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November or December could be when the FAA and other regulators finalize what is needed for the Boeing 737 MAX to return to service. During the approximately 1.5 years it has been grounded, how much our industry and the world have changed.

“Remember when [the MAX] was one of the biggest problems that we had? It’s funny to think of how changes in priorities and initiatives come about,” said American Airlines President Robert Isom in his interview with me during Aviation Week Network’s virtual MRO TransAtlantic. The abridged version appears on page MRO8.

To help you navigate toward recovery, Inside MRO is launching a new one-page feature, Industry Tracker, to highlight key industry data that serve as waypoints in our journey out of the COVID-19 crisis (page MRO5).

While we’re still in the middle of our flight through the pandemic, several positive signs of smoother air on the horizon are emerging.

Isom shared that American has moved its 24 737 MAXs to its base in Tulsa, Oklahoma, so airworthiness directives can be completed quickly when it gets the green light.

Alaska Airlines has taken the time to clear deferrals, train technicians and move its Boeing and Airbus aircraft onto the same processes and systems, Constance von Muehlen, senior vice president for maintenance and engineering, told us during MRO TransAtlantic.

She and a few other MRO executives also hinted at the importance of working with suppliers. “Obviously, that work has slowed down, but we thought it important to continue the work so that our strategic partners continue with their skilled workforce and have them available as we ramp back up—which is really what we’re doing now all the way into next summer, where we plan to fly a large majority of our airplanes and have those return to service,” said von Muehlen.

As airlines plan for the ramp-up in service, this could lead to a surge in maintenance demand, which sounds like a welcome development, but would not be if the MRO industry is not spooled up and ready for it.

Take MRO Holdings, for instance, which has four facilities with 60-70 heavy maintenance lines. The MRO lost 80% of its planned work for the year, or 5 million work-hours, when the pandemic struck the Americas, so it ramped down to 15 lines to preserve cash.

To reach the right equilibrium of MRO capacity and cash reserves, airlines and MROs are going to have to work together over the next several months to match supply and demand.

“I think this is driving a lot more partnership conversations,” said MRO Holdings CEO Greg Colgan. “Because maintenance has this long [lead time] where you can’t just turn it on, I really anticipate even better relationships that look at long-term value, instead of shorter-term engagements.”

For MROs to seek longer-term contracts with airlines is not a new goal, but given this unprecedented environment, will multi-year deals stick?

“This is the perfect opportunity for longer-term agreements to be reached,” as people seek certainty, said Brendan McConnellogue, EasyJet director of engineering and maintenance, during MRO TransAtlantic.

If this turns out to be the silver lining of the pandemic, it would be ideal.

—Lee Ann Shay
Aeronautical Engineers was contracted by Aero Capital Solutions to convert four Boeing 737-800s to freighters for redelivery in the first half of 2021. Modifications will be performed in China by STAECO.

Ascent Aviation Services was selected by Sine Draco Aviation Development as a mod center for its prototype Airbus A321-200 freighter conversion. FAA approval is anticipated in late 2021/early 2022.

AvAir signed a full asset-management contract with Icelandair for all surplus materials, including a variety of Boeing 757, 767, 737NG and 737 MAX parts.

Avianor was selected by Air Transat to perform a C check on an Airbus A330 at Montreal-Mirabel International Airport.

De Havilland Canada secured a five-year All Nippon Airways contract to provide component MRO for 24 Dash 8-400s.

GKN Fokker Services expanded its 10-year FlightSense On-Site Support agreement with Collins Aerospace to repair IDGs for the Airbus A320neo at Amsterdam Schiphol Airport. Collins will continue to manage Fokker Services’ on-site inventory of IDG components.

MTU Maintenance Canada was selected by GE Aviation to provide F108 repair/overhaul for U.S. Air Force KC-135s.

Spirit Airlines secured a Global Crossing Airlines contract to provide on-call and line maintenance at select airports.

Triumph Systems & Support extended its contract with Boeing San Antonio to continue to provide GSE maintenance/support through second-quarter 2022.

Wichita aerostructures giant Spirit AeroSystems secured a 45% cash discount from Bombardier for the latter’s Short Brothers production/MRO facilities in Northern Ireland as well as Bombardier Aerospace North Africa and most of a Dallas MRO site.

Spirit announced the new terms a few days before closing the nearly year-old acquisition agreement with Canada’s Bombardier on Oct. 30. The amendment cut the net proceeds purchase price payable to Bombardier to $275 million from $500 million. At signing on Oct. 31, 2019, Spirit said the deal had a then-total enterprise valuation of $1.09 billion. The new terms cut that to $865 million, down about 20%.

The move makes Spirit one of Bombardier’s largest suppliers, increases work content for Airbus and also diversifies Spirit’s revenue streams with more aftermarket sales. The deal doubles its aftermarket presence.

Spirit’s aftermarket locations now span Wichita, Dallas, Belfast and Casablanca and are named Spirit AeroSystems Solutions. The sites will be integrated so each has the same capabilities, says Jim Lickteig, senior director for aftermarket services.

Long-Term Cooperation With Airlines Growing

The shared need for heavy maintenance providers and their customers to survive the pandemic-driven downturn could foster more long-term agreements that give both sides the certainty they crave, industry executives say.

“This is the perfect opportunity for longer-term agreements to be reached,” EasyJet director of engineering and maintenance Brendan McConnell said during an Aviation Week MRO TransAtlantic panel Oct. 27.

Once the pandemic’s duration became clear, EasyJet grounded its entire 318-aircraft Airbus A320-family fleet and accelerated as much MRO work as feasible, while balancing cash spending. This included scheduling airframes for earlier-than-needed heavy checks at MROs.

“As we sit here today, we’re still focused on having 300-plus airplanes all serviceable and all flying when the demand comes back,” McConnell said, adding that working with vendors now is setting the stage for broader cooperation. “We’re able to take a longer-term view as we come out of the pandemic.”

Cooperation will be key, especially early in the recovery, when capacity challenges are expected to be worst. MRO Holdings CEO Greg Colgan said his company has worked to keep its four heavy-check facilities as busy as possible, bolstered by some customers pulling maintenance forward.

“There is a backlog [of deferred maintenance] that’s growing,” Colgan said. “Ramping up to 60 lines of maintenance when you’ve ramped it down to 15 creates a significant capacity challenge for the industry.”

Conversations with customers about how to manage the anticipated crunch are driving more partnership conversations, he adds. “Because maintenance has this long [lead time] where you can’t just turn it on, I really anticipate even better relationships that look at long-term value instead of shorter-term engagements.”

McConnell said that operators are likely to consider incentives such as discounts or certain service-level guarantees, in exchange for adjusting maintenance schedules to fit what providers can support.

Spirit AeroSystems Expands MRO Through Acquisition
State of the Industry

After Europe and the U.S. saw traffic pick up in June and July, utilization declined again in September and stands at less than 50% of pre-pandemic levels. However, Chinese domestic flight hours had recovered to pre-crisis levels as of September. Aviation Week Network predicts the in-service, active global fleet at the end of 2020 will fall to 2015 levels.

For more information on Aviation Week Intelligence Network Fleet & Data Services, visit AviationWeek.com/FleetDataServices

Aircraft in Service

Scheduled Capacity

Retirements

Utilization

Source: Aviation Week Intelligence Network Fleet & Data Services


Source: Aviation Week Intelligence Network Fleet & Data Services

Source: Aviation Week Intelligence Network Fleet & Data Services

*Utilization indexed to January 2020 activity.
Maintenance Changes

Most of the changes Boeing is making to the 737 MAX family in the wake of two fatal accidents and a 19-month grounding affecting flight operations, but the fleet’s return will bring some changes to maintenance programs as well.

The major technical change for the MAX is revised flight control computer (FCC) software. One change is a revamped Maneuvering Characteristics Augmentation System (MCAS) flight control law, a function of the speed trim system (STS) that provides automatic nose-down horizontal stabilizer inputs in certain flight profiles. The software changes also add redundancy through FCC cross-monitoring.

