely together with its customers to identify the best possible option, considering all parameters.

Given that airlines in recovery are now faced with rising costs, he says MTU continues to explore options to find cost-effective approaches for its customers. For example, leveraging the modular architecture of the CFM56 by utilizing engine pools to generate modules for exchanges or complete engine build-ups.

He points out that, to run this effectively, sophisticated configuration control is vital, along with understanding the performance implication of each module to ensure LLP limits can be reached.

Narrowbody/Regional Love

Oliver James, VP Commercial Trading at AerFin, says his company is involved in short term engine leasing for both narrowbody and regional aircraft types, predominantly the CF34-8, CFM56 and V2500. The first of these, the CF34-8, performed well through the pandemic, driven mainly by capacity from the U. S. domestic market, and many airlines with CRJ and Embraer series aircraft helped service the localised demand and proved to be an ideal low-cost substitute to fill some of those longer routes, typically served by the larger A320/737 aircraft.

The extended localized lockdowns seen across much of Europe throughout 2021 and into 2022 have meant a delayed recovery of CFM56-5B powered Airbus aircraft due to the higher consolidation of the global fleet being in that region. In contrast, the CFM56-7B, applicable to the 737NG, has seen a quicker recovery, with V2500 followed closely behind. He concurs that the strength of the US domestic market was a great help.

The cargo market has been the lifeline of the aviation industry during the pandemic, historically cargo made up around 12% of the sector's total revenue; that percentage tripled in 2021 and AerFin expects to continue to see undersupply for some time.

He says the company took a risk managed approach through the pandemic and were selective with how it managed and deployed capital. Most of its focus remained on supporting asset owners through consignment programs, sale and lease back schemes and asset remarketing.

Oliver James
AerFin

For now, he says, AerFin remains well positioned in the market with a healthy volume of equipment in its acquisition pipeline to support the next phase of growth for the business.

Substantial Recovery

Anthony Spaulding, executive vice president at Magellan Aviation Group, says the trading market has made a substantial recovery from the pandemic, with prices starting to rebound, so competition to acquire assets has increased. Magellan specializes in USM and leasing space for the CFM56, V2500, PW4000 and CF34 engine types.

AerFin says it took a risk managed approach through the pandemic. The company was selective with how it managed and deployed capital. Most of its focus remained on supporting asset owners through consignment programs, sale and lease back schemes and asset remarketing. AerFin image.

Green time engines are still an important lever for the airlines to manage cash spent on MRO. For example, airlines are finding it difficult to find CFM56-5A engines with green time to defer or replace an engine due for a shop visit, On the other hand, there is an oversupply with the CFM56-5Bs engine type that is depressing lease rates which makes it favorable for airlines when they need a CFM56-5B.

Anthony Spaulding
Magellan Aviation Group

Airlines with current technology fleets with an inhouse MRO function are looking at ways to keep the operation running smoothly to avoid SV spend and excessive turnaround times by purchasing engines with a relatively fresh SV. If they can purchase a replacement engine, park or sell the run-out engine, this alleviates unforeseen SV cost escalation and avoids operational disruptions due to excessive turnaround times for engines being repaired.

He comments that, thankfully, the days of an 'all in' rate have just about disappeared, that is, airlines only paid a cost per hour when they flew, a trend that started in early 2021 with aircraft lessors, as there was no revenue from parked aircraft. The traditional model of rentals and lease fees has returned, although the rates are a little soft but recovering – a CFM56-7B26 pre-pandemic was $65-70,000/month, it is now $45-50,000+ and climbing, while it is even lower for the CFM56-5B due to the oversupply.

He says the P2F market hasn't yet helped the -5B rebound like the demand for the CFM56-7B has since there is an approximate 4:1 ratio in favor of the 737-800F over A321F conversions currently. In addition, the A321 also has an engine choice – there is a 70/30 split between IAE and CFM. The SV costs for the V2500 is higher than the CFM56-5B but the V2500 has the advantage of EGT retention. However, he thinks it likely that an A321 freighter will bulk out before it grosses out, which allows operators to derate a bit more and extend engine life.

It may be a similar acquisition strategy for the CFM56-5B powered A321s as happened with the 767 freighter feedstock, where everyone was trying to find CF6-powered aircraft for conversion due to lower SV costs compared to the PW4000. Additionally, as 737/A321 P2F feedstock acquisitions are being made, one of the issues buyers are finding and dealing with is aircraft that were returned during the pandemic tend to have one or more engines that is runout or due for an expensive SV. This is helping bolster values and demand for green time engines, especially for the CFM56-7B.

Labor Shortages Will Play

There is also the issue of extended turnaround times, narrowbody engine overhauls now being similar to those previously for widebody engines. Of course, this is because of labor shortages and supply chain issues, he makes the point that engine piece part repair shops are equally affected, adding that extensive training is required to operate the specialized machinery needed for turbine blades, for example. It also affects Magellan, as spares recovered from tear downs have to be repaired before they can be sold as USM. For the OEMs, he notes raw materials, such as precious metals that are/were sourced from Russia, could also become a problem as demand recovers for new build deliveries.

He too feels that it will take about two years, hopefully less, to recover but this depends on the labor market, as there are general shortages in every area of aviation. One way for the industry to recover from this current situation is to make a concentrated effort to reach out to young people to bring on a new generation that an aviation career will be positive career choice for professional growth with a well-paying salary.

On a more positive note, the spending on maintenance has definitely picked up in the aircraft and engine MRO space that are key customers, which is good news for Magellan and the industry as a whole. AVM

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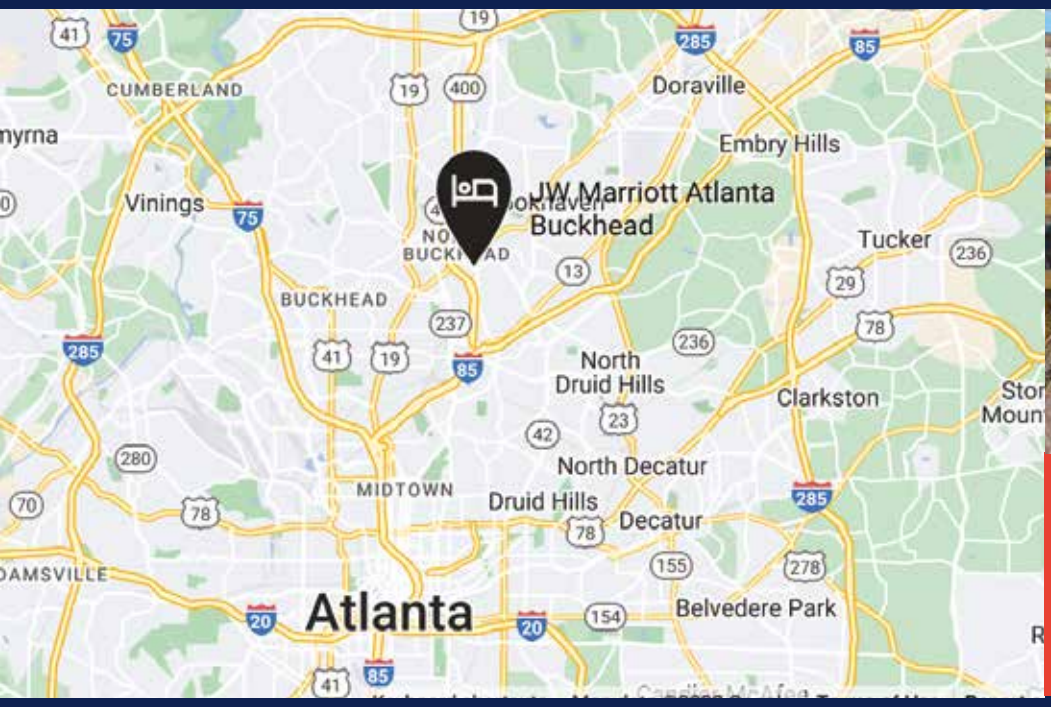

