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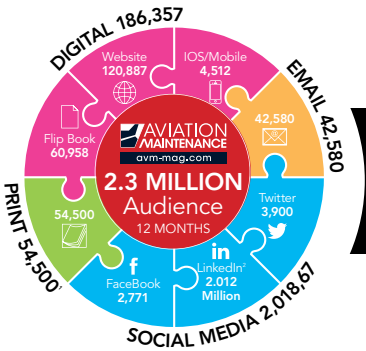

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Tempus Fugit

BY JOY FINNEGAN
EDITOR-IN-CHIEF

Tempus fugit is the Latin phrase meaning time flies. They say the older you are, the faster time appears to go, which may be related to the ratio of years lived to increments of time and how we perceive time. Not trying to get too philosophical here but it does seem to be true. For example, we are making note of two big milestone anniversaries of extraordinary events in the aviation industry and to me they seem like they happened just yesterday. I've talked to many colleagues who feel the same way. Perhaps it's because these events made such a huge impact on our collective psyches in the aviation industry but also likely because of the personal connections and results that reverberated throughout our lives.

A night view of the National 9/11 Pentagon Memorial.

First is the 25th anniversary of TWA Flight 800 that crashed on July 17, 1996. First, let me say that this accident happened on my husband's birthday so, we remember the date exactly and make a note of it every year. We are both lifers in the aviation industry, so we pay attention to these types of events but never more so than this one. Why? Because second, we had recently moved to Montoursville, Penn. You may have a brief memory of the fact that many members of a high school French club were onboard that flight to Paris for an experiential learning trip — and all of those kids were from this small, tightknit town, Montoursville, Penn. Try to imagine the devastation of 16 students and 5 adult chaperones from the French club of your high school perishing all at once. That event clearly hit this small town hard. As if that isn't enough, the third reason this particular accident stays with me all these years later is that I had flown for a TWA feeder, knew some folks at that airline and one in particular whose fiancé died onboard that aircraft.

All 230 people on board TWA 800 died in the crash making it one of the deadliest in U.S. history. Accident investigators from the National Transportation Safety Board (NTSB) traveled to the scene, and later, officers from the Federal Bureau of Investigation and other security-related agencies arrived amid speculation that a terrorist attack was the cause of the crash. There are some who still believe that there was a cover up and that the accident was the result of being shot down or a bomb.

But as you will see in Jeff Guzzetti's piece, "Wired for Safety" on page 38, the TWA 800 accident was the result of the center wing fuel tank of the older 747 exploding, which was likely caused by wire chaffing and arcing outside of the fuel tank. In Guzzetti's piece, he looks not only at the TWA 800 accident, but at several others that are all related to wiring.

If you have ever had the privilege of taking courses at the NTSB Academy, you may have seen the truly amazing and extensive reconstruction of the TWA 800 accident aircraft in a huge hangar-like facility at the academy. It is something to behold and the epitome of accident reconstruction. Unfortunately, the NTSB announced recently that they will be disassembling the display and that it will no longer be available for viewing.

The reconstruction was housed in a 30,000 square foot hangar along with other training tools at the NTSB's Training Center, has been used in the NTSB's accident investigation training courses for nearly 20 years. The NTSB said "advances in investigative techniques such as 3-D scanning and drone imagery, lessen the relevance of the large-scale reconstruction in teaching modern investigative techniques." Unfortunately, in the time of conspiracy theorists, this decision has reignited the flames of those who believe there was a cover up of a sinister act that caused the accident. Read Guzzetti's explanation on page 38 to understand more.

Moving on. This September we are also commemorating the 20th anniversary of the events of 9/11. Again, for all of us who have worked in the aviation industry, we felt the impact of that terrorist attack deeply, personally and its effect continues to reverberate in the lives and careers of so many. When I thought about the fact that it happened 20 years ago, I was stunned. It seems like it just happened.

I think of all the things that came out of that time period. The change to the New York skyline. The changes to aviation security. The military actions made poignant by the recent withdrawal of troops from Afghanistan. Let me take a moment to express my gratitude to anyone who served there and please know that the sacrifices you made are appreciated and valued — thank you.

I have written before about my college friend, David Charlebois, who was the first officer aboard American Airlines Flight 77 that was deliberately crashed into the Pentagon that day. I remember him every year at this time. He was living the dream we talked about at college — flying around the globe as a pilot and building experience to become a captain someday. He was well on his way. He was so motivated and one of the first of our cohort to have made it to the right seat of the 757. He gave us all hope that we too might make it, someday.

I feel the need to finish on a high note so let me try. I entitled this piece tempus fugit but let's don't forget another oft-quoted Latin phrase: carpe diem. Seize the day. If I had one piece of advice for all, especially now in the throes of the pandemic, it is to seize the day. Tomorrow is not promised. Take the leap. Do the thing you have been putting off. Get the degree. Forgive the one you've been holding a grudge towards and move on. Protect yourself, get vaccinated and then, carpe diem. The next thing you know, 20 years — or 25 — will have passed. AVM

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GE Aviation and Safran Launch Program for Sustainable Engines, Extend CFM Partnership to 2050

GE Aviation and Safran have launched a technology development program targeting more than 20 percent lower fuel consumption and CO2 emissions compared to today's engines. The CFM RISE (Revolutionary Innovation for Sustainable Engines) program will demonstrate and mature a range of new, disruptive technologies for future engines that could enter service by the mid-2030s.

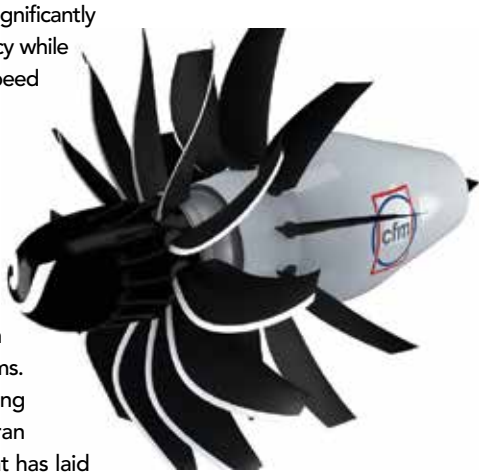
The companies have also signed an agreement extending the CFM International 50/50 partnership to the year 2050, declaring their intent to lead the way for more sustainable aviation in line with the industry's commitment to halve CO2 emissions by 2050.

"The relationship between GE and Safran today is the strongest it has ever been," said John Slattery, president and CEO of GE Aviation. "Together, through the RISE technology demonstration program, we are reinventing the future of flight, bringing an advanced suite of revolutionary technologies to market that will take the next generation of single-aisle aircraft to a new level of fuel efficiency and reduced emissions. We fully embrace the sustainability imperative. As we have always done in the past, we will deliver for the future."

"Our industry is in the midst of the most challenging times we have ever faced," said Olivier Andriès, CEO of Safran. "We have to act now to accelerate our efforts to reduce our impact on the environment. Since the early 1970s, breakthrough engine efficiency and reliability have been the hallmark of our historic partnership and our LEAP engine already reduces emissions by 15 percent compared to previous generation engines. Through the extension of our CFM partnership to 2050, we are today reaffirming our commitment to work together as technology leaders to help our industry meet the urgent climate challenges."

Technologies matured as part of the RISE Program will serve as the foundation for the next-generation CFM engine that could be available by the mid-2030s. The program goals include reducing fuel consumption and CO2 emissions by more than 20 percent compared to today's most efficient engines, as well as ensuring 100 percent compatibility with alternative energy sources such as Sustainable Aviation Fuels and hydrogen.

Central to the program is state-of-the-art propulsive efficiency for the engine, including developing an open fan architecture. This is a key enabler to achieving significantly improved fuel efficiency while delivering the same speed and cabin experience as current single-aisle aircraft. The program will also use hybrid electric capability to optimize engine efficiency while enabling electrification of many aircraft systems.



The program is being led by a joint GE/Safran engineering team that has laid out a comprehensive technology roadmap including composite fan blades, heat resistant metal alloys, ceramic matrix composites (CMCs), hybrid electric capability and additive manufacturing. The RISE program includes more than 300 separate component, module and full engine builds. A demonstrator engine is scheduled to begin testing at GE and Safran facilities around the middle of this decade and flight test soon thereafter.

The original 1974 framework agreement creating CFM International as a 50/50 joint venture between the two aircraft engine manufacturers redefined international cooperation and helped change the course of commercial aviation. The partnership was renewed in 2008 for the launch of the LEAP engine program. Today, CFM is the world's leading supplier of commercial aircraft engines with a product line that serves as the industry benchmark for efficiency, reliability and low overall cost of ownership. More than 35,000 CFM engines have been delivered to more than 600 operators around the globe, accumulating more than one billion flight hours.

AFIKLM E&M Appoints Teboul SVP Commercial

Pierre Teboul, who has until now been in charge of components Customer Support & Product Performance within Air France Industries, is taking over from Fabrice Defrance, who is retiring, as AFI KLM E&M senior vice president Commercial.

Teboul will continue to develop the commercial presence of AFI KLM E&M and its network with operators, customers and partners around the world. Building on the many years of success of his predecessor, such as the support of the GE90, the 787 and the A350 on the five continents, Teboul says he will promote new generation products such as the A220 support or the GEnx and the LEAP engine solutions and will lead his sales team in the upcoming transformation and challenges of the MRO business.

"On behalf of Air France-KLM Engineering & Maintenance, it is with great emotion that I thank Fabrice Defrance for his great dedication during these many years," said Anne Brachet, EVP Air France-KLM Engineering & Maintenance. "Under his leadership, our services have been greatly developed through careful listening of our customers. In the current context, it is more important than ever to work in a mindset of partnership and listening. I know that Pierre Teboul will give his best to continue the work already accomplished and endeavour to build ever stronger relationships with our clients and partners."

Pierre Teboul, AFIKLMEM SVP, Commercial

Teboul added: "I will put my knowledge at the service of AFI KLM E&M's customers by measuring the work already accomplished, the humility that the period imposes on us and, above all, the greatest enthusiasm. On behalf of AFI KLM E&M: Listening, developing and proposing the best solutions for the aviation business, this is what will guide me in the coming years alongside our customers."

Pierre Teboul has more than 30 years of professional experience in the aviation industry within Air France and Air France-KLM Group, from airline business to engineering & maintenance. Since 2007, Pierre has been successively Regional Sales Director North & Eastern Europe AFI KLM E&M and VP Customer Support & Product Performance for the components business.

Drawn to a Different Kind of Runway: A Career Shift Fashion to Aircraft Maintenance

Chrishanna Frayser's career began in the fashion industry, but it didn't take long before she found herself drawn to a different kind of runway.

"I was on the management track in retail women's clothing, and before that I worked at a modeling and talent agency," says Frayser. "But I basically fell into a fashion career due to family contacts, and I knew it wasn't my passion. One day I got fed up with not being happy with my work, so I decided to change my career and do something that interested me."

Frayser's lifelong love of airplanes — and her passion for learning how to take things apart and put them back together again — inspired her to enter the aviation maintenance field despite having no prior mechanical training.

"My dad made sure my siblings and I knew how to change our oil and tires, but beyond that I was kind of hopeless," Frasyer recalls. "I felt like I was really far behind my classmates who were more mechanically educated, but that just encouraged me to work harder and take every opportunity to learn more so I could catch up faster."

It turned out to be a winning strategy. In 2020, Frayser graduated at the top of her class from PIA's Hagerstown Campus. Today, she is the only female minority FAA–licensed aircraft technician at Plane Care, a repair facility located at Hagerstown Regional Airport. Her responsibilities include aircraft maintenance and inspections, general repairs, and the removal and replacement of parts and accessories.

One of Frayer's most memorable jobs was replacing a fuel bladder on a rare HT–295 Helio Courier. "Due to the aircraft's age and unique design (only 4 of that particular design are still operating in the continental USA), it was hard to find the proper replacement part," says Frayser. "The first one we were sent was so far off from the required specs that it tore when I tried to install it. Thankfully, we were able to send in the original bladder so they could find a new one that matched it exactly. But to install it, I still had to sit on a ladder 7 feet in the air and work through a hole that only allowed my arms or my head through, but never both at the same time. Eventually, I got so good at taking the bladder in and out that the final installation only took me about 75 minutes."

Chrishanna Frayser made a career move from fashion to aircraft

Working at a regional airport also has its perks, like getting to know the private plane owners who rely on technicians like Frasyer to keep their aircraft running safely. "My favorite job so far was changing a brake cable on a Piper PA-22 Tri-Pacer, which also happens to be my favorite plane. It was a simple job, but the owner is very particular about who is allowed to work on his plane, which is understandable since he maintains it beautifully. I must have done a good job, because he allowed me to go on a ride and even let me fly it a bit. That experience alone was worth getting my A&P license."

For anyone considering a career in aviation maintenance, Frayser encourages them to trust in their own potential. "If you want the satisfaction of being able to throw yourself into your work and see a job through from end-to-end, this is definitely something you can learn to do. It's hard work, but sticking with it is so rewarding. Seeing a plane you worked on take off safely down the runway is the best feeling in the world."

MTU Aero Engines Gives More Guidance after the First Six Months

In the first six months of 2021, MTU Aero Engines AG generated revenue of €2.004 million; in the first half of 2020, revenue was €2.049 million. Net income developed in line with operating profit and was €135 million, compared with €161 million in the prior-year period. "MTU continued to operate profitably in the first half of this year. Based on this performance and the improved visibility up to year-end, we can now give a more precise guidance for the 2021 fiscal year," said Reiner Winkler, CEO of MTU Aero Engines AG. "We are somewhat more optimistic than previously about the commercial series business and the military business, but have slightly reduced our forecast for commercial maintenance. Overall, we are slightly increasing the lower end of our target ranges for both revenue and earnings."

MTU now expects full-year revenue to be around €4.3 to €4.5 billion. Previously, the company's

guidance was for a revenue range of between €4.2 and €4.6 billion. MTU posted higher revenue in both the commercial maintenance business and the military business in the first six months of the year.

In commercial maintenance, revenue rose 6 percent from €1.27 billion to €1.35 billion.

"In the core MRO business, revenue was below the prior-year level. However, we were able to offset this thanks to sustained high demand for maintenance services for Geared Turbofan engines," reported Winkler. MTU is well-positioned for the future. In the first six months, the company won MRO contracts worth U.S.$3 billion; the value in the comparable prior-year period was U.S.$1.7 billion. "That fuels our confidence that the downturn has bottomed out and a sustained recovery has started on the aftermarket," said Winkler. The most important revenue generators in the commercial maintenance business were the PW1100G-JM, which is used in the A320neo, and the V2500 for the classic A320 aircraft family.

Revenue from the military business increased from €183 million in the first half of 2020 to €187 million. The main source of revenue was the EJ200 engine for the Eurofighter.

In the commercial engine business, revenue declined from €631 million to €515 million. "The decline in revenue was particularly sharp in the commercial series business. Here, the decrease in organic revenue was in the 20-percent range. The organic drop in revenue in the spare parts business was in the high single-digit percentage range," reported Winkler. The main revenue generator in the commercial engine business was the PW1100G-JM for the A320neo.

The order backlog at the end of the first six months was €20.5 billion, an increase of 10% compared with year-end 2020 (December 31, 2020: €18.6 billion). The majority of these orders were for the V2500 engine for the A320 and the PW1000G family of Geared Turbofan™ engines, especially the PW1100G-JM for the A320neo.

In the first six months, earnings declined faster in the MRO business than in the OEM business.

SABENA TECHNICS STRENGTHENS ITS EXECUTIVE COMMITTEE

Sabena technics group has appointed Bruno Paccagnini as deputy to Gilles Foultier, current COO of Military Affairs, to whom he will succeed at the start of 2022 after a few months of transition.

Bruno Paccagnini, Sabena technics, Deputy Military Affairs

Sabena technics says the company will benefit from Paccagnini's rich experience in implementing transformation projects within complex environments, which he has managed throughout his entire career, especially as deputy chief of Performance of the French Armed Forces. The MRO says they will also rely on Paccagnini's experience as a fighter pilot, within squadrons in France and the United States, to better integrate the operational dimension into its range of services.

Paccagnini's military career ended as general inspector of the French Armed Forces (air), from which he was able to get a complete overview of the entire Ministry of the Armed Forces. The company says this vision will allow Sabena technics to meet with relevance the future challenges of this Ministry in the field of Maintenance in Operational Condition (MCO) and, more broadly, the new services expected by the Armed Forces.

"Sabena technics is a company in which I found an agile, efficient management, focused on customer service. In addition to staying in a field that is familiar to me, the range of know- how, the very broad technical skills and the remarkable quality of the staff that I met

ACC Aviation Launches Technical Services Division, Aldana Named VP

ACC Aviation is adding to its business beginning in September with the creation of a Technical Services division. The new division sees ACC add a fourth practice area to its consultancy offering, following its move into aviation finance services earlier this July.

Leading the new business unit is Julian Aldana, an experienced aviation technical professional with specialist skills in aircraft asset management, aircraft inspections and technical consulting services. He takes on the role of vice president, Technical Services,

Aldana brings 16 years' aviation technical experience to ACC, having previously spent the last two years as technical manager, Americas for IBA Group, based in Toronto. Prior to this, Aldana held several senior technical roles with airlines such as Etihad, Air Berlin and Swiss.

ACC Aviation's Technical Services Division will offer aircraft inspection services (from pre-purchase to final assembly); lease returns, asset recovery, and transitions; maintenance event management; airworthiness assessments; and technical due diligence.

The company says their newly added services closely complement their established activities in asset management, aviation finance and consulting, widening the expertise offered to lessors, lenders and airlines on a global basis; leveraging an office network that spans Europe, Middle East, Africa, USA and Asia.

"This is an opportune time to widen our portfolio of services, offering unbiased, independent counsel, building on our strengths across aircraft trading, financing and advisory work," said ACC Aviation CEO Phil Mathews. This means we can offer a 'complete' service, bringing multi-disciplinary insight and adding value to projects we work on. We are pleased to have someone of Julian's caliber help us build the business," he added.

"The landscape for technical services is ripe for market entry," saids Rob Watts, ACC Aviation's director Consulting. "The number of aircraft that are expected to change hands as lessors redeploy and rebalance portfolios; the unfortunate truth that many airlines will not persevere through to full market recovery, and the plethora of new market players entering the market presents a compelling opportunity for market entry, especially combined with our existing aircraft trading and financing capabilities. We believe we are well placed to make a strong move into this market segment."

Julian Aldana, ACC Aviation VP, Technical Services

Aldana added: "It's a great challenge to lead this new Technical Services division. ACC Aviation is a well-respected, well-backed, diverse group, with structure. These were major factors for me in joining them and I'm also looking forward to being back in Dubai again, re-establishing business relationships and forging new ones. The market is opening up after 18 months of pandemic distress and a Dubai base is the right location to explore business opportunities in EMEA and Asia."

Aldana, who has a MSc in air transport management from IT Aerea Business School in Spain and an MBA in Leadership and Sustainability from the University of Cumbria, holds multiple qualifications in engineering, including USA FAA A&P, EASA Part 66 B1/B2/C, UAE GCAA, and Australia CASA on various Airbus and Boeing type ratings.

Singapore Airlines and Heston MRO Extend Maintenance Agreements

Singapore Airlines (SIA) and Heston MRO extended their MRO partnership for another three years. Under the newly extended agreements, Heston MRO will handle all incoming and departing SIA passenger flights in Melbourne, Brisbane and Perth, utilizing Boeing 777, 787 and Airbus 350, 380 aircraft types.

The handling agreements also cover SIA's Boeing 747 freighter flights to Melbourne. Under the signed extended agreements, the scope of services include full handling of aircraft transits, defect rectification, local warehousing and logistics support. "This is great positive news for Heston MRO in the Covid-19 affected aviation world," said Asta Zirlyte, CEO of Heston MRO. "Despite the current travel restrictions, airlines in Australia and South East Asian region are gearing up for the post-pandemic market recovery. Heston MRO is positioning itself to play an active role in the upcoming market recovery."

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"I've been an engine module technician on CFM56 and CF6 engines for 10 years. Thanks to this experience I have joined the LEAP team. I'm determined to provide the best quality and TAT to meet our customers' expectations, while always looking for ways to improve our processes."

***Leandro Rodrigues Oliveira**, Engine Module Technician*

AFI KLM E&M has extended its capability list to include maintenance for the LEAP* engine, with an MRO service offering that covers both On Wing/On Site support and shop visits. AFI KLM E&M, which has provided support when new engines go into service on a number of occasions in the past, is capitalizing on the know-how of its teams to support early-stage operations on the LEAP worldwide. We are ready to meet the needs of the airlines with services that are always the **Best4You.**

** LEAP engines are products of CFM International, a 50/50 joint company between GE and Safran Aircraft Engines.*

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Helidax Selects ADSOFTWARE to Upgrade its CAMO and MRO Management Software

Helidax has selected ADSOFTWARE to replace its MRO and CAMO management software as the company grows. The project has begun and covers the implementation of the CAMO and MRO management solutions, training and additional developments specifically requested by Helidax.

Helidax puts its fleet of 36 H120 and 18 AS550 at the disposal of the French Defence Ministry through two contracts: the first contract is a pioneering agreement that aims at maintaining a high level of fleet availability for pilot training while reducing operational costs, the second contract assigns the comprehensive fleet management responsibility to a unique provider; illustrating the new MOC approach of the Ministry. In this context the selected software solution will play a key role in attaining these objectives.

ADSOFTWARE says it has a proven track record of more than 20 years in the field, with major helicopter operators among its customers and also military operators. The solution appeared user-friendly and yet advanced enough to host the complex procedures of Helidax operations.

ADSOFTWARE also demonstrated its data protection measures, an essential requirement for any contract associated with the Ministry of Defense. This contract marks another important milestone for ADSOFTWARE as this is the largest military contract signed by the company to date.

Fred Ulrich, ADSOFTWARE's CEO says the company is "extremely proud of this achievement. Our level of commitment and dedication to Helidax is second to none. This confirms ADSOFTWARE position among the world's leading IT solutions for aviation. We are happy to be associated with Helidax, a company characterizing L'excellence française."

MRO Insider Forges Ahead with Wyvern Partnership

MRO Insider and WYVERN say they are moving ahead with their partnership to bring "safety to the forefront of business aviation maintenance." MRO Insider has developed an operator-facing indicator on their platform to distinguish MROs who have a WYVERN certified SMS system and will work directly with Wyvern and the MROs to make this a success.

"Since the beginning, our goal has been to provide clarity to maintenance decisions made by our aircraft operators," said Andy Nixon, co-founder and president of MRO Insider. "Incorporating an SMS system is a great way to stand out from the crowd when it comes to the safety and quality of a provider's operation. WYVERN's experience and vision makes them the perfect partner to incorporate a safety-focused accreditation for providers who want to continue moving the bar forward."

Sonnie Bates, CEO of WYVERN, stated, "Ensuring excellence in aircraft maintenance is fundamental to aviation safety. However, many MROs do not have sound practices to ensure technicians are adequately trained and competent on the aircraft they repair and inspect. Furthermore, many MROs do not manage fatigue for their maintenance professionals, which undermines their health and well-being, and adversely affects their job performance. This partnership with MRO Insider aims to address these and other safety issues with well-designed safety management systems."

The MRO Insider platform is a single solution for aircraft operators to obtain quotes for services. After WYVERN qualification as a Bronze, Silver, or Gold Safety Member, their status will be easily shown to users on the MRO Insider platform, allowing operators who may be interested in using a provider they haven't used before to feel confident that the provider prioritizes safety by utilizing an SMS.

The MRO Insider/WYVERN SMS certification allows providers to choose from three different levels. Implementers can choose a one-time virtual or on-site audit to validate the MRO's SMS performance using the certification criteria, or opt to become a WYVERN member, which includes ongoing assessment and continual improvement by a WYVERN SMS coach.

PLAY Awards Component Support of A321 Fleet to OEMServices

Icelandic start-up PLAY began operations with its inaugural flight in June this year. The company successfully raised $90 million in fresh capital from in an initial public offering (IPO) and is traded on the Nasdaq First North Growth Market Iceland.

The airline received its air operator certificate (AOC) from the Icelandic Transport Authority in May and launched its Reykjavik-London Stansted service with A321 NEO equipment on 24 June, followed by six other European destinations in June and July. PLAY already operates three A321 NEOs and plans to grow the company's fleet to six A320/1 NEOs in Q2 2022 in order to begin its USA service, and to operate more than 15 aircraft by 2025 while servicing destinations in North America and Europe.