The software revisions prompted a working group—including representatives from Boeing, several airlines, the FAA and Transport Canada—to review parts of the MAX maintenance program. Among the issues reviewed were Maintenance Significant Items (MSI) developed through the Maintenance Steering Group-3 process used to determine maintenance tasks and intervals.

The review led to one additional task: an operational or built-in test-equipment check of the MCAS signal to the horizontal stabilizer trim motor every 6,000 flight hours. The new task is part of MSI-22-11, Autoflight/Digital Flight Control System and was approved by an industry steering committee for inclusion in the 737-8/9 Maintenance Review Board Report, the FAA says.

Besides the new task, 737 MAX-family maintenance manuals will include more descriptions of systems linked to the MCAS and how it functions. Unlike the original MAX flight crew manuals, which did not include discussion of the MCAS, revised maintenance documentation references the system as part of troubleshooting. Boeing’s revisions include adding significant detail to both flight crew and maintenance manuals about the MCAS’s functionality.

In addition to the airplane maintenance manual changes, the Collins Aerospace component manual for the angle-of-attack (AOA) sensors include a final check “intended to prevent a repair shop instrumentation error,” the FAA says. Both MAX fatal accident sequences that led to the model’s grounding— Lion Air Flight 610 in October 2018 and Ethiopian Airlines Flight 302 in March 2019—started with faulty AOA data inputs to the FCC, triggering the MCAS when it was not needed and resulting in uncontrollable dives. Investigators determined the Lion Air 737-8’s left-side AOA was improperly calibrated during a repair at a third-party repair station.

The software changes and broader flight control system reviews prompted several master minimum equipment list (MMEL) changes that the FAA published earlier this year. The most significant operational issue is that MAX-family aircraft must have both of the dual FCCs, including autopilots, operational for dispatch.

The original MAX MMEL, approved in 2018, allowed dispatch without either autopilot functioning so long as the planned route times were not too long, routes and approaches avoided airspace that require an autopilot, and the pilots assigned to the aircraft, who would face higher workloads when hand-flying, did not object. All other 737s have similar conditions.

Other changes to the MAX MMEL require an operational STS, certain STS warning lights and a functioning Autopilot Disengage Aural Warning System.

Two of the warnings now required to be functional for dispatch are the Speed Trim Fail and Stab Out-of-Trim lights.

“The updated FCC software uses existing maintenance messages to trigger the Speed Trim Fail and Stab Out of Trim warning light for internal faults to the FCC,” the FAA says. “For certain potential AOA failures, such as physical failure due to damage or a mis-calibration, the updated FCC software reduces crew workload by inhibiting MCAS activation and presenting the Speed Trim Fail alert (which has no associated crew tasks).”

The grounding of the 385-aircraft MAX fleet has been prolonged by regulators seeking more changes and more validation that certain failures do not present safety-of-flight risks.

As of mid-October, prospects for regulatory approvals by year-end looked promising. Flight tests of the revamped software by the FAA, European Union Aviation Safety Agency (EASA) and Transport Canada did not reveal any major issues, and a joint regulatory board signed off on proposed training. The FAA is reviewing more than 220 sets of comments on a proposed return-to-service blueprint, published in a draft airworthiness directive (Inside MRO September, p. MRO5), that outlines steps operators must take. Once the directive is finalized, operators regulated by agencies that lift MAX operations bans can begin preparing their MAXs for flight, including obtaining approvals for updated flight and maintenance manuals. Boeing can also start updating the 470 MAXs it has built but not yet delivered.

—Sean Broderick
PLANS FOR THE PRESENTATION OF AVIATION WEEK’S Lifetime Achievement Award for MRO were kept secret from me. I was not only physically unprepared (in farming clothes with a bad hair day) but emotionally floored. After pure disbelief, the surge of joy that we (ARSA’s team, the board, the industry) have been recognized for hard, unremitting and (supposedly) thankless work was overwhelming. It provides armor against the slings and arrows of remarks like “nobody else is complaining,” “nobody else sees it that way,” “nobody else cares enough” associated with regulatory compliance activities.

Since that time, other thoughts have come up. One is gratitude that my upbringing was so unconventional. Papa raised me with three rules that provided me the foundation to “be somebody.” The first maxim was: Don’t be financially dependent on anyone—learn a trade or enter a profession that will always provide you with income. That admonishment led me to learn to type and take shorthand, which allowed me to work for lawyers, become an office manager and go to law school.

The next solid block in this foundation was: Don’t let anyone tell you that you can’t do something because you are a woman. For years, I didn’t recognize that things were not going my way simply because of my physical appearance. Looking back, I am glad I was so ignorant—I just thought others didn’t understand or were just, well, stupid.

Papa’s last law for his youngest daughter was: Question authority. That one is probably a large reason that I receive any recognition—and until now, it hasn’t always been of the most positive type.

The gratitude to the old man that raised me (he was 57 when I was born) is extended to every individual who stepped in the way, because challenges are only opportunities in disguise. “Nobody else is complaining” allowed this “somebody” to enable change and enlightenment. Equal appreciation goes to the individuals who helped find open skies—those that took the time to explain, to educate, to push an idea to the next level or finish the work. The bottom line is I could not have achieved this recognition without the team members and colleagues, agency personnel and legislators behind me and the persistent humans, including pushy female lawyers, ahead of me.

It is daunting to be presented with such an honor just when the international aviation maintenance industry and the association founded to support it are finally coming into their own. We have more to achieve before my time in aviation is over, so I sure hope this isn’t folks saying they have had enough of my “Boys, I am taking charge here (B.I.T.C.H.)” style created by those to whom so much is owed.

Sarah MacLeod is managing member of Obadal, Filler, MacLeod & Klein and a founder and executive director of the Aeronautical Repair Station Association.

Sarah MacLeod received Aviation Week’s Lifetime Achievement Award for MRO during a surprise videoconference before Aviation Week Network’s virtual MRO TransAtlantic.
What is the American Airlines Tech Ops approach to this pandemic? How are they handling it?

We started with a fleet of well over 900 aircraft and we’ve retired 150 of those. We’ve tried to be smart about simplifying wherever possible and ultimately being there for when the airline needs us from a Tech Ops perspective.

**American Airlines Tech Ops was close to finishing its Sceptre project. What’s the status of that?**

The Sceptre Project—the maintenance control and tracking configuration system—is one of the last remaining items left over from the integration of US Airways and American, and we’ve been at it for some time. Bringing all our aircraft to reside in the new system has been a tremendous undertaking from an IT and maintenance perspective. We’ve taken advantage of the reduction in flight schedules during the pandemic to accelerate the conclusion of the project. And to that end, we’ve made incredible progress. As we bring all of our aircraft onto one system over the remainder of the year, and that’s a big accomplishment, it will make things much better as we come out of the pandemic from an efficiency, quality of work and quality of life for our employees perspective. It’s going to allow us to provide a more dependable and reliable service day in and day out.

**How’s American handling a fleet in flux? What is your outlook for 2021?**

You’re right about having a fleet in flux. We have to be really nimble in what we’re doing. At the start of the pandemic, we had pulled the schedules down by 80% plus, versus what we were flying in 2019. And that meant putting aircraft into storage in all sorts of places. So much of our attention has gone from figuring out where we put different aircraft and how we can preserve them to: OK, how are we going to build back? Where do we put aircraft so that they’re ready to go? What are the steps that we have to take so that, out of the box, reliability is at an all-time high?

The maintenance team has done a remarkable job trying to get ahead of deferred maintenance and work so we’re ready when demand returns. Having Spectre in place makes that easier. Life is also made easier by the way in which we retired aircraft. We took out four fleet types—the Embraer 190s, the 767s, the 757s and the A330s. We’ve gone from about 50 different configurations and types of aircraft down to just about 20 over the last few years. As we look at coming out of the pandemic, having rationalized the fleet, having retired the older aircraft, making sure they’re up and ready to go, that is going to be a tremendous advantage.