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MRO

AerospaceTechWeek.com/Americas/MRO

CONFERENCE PROGRAM

TUESDAY 8TH NOVEMBER

9am - 10.30am Joint Opening Keynote

11am - 12.30pm
State of the MRO Industry

What is the current state of the MRO industry and what is expected in the immediate future? From the supply chain to the skills shortage, what information and data do we need to plan MRO operations?

How do we build capacity in the industry and how could AR/VR be use in training to speed up the process?

Supply Chain Challenges in MRO – A United Airlines Case Study - Hiren Patel, Sr. Production Controller, **United Airlines**

The Increasing Importance of Digital MRO: What We Learned and Can Apply to a Post-Pandemic World - Jennifer Evans, Field Marketing Manager, **iBASEt**

From Aircraft Health Monitoring to Aircraft Health Management - Chris Markou, Head of Operational Cost Management, **IATA**

Optimizing Maintenance Production Control Using IBM ILOG Solver - Julio Abanto, Aeronautical Engineer – Senior Consultant, **SkyOn Aeroengineering**

2pm-3:30pm
Panel Discussion - Digital Tools: Big Changes Ahead for Airlines and MROs

Airlines, as well as Maintenance, Repair & Overhaul (MRO) companies are making big changes to their digital capabilities in order to be successful in a post-Covid environment. Airlines and MROs have spent the past two years revamping operations to counter Covid-related challenges that included thousands of aircraft being parked or retired, revenue streams being disrupted, supply chains broken, and operations being run remotely.

In this panel discussion we will look at the various kinds of IT innovations integrated into MRO with the advent of digitalization, such as Artificial Intelligence, Machine Learning, Big Data Analytics, Digital Twins, Cloud-based software, Software-as-a-Services (SaaS), ETLs, Mobile Apps, Connected Aircraft, and other advanced and disruptive technologies and there impact for airlines and MROs.

Moderator: Dr. Hugh Revie, EmpowerMX
Panelists:
Senior Representative, **Delta TechOps**
Senior Representative, **EmpowerMX**
TBC

4pm - 5.30pm
Technologies in MRO

As with all parts of the aviation ecosystem, efficiencies and digitization in the MRO sector is no different, but how do we employ these effectively? How can the use of drones help with the visualisation inspection? How can blockchain be an enabler in MRO? What other technologies and innovations are available to enhance MRO?

Blockchain - Pierre-Yves Benain, Senior Product Manager, **SITA** and **Jennifer Torlone,** Vice President of Information Technology, **Willis Lease Finance Corporation**

Do You Really Know What a Digital Twin Is? - Michael Wm Denis, Senior Director, **Capgemini**

Targeting Staff Shortages in MRO Through Technology - How digitization improves your workforce efficiency - Swen Franken, Head of Air Cargo and Line Maintenance, **INFORM GmbH**

Airbus GSE and Tools Innovation: AirLeak Detector Camera and On-Wheels Landing Gear Maintenance - Paula Arteaga Uribe, Business Development Coordinator, **Airbus**

MRO iT

AerospaceTechWeek.com/Americas/MRO-IT

CONFERENCE PROGRAM

WEDNESDAY 9TH NOVEMBER

9am - 10.30am
Technology & Innovation in MRO IT

As technologies advance at a rapid pace, how do airlines best take advantage and ensure technology gets into the production environment?

What role can machine learning (ML), artificial intelligence (AI), and augmented reality (AR) play in predictive maintenance and efficiencies for the airline?

How can we successfully and safely implement newer generations of mobile technology, software in legacy systems and paperless systems?

TBC

Efficiencies AMOS Can Bring in Aviation MRO - Daragh Cunningham, Senior Director AMOS Americas, **Lufthansa Systems Americas, Inc. - Swiss Aviation Software**

Application of AI/ML in MRO IT systems - Senior Representative, **Ramco Systems and Airline Customer**

The Advantage of Using AI (Artificial Intelligence) For Predictive Maintenance - Tamirat Dinkissa Tolu, Aircraft Tech IV (CAT C, B1.B2 Certifying Staff), **Ethiopian Airlines**

11am - 12.30pm
Factors Driving Ownership & Cost of IT Systems

What are the main factors driving the ownership of an IT system? The primary purpose is to manage the process successfully and efficiently. However, as that process becomes more complex and the need to keep up with the latest regulations, what other considerations need to be taken into account? Is cloud deployment viable and secure? Is there an ability to turn down IT costs when a future pandemic, or other 'shock to the system' hits? Is it possible to modulate the costs of the demand? How do we move from OpEx to CapEx?

ATA Spec 2000 and 2500 Work Package Updates - Kenneth N. Jones, Director of Electronic Data Standards, **Airlines for America - ATA e-Business Program**

Evaluating the Difference Between Maintenance Systems - Senior Representative, **Gol Airline***

TBC

TBC - Sudarsan Lakshmikumar, Chief Technology Officer, **KeepFlying**

2pm - 3.30pm
Why Modernise Your MRO IT System? - The Value Case

In many airlines, the pandemic has exposed and highlighted the need to update, modernise, and further digitize many operations - in order to become even more flexible in readiness for the next unpredicted 'major shock to the system'.

But what other values should be considered in modernising a major IT investment? Paperless maintenance, mobility issues, hangar/line maintenance, workforce effectiveness, staff turnover, and predictive maintenance all play a large role, but we will look further into the considerations for airlines.