OEMServices is providing its expertise in nose to tail servicing to airline fleet operators and ensures the immediate availability of solutions to optimize the airlines' fleet operations.

OEMServices says they are providing their Original Integrated Services supports inventory availability 24/7, their component repair support by flight hour as well as engineering services and associated logistics for PLAY's A321 NEO fleet.

"It is not every day that a new airline is born, driven by the energy and professionalism of a passionate team," said Didier Granger, president of OEMServices. "We are humbly proud to have been chosen in such important circumstances. OEMServices' team is very motivated to ensure the complete satisfaction of our services and bring PLAY all the added value of our original approach."

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DCS Awarded $164M Contract to Support USAF Fighters and Bombers Directorates

DCS Corporation has been awarded a $164 million, 4-year prime contract to support the United States Air Force (USAF) Fighters and Advanced Aircraft Directorate (AFLCMC/WA) and USAF Bombers Directorate (AFLCMC/WB). DCS will support the acquisition, fielding, and sustainment for a large segment of the USAF fighter and bomber fleet, along with foreign military sales support to numerous partner nations.

Full contract performance will kick off in October 2021 at Wright-Patterson Air Force Base, Ohio, Tinker Air Force Base, Oklahoma, Hill Air Force Base, Utah, and Whiteman Air Force Base, Missouri. DCS and its industry partners will provide program management, multidisciplinary engineering, cybersecurity, life-cycle logistics, and program security services to augment organic military and civilian staff. Aircraft supported will include the A-10, A-29, B-1, B-2, and B-52.

"DCS is proud to support the United States Air Force global power through this significant award," stated Larry Egbert, executive vice president and Air-Sea Forces sector manager. "We look forward to the opportunity for DCS to further support the mission of AFLCMC Fighters & Advanced Aircraft Directorate and Bombers Directorate. We are thrilled to deliver our technical expertise to the USAF and the Warfighter while expanding the DCS footprint in Ohio, Oklahoma, Utah, and Missouri."

Cathay Pacific Selects HAECO Cabin Solutions' Vector Economy Seating for New Airbus A321neo Regional Service

HAECO Cabin Solutions is supplying Vector Economy, its fully featured economy class seat, for Cathay Pacific's latest aircraft, the new single-aisle Airbus A321neo aircraft. The fleet is now flying from Hong Kong to regional destinations in Asia.

"We are delighted to extend our partnership with HAECO Cabin Solutions with the Vector Economy seat on the A321neo," said Vivian Lo, general manager Customer Experience and Design, Cathay Pacific. "It is a similar seat to the one operated on the A350-1000 fleet and we believe that our passengers will appreciate its exceptional comfort, elevating the short-haul flying experience to new levels."

The seat has comfort-enhancing features including an ergonomic headrest, a folding tablet holder/smartphone ledge, an 11.6-inch HD video screen, and USB-A and USB-C charging ports.

"The Vector Economy seat provides an unparalleled level of passenger comfort for short and long-haul operations," said Doug Rasmussen, president and group director of HAECO Cabin Solutions. "In addition to providing outstanding passenger living space and comfort enhancing features, the seat is lightweight and durable — key considerations for any airline."

W. L. Gore & Associates Offers Ultra-Low-Loss 12G-SDI Coaxial Video Cable for Defense Applications

W. L. Gore & Associates (Gore) announced the expansion of its Coaxial Cables line for defense land system applications. The new product is smaller and lighter than previous offerings, yet capable of transmitting ultra-high-definition (UHD) 4K video with excellent shielding from radio frequency interference.

The cable meets a variety of internationally recognized civil and military specifications, including the latest Society of Motion Picture and Television Engineers (SMPTE) 12G-SDI standard. Published in March 2015, 12G-SDI defines a 12 gigabit per second transmission of uncompressed, latency-free UHD 4K video at 60 frames per second on a single wire. Gore is committed to delivering this performance at operating temperatures ranging from -55 to 200 degrees Celsius.

"Military vehicles today include multiple sensors that generate critical video during missions," said Andrea Menconi, product manager for land systems. "GORE Coaxial Cables can transmit this UHD video reliably and securely, even in the harshest environments."

Designed for use with remote-controlled turret cameras, local situation awareness, and other video-generating sensor systems, GORE Coaxial Cables are engineered with a specialized fluoropolymer insulation. This provides superior resistance to weather, abrasion and other hazards associated with extreme weather, rough usage and confined routing space.

"Vehicle and system engineers no longer need to compromise," Menconi added. "Our Coaxial Cables are smaller, lighter and more flexible, while also providing unequalled video resolution performances, high durability and standards compliance to reduce long-term operating costs."

GORE Coaxial Cables are available in a standard size via distributors.

FAA to Require Strengthening of Engine Structures on B777-200s with PW4000 Engines

FAA Administrator Steve Dickson says the Federal Aviation Administration (FAA) will require Boeing 777-200 aircraft with Pratt & Whitney engines to strengthen the cowling and structure around the engine to prevent any similar incidents to the one in February near Denver.

The timing of the requirements and release of an airworthiness directive will be dependent on engineering and design work that will need to be reviewed and approved by FAA. FAA and Boeing are working together to ensure "the structure around the engine, the cowling and the inlet area, does not damage the aircraft structure," Dickson said at a U. S. House committee meeting.

A United 777 with a PW4000 engine failed shortly after takeoff from Denver on Feb. 20, showering debris over nearby cities. The aircraft was able to return to the airport with no injuries.

At the time, FAA ordered inspections of 777 planes with PW4000 engines, after the NTSB saw cracked fan blades on the United engine and determined they could be due to metal fatigue.

HOW DID THE AEROSPACE SUPPLY CHAIN GET SO BAD?

AND WHAT CAN BE DONE TO IMPROVE IT

James Careless

The aerospace supply chain is like the weather: Everyone complains about it from time to time, but no one seems to know how to fix it. Necessary aircraft parts are often out of stock or awaiting production, while those that are available can be difficult to access due to distribution and delivery problems. The result is frustration for MROs and their clients, plus aircraft parked on the ground rather than earning money in the air. "Poor supply chain management techniques introduce risk to the overall productivity and profitability of our industry," said Daniel Adamski, Kellstrom Aerospace's executive vice president of Distribution. "Ultimately, a poor supply chain affects our bottom line," added Mark Longmuir, vice president of Supply Chain and Operational Excellence

Daniel Adamski
EVP, Kellstrom Aerospace

Rusty Coleman
VP, Surgere

at AMETEK MRO.

A poor supply chain also damages the airlines' relationships with paying passengers, who were already unhappy with their carriers before COVID added extra chaos to the mix. "The largest impact is Aircraft On Ground (AOG) — either planned or unplanned," said Rusty Coleman, Surgere's vice president of Digital Transformation. "When you are sitting in an aircraft at the gate waiting because the part to fix it is unavailable, you miss the connecting flight and the meeting you had scheduled. While this is not new, lack of airworthy part supply makes this devastating as we are trying to get back to normalcy in our business and personal relationships."

What is Wrong With the Aerospace Supply Chain?

In a perfect world, airlines, MROs, and OEMs in the aerospace supply chain would order parts on a consistent basis. Such reliable sales would financially enable manufacturers to keep producing the parts the industry needs. They would then be distributed to end users in a timely and efficient manner to all corners of the globe.

This perfect world would also offer multiple sources of aerospace parts to end users, so that production delays/shutdowns at one manufacturer would not disrupt the supply chain. As well, these manufacturers would produce parts for legacy aircraft (as well as new models) in volume, so that owners/operators could keep them all flying without experiencing supply shortages.

In the real world life isn't like this, which is why the aerospace supply chain is plagued by shortages of necessary parts and delays in accessing those that are available. To save money in recent years, airlines, MROs and OEMs have reduced the quantity of parts they keep in their inventories, resulting in fewer sales by parts manufacturers. Many end users have also signed 'single source' deals with specific suppliers, making thee users vulnerable if something should impair the suppliers' ability to provide these parts as promised. The result: A very imperfect world where parts manufacturers lack the financial means and incentives to keep the supply chain fully stocked.

Darren Spiegel
VP/GM, AAR

"Fiscal decisions were made to maximize profits, reduce costs, or maybe ensure better business outcomes by single sourcing," said Coleman. "Manufacturing capacity and capability were thus fiscally restrained."

Even when end users are willing to forego single sourcing parts, "finding a second source for a component with supply chain issues is not an easy fix," said Darren Spiegel, AAR's vice president and general manager of OEM Aftermarket Solutions. "Due to the safety and regulatory requirements of

aerospace, it take times to get a new vendor qualified, which could be time and cost prohibitive. As well, in many cases OEMs are beholden to their current vendor base and their ability to produce subcomponents in a timely manner."

"The issue is not just supply," he added. "Even if the supply was perfect, unpredictability of demand would persist."

Meanwhile, the availability of 'green-time engines' and other used parts with some lifespan remaining on them have allowed airlines and MROs to reduce their new parts purchases. Add the lack of incentive for manufacturers to make parts for less-popular legacy aircraft, plus distribution issues in hard-to-reach parts of the globe, and one can see why the aerospace supply chain has its problems.

Nevertheless, aircraft need to be kept flying. So "purchasing professionals are using all the tools in their toolkits to secure supply," said Coleman. "Many in the supply chain are working extraordinary hours in minute hour-by-hour details to secure the parts and the certifications needed for flight worthy components."

Then Came COVID

The devastation wreaked by COVID-19 upon the global aerospace industry is nothing less than breathtaking. "By the end of April of 2020, 64% of the global commercial active fleet was set down due to COVID," said Adamski. "The gradual return to service of aircraft over the last year has left scars on the aerospace supply chain."

It wasn't just the pandemic-induced reduction in flight hours that reduced demand for parts during 2020. "With so many aircraft grounded, airlines swapped out aircraft and green-time engines to avoid maintenance," he said. "Purchase of parts was put on hold wherever possible by airlines and MRO shops alike to conserve cash, starving the aftermarket supply chain of sales to sustain operations. Once you power-down the commercial aerospace supply chain machine on both the OEM and aftermarket side, it takes time to re-energize the machine to restore its optimal function."

Visualizing the end-to-end complexity of the supply chain 'machine' is no easy matter. This is a vast network that starts at the mines, oil wells, and chemical factories that provide raw materials such as ore, oil, and chemicals. It then progresses through the refinement of these raw materials to produce aluminum and other necessary metals, plastics, and carbon fibers – and then onto the creation of aircraft parts and systems, including semiconductors, tires, wiring harnesses, and the myriad of components needed to make an aircraft fly.

Alfred Baumbusch
EVP, Maine Pointe

This complex, already hard-to-balance network was hammered by COVID. Thanks to pandemic-driven lockdowns and border closures, "the supply chain has seen reduced productivity at all levels and at all supplier tier levels, crippling the ability to service demand at all stages of the end-to-end supply chain," said Alfred Baumbusch, Maine Pointe's executive vice president and engagement partner for Aviation, Aerospace & Defense Practice. "In addition, labor was isolated and limited to home base locations to minimize the spread of the virus. This reduced, or in some cases completely stopped, production and delivery of materials."

With production being slowed or stopped, the links of the aerospace supply chain came under strain as everyone faced cash flow crunches. "The resulting financial

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Labor, material availability as well as the predictability of demand have all been impacted by the COVID pandemic according to AAR's VP/GM Darren Spiegel. "In good times, any one of these posed supply chain issues. Together, they are unprecedented," he said. AAR image.

pressures caused executives to quickly re-think their strategic plans, and shift to survival mode, thereby further reducing their ability to service clients," Baumbusch noted. "This in turn applied significant pressure to some suppliers' financial positions creating serious solvency issues, which necessitated financial aid by Tier 1 or OEM suppliers. All these factors resulted in increased M&A (merger and acquisition) activity throughout the industry, which continues to play out."

"COVID has affected both labor and material availability as well as the predictability of demand," said AAR's Spiegel. "In good times, any one of these posed supply chain issues. Together, they are unprecedented."

No Easy Recovery

If 2020 was the year in which COVID-19 crippled the aerospace business, 2021 appears to be the year where business begins to recover. But the fact that airliners are returning to service and manufacturers are seeing orders increase doesn't mean that aerospace supply chain issues will suddenly ease. As Kellstrom Aerospace's Adamski noted, a supply chain isn't a machine that can just be switched on or off.

This brings us to the first big challenge of the COVID-19 recovery: Getting the aerospace supply chain back up to pre-COVID delivery levels, or hopefully better.

Let's start with OEMs. After the pandemic hit in 2020, airlines delayed or dropped their new aircraft orders. As a result, "Tier One and Two OEM suppliers were in many cases left with stranded inventory and the need to suspend production and reduce headcount to preserve precious liquidity and ride-out the storm unless they could quickly diversify into less-impacted market segments," said Adamski. "In some cases, long lead time raw material orders were cancelled including castings and forgings, thereby causing a cold-start scenario to resume production for many critical parts and materials with much longer than normal lead times."

"Aftermarket suppliers also face challenges," he added. "With a significant portion of the aircraft grounded for much of the last year, speculation had been swirling in the industry about a wave of aircraft retirements leading to a tsunami of surplus material. But the reality has painted a different picture so far."

The reason: According to Adamski, only 665 aircraft were retired in 2020 compared to 674 in 2019 and 195 as of mid-June 2021. This means the anticipated 'tsunami' of recoverable used parts seems unlikely to materialize anytime soon. "While certain USM material may be available, LLP stacks, HPT blades and other A parts with acceptable traceability and remaining hours and cycles may be less plentiful than one may assume," he said.

Skilled employees are also needed to bring the aerospace supply chain back to pre-COVID levels. Unfortunately, the labor shortage that was dogging the industry before the pandemic "has been magnified for companies trying to ramp up after COVID-related cutbacks, said Spiegel. "This issue is even greater for sub tier parts OEMs that might have shifted labor to another industry with more predictable demand." To make matters worse, "aerospace, in most cases, is not high volume and requires additional specialized talent and processes that cannot be restarted without a significant training effort," he observed.

The result? Lead times for OEM materials published prior to the COVID-19 downturn no longer apply in many cases, said Adamski. "Similar challenges exist in the aftermarket, with OEM lead

times having impacted by supply chain disruptions."

His concerns are echoed by Mark Longmuir. "The primary issue that AMETEK MRO is experiencing is lengthened lead times, and we are adjusting our planning data accordingly whenever we see them to protect supply," he said. "We are also constantly monitoring our materials' quotes for inflation, which has started to creep into our supply."

Fixing Post-COVID Supply Chains

As the pandemic's depressing effect on global aviation continues to wane, the aerospace supply chain is entering into Recovery mode — and encountering the challenges that accompany this kind of ramp-up effort. These issues include delays in the availability of raw materials and finished parts, increased shipping costs, and delivery issues in the trucking industry, which is having its own supply chain and labor issues thanks to COVID.

Fortunately, there are ways to fix the post-COVID aerospace supply chain, or at least make it function more smoothly than it does today.

"Attending to four key areas will bring an immediate impact and improve the supply chain," said Maine Pointe's Baumbusch. "First and most obvious is to take a fresh look at the business: Suppliers at all stages of the supply chain need to prepare a roadmap by bringing together procurement, logistics, operations, and leadership to establish a clear and effective path forward."

"Secondly, it is essential to consider utilizing more accurate and useful data analytics, which would allow for better and more proactive decision making," he continued. "Third, better visibility of the operations between suppliers and customers will improve the accuracy of early warning indicators. Lastly, the economic recovery of other key industries such as automotive, transportation such as air travel, and material/supply delivery, will support increasing inventory levels to Tier Ones and OEMs, and ultimately, to the buyers."

One further way to fix the post-COVID supply chain may well be the most difficult, namely by monitoring and analysing air traffic increases to forecast what kind of supplies will be needed to support the revived airline industry in the months to come.

"The trick now is to accurately forecast a COVID recovery so OEM production can prepare now," said Spiegel. This is a service that AAR is providing to its OEM clients, using future-looking data to help them predict/plan engine shop visits, fleet forecasts, flight hour projections, and general fleet market intelligence. "For parts that might have a 150–300-day lead time, an inaccurate forecast now is

Daniel Adamski, Kellstrom Aerospace's EVP of Distribution says if supply were not an issue, aircraft, engine and component repair Turn-Around-Times (TATs) would be quicker, market pricing would be more predictable, and overall A&D forecasting would be more accurate. Shown in these two images is Kellstrom's Vortex Aviation, a specialist in AOG on-wing engine maintenance services and quick-turn engine repairs across all major commercial aircraft engine platforms. Vortex Aviation is located in Davie, Florida. Kellstrom images.

Kellstrom says they offer multiple aftermarket platforms with solutions for challenges posed by COVID-19-induced supply chain dysfunction. Shown here is a CF6-80C2 teardown. Kellstrom image.

not easily rectified in time to meet future demand," he admitted. "This inaccuracy can inhibit fleet readiness and limit the recovery potential for the end users. Still, looking forward can help limit the reliance on forecasts based on noisy, COVID impacted, rearward-looking data."

Surgere's Coleman offers a one-word suggestion to improve the post-COVID supply chain: "Technology! The technology exists to support workers to improve their capability and their capacity," he told AVM. "Items like IoT (Internet of Things, aka web-connected devices and machines), Analytics, Machine Learning, Artificial Intelligence and Blockchain can be the means to a digital end. Use these digital tools to enhance the capabilities of the workforce you have. Use these technologies to simplify workloads, and use the system-to-system connectivity to make the user experience inviting and efficient."

Progress to Date

Some aerospace companies are making progress in fixing the industry's supply chain, or at the very least, making it better than it was before.

A case in point: "AAR has had multiple OEMs come to us to help prepare for a COVID recovery by forecasting and stocking material," said Spiegel. "With our forecasting ability we are able to provide a service that is taking some of the guess work out of what material should be produced." The company tempers these forecasts using market intelligence gathered by AAR's global sales force. Once an AAR forecast has been accepted by an OEM, AAR provides future order book coverage to allow the OEM to plan for known demand based on AAR's forecast and parts purchases.

AMETEK MRO is using the Lean management techniques typically found in manufacturing and production to manage its supply chain efforts. This is not an easy task: "I've found that the requirements of the MRO industry on supply chain are much more demanding and complex than those of an OEM-only manufacturing environment," Longmuir said. "Supporting tens of thousands of products on our capability list, combined with limited ability to predict what products will arrive on our dock on any given day, requires an agile support team and processes that guarantees the right repair and overhaul material is available immediately."

"Kellstrom Aerospace offers multiple aftermarket platforms with solutions for various challenges posed by COVID-19-induced supply chain dysfunction," said Adamski. For example, the company's OEM distribution business "provides needed balance sheet relief for OEM manufacturers while managing, forecasting, and provisioning the correct mix of OEM material available from stock with 24/7/365 AOG support and global stocking locations."

Kellstrom Aerospace is backed by its large private equity parent company AE Industrial Partners. This gives Kellstrom Aerospace the deep pockets necessary to make large inventory commitments with suppliers. As well, "we use our proprietary inventory forecasting tool in conjunction with our ERP system to forecast material demand effectively to maintain an average distribution fill rate of 98%-plus on our 30-plus OEM distribution lines in service," said Adamski. (An additional strength: Kellstrom Aerospace's Used Surplus Material (USM) business tears-down entire aircraft and engines to offer high quality/best value used parts to customers.)

Hoping for a Better Supply Chain

The concerns that these aerospace companies have about the post-COVID supply chain, and the actions they are taking to try and make the supply chain better, underscore just how important the smooth flow of parts are to the overall health of commercial aviation around the globe.

"If supply were not an issue, aircraft, engine, and component repair Turn-Around-Times (TATs) would be quicker, market pricing would be more predictable, and overall A&D forecasting would be more accurate," said Adamski.

"If supply were not an issue, forecast demands throughout the supply chain would be more stable, financial profitability would recover, and unemployment reduced, increasing the health of the overall economy," Baumbusch added. "The end-to-end supply chain would return to a more harmonious state, and the natural state of supply and demand would work. An increase in future developments would naturally drive the industry forward, resulting in improved R&D and other investments, thereby increasing overall operational performance."

To say none of these companies wanted the supply chain challenge would be an understatement. But it is one that they are all committed to addressing as best they can.

"I view the supply chain situation as a challenge that none of us asked for, that tests our ability to be agile and still meet customer expectations," said Longmuir. "Nevertheless, we will continue to 'turn the knobs' that allow us to meet customer requirements." AVM

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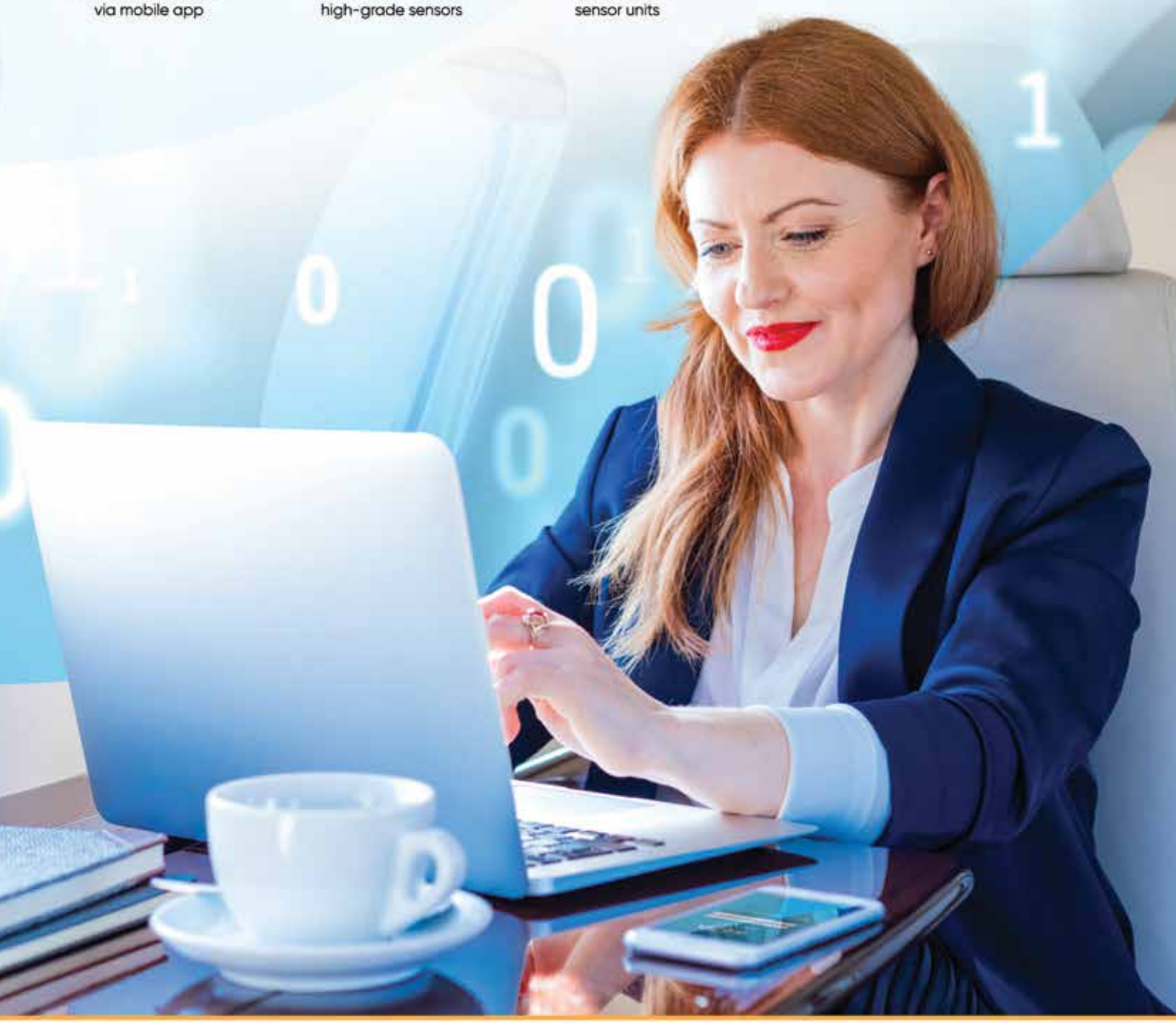

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NARROWBODY ENGINE MROS
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Back in June 2021, ***Aviation Maintenance*** magazine heard from widebody engine MROs with respect to the challenges they're currently facing in serving airline clients, the support programs they provide to help these clients manage their engine maintenance costs, and the advice these MROs had to offer clients for getting more value from their services ('Widebody Engine MROs Talk About Challenges, Support Programs and Advice to Customers').