Hats off to the Tech Ops team for getting us in a good position. I feel really strong that when demand returns, we’re going to be able to deploy a fleet that is the best in the industry. Over the last five years, we’ve inducted almost 500 new aircraft into the fleet, so right now American Airlines has the youngest fleet in the business. That’s another advantage, and again credit goes to the maintenance team for being able to induct and retire an equal number of aircraft.

Because so many metrics that airlines use to plan their operations—including traffic demand—are in flux due to the pandemic, it seems like it would be really difficult to schedule operations—from the aircraft to routes to crews to maintenance control planning. How do you do that in this dynamic environment?

It is really tough. The schedule that we’re running today is about 60% down year-over-year. And looking toward the end of the year and to where we might be next year, of course, we don’t know. We don’t have all the answers in terms of a vaccine. We don’t know when the pandemic is going to end. I can tell you that we see a lot of leisure demand for our business right now, but things have to be open for people to want to go to different places. So there are so many variables to manage, and that’s just domestically.

Internationally, you have quarantines and different regulations about where you can and can’t fly to deal with, and that has implications for the widebody and narrowbody fleet. So you’re right about having an almost innumerable number of variables that we have to work through. Nimbleness and flexibility are key. The work that we are doing puts us in a position where we can build back smartly, and we can build back based on the demand that we see. One of the primary advantages that American Airlines has is its extensive network and partners, and we’re intent on keeping that connectivity.

The focus right now is to match our service to where the demand is and make sure our big hubs like Charlotte [North Carolina] and DFW [Dallas-Fort Worth] remain strong, have strong connecting complexes and have the maintenance and crew resources to support that. As DFW and Charlotte are able to serve leisure demand now, over time we’re confident that business traffic will come back, so we have to make sure that we have a product to serve that market niche as well. From a line maintenance organization to a base maintenance organization to all of our suppliers, we’re getting aligned around having to be incredibly flexible.
American Airlines, like several other carriers, recently had to furlough thousands of employees. Do you think that this is the last round of these for American?

It’s just nothing short of heartbreaking. We at American have just in the last couple of weeks furloughed 19,000 team members. These are folks who we’ve just brought on in the last three, four or five years, and I can tell you that we’re intent on making sure that they can come back to American Airlines and have long careers here. But this is a downturn like none we’ve ever seen.

I have to commend all of our team members, those who have been furloughed and those who are still working day in and day out for fighting through this. Our team members have put on their shoes and gotten out to work and made sure that commerce and people can still connect. And I’m so proud of them for doing that. We’ve got a long road ahead of us in terms of coming back. But it’s been really hard. Beyond the furloughs, there have been leaves that employees have taken, both paid and unpaid. There have been early retirement programs that people have taken. We’ve reduced our team members by almost 40,000 over the last few months with a number of different initiatives. But as I said before, we’re intent on growing back and growing back very efficiently.

It looks like regulators are getting close to allowing the Boeing 737 MAX to return to service soon. What are American’s plans for that?

Remember when that was one of the biggest problems that we had? It’s funny to think of how changes in priorities and initiatives come about. We’ve had 24 of our MAXs grounded well over a year, and quite frankly, they are a key component of our future fleet plan. We’ve been working very closely with the FAA, Boeing and the APA, our pilots’ union, to make sure that the right things are being done so it will be the safest and most reliable aircraft in the skies. There’s work to be done yet. But the FAA has a schedule of things that need to be done, and it looks like by sometime mid-to-late November that the MAX could return to service. That’s what we’re planning on; but we’ve had to be really flexible throughout this whole period since the MAX was grounded. We’ve positioned all of our 24 MAXs in Tulsa so that any remaining airworthiness directive work that needs to be done can be accomplished fairly quickly. We’re ready for the pilot training requirements and have MAX simulators ready to train our pilots.

Speaking of Tulsa, in late February, American unveiled plans to build a widebody MRO facility there and update existing facilities. Given the predicted slower return of long-haul travel, what’s the status of that project?

We’re committed to our base and couldn’t be more pleased with Tulsa’s support and pledge of almost a quarter of billion dollars of financing to help us make sure that the facility stays as modernized as it needs to be. The widebody project is something that is moving forward, but as with all capital investments and the downturn in flying right now, it’s something that we have make sure fits with the kind of schedule that we will be operating in the future. We’re confident that it is something that we and the city of Tulsa will be able to work on.

You mentioned that Sceptre’s completion has accelerated. Are there any other operational silver linings that you see?

American has sought to take advantage of the slowdown, to make sure that anything that we can get done to be ready for when business returns, any products that we can accelerate, that we can get those teed-up and moving. We have aircraft reconfiguration projects that are going on right now that we’ve accelerated, and that has been really good.

We’re also tied in very closely with the airframe and the engine manufacturers to look at anything that we can be doing now that will make American Airlines and the fleet that we operate much more reliable in the future.

In addition to American’s current cleaning procedures, are you looking at any other aircraft interior projects such as dividers to encourage people to fly?

We’ve really taken the steps to make sure customers are safe when they fly—from mandating masks, to looking at different ways of disinfecting aircraft, to coming out with a product like SurfaceWise, an electrostatic anti-viral coating. In terms of air circulation and the HEPA filtration, it changes out cabin air 15 times an hour. Our flight attendants, pilots and our other customer-facing team members have a lower infection rate than company staff as a whole. So I’m confident that flying is something that can be done safely. We’ve been working really hard with countries throughout the world, most recently in the Caribbean, to try to find ways to give customers and countries confidence that if you’re tested in advance and can show proof of no infection, then there are ways to avoid quarantines. 😇

Video American’s Robert Isom talks with Lee Ann Shay about navigating the operation through the pandemic: AviationWeek.com/Isom-Interview
Given the acute demand-side stresses that COVID-19 has inflicted upon aviation, cybersecurity concerns may have dropped down on some MRO companies’ agendas. Even so, the threat to IT systems and data has not diminished. In fact, it has probably increased, as the move to remote working and video conferencing affords cybercriminals more vectors to pursue attacks, hacks and malicious snooping.

The need for vigilance was demonstrated in June, when a U.S. subsidiary of ST Engineering—aircraft MRO provider VT San Antonio Aerospace—suffered a serious breach by what it termed “a sophisticated group of cybercriminals.” Known as the Maze group, the perpetrators have attacked numerous industries since 2019, typically stealing company data and threatening to make it public unless a ransom is paid.

Preventing such ransomware attacks has become a priority for IT managers in most sectors, including aviation. SR Technics, for example, regularly conducts risk assessments to identify the measures needed to prevent, detect and thwart a ransomware attack.

“As a result of our most recent risk assessment, which is part of our theme-based information security plan, we made additional security investments in our IT infrastructure [and] employee security awareness and are in the process of engaging our security partner to improve our detection and response services,” says Patrick Kuster, senior vice president of group IT for SR Technics. “We will end this particular theme with a simulation of a ransomware attack to assess the effectiveness of our investments.”

Other parts of the MRO supply chain are similarly worried. “Our biggest concerns are breaches of sensitive information, ransomware and fraud,” says Paul Morales, vice president of information technology for GA Telesis. “These seem to be the most prevalent attacks in most industries, including aviation,” which has driven the MRO to launch “several new initiatives based upon the increased frequency of cyber-attack attempts,” he says.

Although the breach at VT San Antonio has been the most well-publicized cyberattack in the MRO sector, Morales reports that GA Telesis has thwarted “several multimillion-dollar fraud attempts,” mostly involving phishing emails, which typically attempt to con sensitive information (such as passwords or bank account details) out of their targets.

Indeed, most of the companies that Inside MRO interviewed about this issue reported some kind of cyber-attack or attempted attack.

“We had one of our servers breached in 2016,” says Max Wooldrik, chief executive of Dutch part-out company APOC Aviation. “However, we noticed this within one business day, and thankfully no damage was done in the interim.”