To Digitize or Not to Digitize - Hiren Patel, Sr. Production Controller, **United Airlines**

Driving Records Efficiency Throughout the Asset Lifecycle - Nate Hicks, Senior Product Director, **GE Digital, Aviation Software**

Implementing to Digitizing your MRO Facility - Phil Bathurst, President & CEO, **Aspire MRO**

Turnaround from bankruptcy to profit through digitization – Senior Representative, **Mexicana***

PROVISIONAL CONFERENCE AGENDA

Tuesday 8th November

	Avionics	Connectivity	Flight Ops iT	MRO
9am	JOINT OPENING KEYNOTE			
10:30am	Networking Coffee Break			
11am	Mandates & Regulatory Framework Updates	Connectivity, Communications & E-Enablement	Developing Flight Ops IT Strategies	State of the MRO Industry
12:30pm	Delegate Networking Lunch			
2pm	Uncrewed Aerial Systems and Urban Air Mobility	Increasing the Value of Connectivity Through ATM	EFB Applications and Additional Operational Drivers	Panel Discussion
3:30pm	Networking Coffee Break			
4pm	Visualisation Display Challenges - Future Cockpit/Avionics Technology	Aircraft Data Management and Cybersecurity	Data and Changing Ownership of Assets, Legality of Who Owns and Controls the Data	Technologies in MRO
7pm	Networking Dinner			

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Wednesday 9th November

	MRO iT	Testing	Sustainability	MOSA/SOSA/ FACE
9am	Technology & Innovation in MRO IT	Panel Discussion - Industry 4.0 in Testing	Technology for Sustainability in Aviation	Open Architectures for Military Aviation Platforms
10:30am	Networking Coffee Break			
11am	Factors Driving Ownership & Cost of IT Systems	Hardware and Software Testing	Sustainable Fuel Alternatives	MOSA Strategies for Sensor Applications
	Delegate Networking Lunch			
2pm	Why Modernise Your MRO IT System? - The Value Case	Testing for Electrification, Supersonic, and Complex	Optimising Fuel Efficiency	Leveraging Commercial Technology for Defense Applications
4pm	Conference Close			

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Wednesday 9th November 2022 ...8:00am - 5:00pm

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Wednesday 9th November 2022.....9:30am - 5:30pm

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THE POWER OF ELECTRONIC TASK CARDS FOR MROS

James Careless

The traditional paper trail associated with MRO repairs tends to be a long and complicated one, culminating in a blizzard of task cards that tell MRO technicians what to do and to record what they have done.

This is why the creation of electronic task cards has been a boon for the MRO industry. Not only are electronic task cards easy to access, read, and modify on the shop floor using workplace tablet computers, but the data they hold and capture can be easily stored and shared across the entire MRO enterprise. Among other things, electronic task cards can be used to track and document job progress, schedule sub-tasks, ensure that proper procedures have been followed through the use of automated checklists, record inspection signatures, and send data to the Billing Department when the work is done.

This is just some of electronic task cards' positive impacts on the MRO industry and a glimpse at their potential to make this business more productive, efficient, and accountable. To gain an in-depth

understanding of their benefits, **Aviation Maintenance** magazine spoke with top executives at three leading software companies; all of which incorporate electronic task cards into their end-to-end MRO documentation management platforms. These experts are Karl Steeves, CEO of TrustFlight (currently in a Proof of Concept phase); Saravanan Rajarajan, director of Aviation Consulting, Ramco Systems (already available); and Levi Schmidt, managing director of Customer Excellence at EmpowerMX (already available).

Saving Precious Time

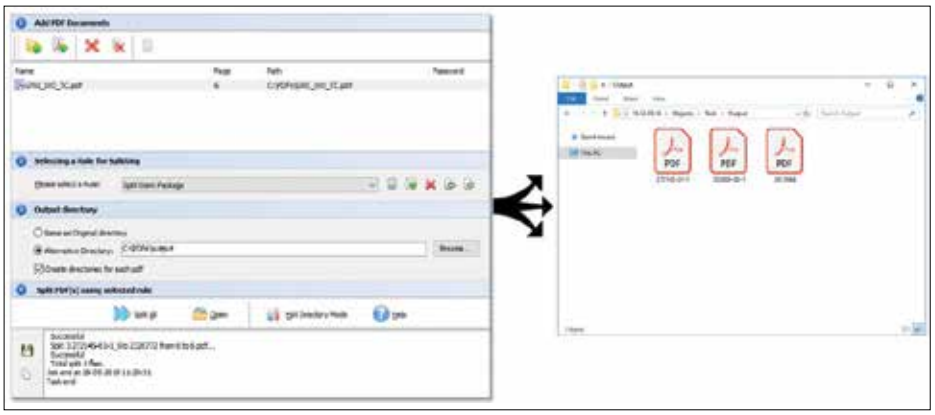
No matter what business you're in, time is money. This is doubly true with respect to the time spent on tasks that don't earn income, such as filling out paperwork.

Karl Steeves
TrustFlight

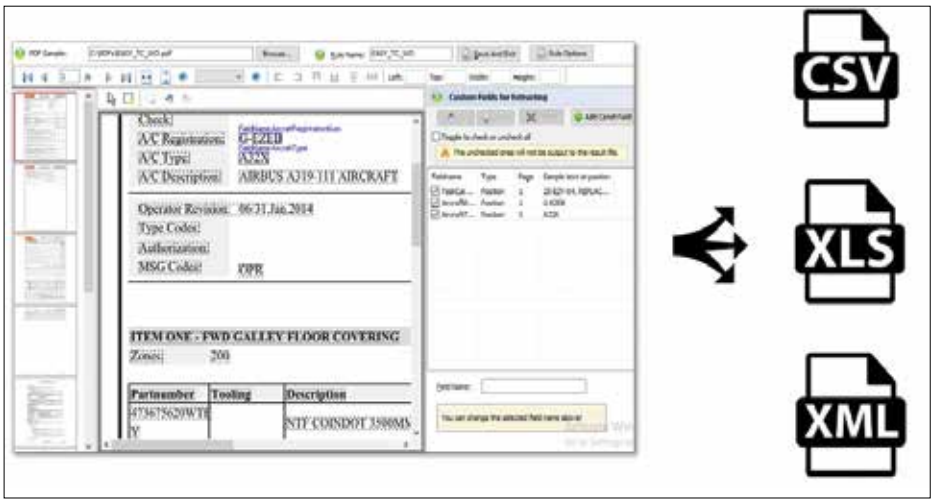
Unfortunately, the mission-critical nature of the aircraft repair industry means that MROs spend a lot of time on paperwork. In fact, "when we analyzed where MRO engineers' typically spend their time, we found approximately 50% of this time was spent completing paperwork and various compliance activities rather than working on aircraft," said TrustFlight's Steeves. "For us, the opportunity associated with electronic task cards is to reduce this percentage as much as possible, freeing up engineers and mechanics to spend more time doing actual work on the aircraft."