It is now time for narrowbody engine MROs to share their views on the same topics. Here's what they had to tell us.

AFI-KLM E&M

In addition to accommodating widebody engine clients, AFI-KLM E&M's MRO facilities in Amsterdam-Schiphol, Paris-Charles de Gaulle and Paris-Orly offer narrowbody engine maintenance and overhaul services on the CFM International (GE Aviation-Safran) CFM56 engine used on Airbus A/318/A319/A320/A321 and Boeing 737 Next Generation airliners. AFI-KLM E&M provides the same level of support to the CFM International LEAP engine, which is being used on the Airbus

According to Oliver Wyman's Global Fleet and MRO Forecast 2021-2031, recovery from the ravages of the COVID-19 pandemic will start slowly, with growth picking up steam in the second half of 2022, after the fleet finally recovers to its January 2020 level. "Still, none of the three segments — airlines, aerospace, and MRO — are expected to catch up with pre-COVID projections by the end of the 10 years.," the forecast says. One bright spot will be narrowbody aircraft usage. "The popularity of narrowbody aircraft is...on the rise. For years, the narrowbody share of the total fleet has increased as the improving range capability and attractive seat mile efficiency of the class have made the aircraft the choice of low-cost carriers. This trend is expected to continue as more airlines align fleets to the demand realities of COVID-19," the Oliver Wyman experts say. Pratt & Whitney images.

James Careless

A320neo, Boeing 737 MAX and Comac C919.

Their biggest challenge? Keeping these engines serviced during pandemic shutdowns and parts shipping delays has been difficult, but AFI-KLM E&M has been able to cope. "In the current COVID situation it is essential to manage the supply chain in order to lower maintenance costs, and to be creative and innovative to get through this period," said Michael Grootenboer, AFI-KLM E&M senior vice president Engine of Group Engine Products. "Industry-wide, it will be a further challenge to manage the supply chain and the pressure on overhaul capacity once traffic starts picking up again."

To help its airline narrowbody engine clients keep their costs under control — especially now when cash is tight due to COVID — AFI-KLM E&M offers a range of service contracts based on different pricing models. These pricing models include Cost per Flight Hours, Firm Fixed Price (FFP), Not to Exceed (NTE), and Time & Materials (T&M). "The model provided depends on each customer's operations," Grootenboer said. "We adapt our answer to be the best fit for each customer."

When it comes to offering value-maximizing advice to narrowbody engine customers, Michael Grootenboer's answer is short and sweet: Book your shop visits now to ensure that you can be served in a timely manner. "Airlines have avoided engine overhauls to preserve cash because of the Coronavirus crisis," he explained. "MRO capacity will be scarce when the market picks up again and increased traffic will be back to 2019 levels for narrowbodies first. So securing engine MRO slots now to keep your operations going is essential."

Lockheed Martin Commercial Engine Solutions

Lockheed Martin Commercial Engine Solutions (LMCES) provides full overhaul capability for Airbus and Boeing narrowbody engine platforms such as the CFM56-5A/-5B (A320 engines), CFM56-7B (B737 engines), and CFM56-3 (older generation B737 engines). LMCES also maintains non-narrowbody engines including CF34-3 (regional jet engines), and CF6-50 (widebody military refueling tanker engines). All MRO work is performed at the LMCES engine shop in Montreal, Canada.

From LMCES' vantage point, there is one primary business challenge dogging the airline and MRO industries — COVID-19.

"Globally, narrowbody operators continue to be adversely impacted by the pandemic," said David Bridges, LMCES' director of Strategy & Business Development. Their cash flow woes are trickling down to the MRO industry. "Although many U.S.-based operators have experienced a recovery in their passenger service, most remain engaged in aggressive efforts to avoid or delay expensive engine overhauls whenever possible," he said. "Some of those efforts involve the renegotiation of aircraft lease return conditions and utilizing remaining life from 'green-time' engines to avoid short-term engine maintenance costs. In general,

Many U.S.-based operators are experiencing a recovery in their passenger service but most remain engaged in aggressive efforts to avoid or delay expensive engine overhauls whenever possible, according to David Bridges, Lockheed Martin Commercial Engine Services director of Strategy & Business Development. LMCES image.

most of the airlines operating narrowbody aircraft are seeking flexible, customized work scope solutions for any engines that require in-shop maintenance,"

The numbers tell a stark tale: According to LMCES, commercial demand for engine MRO services across the industry was roughly cut in half in 2020 because of COVID. To stay afloat financially, this MRO shifted its short-term focus to narrowbody aircraft lessors and military opportunities.

The results of this focus shift have apparently paid off. In late 2020, LMCES signed a long-term narrowbody engine service agreement with leasing company Fortress Transportation and Infrastructure Investors LLC (FTAI) for CFM56-5B/-7B engines. LMCES also signed a long-term MRO contract with the United States Air Force for its F108 engine, which is the military version of the CFM56-2.

"LMCES continues to anticipate strong demand from its military sustainment customers through contracts with the U.S. government for KC-10 and F-108 engines going forward," said Bridges. "With more than $1 billion in new contracts, our team is proud to be growing with many career opportunities to join the team in Montreal."

Back to the airline MRO business: When it comes to narrowbody engine service plans, "commercial customers mostly desire, and LMCES mostly offers, Firm Fixed Price (FFP) contract options," Bridges said. "FFPs allow LMCES to work closely with its customers to optimize costs."

"Conversely, Time & Material (T&M) programs shift risk to customers while Flight Hour Agreements (FHAs) shift risk to the MRO," he observed. "Neither T&Ms nor FHAs allow as many opportunities as possible for collaboration on engine cost reduction."

When it comes to getting more value for their engine MRO dollars, David Bridges' advice to narrowbody engine owners is to take advantage of a new joint venture between LMCES and FTAI called 'The Module Factory'. It is a dedicated commercial engine maintenance center operated by LMCES that focuses on the modular repair and refurbishment of CFM56-7B and CFM56-5B engines. "The Module Factory offers a unique product from typical engine MRO work by utilizing plug-and-play modules and standardized work scopes," he explained. "It is designed to significantly lower turn-around-times (TATs) and to lower cost per cycle for narrowbody engine customers."

MTU

MTU Maintenance is predominantly focussed on the narrowbody engine MRO market. They offer full overhaul services for:

- CFM56-7B engines at MTU Maintenance Hannover and MTU Maintenance Berlin-Brandenburg, CFM56-5B/7B engines MTU Maintenance Zhuhai, and the CFM56-2 variant at MTU Maintenance Canada;
- International Aero Engines (IAE) V2500 engines (Airbus A320 family, McDonnell-Douglas MD-90, and Embraer KC-390) at MTU Maintenance Canada, MTU Maintenance Hannover and MTU

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Pratt & Whitney's Eagle Service Asia facility in Singapore overhauls the fuel efficient GTF. Pratt & Whitney image.

Maintenance Zhuhai;

• Pratt & Whitney PW1100G-JM engines (Airbus A320neo) at MTU Maintenance Hannover and EME Aero, with services being added at MTU Maintenance Zhuhai (while some PW1100G-JM piece part repairs are also carried out at MTU Maintenance Berlin and MTU Aero Engines in Munich);

• LEAP-1B and soon LEAP-1A engines at MTU Maintenance Zhuhai;

• Pratt & Whitney PW2000 engines (various aircraft including Boeing 757s) at MTU's Hannover facility.

As with other narrowbody engine MROs interviewed for this story, coping with COVID remains a major challenge for MTU — in this case, dealing with growing and unpredictable demand as airline travel returns to normal worldwide.

"Some positive signs have already been observed in Asia (where 85% of China's fleet is now active), North America (over 70% active) and Europe as regional and domestic travel has started to recover," said Fabian Schoen, MTU Maintenance's director of Programs. "This renewed traffic has predominantly been with narrowbody engine aircraft. We are prepared for this and expect to see our MRO levels recover in 2022/23. Furthermore, we retained our highly-qualified staff during the pandemic and are ready to support our clients as the recovery occurs."

As for service programs? Given the wide range of narrowbody engines supported by MTU, it makes sense that the company does so in a variety of ways.

"For operators of newer engines, our focus is on generating more flight hours with customized solutions," said Schoen. "We achieve this by intelligent fleet management that optimizes removals across a defined period. Such services are complemented by predictive maintenance, based on engine trend monitoring, on-site services and spare engine support."

When it is time for a newer engine to make an MTU shop visit, this MRO reduces the engine's servicing costs through a combination of customized work scoping, advanced EASA-FAA approved repairs and engineering expertise to help lower overall costs. "We call this program PERFORMPlus," Schoen said. "It is particularly relevant for customers preparing for increased flight schedules later in the year."

MTU's SAVEPlus program for mature narrowbody engines — which typically require more work in the shop — is meant to keep their costs down as well. To make this happen, "our solutions include smart repairs and tailored work scopes to suit operators' remaining flight periods, as well as material salvation and intelligent teardowns," Schoen said. These services can be combined with MRO alternatives such as leasing green-time engines to clients through MTU Maintenance Lease Services or exchanging less-mature engines in alignment with the aircraft's remaining lifespan. "Furthermore, we offer all service contract types including Fly-by-Hour and Time & Material," said Schoen.

When it comes to client advice, MTU doesn't offer any one-size-fits-all wisdom for narrowbody engine owners/operators. But the company does recommend that clients talk to their MROs about their needs as soon as possible, to ensure that they can be met in a timely manner as global airline traffic ramps back up.

"Currently, fleet planning is highly dynamic, so we are working with our customers on finding the best solutions for their fleets, to enable our customers to get the most engine life and value from their assets," Schoen told Aviation Maintenance magazine. "In doing this, we expect to see a continued trend away from traditional planning with fixed maintenance intervals to more individually-tailored solutions. Some airlines are concentrating on short-term savings with cash preservation as the main objective, while others are focusing on long-term planning. MRO providers must flexibly meet both these goals to provide the best solution for customers in today's market."

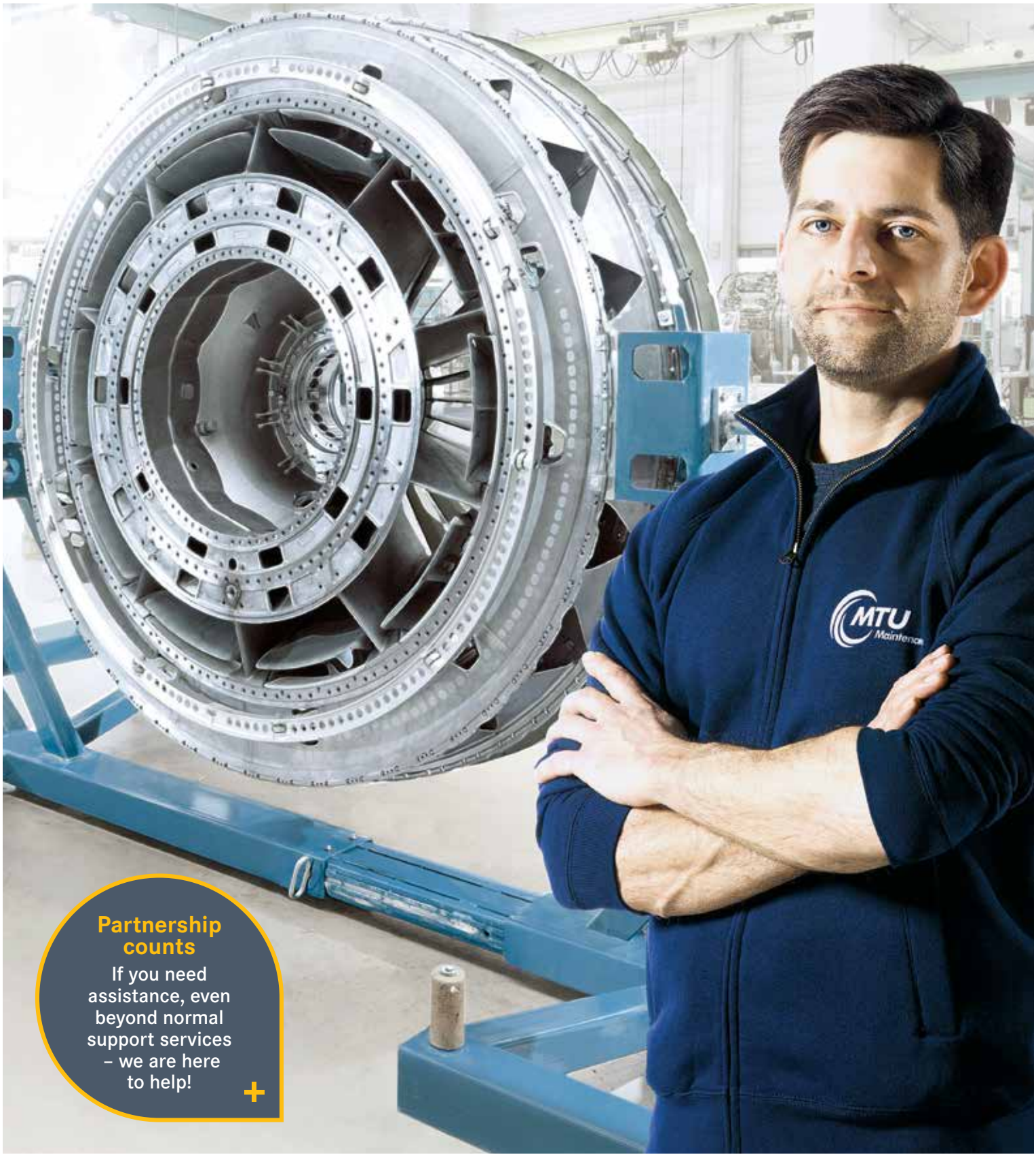
Pratt & Whitney

Pratt & Whitney has MRO service centers around the globe. There are nine International Aero Engines (IAE) party company facilities, Pratt & Whitney being a key partner in the IAE consortium. Three of those IAE MROs are managed directly by the famed engine manufacturer and its joint ventures. There are also nine active GTF MRO shops in Pratt & Whitney's GTF MRO network.

Not surprisingly, Pratt & Whitney services a whole range of airliner engines. They include the PW1900G (Embraer E-Jets E190-E2/E195-E2), PW1500G (Airbus A220), PW1100G-JM, V2500 A320ceo family, PW2000, and the CFM56.

Beyond the inherent technical intricacies involved with maintaining and overhauling jet engines, COVID-19 has been the biggest business challenge facing the company in recent months. "We saw several trends during the pandemic," said Joe Sylvestro, Pratt & Whitney's vice president of Aftermarket Global Operations. "Among these: Aircraft powered by Pratt & Whitney GTF engines were often the last to stop flying and the first to return to service due to the engine's fuel efficiency. Cargo aircraft were less impacted by the pandemic than passenger aircraft: In fact, last October the first A321 passenger to freighter conversion aircraft powered by V2500 engines was delivered to Qantas Freight. And, in general, narrowbody aircraft operators were able to benefit from green-time engine management."

According to Sylvestro, Pratt & Whitney's close relationships with customers gave his company "good visibility" around forecasting and scheduling maintenance, which allowed Pratt & Whitney to tailor its maintenance strategies to address the realities of the pandemic. "For example, with many aircraft inactive during the pandemic, we had a window of opportunity to incorporate planned upgrades into the GTF fleet," he said. "Rather than slow down MRO activity, we accelerated upgrades and restored the fleet to full readiness in anticipation of the recovery. We're currently at a world-class 99.97%



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StandardAero says the North American market is rebounding strongly after the downturn of 2020, and this is driving a significant uptick in shop visits. Shown here is a CFM56-7B. StandardAero image.

dispatch reliability rate on the Airbus 320neo fleet."

Pratt & Whitney addresses its clients' need for service programs/contracts through its suite of EngineWise solutions. Sylvestro said his MRO offers a wide variety of customizable work scopes and payment options for both cargo and passenger air carriers. "Our comprehensive maintenance plans provide a turnkey solution where we will cover most aspects involved in engine maintenance, from health monitoring, to tailored overhaul planning, to execution of the overhauls on a dollar per flight hour basis," he explained. "On the other end of the spectrum, we also offer transactional plans that allow the customer to bring in their engines when they choose and provide them full control over the work scope. We work closely with our customers to provide the solution that works best for them."

Joe Sylvestro's advice to narrowbody engine owners/operators is to keep in touch with Pratt & Whitney on an ongoing basis, so that their MRO needs can be managed efficiently and effectively. "Staying in communication is key," he said. "If an operator can help us understand their needs, we can in turn respond more holistically to reach the best outcome."

StandardAero

StandardAero provides MRO services for the CFM International CFM56-7B at the company's Plant 6 facility in Winnipeg, Canada, which includes two test cells. The company is a GE Designated Fulfillment Center for the CFM56-7B and an independent TRUEngine authorized MRO provider for this engine type as well.

"We launched our CFM56-7B program in June 2009, after being selected to support WestJet's fleet of engines under an exclusive 13-year OnPoint solution contracted by the airline with GE Aviation," said David Green, StandardAero's vice president/general manager CFM56/CF34. "GE subsequently agreed to extend the offload program to include engines from other airlines supported under long-term agreements with the OEM." StandardAero also supports the CFM56-7B engines powering the U.S. Navy's P-8A Poseidon maritime patrol aircraft fleet including engine health monitoring (EHM) support for both the CFM56-7B and the -5B variant.

When it comes to the narrowbody engine MRO business, "our biggest challenge right now is actually staffing back up to meeting resurgent demand from airlines," Green said. "We are fortunate that the North American market, the most important for us in terms of our customer base, has rebounded strongly after the downturn of 2020, and this is driving a significant uptick in shop visits. This is allowing us to rehire many of those employees we were forced to lay off a year ago, though we now find ourselves competing with other aerospace companies for skilled technicians, as the whole industry enters a hiring phase."

Onto StandardAero's narrowbody engine service programs. As a GE Designated Fulfillment Center and TRUEngine authorized MRO provider for the CFM56-7B, this MRO offers a full range of OEM-authorized services for this engine. Meanwhile, to address the varying needs of its clients. StandardAero offers service contract options such as flat-rate agreements (FRA), FFP, NTE, Power-by-Hour (PBH), Power-by-Cycle (PBC), and T&M.

"Our contracts can include a range of services, including scheduled MRO, unscheduled engine removals (UERs), engineering, EHM and field service support," said Bridges. "In terms of financing, while StandardAero does not offer in-house financing we do have agreements and relationships with various financiers, including Export Development Canada (EDC)."

Like the other MROs in this article, David Bridges advise narrowbody engine owner/operators not to delay on booking shop visits any longer. "Demand for shop visits is already rebounding strongly, driven in part by events that were deferred for cost reasons during the worst of the COVID-19 related travel slump," he said. "As a result, operators may be surprised to find that shops are not able to offer immediate induction dates." AVM

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MAINTENANCE STILL LAGS GROWING AIRLINE DIGITIZATION

Kathryn B. Creedy

While airlines continue the process of digitization, industry observers indicate maintenance is lagging the effort that could save millions of dollars while increasing productivity and increasing safety. This is surprising given the fact how fast manufacturers have integrated digital data from everything on board from inflight entertainment systems to engines which stream tons of data every minute.

"When you consider that 20 years ago means 2001, we can confidently reflect on some of the innovations and leaps forward we have made within the aviation industry," flydocs CEO Andre Fischer told ***Aviation Maintenance***. "However, when looking more specifically at technical records, progress has been slower. Huge leaps have been made by the aviation sector in implementing high-tech technology to improve passenger experience and make the journey much more feasible. It comes as quite a surprise that the technical and MRO side of the aviation sector still has so many paper-based processes, especially when it comes to managing technical records. Shifting to paperless is slow but we are starting

to see a real mindset change for digitally driven solutions, with the pandemic giving this area a bit of a boost. As the world locked down, the ability to access records with fewer challenges started to become a priority for many operators, lessors and MROs."

The other factor at play is fleet growth. "Digitization of records keeping is one the major changes in the technical records area," Saravanan Rajarajan, director — aviation consulting, Ramco Systems told ***Aviation Maintenance***. "This can be attributed to two main factors one is growth of the aircraft fleets over the last 20 years which makes the manual processing of records inefficient and the second is evolving technologies in the MRO space to digitize the data entry like electronic tech logs, mobile-based maintenance execution and the availability of technical manuals in digital format. Recent developments on remote collaborations and virtual inspections have stretched the boundaries of the technical records to manage new forms of the data like voice and videos with ability to archive and audit for regulatory purposes."

Fischer explained since the industry entered recovery mode, it is taking time for airlines to realize the true potential and accelerate this push towards digital solutions.

"There is huge optimism though as some airlines are seeing this crisis as an opportunity to drive their digital transformation forward, which not only creates a competitive advantage but plays a role in minimizing the risks of another global game-changer like the global pandemic," Fischer said. "While the industry is seeing the value of digitization, the lag is experienced more on the engineering side where adoption of change is a bit slower. The balance between trying to achieve 100% operational safety on the engineering side and new developments in technology is very tricky so needs to be managed very carefully to bring out the best of both sides."

Fischer noted the lack of standardization is playing a role in slow adoption. "Regulators could play a huge role in developing standardized frameworks and committing to supporting digital initiatives to ensure that every segment of the aviation industry reaps the rewards of digitization," he said.

Record Keeping Maintains Asset Value

Nothing brings the value of an aircraft down faster than lousy record keeping as anyone who has every maintained or tried to sell an aircraft knows. In aviation, forcing an aircraft inspector to root through mildewed boxes to reconstruct the maintenance history quickly brings the value down to zero or the cost of reconstructing those records into the hundreds of thousands.

"MROs can also benefit from more efficient ways to review maintenance records," said Fischer. "The convenience and improved efficiency of being able to access maintenance records instantly in one centralized location from anywhere in the world already has a positive impact. Moving away from having stacks of documents being stored off-site brings a high risk of loss and damage. That risk is completely eliminated with digital records. From a business continuity perspective, COVID-19 proved that digital access of records is invaluable and drives cost savings. "

For airlines, record keeping is the difference between airworthiness and grounding of an aircraft or a fleet. Just recently, DGAC grounded Air Antilles fleet for aircraft maintenance irregularities stranding its passengers scattered among the French islands in the Caribbean. Indeed, for airlines, the issue is not only about record keeping but the efficiency of doing so as part of efforts to ensure compliance and safety and cut costs.

"It's not uncommon to see a value of aircraft drop by 20% due to the missing records during business transactions," Rajarajan told ***Aviation Maintenance***. "Records management also provides the insights needed for the organizations to optimize the maintenance intervals based on their operating environments. With the majority of the items fitted on aircraft on condition and subject to rotate between the aircraft, records management becomes vital to track the configurations control, component status, hours and cycles.