**DANGERS AND DEFENSES**

While ransomware attacks are essentially blackmail attempts, the aviation aftermarket has more to fear than financial payouts. Keeping client data confidential is a top priority, but manufacturers and MRO providers must also guard against intellectual property theft and other malicious actions by rival companies or even nation states.
“The loss of our corporate data would be devastating,” says Wooldrik. “We have worked very hard to design our own proprietary software and algorithms to be able to identify successful projects and business opportunities. This really sets APOC apart from various competitors and is the driving force behind our success. Obviously, we wouldn’t want this data to fall into the wrong hands.”

Losing customer data is another big danger. As well as the reputational and relationship impact, this presents additional headaches for companies that use such information to provide tailored or predictive MRO services.

For example, Lufthansa Technik has access to certain airline data via its Aviator platform, although it includes only what each customer is willing to share. As well as keeping each customer’s data separate, the MRO provider uses encryption throughout the Aviator platform, both for data in storage and in transit. This is the last line of defense if other security measures—such as Aviator’s firewall and automatic threat detection—are breached.

MRO companies are also becoming more vulnerable as internet-enabled devices and components proliferate on aircraft and in the hangar.

“With almost every new device having a network interface of some sort, the attack surface increases. Because these devices utilize multiple operating systems, your standard ‘agent’ endpoint security software will not suffice,” Morales notes.

To address this issue, GA Telesis uses software that monitors traffic to and from its data center—i.e., to and from the outside world—and traffic among devices within its own internal network. This so-called “North/South, East/West” monitoring “allows us to have a stronger defense to threats missed by traditional signature-based security tools,” Morales says.

Another approach to security is to authorize specialized companies to attempt simulated attacks on an IT system to discover any weaknesses.

“We have conducted various pen-tests [penetration tests] in the past and will continue to do so,” Wooldrik says. “Fortunately, the outcomes of these tests are usually very positive and show that we have above-standard security measures in place.”
THE HUMAN FACTOR
Although cybersecurity requires a multilayered approach that encompasses firewalls and mail filters as well as antivirus, antimalware and intrusion-detection software, even the most sturdy technological defense is easily undermined by human error or sloppy practice, be it through poor password security, the use of unauthorized devices or an inability to detect scams.

This explains the increasing use of phishing attempts at both the corporate and individual levels. Most data breaches that occur are thought to be the result of human error. “This means the attackers understand that going after the user typically yields a better result than a ‘brute force’ attack,” Morales notes.

All of this means that any effective cybersecurity strategy will rely on recruiting the right IT staff or outside contractors and training the wider workforce to observe proper security practices. “We invest significant time in ensuring that employees know how to identify potential cybersecurity risks and how to correctly respond to them,” Kuster confirms.

Morales agrees, noting that GA Telesis’ best defense is its “human firewall.” To strengthen that wall, “we continue to invest in user training and simulation testing,” he says. “We have found while classroom instruction is effective for security training, conducting ongoing simulation and remediation increases retention of the skills required to spot threats.”

RECRUITMENT
The staffing squeeze faced by the wider MRO sector in recent years seems almost an anachronism given the present tide of mass layoffs and predictions for years of lower demand. However, the crisis has deepened many businesses’ reliance on technology and connectivity, meaning there has been no let-up in demand for IT staff.

“As a result, the technology field remains very competitive, and our teams are often sought after,” says Morales at GA Telesis. High pay aside, he notes that the key to hiring and retaining the right personnel is to keep them engaged, a view echoed by Wooldrik at APOC Aviation in the Netherlands.

“The fact that we are using the latest technologies really helps get people excited about our projects,” Wooldrik says. “Our system is built up using a CQRS architecture. Not a lot of developers are familiar with this technology, but most know that all major websites like Google, Amazon, Facebook, etc., use this architecture to help scale things up. Therefore, most developers are excited to become part of a team where they can master this technology.”

He notes that the aviation industry itself is also a draw, as many people “tend to have a soft spot for aircraft,” which is good news for those aftermarket companies not sporting the network architecture du jour.

Another option is to use a mix of internal and external IT specialists, which is how SR Technics has responded to what Kuster describes as “the general shortage of qualified cybersecurity professionals.”

He adds: “Internal security professionals understand our business and work very closely together with our employees and business partners, whereas our external partners monitor and keep our technology secure. We believe that a mix of internal and external experts keeps us one step ahead of the rapidly evolving cybersecurity threats and technologies.”

A HOLISTIC APPROACH
An effective cybersecurity strategy means the right mix of people, technology, training and policy, with deficiencies in any of those four pillars constituting a weakness that may be exploited.

For example, even a sophisticated firewall can be breached by determined hackers, so companies should also practice system segregation whenever possible, as well as full data encryption. Again, even those measures can be undone by a stray password, so it is important to keep control of encryption keys.

Meanwhile, physical security should be maintained by controlling access to critical IT infrastructure and restricting the use of USB and other external devices in places such as data centers. Furthermore, use of mobile devices should be monitored and controlled, while the cybersecurity of suppliers should also be assessed, as malware can be embedded in devices or newly made components coming out of the factory.

Another tool in the fight against cybercriminals—albeit one that is also used by them—is artificial intelligence (AI), which can detect probes of data that often precede an attack. “When an attacker breaches an organization, they typically begin gathering as much intel as possible,” Morales notes. “This includes identifying key stakeholders for phishing and spear phishing attacks. Using machine learning allows for the automation of this discovery phase and speeds up the process. The information gathered is then used in a tailored attack against the organization, often leveraging logos and familiar addresses to increase legitimacy.”

To counter such threats, GA Telesis uses tools that leverage AI to predictively analyze threats and new tactics, information it then shares with the wider cybersecurity community.

AN EVOLVING THREAT
One of the main challenges of cybersecurity in any business is keeping pace with developments in the strategy of cybercriminals, developments that can quickly render obsolete once-sophisticated countermeasures and even the skills of competent IT staff.

“We have found that the biggest error an organization can make in this era of information security is not the incorrect selection of tools or policy, but rather failing to keep pace with the evolving strategy of cybercrime networks,” Morales says. “We employ continuous improvement to adapt to these shifts quickly and efficiently. As attacks become more complex, so should your defense.”

However, this does raise the question of how far the cyber arms race will go, especially as MRO provision becomes more automated, data-led predictive maintenance more important and remote monitoring and working more common. Consequently, the efficiencies gained in these areas might be somewhat offset by the extra information-security investments needed to protect them. Nonetheless, the magnitude of the threat—to a company’s finances, relationships and intellectual property—is such that MRO providers will need to continue their cybersecurity investments in earnest, crisis or no crisis.
Dramatic Downturn

Used parts harvested from retired aircraft are just one option for cost-conscious operators

Sean Broderick Washington

Airlines seeking to keep maintenance costs in check as they manage their way through the novel coronavirus pandemic will have ample surplus material options. But the rise in available parts and components will not necessarily come from retired aircraft—especially in the near term.

Used serviceable material (USM)—typically parts harvested from retired aircraft—are the most common source of non-OEM parts. But surplus parts come from other sources, too—notably, excess stores that airlines no longer need. These, says Mike Stengel, AeroDynamic advisory senior associate, are expected to drive the initial surge in available material.

Recent deals announced by AvAir underscore the trend. The Chandler, Arizona-based parts distribution specialist bought 45,000 line items of rotatable and consumable material from Aerolíneas Argentinas, which has removed Airbus A340s and some Boeing 737 Next-Generation (737NG) aircraft from its fleet in recent years. AvAir also cut a deal with Icelandair to market excess material for Boeing 757s, 767s, 737NGs and even the 737 MAX—a result of fleet downsizing that many airlines are facing in light of significantly reduced traffic.

The excess material will help form a “first wave” of surplus parts, Stengel says, and will grow as airlines firm up fleet changes in the coming year or so. Excess inventory provides some opportunities that the part-out market does not, he adds. Chief among them: consumables and expendables.

The pandemic’s reach is creating another rarity in the secondary-parts market—availability of new-generation material. Icelandair put its first 737 MAX into service in March 2018. That it has excess inventory a little more than two years later underscores the extreme shock that the pandemic has brought to the industry.