Saravanan Rajarajan
Ramco

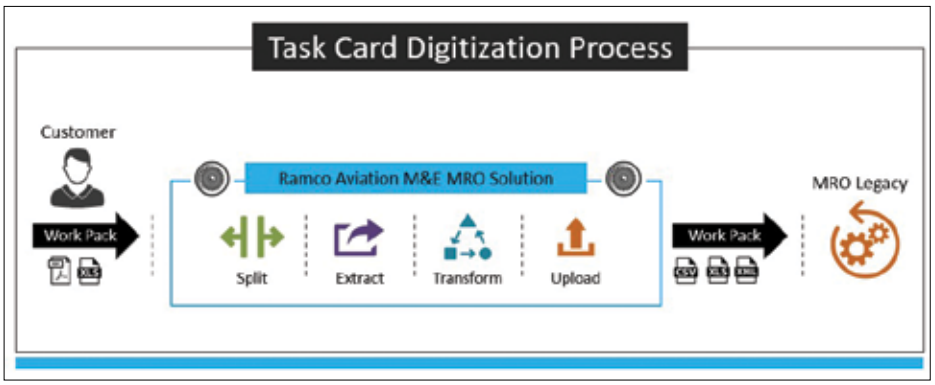
It's not just record-keeping that consumes MROs' precious hours. "Engineering and technical records departments also spend considerable effort whenever they deal with managing



Show above, Ramco's automatic splitting of individual task cards from PDF documents. Ramco image.



This image shows extraction for data from PDF through optical character recognition (OCR) technologies in Ramco's digital task cards. Ramco image.



Shown above is Ramco's integrated task card digitization process. Ramco image.

OEM technical documents and manuals," said Ramco Systems Rajarajan. "This can be tasks like the induction of a new set of documents or manuals into their systems or managing revisions for their existing contents and manuals."

If the incoming documents are PDFs, even more time can be lost converting them into a shareable interactive electronic format for work orders, unless the conversion can be handled automatically (as is the case with the Ramco Systems' platform). "This is why pursuing a digital technical documentation program that uses electronic task cards has been proven to improve the operational efficiencies — not only within the engineering and technical records functions but across the downstream maintenance process," Rajarajan said.

Using Advanced Tools to Improve Productivity

Levi Schmidt EmpowerMX

It may come as a surprise that electronic task cards are not a recent technological advance. In fact, "EmpowerMX has been providing electronic non-routine task cards for 20 years now," said Schmidt.

However, electronic routine task cards are a new invention, he noted. "There has been a standard recently established — S1000D — which would allow broader adoption of electronic task cards by closing the gap for routine task cards in terms of their use in the workplace," said Schmidt. "However, S1000D has a rigid framework that must be respected for compliance reasons. This makes S1000D somewhat difficult to adopt so that MROs can go 100% paperless."

In response to S1000D's constraints, EmpowerMX has created its own compliant routine task card application called eTaskCard. "With EmpowerMX eTaskCard, MROs can be 100% paperless," he told Aviation Maintenance. "EmpowerMX achieves this by using the existing PDF task cards that every airline and MRO already uses, and then enables interactive functionality to sign off those task cards in the EmpowerMX application."

In both instances, advanced software tools such as artificial intelligence (AI) monitor the progress of electronic task cards and check for procedural compliance at every step. "AI performs two functions that help the technician maximize their productivity," said Schmidt. "The first is that the AI error proofreads the job card: This means a block cannot be missed. A block cannot be unreadable. A stamp cannot be too light or too dark, and a non RII (Required Inspection Items) inspector cannot sign an RII required block. The time savings achieved by eliminating error corrections alone increases productivity."

The second way that AI increases

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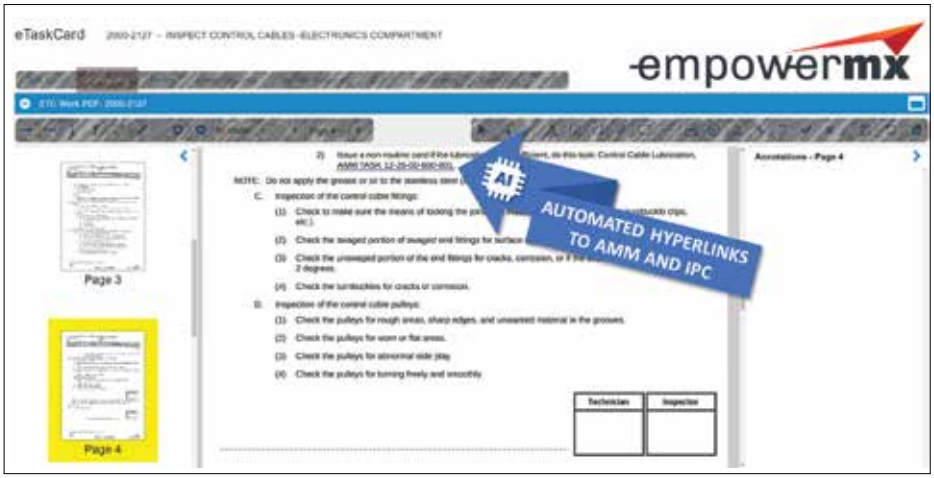
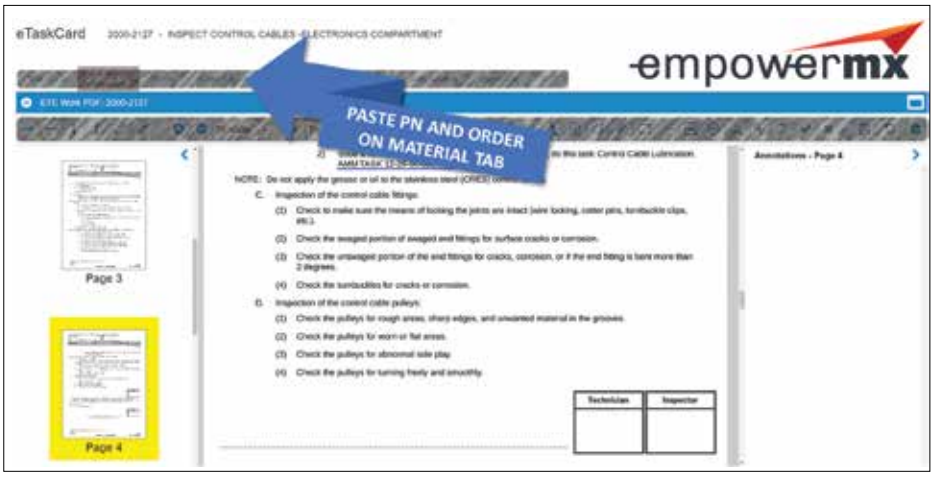


EmpowerMX digital task card hyperlinks to the AMM and IPC via artificial intelligence. EmpowerMX image.



NR material association by adding in material tab of the eTaskCard. EmpowerMX image.

technicians' productivity through electronic task cards is by eliminating the need for them to go back and forth to a desktop computer to look up manuals. "EmpowerMX eTaskCard automatically converts manual references for sub-tasks into clickable hyperlinks that show up on the electronic task card screen," Schmidt explained. "When the technician gets to a step with a hyperlink, they just click on the link and read the sub-task from within the manual reference, all without leaving their task card app."