"The technical records department spends considerable effort and time whenever they deal with paper-based documentation to manage error correction, reviewing the accuracy, scanning and archiving," Rajarajan continued. "Efforts tend to be significantly higher if the organization doesn't have a proper technical records system in place. We have seen pursuing a comprehensive technical records digitization process organization can save 40% of the department expenses owing to automation of manual process at the organizational level. The rapid progress and maturity of mobile technologies and digital content availability of technical documentation including manuals and job

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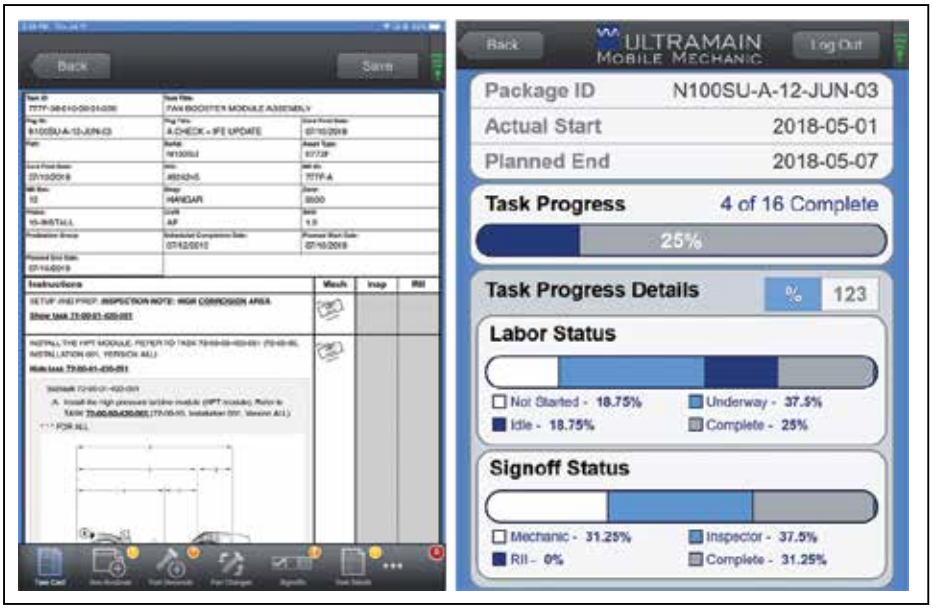
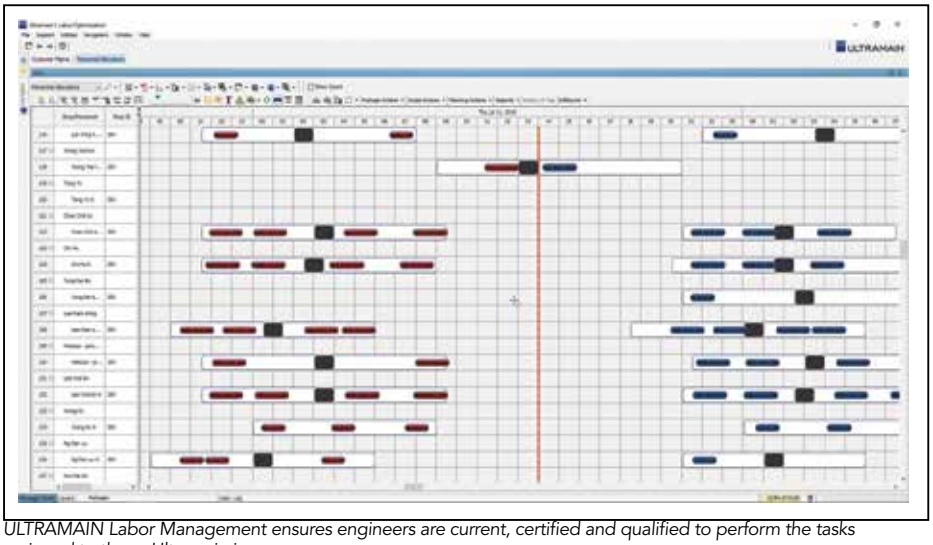


Ultramain's Mobile Mechanic, Mobile Inventory and Mobile Executive can help streamline workflow, reduce costs and improve operational efficiencies, the company says. Ultramain image.



ULTRAMAIN Labor Management ensures engineers are current, certified and qualified to perform the tasks assigned to them. Ultramain image.

cards, has made the shop floor digitization a reality."

John Stone, Ultramain vice president of Product Management agrees. "Airlines are required to maintain detailed records of aircraft usage, and aircraft maintenance including any changes made to aircraft, configurations and components," he told ***Aviation Maintenance***. "MROs are required to provide records of maintenance accomplished. If airlines do not comply or do a poor job of record management, they can face fines and forced closure. Aircraft resale value and lease returns are impacted by having or not having good maintenance records. Equally important, good data collection related to maintenance accomplishments allows better accomplishment of future maintenance through better planning, scheduling and contingency planning."

John Stone
Vice President, Ultramain

Even when an aircraft is parted out, record keeping is a major part of the equation as evidenced by the fact record keeping, inspecting and refurbishing are part of realizing the value of parts that can be re-used. For instance, Tarmac Aerosave and VAS Aero Services are breaking down former Singapore Airlines Airbus A380s for owner Dr. Phillips Group as they recycle 90% of the giant jumbo. Paperwork — written and photographic documentation — for the 5,000 parts harvested from the aircraft can take a month or more of the three or more months aircraft recycling takes. But the effort could yield between $30 million and $50 million for the owners.

Industry Slow to Go Paperless

Today, with modern aircraft streaming tons of data, it has become more important than ever to integrate Artificial Intelligence (AI) and Machine Learning (ML) into the process and ***aviation maintenance*** vendors such as RAMCO, flydocs and Ultramain are bringing the technology to bear. They are all part of the digital transformation taking place in the maintenance bay supporting paperless operations.

flydocs reported digital document management systems are playing a huge role in streamlining maintenance activities. "What these digital systems often have in common is in the increased visibility of an aircraft's entire maintenance records, easy online access and more importantly, reporting functionality that contains all the required insights," Fischer advised. "It also enhances fleet airworthiness, allowing customers to focus time and resources on the core business."

He discussed how flydocs' records management platform is transforming how the commercial aviation sector undertakes end-to-end aircraft records management whilst delivering substantial efficiencies and cost savings for its 75 clients worldwide.

"The flydocs team help clients improve processes, driving time and cost efficiencies through digital aircraft records management," he said. "They are empowered by the flydocs platform, a centralized online system, which provides internal and authorized third parties with instant access to millions of approved aircraft records for compliance verification. The system transforms complex, unstructured data into industry-standard formats; and through integration with

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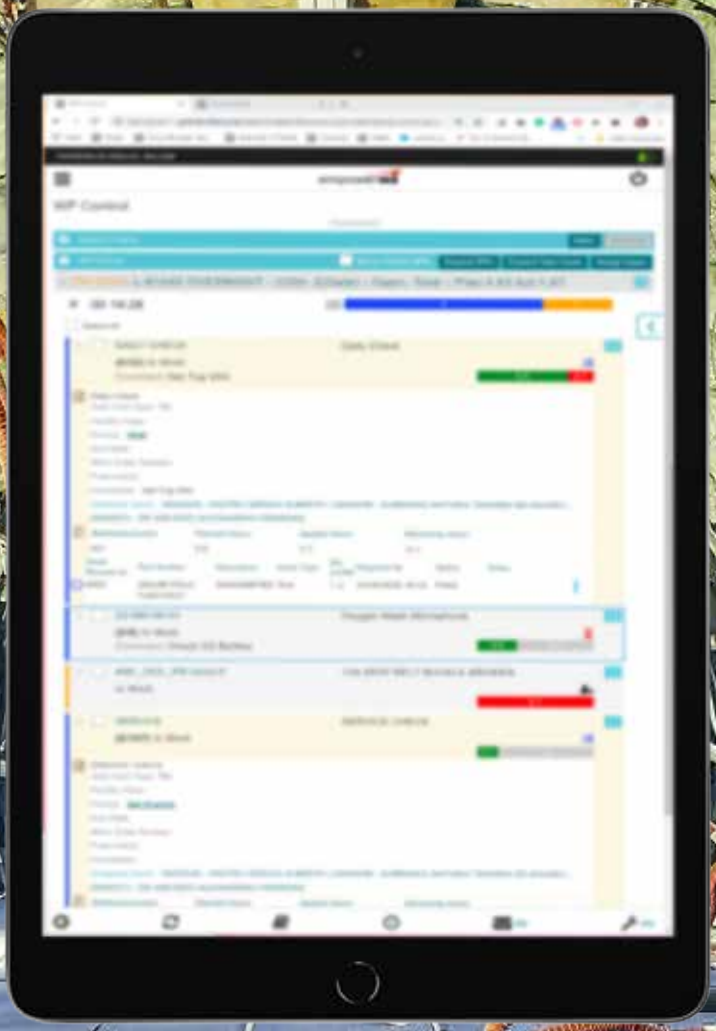

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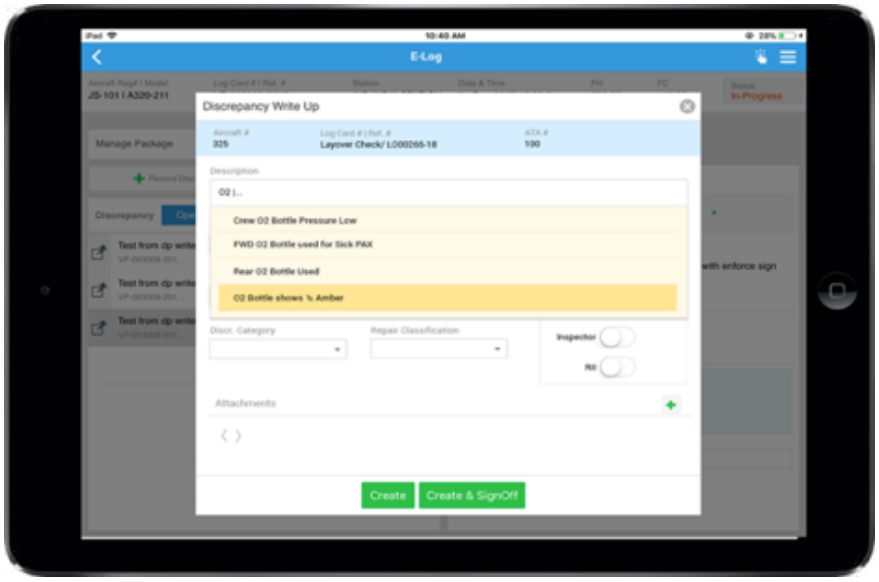
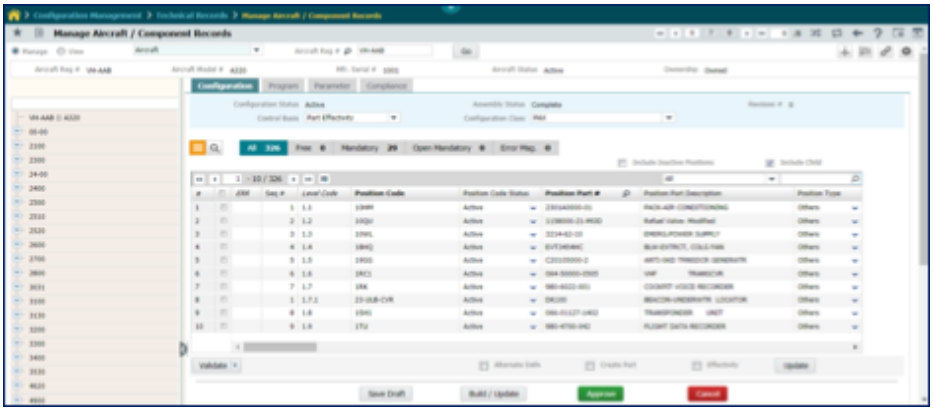
existing ERP/M&E systems, it automates and streamlines record builds to provide the right information exactly when they need it, resulting in compliance on demand, simplified end-of-lease transfers and real-time asset management."

Sea Change Unfolding

Airlines are already incentivized to adopt digital solutions to unlock the value through the end-to-end digitization process because, as Stone pointed out, the improved productivity, reduced operational costs and reduced overhead compared to traditional paper-based record keeping system which is more costly. Ultramain has two product divisions, M&E/MRO and Onboard Systems each designed for full paperless operations using the ULTRAMAIN ELB software to address a broad spectrum of aviation maintenance needs. including maintenance (line, base, engine, shop) with materials, labor, documentation, ELB and procurement. Complementing this is several mobile applications including Mobile Mechanic, Mobile Inventory and Mobile Executive, which help streamline workflow, reduce costs and improve operational efficiencies. The system provides real-time maintenance work status and completion.



RAMCO is using artificial intelligence and machine learning (AI/ML) and advanced algorithms to derive insights for tactical intelligence. RAMCO image.



RAMCO's technical records functions are integrated with maintenance execution modules, providing a single interface. RAMCO image.

"This real-time visibility into work being performed, coupled with digital sign-off is important because it helps operators by reducing the delays associated with paper-based systems," said Stone. "Meanwhile, our ULTRAMAIN Labor Management ensures engineers are current, certified, and qualified to perform the tasks assigned to them. It does not let them log onto a task unless they are. In fact, ULTRAMAIN will not let you even assign a task to someone who is not qualified to perform it and it will not let engineers sign off tasks unless they have proper authority, improving safety and accountability. In addition, NRI approvals and billing agreement is enforced before allowing work to begin on them."

flydocs also sees digital maintenance record keeping as supporting airline growth in addition to improved compliance on demand, improved agility to adapt to operational business process changes, increased workforce productivity, job satisfaction and a reduction in aircraft delays.

Benefits include automation of manual and repetitive tasks and integration with the entire aviation eco-system easing the workload for operators, lessors and MROs. "Routine and repetitive back-end activities are being automated to detect the exception patterns and provide intelligent real-time alerts and notifications," Stone explained. "As the data are entered in the digital format missing sign off blocks, missing mandatory measurement readings are instantly identified for rectification. With the interdependence in the industry between the lessors, operators, MRO's to work seamlessly with one another's digital records enables interoperability thereby reducing the transactional costs during the asset transfers."

Stone indicated the real-time notifications identifies when delays are happening during maintenance checks so they can be addressed quickly and to ensure customers get their aircraft, engines or components back on time, with correct electronic paperwork and with proper billing which speeds up payment.

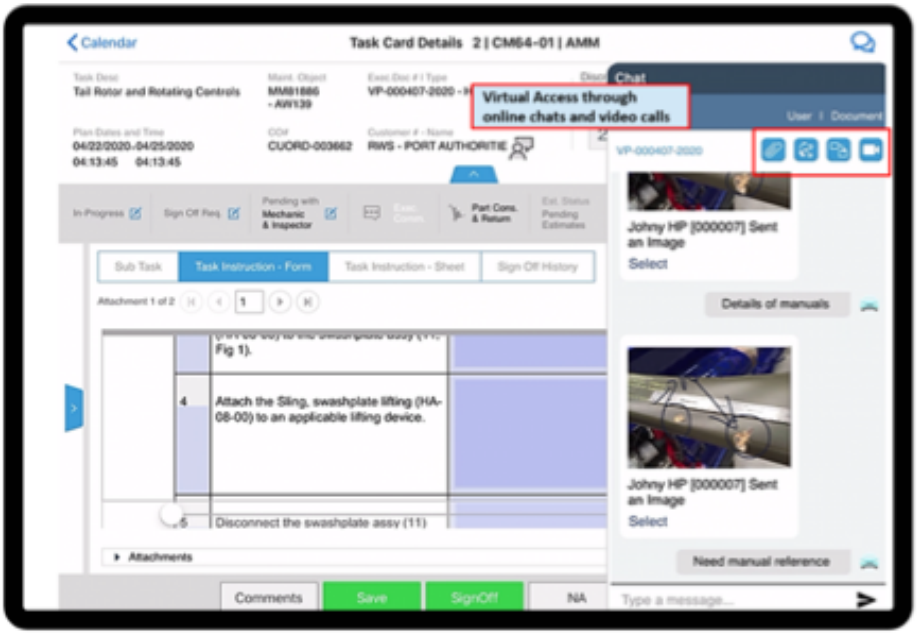
"All this means check planning, quoting, execution, records are better and expenses lower," he said.

"Profitability is then managed and more predictable."

AI & ML Brought to Bear

"RAMCO's artificial intelligence and machine learning (AI/ML) capabilities leverages data and advanced algorithms to derive insights for tactical intelligence," said Rajarajan. "By leveraging the historical records pertaining to the non-routine or defect, mechanics, while reporting a new case, are presented with the suggestions using similar cases with possible resolution options and any parts or tools required for fixing the defect. Final determination of accepting the recommendations still lies with the mechanics, even though this is tactical insight it has the potential to significantly reduce turn-around time especially during unplanned grounding of the aircraft."

Ramco has the comprehensive technical records functions tightly integrated with maintenance execution modules, providing a single interface, technical records hub, which caters to the technical records teams. That hub then provides the complete visibility of the aircraft configuration control, component configuration and status of the fitted items and items due for maintenance from stores.



Robotic Process Automation (RPA) Bots are being used to catch missing paperwork, missing data entry and for accuracy reviews says RAMCO. RAMCO image.

The advent of both voice and video gives aviation maintenance technicians a new tool to record data that automatically integrates records as part of the technical documentation, tagged, indexed and archived for future search, retrieval and audit purposes.

Leveraging RAMCO's expertise of its MRO Lab in Singapore, RAMCO is actively working with customer's specific use cases leveraging Robotic Process Automation (RPA) Bots for missing paperwork, missing data entry and accuracy reviews.

As M&E/MRO catches up to the passenger side of digitization, airlines, which continue to search for cost cutting technologies, are creating a whole new world for asset management. AVM

WIRED FOR SAFETY:
PREVENTING FIRES BY CHECKING WIRES

Jeff Guzzetti

This summer marked the 25th anniversary of the most complex and vexing aircraft accident in aviation history – TWA Flight 800. The vintage Boeing 747-100 had just departed from New York on its way to Paris when it suddenly exploded off the coast of Long Island. All 230 people on board were killed. As a rookie NTSB field investigator at the time, I was not involved in the years-long effort to solve the accident, but I sure do remember its impact, especially later when I taught at the NTSB Training Center where the TWA 800 reconstruction was housed (see top image at right).

The NTSB concluded that the center wing fuel tank of the 747 exploded, likely due to wire chaffing and arcing outside of the tank, which led to a short circuit that allowed excessive voltage to enter the tank through the wiring for the fuel quantity indication system (FQIS). Additionally, NTSB examinations of wiring on 26 other airplanes of varying ages (ranging from new to 28 years old) revealed that all of the older airplanes exhibited numerous examples of mechanically damaged, chafed, cracked, and contaminated wires (see image at lower right). Sharp-edged metal drill shavings (which can damage wire insulation), fluid stains, and other potentially hazardous material were also found in or near the wiring of old and new airplanes.

While not considered a "maintenance related" accident, the TWA 800 tragedy focused the MRO industry's attention on the pitfalls of aging and improperly installed electrical wiring. Unfortunately, several more similar accidents and incidents followed in the late 1990s.

The 3-dimensional reconstruction of the wreckage from TWA flight 800 is currently housed at the NTSB Training Center. The reconstruction assisted investigators in determining that the center wing fuel tank exploded, likely due to deteriorated wiring in the fuel quantity indicating system (FQIS)

NTSB systems investigator Bob Swaim shown here examining the damaged wiring from the TWA 800 wreckage and other similar aircraft.

SWISSAIR Flight 111

Two years after the TWA disaster, another wide-body jet was felled by wiring problems. This time, it was a McDonnell Douglas MD-11, operating as Swissair Flight 111 on a flight from New York to Geneva, Switzerland, with 215 passengers and 14 crew on board. And, this time, I was involved in the investigation.

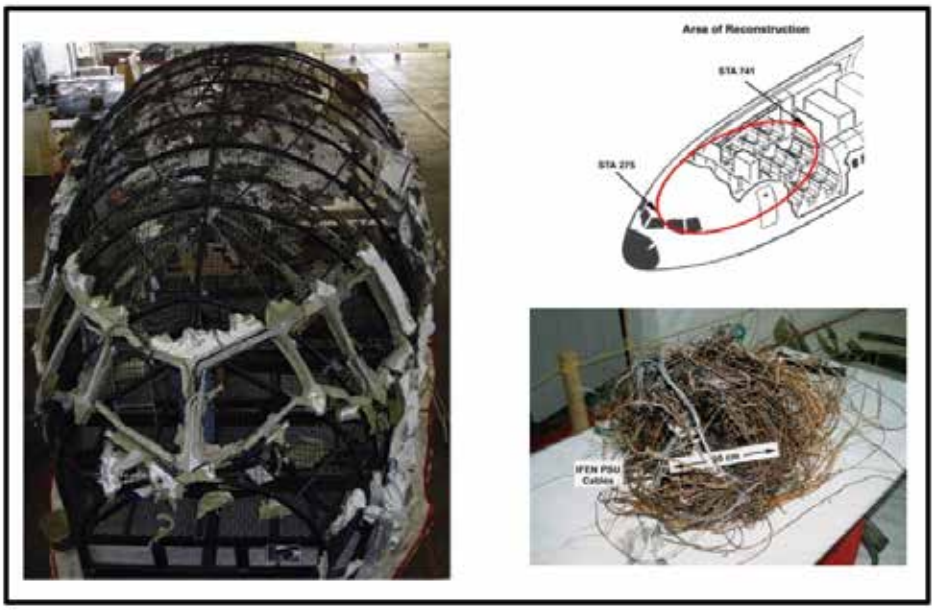
The date was September 2, 1998. Swissair Flight 111 was cruising at 33,000 feet about an hour after departure from JFK Airport when the flight crew reported a smell of smoke. As the smoke became dense and entered the cockpit, the crew attempted an emergency landing at Halifax International Airport in Nova Scotia, Canada. But it was too late. The MD-11 impacted the Atlantic Ocean a few miles

off the coast near Halifax. There were no survivors.

Freshly promoted to the NTSB "go-team" as a systems engineer, I launched to Halifax to assist the Transportation Safety Board (TSB) of Canada since the aircraft was designed and built in the United States. I spent several weeks on a floating barge (see top right) with other investigators, sifting through piles of shredded wreckage brought up from the ocean bottom by a massive crane and bucket.

The Canadian TSB's meticulous investigation rivaled that of the NTSB's effort with TWA 800, including a 3-dimensional reconstruction of the front of the airplane (see lower right). Evidence revealed that a fire raged above the ceiling in the front area of the aircraft. The Swissair MD-11 was modified with an in-flight entertainment network (IFEN) for first class passengers, and it was connected to aircraft power in a manner that was not compatible with adequate emergency electrical load-shedding.

The author on a floating barge to assist Canadian investigators with examining wreckage of Swissair flight 111 as it was pulled up from the ocean floor.



The Transportation Safety Board of Canada built a 3-D reconstruction of the Swissair MD-11 to help pinpoint the source of the in-flight fire. The wiring from the in-flight entertainment center was the culprit.

The IFEN was an approved, but inadequately reviewed, Supplemental Type Certificate (STC) installation.

A review of IFEN system installation records revealed discrepancies in the drawings and supporting documentation. No details for wire routing were provided. Additional inspections of wiring around the cockpit overhead circuit breaker panel in other MD-11s revealed loose wire connections, inconsistent wire routings, broken bonding wires, small wire bend radii, and cracked and chaffed wire insulation.

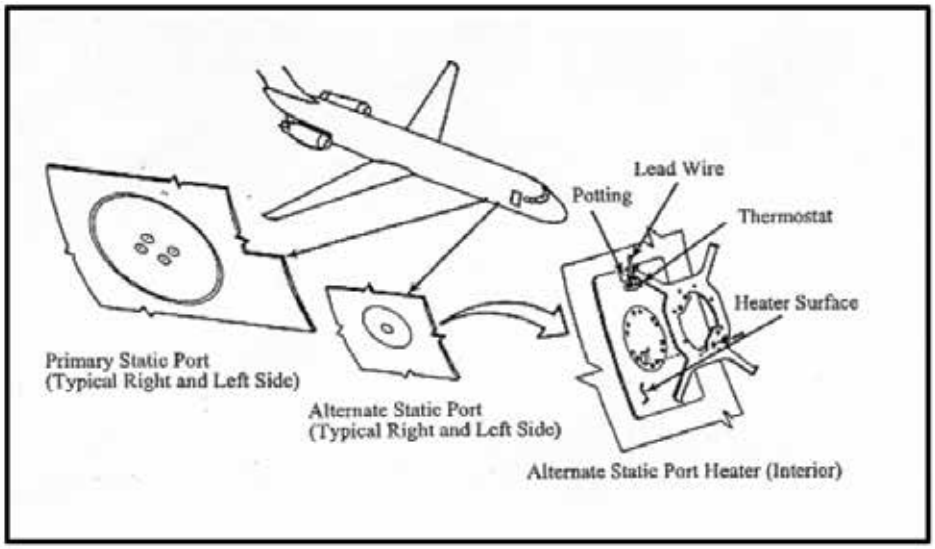
The investigation led to numerous recommendations regarding insulation flammability, crew checklist procedures, and system design. More importantly for the readers of this magazine, the accident highlighted the importance of guidance contained in FAA Advisory Circular (AC) 43.13-1B, "Acceptable Methods, Techniques, and Practices—Aircraft Inspection and Repair," and AC 65-15A, "Airframe and Powerplant Mechanics Airframe Handbook." These "best practices" rely heavily on the training and experience of the maintenance professionals who perform the installation work to determine proper wire routing.

More Incidents of Arcing and Sparking

Because of the TWA 800 and Swissair 111 tragedies, the aviation industry was "on edge" to say the least. Every report of a potential electrical arc or short was scrutinized. As the "on call" NTSB systems investigator in September of 1999, I was dispatched to examine a Delta Air Lines MD□88 that performed a precautionary landing near Cincinnati, Ohio, after declaring an emergency due to a cabin fire. The flight attendants reported that there was a sulfurous smell followed soon after by smoke in the forward cabin. During the descent to land, a flight attendant discharged a Halon fire extinguisher into a floor grill where she saw a flame.