Icelandair placed an order for 16 MAXs in 2018—all slated to be in service by 2022. But a combination of the pandemic and the model’s grounding forced the carrier to revise its fleet strategy. It now plans to have no more than nine MAXs in service as part of its peak summer 2021 schedule and canceled four orders.

Other carriers also are delaying deliveries of new-generation aircraft. Those with some already in service may find themselves with excess material obtained as part of initial provisioning packages bought to support the new fleets. Carriers that need cash more than expensive, spare components sitting on their shelves may turn to the USM and excess-parts market to offload some inventory, says Naveo Managing Director Richard Brown.

“There isn’t much of the latest-generation material on the market, and [most of the aircraft] are under warranty,” Brown says. “If you’re not going to take, say, your 737 MAXs or new widebodies for a while but you’ve invested in some provisioning, do you as an airline make that material available on the market? Especially among widebodies, if you have high-value, new-generation material, you could imagine some of that getting on the used market. This may impact profitable OEM provisioning sales.”

Airbus Senior Vice President for Customer Support Valerie Manning acknowledges this threat. “We could see some price reductions across parts catalogs,” she said during the recent Aviation Week MRO TransAtlantic virtual conference.

Naveo estimated the commercial air transport materials market at about $82 billion in 2019, including $5 billion for USM. The COVID-19 pandemic’s

The used-parts market will not heat up until airlines make firm fleet-retirement decisions.
ramifications will likely lower these figures by 40% or so in 2020. Parts purchasing will rebound, but the USM segment’s climb will not be as linear as many believe, Brown says.

Removing hundreds of aircraft from fleets on the heels of USM shortages on many popular platforms led some to predict a rapid surge in available material. But the pandemic’s uncertainty means many airlines are simply idling aircraft until demand trends become clearer, rather than retiring them—particularly among increasingly useful narrowbodies and smaller widebodies.

“Teardowns will increase, but you only need to be breaking down airplanes when the airlines or MROs need the parts,” Brown says. “Right now, they don’t need the parts so urgently.”

The increase in available surplus parts is one reason. Another is that airlines parking only portions of sub-fleets can generate their own USM flow. While some operators such as Delta Air Lines and Southwest Airlines have long embraced the strategy, the pandemic—combined with a broader focus on cost-savings on controllable line items such as maintenance spending—is leading more carriers to explore the idea. Icelandair’s recent announcement that it would retire four of its 757s and part them out is the latest example.

“Icelandair will realize the part-out value both by selling parts to [third parties] as well as maintain parts for our own stock,” says the carrier, which plans to keep 17 757s flying as part of its summer 2021 schedule.

While such strategies could reduce USM demand and keep quality material off the market, new customers will emerge to help generate business for suppliers. While USM is an accepted part of keeping costs low for many operators, not all airlines have embraced it, opting instead for the security of new parts—even at higher cost.

While each carrier is different, USM has always been more established in North America and Europe, but it is increasingly being used in the Middle East and Asia, Brown says. The need to keep costs low as traffic slowly recovers will lead to even more converts.

“USM is an acceptable choice for an increasing number of global airlines looking to save money on new OEM parts,” Brown says.

Growing acceptance of USM and a slowdown in new-aircraft sales could generate interest from larger suppliers that currently do not play much in the space. Add in airlines’ desire to limit the number of vendors they have, and the idea of big players with parts-distribution businesses—including aircraft manufacturers—entering the USM market is easy to envision.

“Scale matters,” Brown says. “I would not be surprised if you see OEMs and larger suppliers investing in broader USM solutions such as guaranteeing part availability and quality. It’s about capitalizing on the opportunity to give their customers something they want.”

In the interim, airlines, lessors, and parts traders will wait and see how global demand trends evolve. Airlines are loath to retire aircraft too quickly, lest they find themselves without enough capacity if demand comes back faster than projected. Storing aircraft for $10,000-20,000 per month is an “affordable insurance policy” against making too hasty a retirement decision or incurring a large impairment charge, Stengel says.

USM specialists are keeping an eye on trends as well, looking to avoid overpaying for assets the market does not need. “We do expect the availability of USM and excess new material to substantially increase,” Canaccord Genuity analyst Ken Herbert says. “However, it appears for now the industry is in a ‘wait and see’ mode while pricing and supply-demand settle with the new reality.”

Since hitting their one-year peak of 884 in 2012, retirements have been slow. A Naveo analysis of Aviation Week Fleet Discovery data shows that annual jet transport retirements have averaged 2.5% of the active fleet, with stored and parked aircraft—those most likely to be retired—at about 7%. As of mid-September, the 465 recorded 2020 retirements represented about 2.2% of the active fleet, but an eye-opening 62% of that fleet—about 13,000 aircraft—was idled.

As airlines make imminent retirement decisions, USM activity will increase. AeroDynamic projects the surplus parts market, excluding excess inventory, may not reach $1 billion in 2020. By 2025, however, it will be around $6.4 billion.

“The retirements and part-outs should start picking up next year,” Stengel says. “For the near term, it will be pretty tepid.”

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**Annual Commercial Aircraft Retirements 2000-2020**

Source: Aviation Week Fleet Discovery/NAVEO Analysis
They Do Windows

Next-generation transparency technology for aircraft windows

Paul Seidenman and David Spanovich San Francisco

They are not the windows of a past generation of business and commercial jets: In the arcane world of aircraft windows, engineering trends are moving in new directions—such as shielding passengers and crews from harmful ultraviolet (UV) rays.

To that end, in June 2019 PPG announced its Solaron Blue Protection UV+ blocker technology, which “is the first technology to offer the broader protection in the harmful low end of the light spectrum,” says Brent Wright, PPG’s global business director for aerospace transparencies. “At the high end of the spectrum—say 800 nanometers—you have infrared light and thermal heat. At the other end—below 420 nanometers—you have UV and Hevblue [high-energy visible blue] light. These light rays appear to have links to skin cancer and macular degeneration.”

Solaron Blue Protection blocks 99% of the harmful ultraviolet A and B rays and more than 50% of Hevblue portions of the light spectrum, without degrading actual visibility for pilots, Wright says. “Existing aircraft transparencies [offer] a nominal amount of protection as a result of the chemistries that comprise their material construction,” he notes. “However, a typical glass cockpit window incorporating Solaron can exhibit an 83% improvement in Hevblue and a 27% improvement in UVA blockage.”

To accomplish this, PPG modified the chemistry of the materials used in the cross-section of its cockpit windows to incorporate Solaron—a PPG proprietary chemical compound—during the manufacturing process. “It is not a coating or similar component that is added later,” Wright points out.

The Solaron transparencies, used for both cockpit and passenger cabin windows, are in the final stages of European Union Aviation Safety Agency certification, initially for a business jet application, and will be available as standard equipment for both line and retrofit. Wright could not name the specific business jet type or its manufacturer at this time.

Wright sees the business jet as a first step and is optimistic that Solaron will find its way onto commercial...
airline aircraft as well. “In fact, it was inquiries from commercial transport pilots that initially led PPG to pursue development of technology to mitigate potential UV/Hevblue issues,” he notes.

Solaron is available for any multiply PPG cockpit window, passenger window or fighter jet canopy. “PPG has performed extensive testing to assure the technology does not change the structural, performance or durability characteristics of the equipped windows,” he says. “Thus, certification for OEMs is a matter of a drawing change backed by a comparative material properties report supplied by PPG.” He stresses that because Solaron does not affect the structural cross-section and adversely affect the metal heater components.

“In theory, perhaps the protective properties of Solaron might enhance the life of a cockpit window, but we can’t claim that now,” Wright cautions. “Combined with PPG’s Opticor—an advanced transparency material—there may be an opportunity to enhance the service life of cabin windows versus conventional stretched acrylic,” he suggests.

Opticor is flying in some cabin window applications today. “Performance to date is promising, but the jury is still out on whether longevity can exceed the 10 years currently seen with some stretched acrylic windows,” Wright explains.