Similarly, an AI-enabled electronic task card can simplify the ordering of parts during a job. "When our EmpowerMX Materials Module is combined with the EmpowerMX eTaskCard, the technician can simply hyperlink over to the IPC (Illustrated Parts Catalogue), copy the part number, paste the need into their electronic task card, and order their parts," he said. "Since it's all being done by this system, there's no need to record the part information in the electronic task card. That's all done in the background."

Streamlining the Workflow

The MRO workflow is a complicated, often cumbersome process, due to the interplay of customer, compliance, and technical concerns that have to be documented and attended to. The adoption of electronic task cards can go a long way to streamlining this process, by making it faster and easier to execute while at the same time improving transparency and data sharing for all.

A case in point: "Electronic task cards can provide a way for engineers and mechanics to have direct access to work instructions generated by a Maintenance and Engineering (M&E) system alongside all supporting publication excerpts such as Aircraft Maintenance Manual (AMM) procedures," said Steeves. "Once completed in the digital system, task card compliance data could be automatically fed into the M&E system to complete a task. Today, this is a manual process completed by technical records teams that takes a lot of time."

It helps if this functionality is purpose-built into the system. For example, "EmpowerMX supports digital non-routine task cards as a matter of course," said Schmidt. "By enabling eTaskCards on that pre-existing framework, the electronic task cards are automatically integrated into an already optimized workflow without having to take on any additional integrations or processes."

Meanwhile, when it comes to precisely streamlining the integration of third-party task cards into an MRO data/task management system, "the first step in the process is to seamlessly ingest and process SGML/XML based documents complying to ISPEC 2200 and S1000D standards from the OEMs," Rajarajan said. "The ingested task cards are then customized by the MRO through user-friendly screens to add additional texts, warnings, tables, formulas and graphics to the MRO's own electronic task cards. Then, whenever the technician finishes the job, the complete task card with OEM and customized instructions are available on the MRO's Point of Work internal website for reference and sign off."

Improving Maintenance Tracking

Consistently executed, properly documented aircraft maintenance is a must for MROs and their aviation customers. This is why proper maintenance tracking is more essential than ever.

Electronic task cards satisfy this need nicely, improving both the accuracy and completeness of maintenance tracking. In fact, "electronic task cards can help improve maintenance tracking in several ways," said Schmidt. In this system, no

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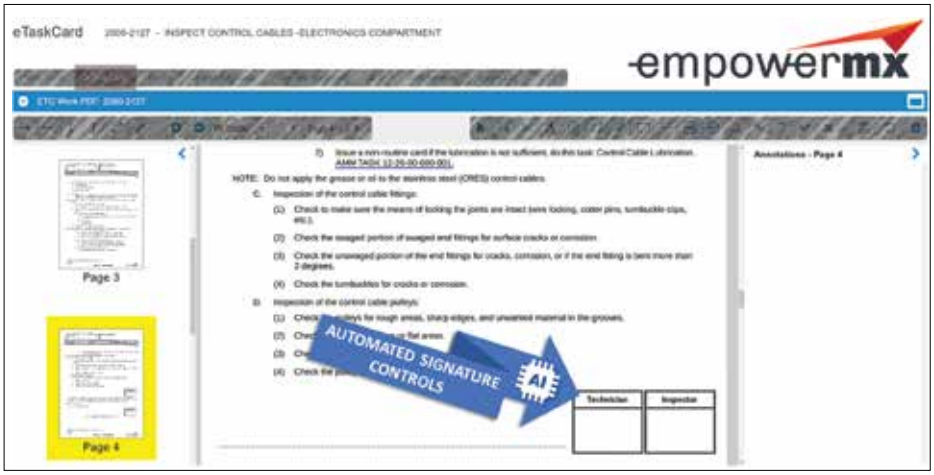
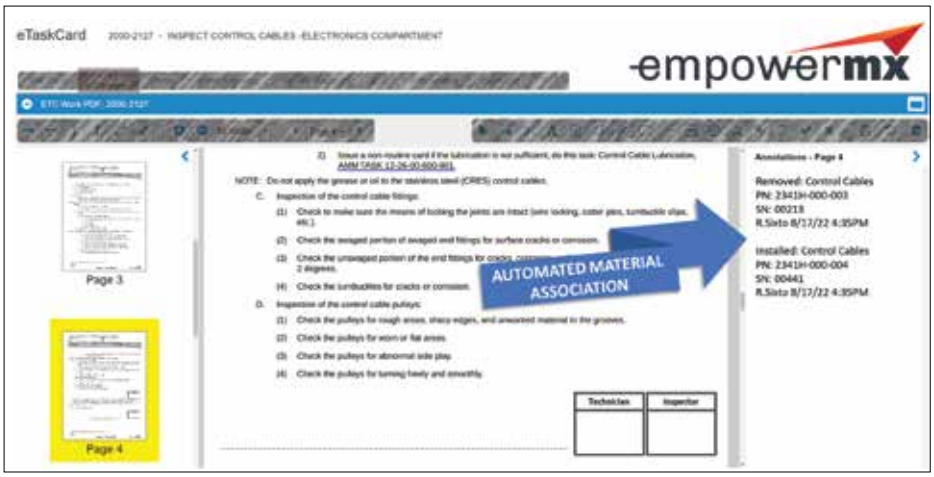


EmpowerMX's eTaskCard offers controlled sign off when the material is installed and certified. EmpowerMX image.



EmpowerMX's eTaskCard also offers automated material association on removal/install. EmpowerMX image.

task cards can be lost since they are digital, and no pages can be scanned incorrectly when being recorded into the work order. "No steps can be missed when the AI requires them to be signed for, while parts that are ordered and used for a task do not get forgotten or incorrectly transcribed," he explained. "All told, the use of electronic task cards is the most optimal approach to maintenance tracking, making it much more accurate and reliable. From a centralized production control booth, a team can see the status of any job throughout the facility, right down to the last step completed."

On a larger scale, analysis of the data within the electronic task card system can be used as the basis for process improvement. "And if a technician notices something about the task or the data associated with the task, they can flag for the proper support at that moment," Schmidt noted.

Electronic task card systems can also aid in tracking the completion of a scheduled aircraft maintenance check in progress, and in keeping an MRO's maintenance forecasts up to date and correct in their M&E system.

"Tracking progress of a check can be difficult as information can't be gathered until tasks are uploaded into the M&E system by tech records teams," said Steeves. "Some rudimentary ways are used today including measuring the thickness of piles of completed and still-to-do task cards! In contrast, electronic task cards support real-time status updates on check progress."

The same limitations of manual task card systems apply to maintenance forecasts and M&E system accuracy. "Audit and completion of a maintenance check cannot be finished until all task cards are uploaded and processed by records teams," Steeves said. "When this is a manual process, there is often a delay along with errors in the data uploaded to the M&E system, leading to compliance and safety risks. Electronic task cards remedy this problem by providing validation at the point of data entry by the engineer/mechanic as well as updating the M&E system in real-time."