The MD-88 has two heater plates on

both sides of the fuselage that are flush-mounted against the static air pressure sensing ports to ensure that the ports do not become blocked by ice (top image page 40). The heaters are powered by 115-volt alternating current through a 10-ampere circuit. The investigation revealed that a spark from the right static port heater plate ignited a small fire that propagated by consuming the sidewall insulation blankets surrounding the heater (lower image page 40). Examination of the heater revealed localized soot on the thermostat case, and on the lead wire that carries the 115 volts to the thermostat.



Exploded view of the MD-88 static port system. The lead wire was found to have a severe bend radius which precipitated chaffing, arcing, and sparking

Investigators laid out the thermally damaged areas in the MD-88 cargo hold that were associated with the right-side static port.

The lead wire was bent sharply around the thermostat case, and its conductor was exposed at the bend (top image page 41) due to a manufacturing flaw. In response to the incident, Delta Air Lines initiated detailed visual, electrical, and functional inspections of the static port heaters on its entire MD-88/MD-90 fleet of 136 airplanes. What they found was frightening: 11 percent of the airplanes had at least one heater installation that exhibited some type of damage. Nine of the heater installations had arced, burned, or melted parts in the area of the electrical connector. Two heaters had charred and exposed elements on the heater plate.

In addition to the Delta MD-88 incident, I investigated another event involving an electrical fire in a World Airways MD-11. A vigilant mechanic at an MRO in California discovered evidence of sooting while removing several floorboards in the MD-11's cargo hold. A wiring harness was routed onto a frame without the required support bracket/clamp, which allowed a wire bundle to chafe against the frame. The finding led to an FAA airworthiness directive (AD) that required visual inspections of certain MD-11 airplanes to verify that a bracket and nylon clamp were installed to support a specific wire bundle, repair any damage to the bundle, and install a protective wrap around it. Who knows what could have happened if that MRO mechanic ignored this discrepancy.

Rearing its Ugly Head in San Francisco: ABX Air 767-200

The airline industry kept serious wiring issues down to a dull roar during the years immediately following these events. But then, in late June 2008, while filling in for the vacationing director and deputy director of the NTSB's Office of Aviation Safety, I was notified of an ABX Air 767-200 freighter that experienced a ground fire at San Francisco International Airport just before engine start. The pilots evacuated through the cockpit windows and were not injured, but the airplane's crown had severe fire damage (see middle image on page 41). I facilitated the launch of a small go-team to investigate the event. I remember thinking: "But for the grace of God that the fire occurred on the ground rather than in the air."

The 767 was converted from a passenger to a cargo configuration four years prior to the event by a company that performed an STC modification to the "supernumerary" crew seating area behind the flight deck. The STC included flexible hoses for a supplemental oxygen system (see lower image page 41). During postaccident inspections of other ABX Air 767 airplanes that were modified by the same company, some installations were found to have electrical wiring routed above and in direct contact with the oxygen tubing, even though the STC provided for positive separation. The investigation of the fire aboard the accident airplane found that a short circuit from electrical wiring was the most likely source to energize a coil spring inside an oxygen system hose, causing the hose material to ignite.

Advisory Circulars 43.13-1B and AC 65-15A state that no electrical wire should be located within ½-inch of any combustible fluid or oxygen line and that, if the separation is less than 2 inches, back-to-back clamps or a polyethylene sleeve should be installed to ensure positive separation. However, this guidance was not followed in the installation and inspection of the STC in the ABX Air 767, and a fire ensued.

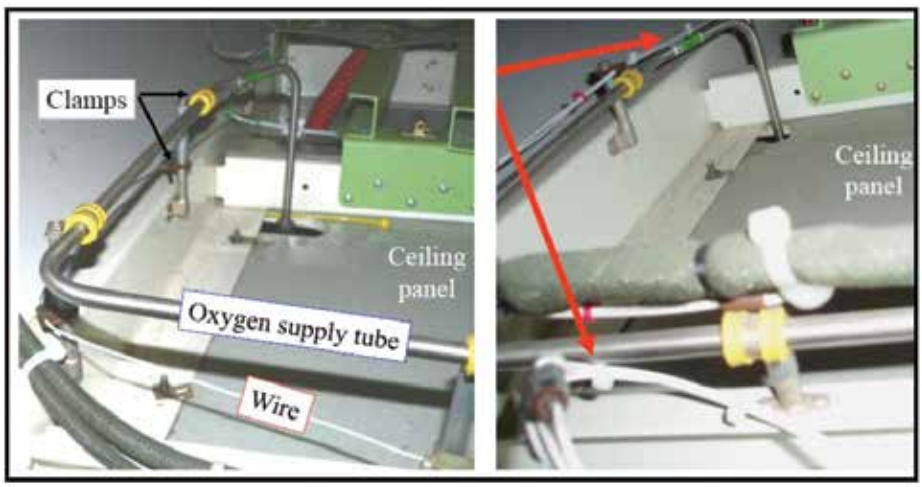
The static port heater plate from the MD-88 incident airplane. Note the magnified view on the right side of the graphic, showing a sharp bend radius of the lead wire around the thermostat case.

A view of the fire damage to the crown of an ABX 767-200 in San Francisco.

History Repeats Itself: A Piper Cheyenne II in-flight fire.

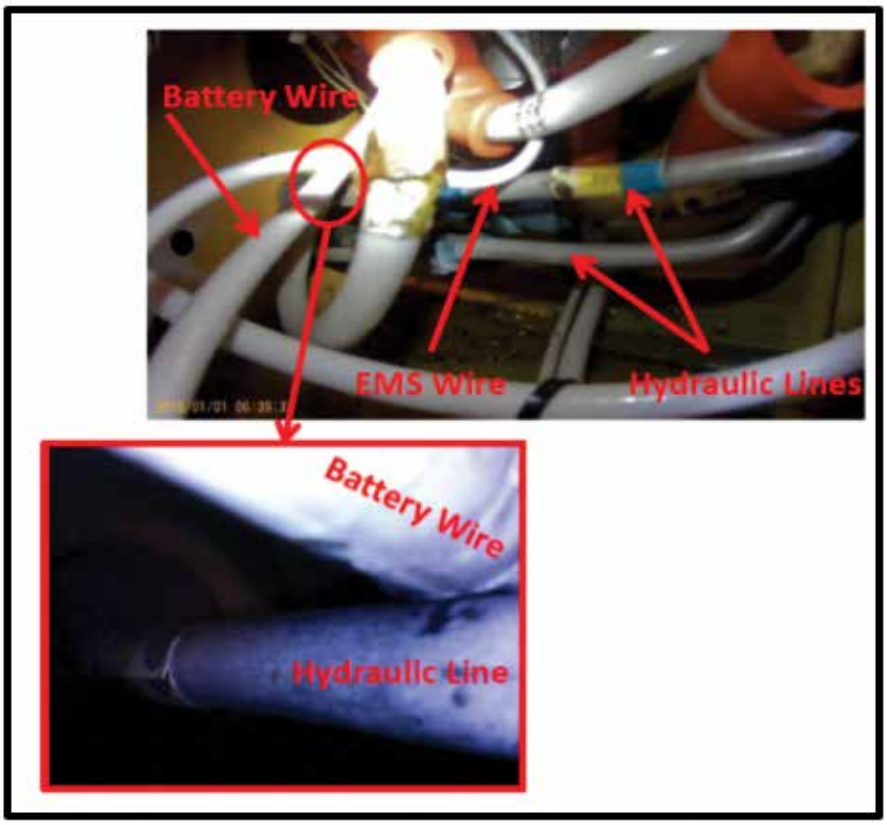
Later in my career, while serving as the director of FAA's Accident Investigation Division, another accident occurred due to the lack of separation between electrical wiring and other systems. On July 29, 2016, a Piper PA-31T Cheyenne II twin-turboprop — while operating as an air ambulance — broke up in flight over McKinleyville, California shortly after the pilot reported smoke in the cockpit. The pilot, two medical personnel, and the patient were killed.

The wreckage was located several hours later in heavily forested terrain. Portions of the burned and fragmented wreckage were scattered along a half-mile debris path. The center fuselage and cockpit areas were largely intact and displayed no evidence of fire (see top image page 42); however, a large area of thermal damage to the forward fuselage and circuit breaker



The photo on the left shows a proper installation – with adequate separation — of electrical wires and an oxygen supply tube from a cargo conversion STC. The photo on the right shows an improper installation from an exemplar 767 that had the same STC conversion.

The left half of this photo shows the center fuselage wreckage from the inflight breakup of a Piper PA-31T airplane. No thermal damage was found. However, the forward fuselage and circuit breaker panels shown in the right half of the photo were severely burned due to a fire that was ignited by a chaffed electrical wire.



Photographs of instances where electrical wires were in close proximity to hydraulic lines in PA-31T airplanes.

panels were found. An aluminum stringer in this location exhibited "broomstrawing" indicating that it was heated to near its melting point prior to impact. A single wire located in the area exhibited "notching" consistent with mechanical rubbing (see lower image page 42) and exhibited evidence of electrical arcing. Four hydraulic lines servicing the landing gear were located in this area, and all the lines were partially burned, melted and missing sections of material.

Prompted by these disturbing findings, six other airplanes of the same make and model were examined.

Sure enough, they all had instances of electrical wires and hydraulic lines in direct contact with each other in the area of the main bus tie circuit breaker panel. Some of the wires were chaffed. The NTSB stated the cause was: "An inflight fire in the floor area near the main bus tie circuit breaker panel that resulted from chafing between an electrical wire and a hydraulic line and/or airplane structure." But even before the cause was determined, the NTSB issued an urgent safety recommendation to address the unsafe wiring conditions. The FAA quickly issued an AD that required repetitive detailed visual inspection of the wiring below the circuit breaker panels in Piper PA-31T series airplanes.

Prevent Fires by Checking Wires

The lessons learned from these accidents and incidents are plentiful. If you are a maintenance professional who wants to prevent opportunities for aircraft fires, you need to heed the guidance from the FAA and the manufacturer. More importantly, if you "see something" similar to the items listed below, then you need to "say something" so that an electrical fire can be prevented:

- No wire should be located within ½-inch of any combustible fluid or oxygen line.
- If the separation is less than 2 inches, back-to-back clamps or a polyethylene sleeve should be installed to ensure positive separation.
- To prevent chaffing, wiring harnesses should not be routed onto a frame without the required support bracket/clamp.
- Generally, clamps should not be spaced at intervals exceeding 24 inches. In high-vibration areas or areas requiring routing around structural intrusions, the clamping intervals may need to be reduced in order to provide adequate support.
- Routing of wires with dissimilar insulation, within the same bundle, is not recommended.
- Accumulation of dirt and lint near electrical wires creates a potential for smoke and fire.
- The minimum radii for bends in wire groups or bundles must not be less than 10 times the outside diameter of their largest wire.
- Metal stand-offs must be used to maintain clearance between wires and structure. Employing tape or tubing is not acceptable as an alternative to stand-offs.

Many wire defects may be difficult or impossible to detect through visual inspection alone, automated test equipment (ATE) inspection systems are available to supplement visual inspections. These systems include electrical continuity or resistance tests, insulation resistance and capacitance tests, and time-domain reflectometry (TDR). AVM

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Erkki Brakmann

Q&A with Erkki Brakmann, Founder and CEO, SkySelect

SkySelect was formed in 2017 with the aim of making the buying process for aircraft spares as fast and efficient as possible. Ian Harbison spoke to Erkki Brakmann, founder and CEO.

AVM: You have an interesting company network – Estonia, California, Chile.

EB: The COVID-19 pandemic has taught us that location is no longer important. We set up originally in Tallinn, where there is a great talent pool for IT development. California is in one of the largest aerospace markets and home to many suppliers and also to our investors. As for Santiago, that reflects a more traditional way of working, of being close to your customer – LATAM was one of our early contracts.

It is also worth pointing out that SkySelect was founded not just by IT professionals, our staff members also have airline and supplier experience as well.

AVM: Why did you feel the buying process needed a helping hand?

EB: The way buyers are used to purchasing parts has not changed over the last 20-30 years, but the world has evolved quite a bit during that time. Airlines and MROs generally purchase used serviceable material (USM) in small quantities and at the last minute to avoid the overheads of holding inventory but, even if there is a well-established supply chain with preferred partners, searching for best mix of suppliers, evaluating what is the best option and placing an order itself is labor and time intensive. Automating the process is more efficient and can also produce cost savings.

AVM: How is this achieved?

EB: We use application programming interfaces (APIs) to connect the customer's ERP system with the IT systems of the suppliers. By establishing buying rules, such as priorities (routine, urgent, AOG), location and price limits, the process becomes automatic. Computers work 24/7 and can process thousands of part requirements simultaneously speeding up the purchasing cycle from a purchasing requirement to an order up to 10x. They can also consolidate orders, so there may be a price advantage from volume. The process scales up and down automatically depending on demand.

We use algorithms and machine learning to enhance the search and ordering procedures. Remember, considerable amount of purchasing is close to 'Just In Time', so price may not always be the main driver. For example, the customer may be prepared to pay a premium to get hold of a component that is in a closer location, so that the delivery time is shorter to meet the deadline for a departing aircraft.

Of course, the system is constantly evolving, as we bring improvements. These have included automated follow up on open orders and shipment tracking to boost on time deliveries, machine learning algorithm to match parts with the best suppliers and advanced analytics. The Hosted Catalogs section provides instant access to quotes from catalogs uploaded by suppliers.

In addition to modern APIs, the system is compatible with the SPEC2000 industry standard, meaning it is easy to send orders and receive acknowledgements and to get messages on order changes, shipment notifications and invoices.

AVM: You say the process is automatic but are there limits?

EB: Initially, customers may check every purchasing suggestion offered by SkySelect's algorithms but, as they gain confidence in the system, they let it become more autonomous. While that works for around 90% of orders, some parts tend to be very expensive, so these will usually be flagged for individual review and even negotiation with the supplier.

AVM: Cradle to grave paperwork is becoming ever more important, especially in relation to maintaining asset values. How does that operate in an automatic environment?
EB: That can still be a holding factor in maximizing the efficiency of the process but digitization of records is becoming more common.

AVM: Have there been any changes since the United Kingdom left the European Union and EASA?
EB: As that means a UK-sourced component can no longer be released on a Form1, with dual EASA/FAA approval, we find that customers tend to prefer a European source if they are buying in that market area.

AVM: What does your customer base look like?
EB: We have airlines such as JetBlue, Avianca, Azul, Icelandair and LATAM, with TAP Portugal joining in June this year, as did Magnetic MRO, joining Aero Norway on the MRO side.

AVM: And you have just added a new customer - can you tell us who that is?
EB: Yes, Azul Linhas Aéreas and SkySelect have been working closely together to transform their aircraft parts purchasing process. Leveraging our advanced aviation material purchasing system powered by algorithms and robotic process automation, Azul Linhas Aéreas has restructured its parts purchasing and tracking, bringing greater efficiency to its aircraft maintenance processes, saving the carrier both time and money. As one of the largest airlines in South America, Azul Linhas Aéreas currently has a fleet of 143 aircraft flying to 114 destinations. Given the size and scale of the carrier's operations, it's imperative to have a parts purchasing system and service that's transparent, trusted and scalable.

AVM: It is easy to see how the system works for buyers but what advantages do suppliers get out of It?
EB: Suppliers get access to real demand from the end users and close to real-time. This speeds up the decision making process benefitting the suppliers who have live connection with SkySelect. They can also keep their inventory details private, away from competitors. If they are selected, an order can be generated easily or even automatically and SkySelect allows for easy feedback from the customer, perhaps resulting in faster payment by getting answers on open issues. Requests also give an insight into current market demands, which can assist with future procurement plans.

AVM: Of course, airlines may also want to get rid of surplus inventory.
EB: We do help with it as a value-added service, but our focus is on providing the most efficient and economic way of purchasing spares.

AVM: How is the market these days?
EB: Pre-COVID, there was a shortage of both feedstock and a supply of used serviceable material (USM). Now, with many more aircraft retirements, compared to the average 1,100 recorded in recent years, there are a lot of parts from these aircraft that can be used to keep the aircraft in service. In addition, some carriers have changed their business model, such as Norwegian Air Shuttle exiting the long-haul market, so relatively new aircraft are being returned to lessors. There are also airlines that embarked on fleet renewal, such as United Airlines buying 270 Boeing and Airbus jets, and new aircraft obviously require less maintenance and parts.

AVM: How does that affect the buying process?
EB: With so much material available, it is currently a buyer's market and an airline or MRO that can work faster and smarter by using SkySelect will be able in most cases to find what they want at a good price, producing significant savings. That is particularly important as maintenance costs can range from 10-45% of total yearly operating expenses.

AVM: But if flying hours are down, is demand less?
EB: Flying hours will come back as the pandemic situation stabilizes around the world. According to Oliver Wyman, the USM demand alone is expected to grow at 68% per annum through 2022 and beyond, when the market is expected to reach $7.9 billion and over. In total, USM will represent 11% of aftermarket materials spending versus 9% in 2019. So, the signs are good. AVM

By Jason Dickstein

SMS Part 6: Strategies for Identifying and Selecting Risk Controls

In this article we will begin to look at the high level strategies for selecting mitigations - or risk controls - to reduce the risks associated with aviation safety hazards.

Aviation Maintenance Magazine has been publishing a series of articles explaining how to establish and use a safety risk management (SRM) system to identify aviation safety hazards and assess them for risk. The SRM is one of the key elements of a complete Safety Management System (SMS). This article assumes that you have some familiarity with the basic concepts of SMS that were covered in those articles. If you do not, then we recommend that you go back and read the past five articles (you can find all five on Aviation Maintenance Magazine's website).

In the past articles on SMS, we have discussed how to identify a hazard, how to assign values to the hazard correlating to likelihood of harm and consequence of such harm, and how to assess the total risk posed by the hazard. The nature of this process is that you will be able to rank the risks so that the hazards that pose the greatest risk can be addressed first. This allows an aviation business to focus its limited resources on mitigating the most important risks first, while at the same time preserving the less important risks to be addressed at a later date.

But what do we mean when we say, "address the risks?"

Two easy meta-strategies for mitigating the risk associated with a hazard are (1) to reduce the likelihood that the hazard will arise and (2) to reduce the consequences of the hazard if it arises. Remember that likelihood and consequence are the two metrics hat we used to calculate total risk associated with each hazard. And these are both things that we do in aviation every today.

A typical hazard in a repair station is the possibility that the person performing maintenance will skip a step. This is a hazard that is mitigated in most repair stations through risk control processes aimed at both likelihood and consequence. For example, it is normal for the repair station to develop a "traveler" that describes the step-by-step process for the intended repair. This will typically be developed from the existing maintenance manual(s) for the article to be repaired. The mere existence of the traveler as a guide is a risk control to help mitigate the likelihood of missed steps in the repair. But that is not all we do. We also typically ask the person completing the processes to initial or stamp a check-box for each step to show that the step has been completed. This provides a visual cue to the maintenance technician that each step has been completed, and makes it obvious which step is next to be completed (this also mitigates other hazards, like the hazards posed by maintenance that spans over more than one shift). Each of these processes reduces the likelihood that the maintenance technician will skip a step during maintenance.

That is not all we do to mitigate the risk of skipped steps. We've all heard the adage that the work is not complete until the paperwork is complete. It is normal in repair stations for the traveler to be reviewed by an inspector before the work is considered to be complete. In such a review, if a step was skipped them the inspector will identify this as an issue that needs to be corrected before the article can be approved for release to service. This review is a process that mitigates a number of hazards, but one of the things that it does is it mitigates the consequence of errors. This is because if an error was made (like a skipped step), then the consequences are less likely to escape from the system because of the review process. Thus, the safety consequences of skipped steps are mitigated to an insignificant level when the review process works correctly to identify when such steps may have been skipped.

Anther way of looking at this particular mitigation (inspecting the work to ensure steps were not skipped) is that it limits the exposure of the hazard. By identifying the hazard in-house when it arises and preventing the affected article from leaving the quality system, the processes insulate the repair station's customers from exposure to the risk. Exposure limitation can also arise in ways that are more attenuated from consequence mitigation, such as preventing access to areas in which hazards arise.

Modern technology is being used to reinforce these efforts. Computer-based travelers can be programmed to prevent an article from moving to the next step unless each step is confirmed to have been completed.

As you can see from these last few paragraphs, there are a number of ways to mitigate risks. While the meta-strategies are to reduce the likelihood or to reduce the consequences of the hazard, there are specific strategies that are commonly used to accomplish these meta-strategies.

Four common risk process control strategies – in order of their priority – are:

1. Design for minimum risk
2. Incorporate safety devices
3. Provide warning devices
4. Develop procedures and training

When you can design for minimum risk, that always allows

helps to ensure that inherent hazards are mitigated. This can be true in the design of the article by the manufacturer, but it can also be true in the design of a repair station's facility. For example, if an identified hazard is inhalation of paint fumes, then the risks associate with that hazard can be mitigated through a facility design that keeps painting separate from humans, and effectively exhausts the fumes through a mechanism that reduces their toxicity to acceptable levels.

When it is not possible to minimize risk through design approaches, then the next consideration should be incorporation of safety devices and mechanisms. Using the paint-shop inhalation hazard, appropriate respirators can be safety devices that help to mitigate the inhalation risks for those employees who must be potentially exposed to inhalation hazards.

Warning devices can also be risk mitigations. They are typically used to reduce the likelihood of harm from a hazard, because they warn the employees away from the hazard or provide advice on how to best mitigate the risk posed by the hazard. Warning devices are used throughout aviation, from signs warning unauthorized personnel away from a place with hazards, to "remove before flight" tags hung from access panels that must be closed at the conclusion of a maintenance operation.

Developing procedures and training is listed last. Ensuring that your colleagues have the right training, and the right procedures is important; but if you rely solely on these then you are introducing human factors into the risk process controls, which means that there is a greater likelihood of failure in these controls. This doesn't mean that procedures and training are not important. They might be the only way to reasonably control a risk. They are also useful as a supplement to other risk process controls. But when they are the only risk process controls in place then it is especially important to ensure that they are effective (techniques for accomplishing this include auditing and are covered in the Safety Assurance element of SMS).

This article should not be used as a boundary. You should never hesitate to apply creative solutions to thorny problems. But if you are looking for a way to start the hazard-risk mitigation process, then using these categories as a guide can help you to begin identifying what sort of mitigation might yield the results that you want. AVM

Want to learn more? We have been teaching classes in SMS elements, and we have advised aviation companies in multiple sectors on the development of SMS processes and systems. Give us a call or send us an email if we can help you with your SMS questions.

Ed Barnes, Global Chief Engineer of Aviation Lubricants at ExxonMobil
Daniel Kadlecek, PhD, Aviation Fuels Technical Lead at ExxonMobil

Tips for Bringing Aircraft Out of Storage

The number of aircraft currently grounded and that have been in storage over the past year due to the pandemic is unprecedented. As vaccine distribution increases, travel restrictions are lifting, the world is inching its way toward "normal," and people are ready to fly again. According to International Air Transport Association's latest Airline Industry Financial Forecast, regions with large domestic markets – including the U.S., Latin America and Asia-Pacific – in particular have begun to see a resurgence in travel. As global demand for air travel continues to rise, airlines are now faced with a new challenge – getting parked aircraft ready to take to the sky.

When an aircraft is parked for an extended period, there is increased risk for deterioration of its components and structure if preservation procedures are not followed. Preservation procedures vary for traditional short-term storage vs. long-term storage. But regardless of the duration of parked status, it's important to recognize that there are similar risks to the engines, hydraulic systems, fuel tanks and the airframe – namely water contamination and corrosion.

Engine lubricants in particular are susceptible to increased water contamination anytime an aircraft is parked for an extended period. Similarly, a major concern for fuel tanks is microbiological growth due to water contamination. As airline maintenance teams prepare their aircraft to return to service, there are some key steps to take.

It is essential that airlines follow the instructions included in aircraft OEM maintenance manuals and all relevant operational guidance. The considerations in this material are not intended to override OEM specific protocols.

Maintenance steps for the return to service

Returning an aircraft to service requires a multitude of steps, with lubrication and fuel quality being two key areas that could result in costly repairs if overlooked. There are several critical steps in returning the aircraft to service.