In another development at PPG, the OEM is pursuing a “smart” window system dubbed WinLogic. This technology incorporates a component that identifies and mitigates electrical anomalies in a windshield’s heating system to predict a possible failure. In tandem with that is a data-collection capability that can be linked to some big data analysis. That would help to determine future product improvements as well as enable greater reliability and logistical support for operators. “COVID-19 has slowed our ability to get that technology fielded, but we are close,” Wright adds.

DIMLY LIT
With the introduction of the Boeing 787 in 2011, electronically dimmable windows (EDW) were born. When in their “closed” mode, all but a miniscule amount of outside light is blocked, and when “opened,” the windows offer a soft and gradual transition to ambient light.

The 787’s EDW cabin windows are the result of a partnership between PPG, which supplies its Alteos dimmable window assemblies, and Gentex, which provides the electrochromic technology. PPG is also the system integrator and supplies the assemblies to Boeing as well as post-sale customer support.

Gentex’s EDWs are “the first and still the only kind” flying on commercial airliners today, says Mike Behm, the company’s director of business development.

“Our latest technology, with near black-out darkness levels and fast switching speeds, is now offered on the Boeing 777X,” says Behm. “Speed improvements are one of the primary areas of focus and development for our products. People inherently expect instant on/off with things like dimming windows, so we’re constantly working to improve speeds.”

Behm says the 777X EDW will block more than 99.999% of visible light, while those on the 787 block 99.99%. “Although that may seem trivial, the difference becomes very apparent at altitude with full solar loading,” he remarks. “Also, the new EDWs can transition between full dark and full clear—or vice-versa—in approximately half the time as those on the 787s. We refer to the 777X system as ‘Gen3’ and the current one as ‘Gen2.’”

Behm reports that Gentex has also improved the switch design and function for the 777X EDWs, by moving from an elastomeric push-button to a glass-faced capacitive touch design. This offers a more intuitive function, along with significant improvements to durability, he says.

Behm adds that Gentex will be offering a similar dimmable windows package to Airbus in 2021 for application to an as-yet-unannounced aircraft. “The
demand for ‘smart’ surfaces, including dimmable surfaces for privacy or shading, is constantly increasing,” he says. “We expect to see continued improvements to reliability and system design flexibility as material sciences continue to offer innovative new raw materials and substrates for constructing switchable and ‘smart’ surfaces.”

**BIGGER IS BETTER**

Some of the main trends driving aircraft window design and engineering are intended to give pilots unobstructed views by enlarging the size of the cockpit windows and reducing the number and size of structural pillars. New materials are also playing a role, particularly with the use of high-mechanical-strength glasses and organic materials to reduce weight and thickness.

“With increasingly larger windshields, optimizing the mass, geometry and the electrical heating power is becoming a critical factor,” says Scott Huth, Saint-Gobain Mobility’s general manager for aerospace. “Along with that, the Saint-Gobain research and development team is focusing on optimizing the coupling between the airframe and the transparentcies to reach a higher level of impact resistance to bird strikes and foreign objects. There is also an increased utilization of laminate designs that balance the structural requirements, visibility, exterior impact resistance and aircraft weight.”

Citing one example, Huth points to Saint-Gobain’s patented, multilayer product line technology coupled with ultra-thin coating. “Saint-Gobain is a world leader in vacuum-deposited thin layers such as metal, oxide and transparent conductive coating,” Huth says. “The combination of these layers with laser treatments and scribing allows us to finely adjust the heating power to needs of anti-icing over the whole surface of the windshield, keeping the energy consumption lower.”

The OEM is also using high-mechanical-strength glass products and organic materials to reduce weight and thickness. High-mechanical-strength glass has historically been thermally tempered glass. Today, Saint-Gobain provides more generally chemically tempered glass, specifically designed for aerospace applications, allowing higher mechanical resistance and optimized weight, says Huth. To do that, it utilizes polymethyl methacrylate, a stretched organic material. Examples include Saint-Gobain’s Solidion and Ionalex mineral glasses, produced in-house.  

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**Aviation Week 2021 MRO Events**

- **MRO Middle East**
  March 2-3, 2021 • Dubai, UAE

- **Aero-Engines Americas**
  March 30-31, 2021 • Dallas, TX

- **MRO Americas**
  April 27-29, 2021 • Orlando, FL

- **MRO Latin America**
  Co-located with MRO Americas
  April 27-29, 2021 • Orlando, FL

- **Military Aviation Logistics & Maintenance Symposium (MALMS)**
  Co-located with MRO Americas
  April 27-29, 2021 • Orlando, FL

- **Engine Leasing, Trading & Finance**
  May 18-19, 2021 • London, UK

- **MRO BEER**
  Baltics, Eastern Europe & Russia
  June 9-10, 2021 • Istanbul, Turkey

- **Aero-Engines Europe**
  September 15-16, 2021 • Stavanger, Norway

- **MRO Asia-Pacific**
  September 21-23, 2021 • Singapore

- **Aero-Engines Asia-Pacific**
  Co-located with MRO Asia-Pacific
  September 22-23, 2021 • Singapore

- **MRO Europe**
  October 19-21, 2021 • Amsterdam, Netherlands

Learn more at events.aviationweek.com
Regional turboprop manufacturer ATR is proceeding with a continuing effort to reduce the direct operating costs of the 70-seat-class ATR 72 despite an uncertain environment.

A number of ATR operators have been weakened, if not swept away, by the sharp traffic downturn accompanying the COVID-19 pandemic. ATR’s executives still want to see the silver lining of this cloud: Traffic involving ATR’s aircraft has been recovering better than most, they assert. Nevertheless, the financial health of their customers likely will remain fragile for a few years, meaning a glut of used aircraft on the market is possible.

The prospect of lower operating costs may help sustain residual value for ATR’s models, along with planned upgrades and new versions. The OEM has been striving to keep its lineup up to date, even though most competition has gradually vanished. De Havilland Aircraft of Canada has yet to confirm it intends to continue Dash 8-400 production.

Against that contrasting and unstable backdrop, the recent announcement by Airbus that it is studying three concepts for a hydrogen-fueled aircraft to be in service by 2035, including a turboprop, was seen as encouraging.

Meanwhile, airworthiness directives continue to affect ATR’s products, apparently without negatively impacting their consistently high dispatch reliability.

The pandemic crisis is making ATR engineers’ lives more complicated, but operators may expect unfailing support even so, says David Brigante, ATR’s senior vice president for programs and customer services. “We have tried to support them as much as possible. . . . Our customer support team was making calls on a weekly basis; we have tried to understand their issues,” he says. During the lockdown, engineers worked from home “and [ATR] continued to guarantee 24/7 customer support.”

And they followed through on a key project. “We are extending C check intervals to 8,000 flight hours, up from 5,000 flight hours,” Brigante says. The improvement is expected to be effective in the first quarter of next year.

Company experts reviewed service data and determined that it could be done, he says.

The change is described as part of a continuing process aimed at offering lower direct operating costs (DOC) to operators. Overall, “we aim at a two-digit cut in DOC by next year or early 2022,” says Brigante. Another ingredient in the recipe is the new air conditioning system, which ATR asserts offers better performance and costs less to maintain.

Dispatch reliability stands at a stable 99.63% overall, according to Zuzana Hrnkova, ATR’s vice president for marketing. It is measured by region, by customer and by operating environment.

ATR has company-owned service centers in Toulouse (where it is headquartered), Bangalore (India), Miami and Singapore. A fourth, smaller service center is located in Auckland, New Zealand. One-third of the fleet is based in the Asia-Pacific region, Brigante notes.

The maintenance, repair and overhaul facility at Toulouse Frangancazal Airport takes care of services such as major structural repairs.
if they are not performed at the customer's location.

Spare parts distribution centers can be found in Auckland, Miami, Paris and Singapore. Regional support offices have been established in Sao Paulo, Brazil; Johannesburg, South Africa; and Brisbane, Australia.

A network of ATR-certified MRO service providers (also known as partner MROs) maintains proximity with the customer. “We audit them, supervise training and suggest tooling,” Brigante explains. The addition of one in China is a work in progress despite current travel restrictions.