Reducing Downtime, Improving Turnaround Time

Less downtime and faster turnaround time (TAT) was a priority for MRO customers – particularly airlines! – before COVID-19. In the pandemic's wake, achieving both of these goals is more important than ever.

By making the MRO process more integrated, coordinated, faster and far less vulnerable to human errors, electronic task cards can help MROs hit both of these marks. Sometimes the improvements provided by electronic task cards are subtle but significant. "For instance, the system could highlight conflicts where tooling or access may be needed by multiple engineers," said Steeves. By flagging these conflicts before they actually occur, electronic task card systems allow MROs to better plan their jobs, including the complex, more demanding major checks of commercial aircraft.

Taking a Big Picture view of the problem, Schmidt observed that, "Downtime/TAT is the byproduct of a technician's ability to perform. When a technician doesn't need to take time making corrections, or recording part number information, or going back and forth to the computer station, they are building efficiencies," he said. Moving to an electronic task card system delivers all of these benefits, and thus less downtime/faster TAT.

"Time savings are also found when

they don't need to search for a job card because it now exists in cyberspace and can be accessed from anywhere," Schmidt added. "The leads don't need to organize and manage 2,000 job cards on a board. They don't need to track those job cards down and hand them out or request a reprint because they can't be located."

Making MROs Leaner

The push to Lean process management is a top priority for profit-minded businesses, and MROs are no exception. Reducing costs while improving operational efficiencies boost the bottom line, and help MROs do better even in the toughest of economic times – like the last three years.

"Electronic task cards absolutely assist in the Lean process by reducing unnecessary movement," said Schmidt. "For every hyperlinked sub-task, it's a skipped trip to the computer station. For every part lookup and ordering, it's a skipped trip to the computer station."

"Paper task cards today record the hours to complete as filled in by the engineer/mechanic, which takes time and is generally not that reliable," Steeves said. "Electronic task cards do better on both points, which aligns with the Lean process."

"Electronic task cards enable mechanics to access technical documentation through mobile devices," added Rajarajan. "This reduces considerable walk time by maintainers, which is consistent with Lean management principles. As electronic task cards also provide the capability for digital sign offs, the need to access paper documents for DFP are eliminated, thereby improving the task closure rate."

That's not all: "Shops and support teams also benefit by not having to transport paper task cards back and forth from the maintenance bay," said Schmidt. "Planners don't have to produce the cards and transport them to the bay. Those cards don't then need to be organized for the leads to re-organize on a shift-by-shift basis. Production controllers don't need to retrieve those cards from filing, scanning, and shipping."

The takeaway: Electronic task cards and Lean management principles are a natural fit.

The Bottom Line

This article has gone into a great deal of detail to demonstrate one simple point: Electronic task cards are good for MROs and their clients.

It is safe to say that this point has been proven. AVM

THE DAY THE NINE-O-NINE DIED

Former NTSB and FAA investigator Jeff Guzzetti explains how inadequate maintenance contributed to the destruction of a rare vintage airplane and why this accident was "personal."

Jeff Guzzetti

Photo 2: The Nine-O-Nine B-17G bomber.

As a member of the "Greatest Generation," my father served his country in the U.S. Army Air Corps during the latter half of World War II. Dad was a navigator in the Boeing B-17 bomber (see Photo 1, next page). Of the 12,731 B-17s that were produced, over a third of them — 4,735 — were lost during combat missions. Lucky for me, he survived the war, moved back to his hometown of Beaver, Pennsylvania, became an optometrist, met my mom and raised three boys. I was his youngest and I was enthralled with his aviation adventures. The B-17 became my favorite airplane.

Photo 1:
Lt. Albert J. Guzzetti; Army Air Corp, 1943. Navigator.

Photo 3: Former Lt. Albert Guzzetti, in Feb. 1991, nearly 50 years after he served in WWII, posing in front of the Nine-O-Nine after it had been rebuilt and was preparing to fire its engines for the first time since an accident four years prior. Photo by Jeff Guzzetti.

Photo 4: A plume of smoke rises above the location where the Nine-O-Nine crashed at Bradley International Airport in Connecticut.

With a cruise speed of 182 mph, a range of 2,000 miles, and a service ceiling of 35,000 feet, the B-17 could fly faster, farther and higher than any comparable aircraft of its day. Aptly named the "Flying Fortress," the B-17's resilient design gained a reputation for taking a beating and still bringing its crew home alive. However, the advent of the jet age made the Fortress obsolete. After the war, most B-17s were cut up for scrap, used for research or target drones, or sold on the surplus market. As of October 1, 2019, there were only ten B-17s left in the U.S. that were airworthy. One of them was the "Nine-O-Nine" (see Photo 2 previous page).

The Nine-O-Nine first came to my attention more than three decades ago, Soon after graduating as an aeronautical engineer in 1987, I was watching the evening news which aired video of a B-17 — the Nine-O-Nine — at an airshow landing at the Beaver County Airport near my hometown. The bomber veered off the runway and down into a ravine while fighting a stiff crosswind. My heart sank. Fortunately, none of the 12 people on board were killed, and there was no fire. The good people of Beaver County volunteered to drag the airplane out of the ravine and rebuild it at the airport.

It took a few years, but the repair was finally completed in February 1991. The public was invited to the airport to watch the Nine-O-Nine start up its engines. I was an air safety investigator for Cessna in Wichita, Kansas, at that time, but I flew back to Pennsylvania to share the event with Dad. I was so proud of him, my hometown and the resurrection of the greatest airplane of all time. I captured the event with my Kodak camera (see Photo 3 above). I

Photo 5: The remains of the Nine-O-Nine at the crash site after the fire was extinguished.

Photo 6: Bob Gretz, NTSB Investigator-in-charge (center) walking with veteran technical investigators, Dr. Dan Bower and Steve McGladry.

treasure that photo, especially since my father died two years later from Lou Gehrig's disease.

Fast forward 27 years, to October 2, 2019. I had recently retired from the FAA and was surfing the web when I read the news that the Nine-O-Nine had crashed again. This time, the accident occurred at Bradley International Airport near Hartford, Connecticut. While landing on runway 6, the Nine-O-Nine struck approach lights, veered off the right side of the runway, and collided with a deicing fluid tank. Both pilots and five passengers were killed. The crew chief and four other passengers sustained serious injuries. The airplane was destroyed by impact forces and a postcrash fire (Photos 4, previous page and 5 at left).

My heart sank again. There would be no rebuilding of the famed B-17 this time. How could have this happened to such a special and revered airplane?

The Investigation

The NTSB launched a go-team to Hartford to investigate the accident, led by Bob Gretz, one of the best investigators I know (see Photo 6, lower left). The team was briefed that the vintage bomber was being operated by the non-profit Collings Foundation as a Part 91 "Living History Flight Experience" (LHFE) sightseeing flight to allow the public to experience the significance and history of the bomber.