- Exercise the engines: Occasionally "exercising" engines while grounded by moving the aircraft can bring the oil to operating temperature, help evaporate any water, and renew the film of protective additives on the surfaces of engine components.
- Exercise the wheels: Moving the aircraft also rolls the tires, which renews the grease coating on the associated wheel bearing components and helps protect the bearings. This is important because wheel bearings are only re-greased when completely removed from the aircraft. Moving the airplane also flexes the landing gear which renews oil and grease films on landing gear struts and linkages.
- Test the oil: Technicians should periodically test the engine oil in parked aircraft for water (ppm) and monitor total acid number (TAN) and compare these to the oil condition limits set by the engine OEM. Be sure to work with a lab that specializes in aviation fluid analysis like Jet-Care and SGS, which use industry standard test methods, to get an accurate picture of your specific engine lubricant condition – and adjust maintenance practices accordingly. You can't just assume you're operating the engine enough and one airline's approach may not work for another airline. In a limited number of cases, some engines with less than weekly engine runs in a high humidity, high heat environment did show excessive water and excessive TAN.
- Dewater the fuel tanks: All aircraft fuel tanks have drain points to drain water out of the tank. While drain frequency is based on OEM recommendations, more frequent drainage may be beneficial when an aircraft is parked. By draining regularly, maintenance teams can remove water that holds up in low points. When the aircraft is moved, water may also dislodge from spots that don't drain as efficiently, and more draining may be necessary.
- Visually assess the fuel: Following any water draining, it is recommended that maintenance staff take a sample of the fuel in a clear container to visually assess the quality. Check for microbiological growth and particulate in the fuel, as well as the color. Depending on where an aircraft is stored, sand or dirt can find its way into the fuel tank. If particulate is present, it may be necessary to drain the fuel and clean the tank. In terms of color, jet fuel typically ranges from colorless to a light straw color. Anything darker than that may be cause for investigation.
- Clean the fuel tank – only if necessary: If there is particulate, or a buildup of microbiological growth due to inadequate drainage, it may be necessary to drain the fuel and physically clean the tanks. As there are significant cost and safety implications for this, it's recommended that maintenance teams regularly drain the fuel tanks to avoid cleaning them.

As airlines prepare their planes to take flight again, it's critical to test the engine oil and evaluate the water ppm and TAN, change the oil if needed, continue to exercise the engine, and drain and assess the fuel tanks.

Considerations for Long-Term Storage

While airlines worked to keep grounded aircraft parked only temporarily, some aircraft were put in long-term storage, or deep preservation. If an aircraft was put into long-term storage, exercising the aircraft is not an option.

Long-term storage requires preserving or "pickling" an engine, in which preservation additives are added to the lubricants to prevent corrosion. Once the long-term preservative additive is mixed in the lubricant, the engine operation is typically limited by the OEM as the preservative may interfere with other lubricant additives and create less load-carrying, or more deposits forming. For "pickled" engines, workload for return-to-service is very high. Lubricant should be drained, and engine flushed before return-to-service.

From a fuel perspective, many of the maintenance steps remain the same regardless of how long the aircraft has been parked. However, aviation fuel supply locations are required to re-test fuel that has aged for six months beyond its last certification. This same practice would also be beneficial for fuel stored in aircraft for that duration of time. Airlines should work with their supplier to understand the testing process and get clarity on any fuel quality concerns.

With these few additional steps, aircraft will be better prepared to take to the skies, and airlines can avoid costly repairs. AVM

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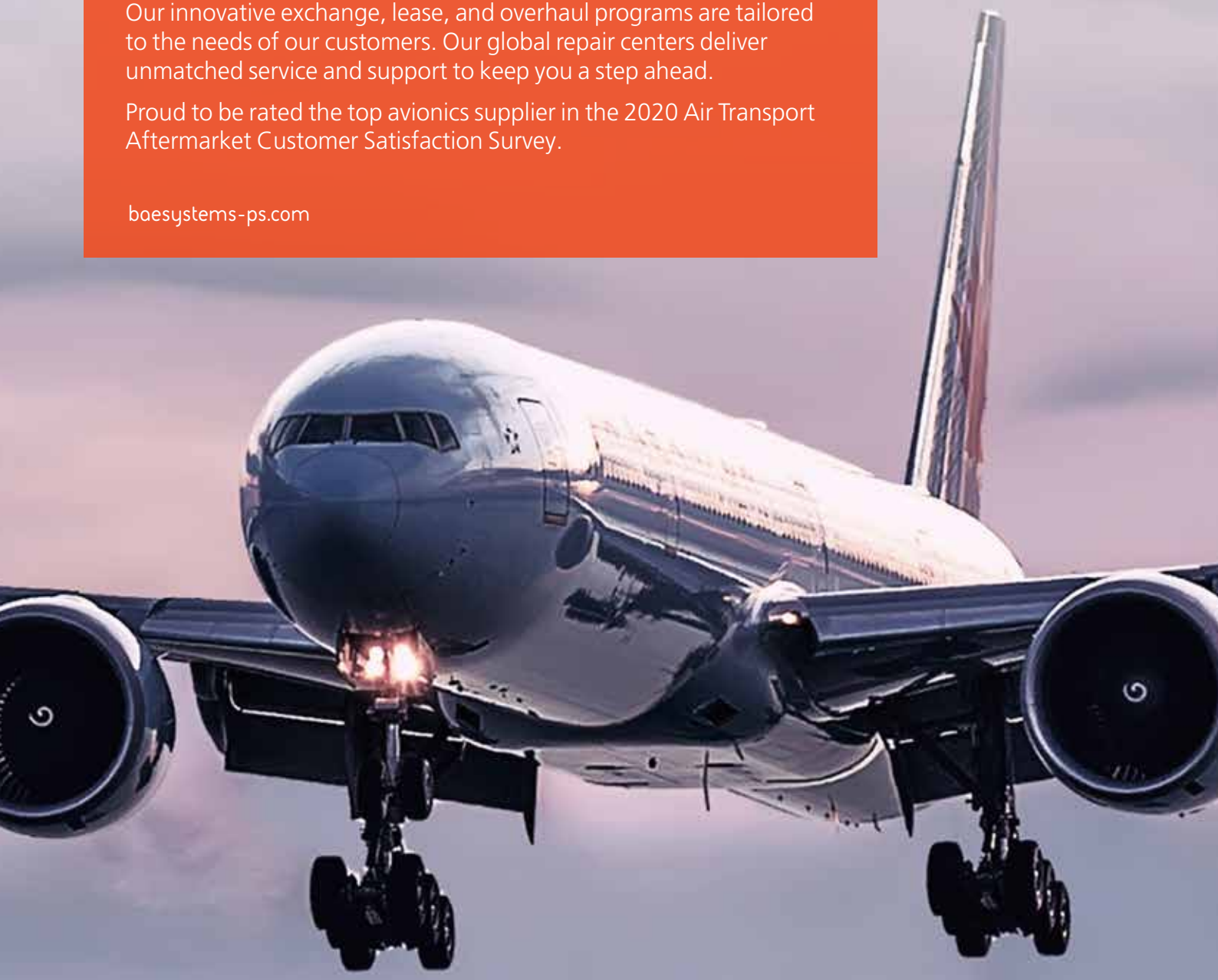

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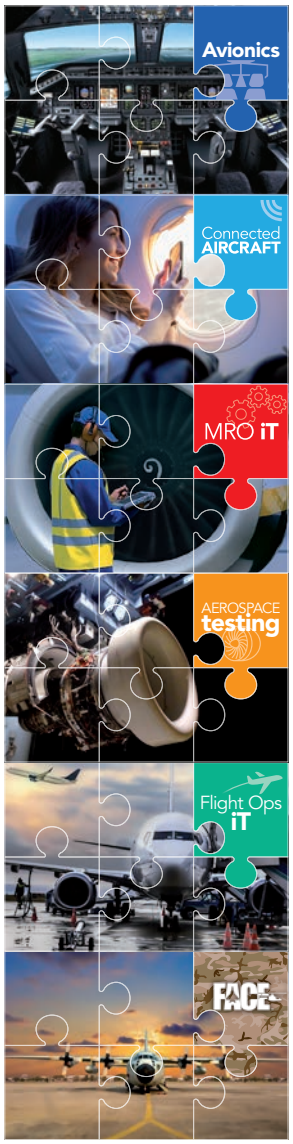

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As you'd expect, we've taken all the precautions we can to make sure this is a SAFE platform to do business. Please take a moment to review our safety measures at aerospacetechweek.com/covid-19-safety-measures/.

With over 7 conferences and more than 150 speakers, post-printing, there may have been amendments to timings and rooms, etc. Please make sure you DOWNLOAD the new EVENT APP via AerospaceTechWeek.com/APP to get the very latest information.

I hope you have a productive trip and will join us again next year, here in Toulouse, at the newly rebranded event ATW GLOBAL 1-2 June 2022. We are also excited to offer you the opportunity to attend ATW Americas in Atlanta 8-9 November 2022. For more details go to the **Aerospace Tech Week** booth 1023.

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Regards and stay safe,

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CONFERENCE AGENDA

	Avionics	CONNECTED aircraft	Flight Ops iT
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12.30pm			Delegate Networking Lunch
2pm	**CNS Updates**	**Connectivity, Communications and E-Enablement**	**EFB Operational Use & Regulations**
3.30pm			Networking Coffee Break
4.00pm	**Challenges for Avionics in the Environment**	**Application and Benefits of Connectivity and E-Enablement**	**Additional Operational Drivers**
5.30pm			Networking Reception

			Thursday 4th November
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10.30am			Networking Coffee Break
11am	**Data, usage of data, trends and monitoring**	**Aircraft Data Management Solutions and Cyber security**	**Innovations**
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2pm	**Innovations in the Industry**	**Future of Connectivity, E-Enablement and Satcom (Funky Future Stuff!)**	**Conflict between Flight Ops and bedfellows!**
4.00pm			Conference Close

MRO iT	AEROSPACE testing	CERTIFIED TRAINING
Creating a value case – the business proposition – ROI	Urban Air Mobility, EVTOLS and UAVs	Optimizing DO-178C/DO-254 Avionics Software & Hardware Development Guidelines
The ETL, and other Regulatory Considerations for MRO IT	High Level Integration and Testing, Complex and Embedded Systems	
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Data, Analytics & Cyber Security	Electrification, Aerostructures, Materials Testing	
Maintenance – able	The Future of Testing	

REGISTRATION HOURS

Tuesday 2nd Nov
2:00pm – 5:00pm

Wednesday 3rd Nov
8:00am – 7:00pm

Thursday 4th Nov
8:00am – 5:00pm

(Registration closes 30 minutes prior to exhibition hall closing)

EXHIBITION OPENING HOURS

Wednesday 3rd Nov
10:30am – 7:30pm

Thursday 4th Nov
9.30am – 5.30pm

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Aerospace Tech Week would like to thank the following representatives for providing their valuable time and contribution towards delivering these excellent conference programmes.

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Aerospace Tech Week delivers an exciting and relevant conference agenda due to the valuable contribution of its industry experts on the Conference Committees.

We are always looking for new members of these Conference Committees, who can contribute and enhance the content of these exciting conference programmes, making them more relevant to the aerospace industry.

If you are interested in getting more involved and able to provide your contribution with a growing depth and understanding to one of these committees, please contact Neil Walker, Conference Director, at neilw@aerospace-media.com, who will be delighted to have a discussion with you.

FREE NETWORKING RECEPTION

Wednesday 3rd November 2021

5.30pm-7.30pm | Exhibition Floor

FREE TO ATTEND

We look forward to welcoming you.

Avionics

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Next Steps in Integration and Implementation for SESAR and Next-Gen

EU and US collaboration in SESAR and Next-Gen aims to harmonise and secure Air Traffic Management (ATM) modernisation efforts as drivers of and in support of the International Civil Aviation Organisation (ICAO) Global Air Navigation Plan (GANP) with the Aviation System Block Upgrade (ASBU) programme.

Both SESAR and Next-Gen recognise the need to integrate the air and ground parts of their air traffic management systems by addressing efficiency needs of flight trajectories planning and execution and the seamless sharing of accurate information.

This framework provides a vehicle for the US and Europe to work together towards interoperable standards and in support of efforts towards achievement of ICAO global

Harmonisation. For example, a significant achievement in the NextGen and SESAR collaboration is the delivery of an agreed-upon baseline NextGen/SESAR Joint Avionics Roadmap.

ICAO estimates that 120 billion US dollars will be spent on air transportation systems transformation in the next 10 years. While the NextGen and SESAR modernisation programmes account for a large share of this spending in Europe and the US, there are parallel investment initiatives in other regions.

CONFERENCE PROGRAMME

WEDNESDAY 3TH NOVEMBER

9am Joint Opening Keynote

Chair: Woodrow Bellamy, Editor, Avionics Magazine

Ihsan Bari, Operations Strategy (Operating Division), Etihad Airways

Phill Godfrey, Director of International Strategy, Collins Aerospace

Bruno Stoufflet, CTO, Dassault Aviation

Alexis Vidal, VP of Product Marketing, Airbus

10.30am-11am Coffee Break

11am-12.30pm Session 1

Mandates and Regulatory Framework Updates

Despite the 2020 Coronavirus Pandemic's massive impact on the aerospace industry, enhanced safety and communications between the aircraft in the sky and the ground control continue to dominate the industry as technology becomes and increasing driver. Airlines need to move from capacity to efficiency, so what's the latest regulations and how are regulators and mandates impacting on the industry? What needs to be installed in the aircraft to meet these mandates and what is the impact on avionics for operators? Following the Coronavirus pandemic and its economic impact on the industry, who is going to pay for updates?

Chair: Luc Deneufchatel, EUROCAE

Mandates and Regulatory Framework Updates – Impact on ANSPs and impact of Pandemic on mandating – Jean-Marc Loscos, Senior officer at DSNA/DTI in charge of European Programmes, Direction des Services de la Navigation Aerienne (DSNA)

GADSS – the next steps – Henk Hof, Head of ICAO and Concept Unit, EUROCONTROL

PCP and Connection with SES – Cristian Pradera, Manager Deployment Programme and Planning, SESAR Deployment Manager

ARINC 834A / ARINC 679 new standard overview – Frederic Trincal, Technical Fellow, Connected Eco-System, Collins Aerospace

12.30pm-2pm Lunch Break

2pm-3.30pm Session 2

CNS Updates

What are the latest developments and trends in Communication, Navigation and Surveillance and flight tracking to mitigate these possibilities. How can we optimise infrastructure and how can enhanced surveillance contribute towards safety and security? What is safety services approved? How do we make positioning more robust with hybridisation? How do we transition from SES to the next systems using the EASA framework?

5mins Chair: Marc Gatti, Thales Avionics

Trends in Navigation (GNSS (incl. SBAS,GBAS), DME/DME) – Gerhard Berz, EUROCONTROL

Trends in the Surveillance Domain – Jean-Marc Loscos, Senior officer at DSNA/DTI in charge of European Programmes, Direction des Services de la Navigation Aerienne (DSNA)

Civil-Military Interoperability Calls for Dual Use CNS Solutions – Jorge Pereira, EUROCONTROL

ADS-B IN Applications on Airbus Aircraft – Pierre Nieradka & Sabine Vieyres, Airbus

Data Link Service Status and Concerns – Manfred Mohr, IATA

3.30pm-4pm Coffee Break4pm-5.30pm Session 3

Challenges for Avionics in the Environment

The aviation industry has been in the spotlight for its adverse impact on the environment, yet huge strides have been made to reduce the environmental impact of aircraft. The Coronavirus Pandemic has shone a bigger spotlight on the sector to be more 'green', with much government financial support linked to environmental change. What are technical capabilities for environmental challenges, how do we decrease emissions and what is the CO_2 limitation challenge? What is impact of given technology of environment (at different stages of flight) and what realistic role can can electrical power play?

Chair: Alex Wilson, Wind River

4D Trajectory Based Operations – Thierry Harquin, Airbus

Impact of Emission Mitigation Strategies on Aircraft Systems – Jacques Gatard, Aerospace Specialist, OcBizDev

The role of technology in the decarbonisation challenge – Marylin Bastin, EUROCONTROL

Flight Management Systems/Mission Management – Cyrille Grimald, Technical Manager – Digital & User Oriented Solutions, Dassault Aviation

If you can't do the little things right… – Marijan Jozic, SAE-ITC

5.30pmNetworking Reception

THURSDAY 4TH NOVEMBER

9:00am Session 4

Connectivity, Architecture and Cybersecurity

As the aircraft becomes more integrated and connected, security and safety concerns are becoming heightened. What are the challenges with connected FMS and what are cyber security implications of IMA? How do we ensure safety and security with the increasing use of multicore processors?

Chair: Philippe Lievin, Collins Aerospace

How is Connected FMS a game changer? – Erwan Paricaud, Sr Engineering Manager, Honeywell

DO-326/ED-202A: How Will It Change Our Lives? – Ehsan Salehi, LDRA

Ethernet Networking Protocols for Next-Gen IMA in UAV/UAM – Mirko Jakovlijevic, TTTech

Using a Connectivity Framework to Expand Capabilities in Complex IMA Systems – Chip Downing, Senior Market Development Director, Aerospace and Defense, Real-Time Innovations, Inc.

10.30am-11am Coffee Break

For the latest information and programme visit aerospacetechweek.com/avionics-prog

11am-12.30pm Session 5

Data, usage of data, trends and monitoring

Following the recent pandemic crisis, airlines need to move from capacity to efficiency. An important role for the need of Avionics to analyse more and more different types of data rates – data which is difficult to treat with single protocol/architecture, causing major under or over use of bandwidth. How can new services and applications be better supported? What is the Data Value Chain and benefit of data sourcing (collected by airlines)?

Chair: Alex Wilson, Wind River

End to End Data Extraction and Usage – View from an Engine Manufacturer – Shiv Trisal, Apps & Data Analytics VSL – Integrated Digital Solutions, Information Management Services, Avionics, Collins Aerospace

Data Link Applications Supporting AIS and Meterological Data (New Services) – Alexander Engel (WG76, EUROCAE)

The Use of Aircraft Data by Meteorological Services – Bruno Piguet, Deputy head of upper-air observation, Meteo France

Addressing the Challenges in connecting Aircraft Operational Data with Applications that drive Actionable Intelligence – Willie Cecil, Sales Director, FLYHT

12.30pm-2pm Lunch Break

2pm-4.00pm Session 6

Innovations in the Industry

How will the industry change after the impact of the Coronavirus pandemic and how will technology assist in efficiencies for airlines and aircraft? With more research and investment being applied in urban mobility, single pilot operations and autonomous systems, what does the future hold and what part will avionics have to play? How do we develop standards for use of AI and machine learning and what impact will autonomy have on the pilot and passenger?

Chair: George Papageorgiou, Honeywell

Airbus is Providing Enhanced Vision to Pilots – Fabrice Bousquet, Vision Systems Expert, Airbus UpNext

Blockchain and AI in Aviation – Sergio Ruiz, EUROCONTROL

Enabling the Migration to Intelligent Commercial and Defence Avionics Platforms Using Software Defined Platforms and Digital Transformation – Paul Parkinson, Wind River

EUROCAE WG-114 on Artificial Intelligence – Anna Guegan, Technical Programme Manager, EUROCAE

Is the Future of Avionics Autonomous? – Alex Wilson, Wind River

4pm Conference Close

Connected AIRCRAFT

aerospacetechweek.com/connected-aircraft-prog

Optimising Connectivity for Maximising Profitability

In 2019, the London School of Economics (LSE) reported there were 3.8 billion passengers flying annually with only around 25% of aircraft in the air offering passengers some form of onboard broadband connectivity service. This service is often of variable quality, with patchy coverage, slow speeds and low data limits.

By 2035, it is likely that IFC will be ubiquitous across the world as aircraft become smarter, fully connected machines, and with the new services being introduced to benefit the passenger experience, grow revenues for airlines and improve safety. However, to achieve these goals it relies on reliable and seamless connectivity – from the cabin to the cockpit.

According to Inmarsat the connected aircraft can transmit data in real-time to reveal insights that could transform operations, potentially saving $5.6bn a year in unplanned maintenance costs. Connectivity enables airlines to bring dramatic, yet cost effective enhancements to the passenger experience – and to take advantage of the new revenue streams that accompany them.

CONFERENCE PROGRAMME

WEDNESDAY 3RD NOVEMBER

9am Joint Opening Keynote

Chair: Woodrow Bellamy, Editor, Avionics Magazine

Ihsan Bari, Operations Strategy (Operating Division), Etihad Airways

Phill Godfrey, Director of International Strategy, Collins Aerospace

Bruno Stoufflet, CTO, Dassault Aviation

Alexis Vidal, VP of Product Marketing, Airbus

10.30am-11am Coffee Break

11am-12.30pm Session 1

The Connected Aircraft Evolution: Increasing the Benefits of Connectivity

Technology has been developing at a rapid rate, but what do we now mean by the 'Connected Aircraft', especially in a post-Covid-19 age? A truly Connected Aircraft becomes a great business enabler and offers airlines and the broader industry great benefits and opportunities. With many airlines focusing on cost savings and efficiences, how can investment in the connected aircraft contribute towards these? What are these benefits and opportunities and how can we deliver enhanced services and solutions for a more integrated aerospace world?

Chair: Murray Skelton, Teledyne

Connected Aircraft: A Game Changer – Matthew Emery, Honeywell

Connected Aircraft: Creating a Digitally Adaptive Ecosystem – Sandeep Sandy Muju, TCS

Wolf Sonnenberg, Director Connectivity Solutions, Teledyne Controls

Managing your Advantage - Electronic Flight Folder – Jon Merritt, Value Stream Leader, Flight Deck and EFB Applications, Collins Aerospace

12.30pm-2pm Lunch Break

2pm-3.30pm Session 2

Connectivity, Communications and E-Enablement

For the Connected Aircraft, communications systems are key, but each offer different benefits and solutions. The drive for cost savings and efficienices means airlines are streamlining or optimising systems. What you can do with satcom, LEO, L and Ku Bands? What type of system is best for different communications such as traffic, ACARS messages, safety services and non-safety services?

Chair: Philippe Lievin, Collins Aerospace

A Step Forward in Data Link Communication Through SatComs with IRIS – Rui Fernandes, Systems Marketing Manager, Airbus SAS and Sylvie Sureda-Perez, Senior Director, Datalink Solutions, Inmarsat Aviation

Technology and Business Model Evolution Towards 5G Ultra-Broadband Aircraft Connectivity – Dr Michael Ohm, CTO & Founder, SkyFive

Data Integrity for Cockpit Communications – Peter Moss, Senior Director Business Development, Inmarsat Aviation

3.30pm-4pm Coffee Break

4pm-5.30pm Session 3

Application and Benefits of Connectivity and E-Enablement

Savings come from applications that bring value and efficiencies. The synergy and compatibility of applications are of prime importance to enhance efficiencies. What are the applications of connectivity and how do these most benefit airlines/operators and the supporting supply chain? How do we get the most value from connectivity? Here we explore case studies of connectivity applications.

Chair: Woodrow Bellamy, Editor, Avionics Magazine

Skywise (and FOMAX) and Connectivity for Airline Operations by Airbus – Alexandre Hofman, Airbus & Lise Gladines, Digital Services Marketing Manager, Airbus

Benefits of Connected EFB Weather Awareness Solution – Avoiding the Avoidable – Victor de los Santos, CSPO Product Manager, SITA FOR AIRCRAFT

ACARS over IP – Murray Skelton, Senior Director of Sales, Europe and CIS, Teledyne & Euan Mitchell, Senior Product Manager, SITA FOR AIRCRAFT

5.30pm Networking Reception

THURSDAY 4TH NOVEMBER

9:00am Session 4

The Increasing Value of the Connectivity Through ATM

What services can be expected from ATM and what is the value chain of connectivity from the ground to the air? Where can the connected aircraft contribute to the wider chain and how can it impact on other operations within the 4 As?

Chair: Mark ter Hove, Inmarsat

Trajectory Based Operations (TBO) – Henk Hof, Head of ICAO and Concept Unit, EUROCONTROL

GNSS Interference Mitigation – Gerhard Berz, Senior Expert Navigation Systems, EUROCONTROL

Michele Carandente, Director of EMEA, Aireon

GADSS/Autonomous distress tracking – Dr. Hannes Gabriel, Director Aerospace and Assured Space Systems – CGI IT UK Limited"

10.30am-11am Coffee Break

For the latest information and programme visit aerospacetechweek.com/connected-aircraft-prog

11am-12.30pm Session 5

Aircraft Data Management Solutions and Cyber security

As data becomes more prolific and more 'valuable' to an organisation, how do we control this flow of information and who 'owns' the data? As processing data offline becomes more economical, what are data limitations, how do we value data and share just required data and ensure its security?