Germany-based Rheinland Air Service (RAS) is one of ATR’s partner MROs. For an annual fee, RAS has access to a parts inventory, technical documentation and support from ATR, says Joerg Peters, director for regional maintenance.

ATR assigns work to RAS and may ask it to dispatch a mobile repair team. “We perform about 30 heavy maintenance checks on ATRs and receive 400–450 ATR work orders per year,” Peters reckons. Those numbers include both ATR models. RAS provides ATR with feedback on its products and market information.

ATR does not promote its partners’ names. “At the end of the day, you make your own reputation,” Peters adds. But at least some customers are reassured by ATR’s logo, and being part of the network helps maintain a good relationship with the OEM, he says.

“ATR are the most reliable turboprops I know,” Peters answers when asked about the product from an MRO standpoint. “You have to focus on corrosion prevention on aerostructures,” he notes. Spare parts availability and pricing are considered good, notably thanks to an active second-hand market. RAS has parted-out more than 30 ATR airframes, he says.

The ATR brand also has a good reputation for maintainability and product support.

Air Corsica has operated ATR 72s for 30 years, and maintenance is done in-house. “In heavy checks, ATRs have relatively predictable needs. The number of manhours will not be too different if you compare one check to the next one, and you should not expect major unscheduled work before 12 years of service,” says Herve Pierret, a member of Air Corsica’s management board.

The carrier has measured dispatch reliability of its seven-strong fleet (six ATR 72s and one ATR 42) at 99%, “only slightly below that of a younger A320,” he says.

Pierret describes the ATR 72’s design as simple. However, it still requires attention, he says. Minor failures may happen frequently, but they are predictable—and they are often the same, he explains.

Such problems need to be resolved immediately. “But once you have understood the aircraft’s philosophy, it is easy to manage,” he says. “If you take care of the aircraft on a daily basis, if you have structured your organization for that, you get great regularity, you get a great aircraft.”

Struggling with a sudden, massive drop in demand, some ATR operators did not survive the downturn. Others are still under Chapter 11-type protection schemes, and some are still afloat only thanks to government support.

According to Aviation Week’s Fleet Discovery data, 490 ATR 72s are in service and 206 are in storage. Most-represented in the in-service fleet is the ATR 72-600—the latest version. The orderbook stands at 201, with the Asia-Pacific region accounting for the highest proportion, at 38%.

Aviation Week’s 2020 Commercial Aviation Fleet & MRO Forecast suggests average annual aircraft utilization for the ATR 72 was close to 2,100 flight hours before the crisis.

“Pre-crisis, ATR aircraft productivity was on average 25 cycles per week per aircraft. Today it is at around 18 cycles per week per aircraft, so our current productivity is 73% of what it was,” says an ATR representative. Those numbers are for the ATR 42/72 family—one in four ATR 72 operators also operates the ATR 42, its smaller sibling.

For some carriers, one vulnerability has been small size: The average ATR fleet stands at six aircraft. Carriers may operate other aircraft, but the number of ATRs is an indication of operator size. The smallest and largest ATR fleets are one- and 60-strong, respectively, according to Hrnkova.

However, since the pandemic crisis began, available seat-miles flown by ATRs have decreased later than they did for any other segment, have declined less and have been increasing more quickly, ATR utilization statistics indicate, based on data supplied by air traffic facts and figures specialist OAG. In the regional aviation sector, ATRs appear to be busier than regional jets and other turboprops.

The decrease in flying means less work for MRO service providers, but its less abrupt decline may be due to the variety of ATR operations, as well as the more diverse geographical footprint. “ATRs fly essential services; they are essential for communities when they carry food and medical supplies—plus, during the pandemic, repatriation flights,” says Hrnkova.

In Taiwan, Uni Air and Mandarin Air Lines have returned to pre-crisis traffic levels, notably thanks to local tourism, Hrnkova says. Around the Mediterranean, Sky Express, Binter Canarias and Air Corsica recorded traffic numbers for the August–September period comparable to winter levels, she adds. Globally, the growth of e-commerce, which translates into greater demand for cargo transportation, has not been slowed by the crisis.

Hrnkova also is seeing the beginning of a wave of replacements for ATR. This implies MRO service providers will transition to working on current-generation turboprops, instead of aircraft from the 1980s and ‘90s. “Around 950 Western turboprops will retire over the coming years,” Hrnkova says. The wave is more related to the smaller ATR 42, as the aging 30-50-seaters have to find successors, she adds.

For example, Florida-based Silver Airways has received 10 ATR 42/72-600s. This is half of the order it placed—via lessor Nordic Aviation Capital—to replace its Saab 340Bs.

A Chinese order has thus far been a tantalizing goal. “Regional aircraft

“The we aim at a two-digit cut in DOC by next year or early 2022.”

David Brigante,
ATR senior vice president, programs and customer support and services
represent 3% of the Chinese fleet, far below the global average of 25%,” Hrnkova says. In 2017, two letters of intent were signed with small operators, but orders have yet to materialize.

The airframer is zeroing in on Civil Aviation Administration of China (CAAC) certification for the ATR 42-600. Last summer, representatives of the CAAC participated in a certification flight in Toulouse, alongside their European Union Aviation Safety Agency (EASA) counterparts.

Expect new versions and significant upgrades to enter service in the near future. The ATR 72-600F freighter the OEM has been developing will be delivered starting this year, as planned, according to company executives. Launch customer FedEx signed a firm order for 30, anticipating performance better than a cargo conversion of a used aircraft.

ClearVision, the first enhanced-vision system with a wearable display in commercial aviation, was to enter service last summer. But the launch customer, Guernsey-based Aurigny, had to delay the pilot training process due to the crisis.

The system is designed to make landing in bad weather possible more often, rendering flight schedules more dependable. Introduction is now hoped for in 2021.

**“If you take care of the aircraft on a daily basis, if you have structured your organization for that, you get great regularity, you get a great aircraft.”**

Herve Pierret, member of Air Corsica’s management board

Development of the short-takeoff-and-landing variant of the ATR 42 is in full swing, and certification is seen late in 2022. The manufacturer has received 20 firm orders for the new variant.

In the more distant future, ATR’s involvement in a project incorporating hydrogen-based propulsion has yet to be confirmed. The company is jointly owned by Airbus and Leonardo, and such a decision would be made at the shareholder level, which may take months.

But Airbus’ expectation that turboprop engines and a 100-seat capacity will be an option for the first hydrogen-fueled passenger aircraft indicates the relevance of turboprop technology and the importance of the regional segment, Hrnkova says.

In recent ATR 42/72 airworthiness directives, EASA has required inspections of main landing gears. Incorrectly installed bushes have been found, and the issue, if not detected, can cause the main landing gear to collapse, the agency says.

The same failure could also be caused by hinge pins with manufacturing defects, which thus have to be replaced. Problems with hinge pins have persisted for years.

A directive and an ATR service bulletin also were prompted by reports of interference and chafing between a propeller brake hydraulic pipe and an electrical wire bundle bracket screw installed in the underwing box of the right-hand engine nacelle. To avoid a fire on the ground, modification of the wiring assembly was required.

Electrical wiring modification was also mandated to avoid chafing on an electrical harness in the left-hand wing, and a wiring modification was also needed behind the overhead bins. Damage was found on an electrical harness bundle, due to chafing with an air duct clamp, which also had to be repositioned.