The captain was 75-year-old Ernest "Mac" McCauley. He held a commercial pilot certificate and a type rating for the B-17. He also held a valid FAA medical certificate and reported 14,500 hours of flight time, of which nearly half was logged in the Flying Fortress. He was the most experienced living B-17 pilot in the world. In addition, he held a mechanic certificate with airframe and powerplant ratings.

McCauley resided in Arizona, but was a full-time volunteer pilot and traveled with the B-17 wherever it went. He was also the director of maintenance for the Collings Foundation. As the recovered aircraft logbooks revealed, he would sign off the daily checks and any routine or non-routine maintenance that occurred during the course of flying. In an interview with the NTSB, the surviving crew chief explained that the Nine-O-Nine was the center of McCauley's life. "I mean, he lived in that thing; cleaned it, worked on it, flew it," he explained.

During the accident flight, the Nine-O-Nine had flown about eight miles

after takeoff and reached an altitude of 800 feet when McCauley reported a problem and requested an immediate landing. After the air traffic controller asked why, McCauley replied that the airplane had a "rough mag[neto]" on the No. 4 engine. The veteran pilot shut down the no. 4 engine and feathered the propeller.

In order to balance the loss of thrust on the outboard engine of the right wing, McCauley accelerated the No. 3 inboard engine to compensate — but he was likely unaware that the no. 3 engine was also in trouble. More about that later.

When the airplane was about 400 feet above the ground, it was on a midfield right downwind leg for runway 6. Witness video showed that the landing gear had already been extended by that time, even though the airplane still had over two miles to fly in the traffic pattern before reaching the runway. Unfortunately, a much closer runway had been NOTAMed closed; the holes in the Swiss cheese were lining up to conspire against the Nine-O-Nine.

Recorded ADS-B data (see Photo 7, upper right) revealed that during the return to the airport, McCauley flew the pattern at an airspeed of 100 mph far, far below the 120 mph required to minimize the loss of altitude. The NTSB determined that the airplane was unable to maintain altitude at the lower airspeeds because the pilot could apply only a limited amount of power to the left-wing engines while simultaneously trimming the asymmetric thrust with the available rudder authority. If McCauley had lowered the airplane's nose to maintain airspeed, and kept the landing gear retracted until landing on the runway was assured, the NTSB's calculations showed that the Nine-O-Nine would have overflown the approach lights and touched down beyond the runway threshold.

Inadequate Maintenance

In addition to the McCauley's improper actions piloting the Nine-O-Nine, his lack of action with maintenance

Photo 7: An aerial view of the traffic pattern flown by the Nine-O-Nine with the recorded ADS-B track and air traffic control communications overlaid.

Photo 8: The no. 4 piston head of the No. 3 Engine, after it had been removed by investigators during the engine teardown. Note the whitish coloring and the damaged texture, indicative of detonation due to premature ignition.

Photo 9: The No. 4 engine, as viewed at the accident site.

Photo 10: Close-up of the No. 4 engine's left magneto, showing P-lead pulled out of the fitting and with a single strand of safety wire wrapped around the head.

Photo 11: Close-up of the No. 4 engine's right magneto, showing the improper gap between the points.

before the flight was also examined. As the Collings Foundation's director of maintenance, he was responsible for performing the Nine-O-Nine's maintenance while it was on tour.

Vintage aircraft require a significant amount of care and feeding. Structure and components are decades old. In fact, for each hour a B-17 spends in the air, ten hours are spent on the ground in maintenance. An engine overhaul can cost $40,000, and required wing-spar inspections and repairs can cost $100,000.

The Nine-O-Nine was equipped with four Wright R-1820-97 Cyclone radial engines, each of which had nine massive cylinders, or "jugs" as the mechanics of the day would call them. The continuous airworthiness program for the B-17G consists of four inspections conducted at a 25-hour interval. Inspections one through four are performed sequentially each 25 flight hours and then repeated.

Examination by investigators of the Nos. 3 and 4 engines – both located on the right wing of the airplane – revealed maintenance issues that were not adequately addressed by McCauley or his team.

For example, the No. 3 engine's 25-hour inspection — which occurred less than one month before the accident — required that the spark plugs be cleaned, inspected, tested, or replaced with new plugs, and the gap between the electrodes should have been checked. However, the spark plugs were worn with gaps between the electrodes that were beyond the manufacturer's specifications. The electrodes were too close together, which caused them to spark excessively. Most of the nine piston heads displayed white coloration that were consistent with detonation rather than normal combustion, with the no. 4 cylinder exhibiting the evidence of significant detonation (see Photo 8, previous page). Detonation in a piston engine occurs when the fuel-air mixture in the cylinder explodes prematurely instead of being ignited by spark plugs and burning evenly and smoothly, as occurs with normal combustion. Detonation can damage pistons and cause a loss of power.

The No. 4 engine (see Photo 9, previous page) had its 25-hour inspection nine days before the accident, but the NTSB's teardown of that engine found a different problem. The engine's left magneto P-lead — the electrical connection between a magneto and the cockpit ignition switches – was partially pulled out of the magneto housing, and the grounding tab was in contact with the housing. A single strand of safety wire

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was observed around the retaining nut (see Photo 10 page 52). A functional test of the magneto showed that the contact between the grounding tab and the housing resulted in the magneto being shorted to ground and unable to function. The right magneto's P-lead was also partially engaged in its fitting, and the grounding tab did not contact the magneto housing. Perhaps this damage was due to impact, but not likely, said the NTSB. Additionally, the right magneto's gap between the points was 0.004 inch, which was less than the minimum gap (0.008 to 0.010 inch) that the manufacturer required (see Photo 11 page 52). When the magneto was tested, the ignition leads for the no. 8 cylinder did not spark; the ignition leads for the other eight cylinders did produce sparks, but they were weak and intermittent. These discrepancies likely added to the loss of power on the No. 4 engine.

Probable Cause and Lessons Learned

The NTSB determined that the probable cause of the accident was the pilot's failure to properly manage the airplane's configuration and airspeed after he shut down the No. 4 engine following its partial loss of power during the initial climb. However, the Board also stated that "the pilot/maintenance director's inadequate maintenance" contributed to the accident by causing the partial loss of engine power to the Nos. 3 and 4 engines.

As a result of this investigation, and others involving similar aircraft and operations, the NTSB issued a formal safety recommendation to the FAA to "develop national safety standards, or equivalent regulations, for revenue passenger-carrying operations that are currently conducted under Part 91, including … flights conducted in …living history flight experience and other vintage aircraft flights." The NTSB stated that standards or regulations should include "operationally specific maintenance" requirements.

For its part, the FAA issued Notice N 8900.568 to provide FSDO inspectors with increased oversight procedures for LHFE operators. The notice indicated that the B-17 accident "revealed the need to bolster surveillance and oversight of LHFE exemption holders." The notice also instructed inspectors to perform an audit of all LHFE operators within their geographic jurisdiction.