Chair: Pacome Revillon, Euroconsult

e-Aircraft DataHub: The Aircraft Data Management Solution – Joan Roca, Product Manager, SITA FOR AIRCRAFT

But They're My Competitor! Why We Need to Collaborate on Cybersecurity – Lori Pierelli, International Marketing Manager, A-ISAC

A Zero Trust model for Avionics – Chris Bartlett, President, CCX Technologies

Enabling $33B in yearly value by breaking logjams in data sharing between aviation stakeholders – Mark Roboff, CEO, SkyThread.aero

12.30pm-2pm Lunch Break

2pm-4.00pm Session 6

Future of Connectivity, E-Enablement and Satcom (Funky Future Stuff!)

What could be done in the future with connectivity and how can new tech assist airlines in reducing costs and enhancing efficiencies? With giant leaps in technological development, what is possible, how can AI and machine learning benefit safety and security? What are other industries doing with connectivity that could be applicable to the aerospace industry?

Chair: Murray Skelton, Teledyne

Future of the market overview – Pacome Revillon, Euroconsult

The future of satcom and airport surface data connectivity technology, for E-enabled operations and maintenance of tomorrow – Willie Cecil, Sales Director, FLYHT

Title TBC – Senior Representative, Inmarsat Aviation

Title TBC – Senior Representative, Presagis

4pm Conference Close

AEROSPACE **testing**

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New Testing Strategies for New Technologies

With maximum aircraft utilization a top priority for profitability at the airlines, aircraft are being worked harder than ever. And it is paying off – the airlines are seeing record profits. All well and good until you think about the usage of the asset. With every hour, every cycle, every landing added to the aircraft, comes the potential for vibration, fatigue, cracking, metal formation in oil, structural degradation and even the eventuality of a catastrophic engine failure like the one that happened on Southwest Flight 1380 in 2018.

Even with record profits, not a single operator can afford a failure like that. And while the aviation safety record is enviable right now, there is no rest or slacking off in the inspections and testing of the equipment in operation in our fleets. Inspection and testing equipment technology is making technological leaps and bounds. Keeping up with those technological leaps is imperative to the safe operation of aircraft that begin aging as soon as they are flown away from the manufacturer.

CONFERENCE PROGRAMME

WEDNESDAY 3RD NOVEMBER

9am Joint Opening Keynote

Chair: Woodrow Bellamy, Editor, Avionics Magazine

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Phill Godfrey, Director of International Strategy, Collins Aerospace

Bruno Stoufflet, CTO, Dassault Aviation

Alexis Vidal, VP of Product Marketing, Airbus

10.30am-11am Coffee Break

11am-12.30pm Session 1

Urban Air Mobility, EVTOLS and UAVs

The concept of Urban Air Mobility is rapidly developing, but with little in terms of regulations and understanding the impact on the airspace – what do we have to test for if we have hundreds in the sky? What are the requirements, how do we appropriately test a crash, what about acoustic emissions tests, how to test without autorotation, what about detect and avoid? In this session we discuss some of the requirements and implications.

Chair: Mark Ter Hove, Inmarsat

Electrical Simulation for the More-Electric Aircraft – Jean-Paul Marcade, Aerospace Application Engineer, MathWorks

Title TBC – Gavin Gregan, Global VP Sales, Sol.One N.V.

Advanced Air Mobility: A New Era in Aviation – Thierry Olbrechts, Director Simcenter Aerospace Industry Solutions, Siemens Digital Industries Software

12.30pm-2pm Lunch Break

2pm-3.30pm Session 2

High Level Integration and Testing, Complex and Embedded Systems

With the move towards Aerospace 4.0 and digitisation, AI and machine learning is becoming an increased focus for organisations. Amongst this, cyber attacks are a major threat to any organisation and is increasing in activity. As more testing moves to server or cloud based environments, securing test processes and data is becoming increasingly important. Cybersecurity also needs to be designed into avionics to maintain continuous airworthiness & testing requirements. What do regulators want the industry to do to meet standards, what does airline need to do to enhance network security on connected aircraft & test it?

Chair: Matt Jackson, Presagis

Towards Robust Partitioning using bare-metal Virtual Machines – Tim Loveless, Lynx Software Technologies

Timing Analysis for Critical Aerospace Embedded Software – Dr. Hashem Ghazzawi, Account Manager & Joseph Anderson, Field Application Engineer, Rapita Systems

An Introduction to Machine Code Structural Coverage: Conforming to DO-178C for Level A Software – Parasoft

Validation of the Pilot – Automation – Aircraft – Operating Environment Systems Dynamics Model for Virtual Flight Testing and Safety Assessment – Ivan Burdun, President, AIXTREE / Alexander Grebenkin DSc, Head of Department, Moscow Institute of Electromechanics and Automatics (MIEA), PJSC / Sergey Kostin, Deputy General Director – Business Development, SP Automatika

3.30pm-4pm Coffee Break

4pm-5.30pm Session 3

Ensuring Successful Testing in the New Environment

The Coronavirus pandemic has had a massive impact on the working environment, including how testing is undertaken. Remote and virtual testing has moved rapidly forward, whlst developments in digital twinning has revolutionised the way the testing and verification is undertaken. What's the impact of the new working environment on multicore, digital twins and digital manufacturing, and what role can predictive maintenance play? How do we employ measures to ensure the reliability and integrity of testing in this new age?

Chair: Jacques Gatard, OcBizDev

Accelerating Regulatory Compliance with 3D Model based Simultation – Jean-Baptiste Quincy, Dassault Systems*

Improving systems test coverage by automated testing and fault injection with Digital Twins – James Hui, Wind River

Advanced Aerodynamic Flight Test Instrumentation Technology – Paul Crowhurst and Frédéric Poirier, EvoMesure

5.30pm Networking Reception

THURSDAY 4TH NOVEMBER

9:00am Session 4

Artificial Intelligence, Machine Learning and Cybersecurity Within The Testing Environment

Cyber attacks are a major threat to any organisation and is increasing in activity. As more testing moves to server or cloud based environments, securing test processes and data is becoing increasingly important. Cybersecurity also needs to be designed into avionics to maintain continuous airworthiness & testing requirements. What do regulators want the idustry to do to meet cybersecurity standards, what does airline need to do to enhance network security on connected aircraft & test it?

Chair: Matt Jackson, Presagis

AIR69988 Artificial Intelligence in Aeronautical Systems: Statement of Concerns Standard – Mark Roboff, CEO of SkyThread.aero, G-34 Committee Chair

Trust in Autonomous Systems – How to Design Collaborative Human / AI Systems – Marc Gatti, Directeur Scientifique & Relations Académiques – HDR, Thales AVS France

Advanced cockpit design trends, an example with an evaluation of AI embodied in a virtual assistant for fighter's pilots – Guillaume Calvet, R&D Management Officer, Human Design Group

"Gaining insight behind ML applications" – how can simulation and virtual hardware provides a more time-effective way to design, collaborate and test intelligent edge devices for the post-COVID developers – James Hui, Solution Engineer, Wind River

10.30am-11am Coffee Break

11am-12.30pm Session 5

Electrification, Aerostructures, Materials Testing

With more new materials in aerostructures, new processes are required to successfully test from birth to death. How do we standardise testing for 3D printing, conductive inks, graphine, ALM for temperature, pressure, loads, corrossion, reliability, obsolence or robustness? Electrification brings new power supply issues, providing potential problems for avionics. How can electrification develop reliable tests of electrical systems?

Chair: Jacques Gatard, OcBizDev

Advanced Flow Front Monitoring with Miniature Line Sensors – Dr Christopher Buchmann, InFactory Solutions GmbH

Aircraft Engine Fan Blade Inspection by Means of UT Phased Array and Eddy Current Array – Michael Barbeyrol, Senior Product & Application Specialist, Olympus

Automated process monitoring of the metal additive manufacturing process – time and cost savings thanks to neural networks – Jonas Holtmann, PHD Candidate, Testia

Reducing Power Consumption in Commercial Processors – Thomas Guillemain, Marketing & Business Development Manager, Teledyne e2v

12.30pm-2pm Lunch Break

2pm-4.00pm Session 6

The Future of Testing

With Machine Learning and AI the current buzz for the future of the aerospace industry, how do we approach designing and testing for automation? How do we identify what to test and to what standards, how do we ensure safety of systems and how to test new processes such as transition from automation to pilot and vice versa? In this session we take a look at what the future of testing holds.

Chair: Mirko Jakovljevic, TTTech

Introducing the New ARINC Standard for Avionics Displays – Matt Jackson, Technical Product Manager, Presagis

Testing safety-critical machine learning – Corentin Perret-Gentil, Machine Learning Scientist, Daedalean

Strategies to address electronic component obsolescence or Tentacle #8 – Marijan Jozic, Octonx

Early screening of multifactorial risk space for Black Swan accident scenarios using virtual Flight test and Safety assessment technology – Ivan Burdun, President, AIXTREE

Prof. Alexander Grebenkin, Head of Department – Moscow Institute of Electromechanics and Automatics (MIEA), PJSC

Andrew Bubin, IT Engineer, AIXTREE

Certifying Future Aerospace Systems – Dr Hashem Ghazzawi, Rapita Systems

4pm Conference Close

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Flight Ops iT

aerospacetechweek.com/flight-ops-it-prog

Enhancing Flight Operations Solutions

The software that supports flight operations (or 'Flight Ops') can mean a myriad of things. It can be specific to a pilot's electronic techlog or flight bag (ETL or EFB) functionality, or it can focus on the wider processes surrounding a flight. For instance, it can be more directed towards crew training, ground handling, line maintenance or fuel efficiency and management and so on. This is before one considers environmental pressures, operational reliability or efforts or airlines to decrease turnaround times (TATs).

The extent that an airline will therefore prioritise each element will depend on its operational style, and there is no 'one stop shop' or fix-all solution that is the single answer. Establishing connectivity 'hubs' or data platforms are becoming more common and will be one of the approaches explored throughout the Flight Ops IT conference sessions.

CONFERENCE PROGRAMME

WEDNESDAY 3RD NOVEMBER

9am Joint Opening Keynote

Chair: Woodrow Bellamy, Editor, Avionics Magazine

Ihsan Bari, Operations Strategy (Operating Division), Etihad Airways

Phill Godfrey, Director of International Strategy, Collins Aerospace

Bruno Stoufflet, CTO, Dassault Aviation

Alexis Vidal, VP of Product Marketing, Airbus

10.30am-11am Coffee Break

11am-12.30pm Session 1

The Business Case and Use Case for Flight Ops IT

A well-established use case motivates airlines to investigate new Flight Ops technologies, while the business case quantifies these benefits and encourages investment. Following the Covid-19 pandemic and additional challenges and pressures on airlines, this session addresses the 'combined business case'; that is, the importance of partnerships between airline departments in addition to third party providers. An IT support team's role in realising potentials is also addressed.

Chair: Philippe Lievin, Collins Aerospace

The Business Case and Use Case for Flight Ops IT – René de Vogel, Senior Manager, Flight Deck, and Data Solutions, Boeing

Paperless Operational Units and Teams in Aviation – Dragan Bilac, Head of Technical Services Performance at Croatia Control Ltd

What Benefits are Delivered to Airlines by an Integrated Application Suite – Frederic Dru, AVIOBOOK

Cost savings during ramp-up – Klaus Olsen, Network & Cyber Security Specialist, Triple-S EFB Administrator, Flightdeck Software AB and Fredrik Uddegard, Frontline Industry Sales Lead, Microsoft EMEA

12.30pm-2pm Lunch Break

2pm-3.30pm Session 2

EFB Operational Use & Regulations

The Electronic Flight Bag (EFB) has been in operational use for some time, however implementation and use is closely regulated. The regulatory framework is summarised, and benefits analysed via real use cases. Maximising the use of the EFB requires integration of various data sources, and subsequent training for Flight Crews on effective use of these technologies. As EFBs conitnue to evolve, we explore key considerations here.

Chair: René de Vogel, Boeing

Wizz EFB Overhaul & Roadmap – Gerben Bondt & Miklos Bodai, Senior Manager Flight Policy and Standards, Wizz Air

Engaging, enabling and empowering pilots with FlightPulse: a case study – Luke Bowman, Senior Product Manager, GE Aviation's Digital Group

New pilot flight briefing experience – Capt. Olivier Aspe, Airbus TRI/TRE Pilot Expert Operations Advisor for EFB products, NAVBLUE, An Airbus Company

Managing your Advantage – Electronic Flight Folder – Jon Merritt, Value Stream Leader, Flight Deck and EFB Applications – Collins Aerospace

3.30pm-4pm Coffee Break

4pm-5.30pm Session 3

Additional Operational Drivers

When one considers Flight Ops IT, the EFB is a leading factor. Yet there is a wealth of additional benefits on offer other than fuel savings and efficient route planning; process efficiencies and greater operational reliability are recognised here. To define these wider operational drivers, real-time data, weather 'nowcasts', and ground handling / line maintenance efficiencies are explored, combined with an appreciation of Flight Ops IT in the overall enhancement of Flight Safety.

Chair: Phil Camm, Specialist Aviation Services

The Market for Connected Digital Applications – David Whelan, Valour Consultancy

Digital transformation – Lessons Learnt – Eric Bogner, Maintenance Control Center – Project Manager, Etihad Airways

Digital Aircraft Strategy – The organizational aspects of the connected aircraft – Samy Mahdi, Partnership Manager, Lufthansa Systems

Fuel and Flight Efficiency – Kevin Ward, NAVBLUE an Airbus Company

5.30pm Networking Reception

For the latest information and programme visit aerospacetechweek.com/flight-ops-it-prog

THURSDAY 4TH NOVEMBER

9:00am Session 4

Data – standardisation, management and analysis

An airline's ability to ingest and analyse flight data efficiently, then filter effectively to pilots via a suite of EFB applications is complex but of key importance. Interfacing different applications to communicate and process data is one aspect, while assimilating various data standards, codes and formats from a mixed fleet of aircraft is another. Learn from the experiences of airlines, OEMs and software providers.

Chair: Samy Mahdi, Lufthansa Systems

Title & Speaker TBC

Data – Standardization, Management and Analysis – Dr Thorsten Wiesemann, Director Flight Deck Solutions – Smart Map Solutions, Boeing

Title & Speaker TBC

How to empower a fuel efficiency program through data and pilot engagement – Stéphane Nitenberg, Open Airlines

10.30am-11am Coffee Break

11am-12.30pm Session 5

Innovations

Development and progression are vital aspects of technology. Join this session to see what is evolving to benefit flight operations, and what innovations can / will extract additional value for airlines. The capabilities offered by new and emerging aircraft types are discussed, in addition to an exploration of what other industries are doing and how this might inspire aviation's own technological endeavours.

Chair: Phil Camm, Flight Operations Support/Technical Librarian – Specialist Aviation Services

BLOCKCHAIN: Options for Industry, Opportunities for Regulators – Robert Stallard, Safety Strategy Specialist, UK Civil Aviation Authority

Taking Flight Efficiency to the Next Level with Predictive Analytics – Francois Chazelle, Safety Line

Use of Transmitting Portable Electronic Devices Aboard Aircraft – Matt Hunting, AAC Engineering

Securing Safety During Take-off and Landing with Airport FOD Detection Radar Systems – Serdar Üzümcü, Systems Engineering Group Manager & Ali Ata, Team Leader/ Product Manager, HAVELSAN

12.30pm-2pm Lunch Break

2pm-4.00pm Session 6

Joint Panel Discussion: Flight Ops IT & MRO IT

Conflict between Flight Ops and Maintenance – able bedfellows!

How can MRO IT and Flight Ops IT best work together for maximum efficiency and minimise turnaround times? With the advent of paperless aviation, where do TechLogs, EFBs and CabinLogs converge and how can the supply chain best support the airlines to ensure complex decisions are made easier?

Moderator: Nick Godwin, NSG Aero

Shane Murphy, AMOS Systems Analyst, ASL Airlines

Paul Boyd, Managing Director, Conduce

Tim Spears, VP of Onboard Systems, Ultramain Systems, Inc.

René de Vogel, Senior Manager, Flight, Deck and Data Solutions, Boeing

Samy Mahdi, Partnership Manager, Lufthansa Systems

Robert Mather, Vice President, Aerospace and Defense Industries, IFS

4pm Conference Close

MRO iT

aerospacetechweek.com/mro-it-prog

Maximising IT for Minimising Costs

Five years ago, the concept of 'paperless' and mobile maintenance formed the buzzwords of our industry. It took time for aviation and its cohort of operators, lessors, regulators, financiers, manufacturers and MRO providers to become more at ease with the disruptive technologies that enabled a new age of maintenance to gain traction.

Today, we see drones, artificial intelligence (AI), machine learning, blockchain and predictive maintenance being discussed more and more. While aviation is still undeniably cautious with new innovations, it is more open to learning how to adapt to them. The MRO IT conference track sessions will encourage forward, proactive thinking in addition to a focus on establishing tangible and robust business cases. End the experience at a joint-panel session with the Flight Ops IT conference speakers, where we will explore the most constructive methods to maximise communications and data-sharing between two of the most important departments in an airline.

CONFERENCE PROGRAMME

WEDNESDAY 3RD NOVEMBER

9am Joint Opening Keynote

Chair: Woodrow Bellamy, Editor, Avionics Magazine

Ihsan Bari, Operations Strategy (Operating Division), Etihad Airways

Phill Godfrey, Director of International Strategy, Collins Aerospace

Bruno Stoufflet, CTO, Dassault Aviation

Alexis Vidal, VP of Product Marketing, Airbus

10.30am-11am Coffee Break

11am-12.30pm Session 1

Creating a value case – the business proposition – ROI

Significant investment in IT/technology is required to ensure successful digitalisation of systems, often with ROI not immediately visible. Following the Covid-19 pandemic, airlines are needing to look at cost savings and efficiencies, however, also needing to invest in different areas. How do we create a value case for new mobile application of new systems and to help transform maintenance, increase productivity and efficiencies?

Chair: Adrian Ionascu, Blue Air

The Implementation of a MRO Software System Through a Pandemic – Shane Murphy, AMOS Systems Analyst, ASL Airlines

Title TBC – Phil Bathurst, COO, EmpowerMX, and Greg Emerson, Vice President Base Maintenance, American Airlines

A Compelling Time to Invest in Digital MRO – John Simmons, iBASEt

Delivering a Mission-critical MRO IT Solution in the Cloud – Considerations and a Case Study – Robert Mather, Vice President, IFS Aerospace & Defense

12.30pm-2pm Lunch Break

2pm-3.30pm Session 2

The ETL and Other Regulatory Considerations for MRO IT

The Electronic TechLog (ETL) is an important tool in digital maintenance. But what regulatory considerations are there, and what are the implications for safety management, such as the Aircraft Network Safety Program (ANSP)? What are the problems with legacy systems moving to modern platforms and what are the best approvals processes? Key compliance and approval requirements are also explored.

Chair: Nick Godwin, NSG Aero

aTechlog and Cabin Log to Make the Work of Operators More Efficient Than Ever Before – Thierry Kuppens, AVIOBOOK

Techlog regulatory approval – Paul Boyd, Managing Director, Conduce

Considerations for the ETL & Digital Maintenance – Tim Spears, Vice President – Onboard Systems, Ultramain Systems, Inc.

MRO Safety Management System & Interface – Sotirakis Stamou, Aviation Safety Inspector, Hellenic CAA

3.30pm-4pm Coffee Break

4pm-5.30pm Session 3

Business modelling and Risk modelling

Technology and data being used for predictive maintenance provides many challenges. Why is predictive maintenance important, but what are the risks involved and how can this affect the business model and supply chain? How can you develop predictive modelling and provide levels of protectiveness through business continuity?

Chair: Dr. Hugh Revie, CEO, dmblue Limited

What are model-driven predictive simulations and how can they benefit your maintenance planning? – Phil Cole, Business Manager Civil Aviation, Aerogility

The Business Case of Fully Integrated, Scenario Based Planning in Aircraft Maintenance – Joost van der Maarel, Novulo

Task Packaging and Scheduling – Dino Spirtovic, Royal Netherlands Aerospace Centre (NLR)

Prognos Predictive Maintenance Solutions – Rob Stolk, Predictive Maintenance Lead, AFI KLM E&M

5.30pm Networking Reception

THURSDAY 4TH NOVEMBER

9:00am Session 4

Enhancing MRO Efficiencies Through use of Emerging Technologies

As technologies advance at rapid pace, how do airlines best take advantage and ensure technology gets into the production environment? How can we successfully and safely implement newer generations of mobile technology, software in legacy systems and paperless systems? What role can AI and augmented reality play in creating efficencies? What should the long term digital strategy look like?

Chair: Julien Methot, Senior Manager Business Consulting – Swiss Aviation Software Ltd

Pilot and maintenance cooperation digitally enhanced by AVIATAR – Gerben Bondt, Wizz Air / Frank Martens, Lufthansa Technik

Benefits of a Digital Twin for MRO Facilities and Processes – Dr. Hugh Revie, CEO, dmblue Limited

Applications of AI/ML use cases in MRO IT systems – Miguel Garcia Braun, Associate Director, Ramco Systems

Digital Tool Management in Aviation Maintenance – Janne Kulmala, Senior Business Consultant – QOCO Systems Ltd

10.30am-11am Coffee Break

11am-12.30pm Session 5

Data, Analytics & Cyber Security

Big data provides the potential to facilitate maintenance planning and predictive maintenance, and the opportunity to optimise decisions, but how do we best achieve this? What role can machine learning and digital twins play? What is our ability to maximise the use of data? What role can the Cloud play and how do we ensure data transfer/ delivery is secure?

Chair: Robert Mather, Vice President, Aerospace and Defense Industries, IFS

Digital Tech-Ops: Providing data & mobility to Mechanics – Experiencing & Benchmarking – Julien Methot, Senior Manager Business Consulting, Swiss Aviation Software

Title & Speaker TBC

Digital Threads, Integrating Core and Innovative Technologies to Optimise Technical Operations – Bruno Bouf, VP Head of Aerospace & Defense, Capgemini Invent, CapGemini

Fast Track to Mature Operational Reliability – Shiv Trisal, Apps & Data Analytics VSL | Integrated Digital Solutions, Information Management Services | Avionics, Collins Aerospace

12.30pm-2pm Lunch Break

2pm-4.00pm Session 6

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For the latest information and programme visit aerospacetechweek.com/mro-it-prog

TECHNICAL WORKSHOPS PROGRAMME

The Aerospace Technology Week Workshops deliver greater insights for engineers and technicians into specific areas of focus with more detailed analysis.

Our Free-to-Attend Workshop Showcase demonstrates the newest technologies, solutions, ideas, and innovations.