Finally, to prevent a seat-track failure in an emergency landing, inspections have to be conducted, after defects were found with the component.
Inside

INSIDE MRO20

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marketplace.aviationweek.com/ company/duncan-aviation-inc

2. Quick, Easy Paint Touch-Ups

Company: Sherwin-Williams Aerospace Coatings
Specifications: Sherwin-Williams Aerospace Coatings has released a new product to easily touch up chips, dings and scratches on aircraft exteriors and interiors. The JetPen features durable, fast-drying paint that Sherwin-Williams says is ideal for rivet heads, bolt heads, scratches, edges, access panels and more on all types of aircraft. The JetPen is available in a variety of colors, can be color-matched and is available in the company’s Jet Glo Express High Solids Polyurethane topcoat, JetFlex Polyurethane cabin coatings and Chrome Hazard Free primer CM0483787. It features a spring-loaded valve to provide material flow control and a capsule to separate hardener within the pen to ensure shelf life and integrity of the product.

marketplace.aviationweek.com/ company/sherwin-williams-aero-space-coatings

3. Chinese Paint Specialist

Company: APC
Specifications: HNAT-STTS Hainan Aerospace Painting Co. Ltd., known as APC, is a joint venture between HNA Technique and Satys Group. It provides painting services for narrowbodies, widebodies, business jets and components from its paint hangar at Haikou Meilan International Airport in China. As of December 2019, it had painted more than 300 aircraft for 31 customers worldwide. In 2021 APC plans to accelerate its strategic development, which includes plans to build one widebody and two narrowbody paint hangars.

marketplace.aviationweek.com/ company/hna-aviation-technic

4. VIP and VVIP Painting Expertise

Company: King Aerospace
Specifications: Oklahoma-based MRO King Aerospace provides paint services for VIP and VVIP aircraft, including full strip and paint, restriping, registration changes, highly com-


ditional regulations. In Provo, which has stringent regulations due to regional air currents, Duncan Aviation has installed an oxidizer to burn off volatile organic compounds and eliminate emissions from paint processes. The site also features an air curtain that reduces the amount of dust that can be carried to other areas of the facility.

marketplace.aviationweek.com/ company/duncan-aviation-inc

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5. Robotic Painting and Stripping

Company: Xyrec
Specifications: Dutch robotics specialist Xyrec provides automated solutions for painting and stripping aircraft. Xyrec says its Laser Coating Removal (LCR) robot can reduce turnaround time by up to 60% and reduce or entirely eliminate environmental and health hazards involved in traditional aircraft paint-stripping processes. The LCR robot produces only around 2 lb. of waste in powder form for a widebody aircraft compared to approximately 475 gal. of chemicals and 3,700 gal. of water generated by traditional paint-stripping methods. Xyrec says its Automated Paint Robot can paint aircraft livery designs on an aircraft fuselage using 30% less paint. Xyrec recently opened North American headquarters at Port San Antonio, Texas.

marketplace.aviationweek.com/company/xyrec

6. Cutting-Edge Coatings

Company: AkzoNobel
Specifications: Aerospace coatings specialist AkzoNobel recently received approval from Boeing for color blending of its Aerodur 3001 basecoat at its Dongguan facility, which will give Chinese customers a local supply of OEM-quality Aerodur 3001/3002 basecoat. Late last year, Japan Airlines became one of the first airlines to select AkzoNobel’s Aerodur HS 2121, which is its new sustainable, selectively strippable system for aircraft exteriors. Developed for Airbus and airlines, it is free of chromates. After acquiring aerospace coatings manufacturer Mapaero last year, AkzoNobel will soon launch what it says are a wide assortment of touch-up kits combining innovative packaging from Mapaero with both companies’ product portfolios to support customers with touch-up work, reduce paint waste and improve ease of use.

marketplace.aviationweek.com/company/akzonobel-aerospace-coatings

7. Global Painting Presence

Company: Satys Group
Specifications: French painting specialist Satys Group has been growing quickly over the last few years, acquiring UK paint specialist Air Livery in 2018, taking over Aero Technique Espace’s painting site in Chateauroux, France, in 2019 and opening two new paint hangars at the Bombardier Singapore Service Centre this year. It has 16 paint hangars around the world with five under construction, including a new paint hangar it is establishing at the Budapest Airport to enable simultaneous painting of two Boeing 737-900 or Airbus A321 aircraft. In addition to painting services for commercial, business and military aircraft, it provides design services from its in-house graphics department such as digitally printed and removable vinyl designs, paint mask stencils for large logo painting, and airbrushed and hand-painted images.

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MRO: A Forgotten Barrier to UAM

What was once a dream—the reality of aviation operating at large within our cities—seems closer than ever. To achieve this dream, the global race is on to develop a suitable vehicle platform—one that uses a green fuel source, is efficient and, certainly, by aerospace standards, available at scale.

The realization of this vision is not without significant challenges, from certification and logistics to social acceptance. That said, with the coalescing of new technologies, committed investors and fresh approaches by regulatory bodies, estimates of first commercial services start as early as 2023. Don’t go telling your friends just yet, though—the viability and sustainability of this novel urban transportation system rests on the ability to scale up to a point where load factors and utilization can satisfy any prudent financial manager.

But with so much focus on making urban air mobility (UAM) a reality, it seems that MRO and the aftermarket have been forgotten. The solution? Plan now and plan together. An effective aftermarket cannot be an afterthought, and the key to enabling it lies in three main areas.

**DESIGN-ENABLED SOLUTIONS**

To maximize utilization in a new era of aviation, we must do more and embrace new technologies as well as new philosophies. The development of embedded sensors, for example, in both the aerospace and adjacent industries such as Formula One, provides greater real-time conditional monitoring beyond what we use today. Coupled with the right data infrastructure, in addition to providing performance and safety benefits, this can significantly decrease the need for inspections. Furthermore, with the application of machine learning and AI, complex trends in maintenance events could be identified, factoring in typical mission profiles or operating environments. A natural conclusion of this is a true digital twin for each operating asset, fed with the data of each component’s specific design, history and current condition. Combined effectively with a high degree of modularity, this could radically change the way we view and schedule MRO operations. Vehicle platforms designed this way early in their life cycle could reap the rewards of a scalable solution, favored by operators over an early entrant without the longevity to thrive in this highly competitive market.

**DIGITAL TOOLS**

The availability of suitably qualified engineers and technicians to perform MRO operations could present a barrier to the high level of utilization required. A leaner, more centralized approach to damage inspection and triage may be the answer—and digital tools are at the heart of this.

The toolbox of the future will certainly be more digital, and the ability to remotely perform and share work will reduce the need for eyes on the apron. Digital maintenance processes are already being used in the aerospace industry, and we must expand this to realize their full potential. The ability to scan a damaged structure, for instance, and for it to be characterized digitally allows for remote or even automated assessment. With the right digital tools at hand, engineers at central locations can do the initial assessments, allowing a focused workforce to be deployed more efficiently on the ground. These assessments also leave digital footprints, providing input into the aforementioned digital twins. Combined with increasingly affordable virtual- and augmented-reality tools, it’s easy to see how remote digital hangars may be a key component of the UAM system and will require new operating models for MRO providers.

**MRO INFRASTRUCTURE**

Aircraft hangars, serving numerous MRO operational requirements, are commonplace at airports today. But this embedded infrastructure doesn’t necessarily work in an urban context where real estate is at a premium. There is a clear correlation between cities where UAM could offer maximum benefit and those with the biggest constraints on urban real estate. The limitations on urban space will strongly influence the configuration of a UAM facility and constrain the MRO services available there.

From simple operational pads to stations and hubs, vehicle and infrastructure operators will need to carefully consider the movements between each to ensure the operational efficiency of any MRO event. With space at a premium, having a vehicle at the wrong place at the wrong time is a sure way to threaten the high utilization that underpins the UAM business model. While infrastructure providers scramble to understand constraints set by high-density movements and battery charging, it’s important to consider where vehicles will be maintained and how this will influence the design of both the infrastructure and the vehicle.

The MRO requirements placed on UAM infrastructure providers must be fleshed out through a tightly coupled development process with vehicle OEMs and operators. Like many aspects of UAM, this early collaboration is essential. No matter how sparse initial traffic may be, solutions that cannot be scaled up to create a totally viable system will prevent us from realizing the great benefits that lie ahead.
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Unison is a world leader in electrical and mechanical systems supplying to nearly every engine and airframe program. By leveraging its technical acumen, Unison has gained while working with OEMs it is able to provide technically superior products and offer product upgrades to MRO customers that our competition simply cannot match.

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