The day the Nine-O-Nine died three years ago brought back shades of the sadness I felt the day my father died 30 years ago. Dad remains enshrined in my memory, as does the legendary airplane type that he once guided during a critical time in our nation. With only nine airworthy B-17s left, and the steady decrease of the population of WWII vintage airplanes of all types, the operators of these magnificent machines must ensure that meticulous maintenance is performed on them to preserve our nation's history. AVM

Jeff Guzzetti is the president of Guzzetti Aviation Risk Discovery (GuARD), an aviation safety consulting firm following a 35-year career with the National Transportation Safety Board, Federal Aviation Administration (FAA), and other agencies. During his 18 years at NTSB, Guzzetti was a field investigator, "go-team" engineer and Deputy Director. He then served as an Assistant Inspector General at the Dept. of Transportation and testified before Congress regarding aviation safety audits. In 2014, Guzzetti served as the Director of FAA's Accident Investigation Division in Washington, D. C. until his retirement in 2019. Guzzetti graduated from Embry-Riddle University with a degree in Aeronautical Engineering, and he is a commercial-rated pilot with multi-engine instrument ratings in airplanes, seaplanes and gliders.

By Jason Dickstein

Safety Management Systems – The Proposed Rule is Around the Corner

The FAA plans to issue a Safety Management Systems (SMS) proposed rule in September. This is something that every repair station will want to examine, because the rule is expected to mandate SMS for repair stations.

Global SMS

This SMS rule is not unexpected. The International Civil Aviation Organization (ICAO) had originally called for repair station SMS rules to be published by 2007. Clearly, most of the world missed that deadline.

Some countries have had SMS regulations in place for many years. For example, Japan applied SMS regulations to repair stations years ago, and has been a leader in SMS implementation.

Other nations spent time studying SMS and running pilot programs to learn more about what SMS can do (and what it cannot do). The European Union and the United States followed this model. In the United States, I was privileged to participate in two different rulemaking committees designed to investigate SMS and make proposals. These efforts have resulted in both regulatory language and also supporting statutory language that is meant to support safety data processes.

The world has been slowly moving forward with SMS regulations. An important part of this is having a robust State Safety Program (SSP) that establishes national metrics and standards for the SMS. The SSP has an opportunity to serve as a clearing-house for data to support effective SMS programs.

EASA SMS Rules

The European Union published an SMS Notice of Proposed Amendment (NPA) in 2013, and finally published the final EASA 145 rules for SMS last November. EASA 145 repair stations are required to develop and implement SMS programs by December 2, 2022. That deadline is coming up fast, so if you are running a repair station that is directly subject to the EASA 145 regulations, you should be developing your SMS program NOW. If you don't know where to start, then you should start by reviewing the SMS articles that I have published in this magazine.

What if you are a US-based repair station with EASA 145 privileges? In such a case your certificate is subject to the Maintenance Annex of the U. S.-EU bilateral agreement, and the related Maintenance Annex Guidance. U. S.-based repair stations must comply with the FAA repair station rules plus they must also comply with the special conditions from the EASA rules that have been identified by the FAA and EASA (this is a gross oversimplification, but it works for purposes of this article). Each jurisdiction's special conditions reflect a list of requirements that (1) are not duplicated in the other jurisdiction's system and (2) are important enough that they reflect additional requirements over-and-above what the local rules require. For example, EASA has documentation rules that it has identified as a special conditions, and that US-based EASA 145 repair stations must follow even though the US rules do not include such requirements.

The FAA and EASA have not yet identified EASA's SMS rule as a part of the special conditions, so US-based repair stations should not be required to comply with the EASA 145 SMS until (and unless) they are added to the special conditions. Because the FAA is publishing its own SMS rules, it is quite possible that the EASA SMS rules will never be listed as a special condition.

FAA SMS Rules

The FAA is in their "blackout" period and cannot answer questions about the SMS rule, but we can make a number of educated guesses about what the rule will look like.

It is likely that the FAA rules will follow the ICAO model. If you've been reading my articles, then you know that this means that there will be four major components of the SMS rules:

- Safety Policy
- Safety Risk Management
- Safety Assurance
- Safety Promotion

It is also likely that the FAA will try to rely on the SMS rules that have already been published for air carriers (Part 5). The FAA's air carrier SMS rules address these four components but also include a fifth component: SMS documentation and recordkeeping. This fifth component simply requires the formalization of the SMS program. U.S. law requires documentation requirements to be approved by the White House Office of Management and Budget (OMB) and as a practical matter this generally means that they need to be published as rules. The FAA's documentation and rulemaking provisions will require the repair station to produce records that the FAA employees can use for their own oversight.

The FAA is planning on issuing the proposed SMS rule in September.

Review the Rule

If you are managing a repair station (or just working in one) then this rule could be the most significant change to the repair station community in the past 20 years. We recommend that everyone in the community look at the proposed SMS rule and consider commenting on it. This is your opportunity to make the rule better:

- If you see language that is unclear in the SMS proposal, then you should highlight it and offer language that is clearer.
- If you do not understand how your repair station will comply with the SMS proposal, then state this in your

comments to the FAA.

• If the SMS proposal is not scalable (e.g., it will not apply to your particular business model because of size, complexity, etc.) then state this and if you can think of ways to correct this problem then offer those suggestions.

• If the SMS proposal conflicts with other regulations, then it will be particularly important to highlight this sort of conflict so it can be resolved before being published as a final rule.

• If the SMS proposal duplicates other regulations, then it will also be important to highlight this sort of duplication so that the two duplicate requirements can be merged or otherwise resolved; for example, if the SMS rule requires processes for ensuring compliance, and if this overlaps with the quality manual requirements to ensure airworthiness, then there ought to be a way to develop a single system that efficiently accomplishes both of these oversight functions, together.

The FAA really wants to publish an SMS final rule that will successfully improve safety, so your comments on the proposed rule will be important to helping the FAA tailor the rule and make it successful.

Compliance Corner

We will be holding hazmat (dangerous goods) training on October 4-5, 2022. This is live online training taught by a pair of compliance attorneys who've defended companies and helped them develop compliance programs for the past thirty years. You can find out more at https://www.washingtonaviation.com/hazmat.html.

Export compliance has become especially important because of the Russia/Belarus sanctions (and because of the attempts by some to circumvent those sanctions). You can find export tips on our aircraft parts blog (start with articles like this one: https://aviationsuppliers.wpcomstaging.com/2022/ 07/11/watch-the-temporary-denial-orders-that-apply-to-air-carriers/ to get an idea of the sorts of issues facing repair stations). AVM

Editorial Note: The FAA's Proposed SMS Rule was received at OMB for final review on July 25, 2022. This is typically the final review step before the proposed rule is published in the Federal Register.

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