WEDNESDAY 3RD NOVEMBER 2021

WORKSHOP ONE

Architecture, Data, Analytics and Security

11am Leveraging AI Methods for Reducing Certification Costs of Safety Critical Cyber Physical Systems – Deni Raco, RWTH Aachen University

11.30am AVI Abstract 32 – Electric Embedded Actuators: How to reduce development and manufacturing costs – Gilles Duplessy, ISP System

12pm Backdrop and context briefing of Aerospace Cybersecurity in 2021 – Florent Rizzo, Cyberinflight

12.30pm Development of contactless power and data transfer unit for flight critical tilt rotor application – Carlo Rens, NLR

1pm Title to be shared soon – Tiago Costa, Product Marketing Specialist N-OCC systems, EMEA Region, NAVBLUE, An Airbus Company

1.30pm Increased threat of RF (Radio Frequency) interferences to Navigation and Surveillance – Aasim Khan, Collins Aerospace

WORKSHOP TWO

Connectivity & Digital Systems

2.30pm 5G Connectivity for Digital Aviation – Patrick Castagnino, Airbus

3pm Furthering Intra-Airline Collaboration Using New App from SITA FOR AIRCRAFT – Kemal Ahmed, SITA FOR AIRCRAFT

3.30pmHow far away is 4G LTE sunset and the need for 5G wQAR technology to keep up with airline big data initiatives? (A clue – it's sooner than you think!) – Willie Cecil, Flyht

4pm The power of real time connectivity with aircraft for live monitoring of aircraft performance and carbon emission reductions – Jean-Philippe Beaujard, General Director & Romain Blanquet, Business Development Director, FlightWatching

THURSDAY 4TH NOVEMBER

WORKSHOP THREE

Flight Systems and Safety

10am ODESSA, an adaptation of Automotive Radar Sensor for Avionic Application – Iacopo De Angelis, Interconsulting

10.30am Next Generation Flight Management – Charles Lockyear, GE Aviation

11am How to write good functional & safety requirements in 2021 – Micael Martins, Visure Solutions

11.30am Title & Speaker to be shared soon

12pm Digitizing to keep staff, customers and crew safe – Stefan Bundgaard, Director of Product, Web Manuals

12.30pm Meeting GADSS Autonomous Distress Tracking Requirements with Distress Tracking ELT – Thomas Lefebvre, Sales Manager, OROLIA

1pm Multicore System Management: Hypervisor or Multicore Framework? Thomas Ulber – Siemens Electronic Design Automation GmbH

WORKSHOP FOUR

Simulation and Testing, Standards & Certification

2.30pm The State of the Art in Smart Wind Tunnel Models – Michiel Bardet And Theo ter Meer, NLR

3pm Systems Engineering Best Practises to manage Complexity for Avionics – Atef Ghribi, Solution Engineer & Technical Consultant, Intland Software

3.30pm Exploiting new satellite connectivity means to conduct efficient flight test missions: the ESA PLATIN Project – Jean-Marc Gaubert, ATMOSPHERE

AEROSPACE TechWeek.com

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6 EVENTS UNDER 1 ROOF

Avionics | Connected AIRCRAFT | MRO iT | AEROSPACE testing | Flight Ops iT | FACE

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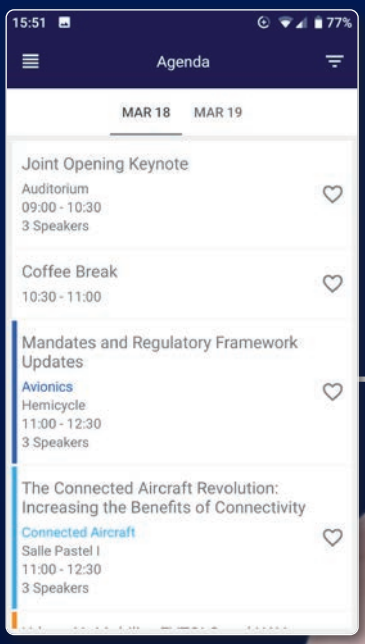

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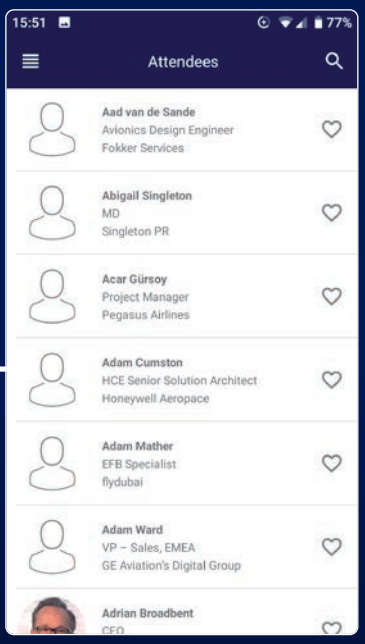
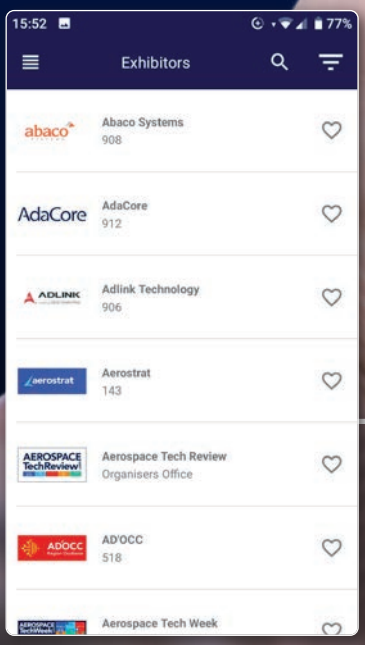




AerospaceTechWeek.com/APP

CERTIFIED TRAINING COURSES

The Certified Training Programme will be delivered by industry leader AFuzion. They are the leading training providers of safety-critical systems, software, and hardware engineering in the aerospace industry. The courses will cover:

WEDNESDAY 3RD NOVEMBER

Course ONE: Optimizing DO-178C/DO-254 Avionics Software & Hardware Development Guidelines

In this fast-paced AEE course, experienced avionics engineers learn how to optimize DO-178C & DO-254 to real avionics. Not just theory, but practical examples to develop better compliance with DO-178C (ED-12C) and DO-254 (ED-80).

THURSDAY 4TH NOVEMBER

Course TWO: Applying the New Mandatory Aviation Systems/Safety Regulations: ARP4754A (with ARP4761/A)

The now nearly-mandatory SAE-ARP4754A provides guidance for the development of aircraft and aircraft systems while taking into account the overall aircraft operating environment and functions.

ROYAL AERONAUTICAL SOCIETY TOULOUSE BRANCH

RAeS LECTURES
(FREE TO ATTEND)

WEDNESDAY 3RD NOVEMBER 2021 – 11am-4.30pm

11.00 am – 11.45 am
Philippe Crebassa
Aéroport Toulouse-Blagnac – Chairman of the Executive Board
Topic: "Exiting the pandemic stronger: a short airport story"

11.45 am – 12.30
Benoit Broudy
Thales Alenia Space – Vice President Satellite Navigation
Topic: "Satellite Based Augmentation System (SBAS) performances improvement for aviation"

2.00 pm – 2.45pm
Jean Botti
VoltAero – CEO
Topic: "Removing General Aviation from the Environmental Equation"

2.45 pm – 3.30 pm
Marwan Lahoud
ACE Capital Partners – Executive Chairman
Topic: TBC

3.30 pm- 4.15 pm
Dr. Simon Weeks
Aerospace Technology Institute, CTO – FlyZero
Topic: TBC

The Royal Aeronautical Society Toulouse Branch was formed in 1991. The Branch organises a monthly lecture programme including one each year dedicated to the Branch founding chairman, the distinguished test pilot Gordon Corps. Aerospace Technology Week is delighted the RAeS Toulouse Branch will be contributing an interesting Free to Attend Lecture during the event.

Register your interest at **www.aerospacetechweek.com/register**

FACE WORKSHOP

WEDNESDAY 3RD NOVEMBER

11am-12.30pm

Driving Interoperability with the FACE Business Approach and Technical Standard

The Future Airborne Capability Environment (FACE) business approach and technical standard is creating a new higher level of avionics design efficiency and interoperability. This session discusses a range of FACE advantages that drive faster and more efficient development and deployment of FACE solutions.

- **Intro to Future Airborne Capability Environment (FACE) Business Approach and Technical Standard for Modernizing Next-Generation Military Avionics** – RTI (Speaker: Chip Downing)
- **Developing Portable and Reusable Applications with SCADE, FACE and ARINC 661** ANSYS (Speaker: Thierry Le Sergent)
- **Interoperability to FACE Certified Conformant Systems** – RTI (Speaker: Andre Odermatt)

2pm-3.30pm

Accelerating Avionics Safety and Airworthiness Usingxthe FACE Architecture

One of the most challenging aspects of avionics deployment is achieving airworthiness and safety certification. This session delivers explicit examples of using the FACE architecture to rapidly achieve safety certification and platform airworthiness.

- **Attaining FACE Conformance through Automation –** LDRA (Speaker: Ehsan Salehi)
- **Does SafeMC Multicore Face Conformant RTOS** – DDC-I (Speaker: Gary Gilliland)
- **Conforming to the FACE Technical Standard – an OS Vendor perspective** – Wind River (Speaker: Alex Wilson)

THURSDAY 4TH NOVEMBER

9am-10.30am

High Assurance and Security

Deploying trusted platforms in compressed time frames is a challenge both required and hard to achieve. This session will focus on creating secure compute and data delivery solutions using commercial-off-the-shelf (COTS) technologies using the FACE Technical Standard and architecture.

- **Using DDS to Secure Communication Between FACE Applications** – RTI (Speaker: Andre Odermatt)
- **Secure Firmware Updates for safety-critical airborne systems** – wolfSSL (Speaker: Daniele Lacamera)
- **Title & Speaker TBC**

11am-12.30pm

Accelerating FACE Applications into Next Generation Avionics Systems

The proof of any standard is the adoption and deployment of that standard into a compelling application use case. This session will demonstrate how the FACE Technical Standard and Business Approach is rapidly creating innovative applications in next-generation systems.

- **Changing the Focus from Application-Centric to Infrastructure-Centric Integration: Addressing the Challenges of System-of-System Integration and Leveraging the FACE Technical Standard** - SKAYL LLC (Speaker: Shaun Foley)
- **Verifying Multicore Systems Supporting the FACE Architecture** – Dr Hashem Ghazzawi, Rapita Systems
- **Making FACE™ Units of Conformance Fully Portable: Coding Guidelines for Ada** – AdaCore (Speaker: Eric Perlade)

LIST OF EXHIBITORS

EXHIBITOR DETAILS

Abaco Systems | AMETEK

Booth: 908

Abaco Systems is a global leader in commercial open architecture computing and rugged embedded electronics. With more than 30 years of experience in aerospace & defense, industrial, energy, medical, communications and other critical sectors, Abaco's innovative solutions align with open standards to accelerate customer success.

Abaco Systems is a subsidiary of AMETEK, Inc., a leading global manufacturer of electronic instruments and electromechanical devices with 2020 sales of more than $4.5 billion.

abilieapty (ability to leapfrog your business)

Booth: 1112

With 30+ years experience and expertise in EDA, **abileapty** offers design support in electronic industries such as aerospace, automotive, defense, space, telecom, medical, IoT.. for application systems certified like DO175, DO 178, DO26262, ISO 13485… as well as systems integrating IPs such as PCIe, SBC LEON SoC, ARIN 818…

Created in 2012, abileapty offers a unique design ecosystem which supports customers and/or common designs, that request agility, reliability and cost effective deployment for any electronic and embedded designs.

Buzz words: HW/SW Design (ASIC, FPGA, IP, SW) , Verification, Architecture, Simulation, Prototyping, SystemC/

AdaCore

Booth: 912

Founded in 1994, AdaCore supplies software development and verification tools for mission-critical, safety-critical, and security-critical systems.

Our flagship GNAT Pro development environment supports Ada, C and C++ and is ideal for applications that demand high reliability and maintainability.

AdaCore has a long and successful history supplying products to the avionics community, including several tools and run-time libraries that have been used in systems certified at the highest levels of DO-178B/C (ED-12B/C).

Adlink Technology

Booth: 906

ADLINK is pleased to be exhibiting at Aerospace Tech Week in Toulouse France. We will be demonstrating our FACE Conformant TSS (Transport Service Segment) software in a live aircraft tracking system using the recently mandated ADS-B data model. Our live demo will track aircraft and visualize their locations in real-time from anywhere. We will be demonstrating interoperability with another DDS vendor and their TSS. Each publishing data, through our Conformant TSS's, that the other will be visualizing. Our goal is to bring greater awareness of the OMG DDS Standard as the preferred transport for future FACE applications.

Adsoftware

Booth: 205

ADSOFTWARE is a leading provider of CAMO and MRO software solutions to Airlines, Helicopter Operators, MRO shops and CAMO firms. Our offer covers fleet management, supply chain management, airframe damage reporting tools, electronic logbooks, Part 145 mobile apps and more.

With 65 customers worlwide, 1200 aircraft and 700 helicopters, ADSOFTWARE is among the top 5 software providers in the world.

AES Aerospace Embedded Solutions GmbH

Booth: 604

AES Aerospace Embedded Solutions GmbH: Safety. Security, Agility. We deliver safe and secure solutions using trusted agile methods to meet your development needs for critical embedded systems.

AD'OCC

Booth: Aerospace Valley Pavilion 1101

AD'OCC is the regional economic development agency of the Occitanie region. As such, we offer free consulting for your corporate location or partnership projects in Southern France.

Come and visit us. Let's discuss your development plans!

The Occitanie region is the world leader for civil aeronautics, home to:

– 3 aircraft manufacturers: Airbus (world HQ), ATR (world HQ) and Daher,

– 700 companies employing over 90,000 employees.

Come and join world-class companies established in Occitanie.

Aerospace Tech Week / Review

Booth: 1023

Aerospace Tech Week (ATW) is the only event dedicated to the international aviation technology market. It is the leading forum for companies involved in the high-tech sectors of aviation, commercial and defence, fixed wing and rotorcraft. Comprising of six events – Avionics, Aircraft Connectivity, Aerospace Testing, Flight Operations IT and MRO IT and space, you can reach over 1800 buyers within the aviation technology market. With over 20 years of experience of running conferences, events and magazines in this marketplace, the event continues to provide the best platform for suppliers to showcase and discuss their products as well as the best value for money!

- Aerospace Tech Week Europe, 1 – 2 June 2022, Toulouse, France.
- Aerospace Tech Week Americas, 8th – 9th November 2022, Atlanta, USA.

Aerospace Tech Review (ATR) is the leading international publication for all companies involved in the high-tech sectors of commercial aviation/ airlines and defence industries. Published quarterly, the magazine features the core sectors that our show covers – avionics, aircraft connectivity, aerospace testing, flight operations IT, MRO IT, FACE (Future Airborne Capability Environment) and Space. As well as IoT, AL, ML, digital transformation, advanced urban air mobility, eVTOLs, UAV's, drones, plus other new innovations and developments.

Visit us on Booth 1023 for details on our 2022 worldwide events and to pick up the latest issue of Aerospace Tech Review magazine.

Aerospace Valley

Booth: Aerospace Valley Pavilion 1101

Aerospace Valley is the first world competitiveness cluster for the aerospace sector, serving three strategic industries – Aeronautics, Space and Drones – and

covering the Occitanie-Pyrénées-Méditerranée and Nouvelle-Aquitaine regions.

With its Ecosystems of Excellence – Embedded and Communicating Systems, Structures and Mechanical Systems, Propulsion and Embedded Energy, Data and Artificial Intelligence, Products and Services for the Industry – Aerospace Valley drives a supportive, competitive and attractive community aimed at fostering innovation in order to serve growth.

Ranking in the top 3 world competitiveness clusters for the performance of its cooperative R&T projects (among which 580 have already been funded), Aerospace Valley is in charge of animating a dynamic network of international reputation, composed of 850 members (industries, research labs, training centres, universities and high schools, local authorities, structures for economic development).

Since September 2017, the Aerospace Valley association is chaired by Yann BARBAUX, Senior Vice-President of Airbus and former Airbus Head of Innovation.

AIM GmbH

Booth: 815

AIM is a leading designer and manufacturer of high performance test and simulation modules, embedded interfaces, databus analysers, network analysers and customized systems for MIL-STD-1553A/B, STANAG3910/EFEX, ARINC429, AFDX/ARINC664P7, ARINC825 (CAN bus), PANAVIA Serial Link, Fibre Channel and MIL-STD-1760.

AIM's field proven, robust and mature product suite is unsurpassed in the avionics test and simulation market and our pedigree is recognized throughout the world. Our products and services set the standard for the industry.

Founded in 1989, in Freiburg, Germany, AIM GmbH has seen steady, solid and consistent growth.

Establishing long term and trustful relationships with our customers and suppliers has been the key to our success. Expert, pre and post sales technical support comes as part of the AIM solution. Our direct AIM sales offices, in co-operation with our fully qualified representative network, provide optimized in country service for all your Avionics Test and Simulation requirements.

AirBorn International

Booth: 711

For almost 60 years AirBorn has been at the forefront of innovation, design and manufacture of high reliability interconnection technology. Our advanced products and proprietary technologies are used extensively throughout every continent of the world. Reliability comes as standard. We have manufacturing facilities in the USA and the UK, international operations in Europe and Asia and a proven network of dedicated world-wide distributors. In short, AirBorn is the global source for connector products and technical design assistance wherever they are needed.

Airbus

Booth: 314

The Airbus Services purpose is to further enhance safety in the aviation industry, strengthen our relationship with our customers and contribute to a more sustainable future.

Our team creates value by optimising aircraft safety and availability, streamlining flight operations and enhancing in-flight experience, with all the expertise of an aircraft designer and manufacturer. Building on Airbus' pioneering spirit, we collaborate with our aviation industry partners and deliver world leading aviation services powered by digital and new technologies. Our innovative services help operators make the best out of their aircraft, support MROs with maintenance activities and maximise lessors' assets whilst minimising impact on the environment.

From a fully integrated package including training, flight ops, maintenance, upgrades, dismantling & recycling, to a single adhoc solution, our complete services portfolio covers the entire aircraft life cycle from entry into service to end of life:

- Core Services: Assisting Customers to safely operate their Airbus fleet with highly skilled and dedicated teams around the world
- Optimised Aircraft Availability: Solutions to ensure safe and efficient maintenance throughout the aircraft life cycle
- Streamlined Flight Operations: Solutions to increase operational efficiency and minimise environmental impact
- Enhanced In-Flight Experience: On-board upgrade and digital solutions improving passenger and crew comfort, connectivity and experience

Air Support A/S

Booth: 139

We specializes in the provision of flight planning software PPS Flight Planning System (PPS) with integrated web-based briefing service CrewBriefing, and OpsControl | Flight Watch incl. global coverage and gate-to-gate precision. AIR SUPPORT is one of the world's leading suppliers of flight planning software solutions to regional/charter/cargo/national airlines, corporate aircraft operators as well as government/military operators.

AIR SUPPORT also specializes in the provision of advanced interfaced solutions towards airline and business aviation operators who utilize 3rd party scheduling and crew planning systems. Interfaced solutions offer operators fully automated and dynamically optimized data output. Today, we provide flight planning solutions to 400+ customers world-wide.

Aitech Systems Ltd.

Booth: 712

With 40 years of experience, Aitech is a global digital electronics manufacturer with expertise in providing reliable, rugged embedded systems for the harshest, most unforgiving environments in military, aerospace and space applications. We enable the world's leading companies to expand their most revolutionary explorations and push the boundaries of innovation across sea, land, air, and space.

Aitech provides COTS products based on multiple open standard architectures, including SOSA, FACE, VPX, CompactPCI, etc., such as single board computers, I/O, memory and graphics boards, PMC/XMCs and sub-system enclosures, with over 100,000 boards and custom integrated systems delivered to take on the most challenging projects in the harshest environments. As a pioneer in space applications, Aitech offers proven space pedigree with trillions of miles flown in a variety of space missions without a single failure.

At Aitech, we stand behind our product and our customer to secure a better tomorrow.

EXHIBITOR DETAILS

AMETEK

Booth: 815

Global leader in the design and manufacture of precision, programmable power supply brands Sorensen, California Instruments, and Elgar for R&D, test and measurement, process control, power bus simulation and power conditioning applications across diverse industrial segments. Programmable Power's VTI Instruments brand instrumentation provides high accuracy measurement and full featured software for the most demanding NVH application requirements, data acquisition and test and measurement solutions.

AMETEK Group consists of two operating groups, both with highly-differentiated technology and leading positions in niche markets :

Electronic Instruments : a worldwide leader in the design and manufacture of advanced analytical, test and measurement instrumentation for the energy, aerospace, power, research, medical and industrial markets.

Electromechanical : a differentiated supplier of automation and precision motion control solutions, and highly engineered electrical interconnects, specialty metals and thermal management systems.

ANSYS Inc

Booth: 902

If you've ever seen a rocket launch, flown on an airplane, driven a car, used a computer, touched a mobile device, crossed a bridge or put on wearable technology, chances are you've used a product where ANSYS software played a critical role in its creation. ANSYS is the global leader in engineering simulation. Through our strategy of Pervasive Engineering Simulation, we help the world's most innovative companies deliver radically better products to their customers. By offering the best and broadest portfolio of engineering simulation software, we help them solve the most complex design challenges and create products limited only by imagination. Founded in 1970, ANSYS is headquartered south of Pittsburgh, Pennsylvania, U.S.A., Visit www.ansys.com for more information.

Atmosphere

Booth: Aerospace Valley Pavilion 1101

SME specialised in Satellite Connectivity Solutions for the Aerospace Market. ATMOSPHERE offers hardware, network and application software, satellite airtime, running service and support. ATMOSPHERE delivers solutions for Aircraft, Rotorcraft, Drones and Balloons. ATMOSPHERE targets niche markets such as Industrial Flight Test and Airborne Science Applications. Customers porfolio include AIRBUS, DASSAULT, HONEYWELL, DGA, ESA, DLR, CNES, CNRS. ATMOSPHERE is Iridium Satellite Value Added Manufacturer, and delivers Iridium Certified Satellite Terminals. ATMOSPHERE has an European footprint withfacilities in France (Toulouse) and Germany (Munich)

Aviation ISAC

Booth: 416

The Aviation ISAC is the international consortium for cybersecurity intelligence sharing to build a safe, secure, efficient, and resilient global air transportation system.

We are an international, non-profit membership association created to facilitate the timely exchange of vulnerabilities, threat intelligence, and best practices to reduce operational risks and provide the means for trusted sharing and professional exchange.

With members on five continents, the A-ISAC fosters the foundation of trust underpinning aviation-focused cyber threat intelligence and information sharing designed to better protect global aviation businesses, operations, and services. Membership in the A-ISAC is open to trusted private sector global aviation companies.

AVIOBOOK

Booth: 508

AVIOBOOK, a Thales Group company, supports airlines as a partner in their digital strategy. AVIOBOOK offers a comprehensive and highly integrated suite of ground and flight applications, systems and solutions that connect all stakeholders and key assets in a safe and secure manner. This, combined with expertise in data and cyber security, gives airlines an edge through greater efficiency and ultimately sustainable, profitable growth.

Avion Group

Booth: 520 Dutch Pavilion NAG

Avion Group is a Dutch company focusing on Level D Full Flight Simulator design, manufacturing, and operation. We have an EASA Approved Training Organization (ATO) and operate Flight Training Centers in Malta and London.

At Avion, we set up regional Flight Training Centers at our customer's locations, designed to our customer's specific needs and requirements. This substantially lowers flight crew training costs by avoiding hotel costs and daily allowances. It also reduces travel risks and improves the crew productivity of an airline.

More importantly, we deliver an ultimate training experience that excites even the most seasoned pilots in the world.

Avionica LLC

Booth: 403

Based in Miami, Avionica has spent 28 years improving aviation safety and efficiency with its miniQAR, Onboard Network Server (ONS), Remote Data Concentrator (RDC), 4G Wireless GSE Module, WiFi, Iridium SATCOM and avSYNC service that automatically downloads flight data to a land-based server. Avionica is driving the industry's shift towards e-Enablement and connectivity for the cockpit and cabin services. We take pride in our products, service and customer support and strive to delight our customers.

Avionics Support Group

Booth: 411

Avionics Support Group, Inc. (ASG) is a premier Avionics Systems Integration & AS9100D/FAA-PMA approved Aerospace Manufacturing company. ASG's competitive advantage can provide your company with a Single Source Solution for avionics engineering, manufacturing, aircraft installation technical support, Supplemental Type Certificate (STC's), SATCOM, and much more. We lead the aerospace industry with our US patented Constant Friction Mount (cfMount™), Integrated Power Supplies, Ethernet/ Power connectivity to iPads and iPad EFB Cradles. So Contact ASG Today to learn how ASG's Single Source Solution can work for your company!

AVTECH SWEDEN AD
Booth: 152

Next generation **flight optimization** and weather services are fully automated and runs in real-time, directly **reducing cost** and **minimizing the environmental impact**. Our services are already used by major airlines such as Southwest Airlines, easyJet, Norwegian among others with proven results.

Combining powerful ground-based systems with existing aircraft technology enables us to deliver all our different services to any airline **without any investment costs**. All services can be delivered directly to the cockpit, to our **EFB** application or any other solution already in use by the airline.

AVTECH is an IT-company delivering scalable ground-based services, helping airlines optimizing their operations. As we offer free trials including analysis, the results are guaranteed. Visit us at **booth 152** to learn how AVTECH can deliver customized services to your airline.

Barfield Inc
Booth: 501

Founded in 1945, Barfield has six facilities located near airports in Miami (MIA), Phoenix (PHX), Louisville (SDF), Atlanta (ATL), Doral (MIA) and Medley (MIA), to satisfy the needs of customers operating commercial or regional aircraft in North, Central and South America. Barfield is part of the Air France Industries KLM Engineering & Maintenance (AFI KLM E&M) network, a major MRO provider. With a workforce of 14,000, AFI KLM E&M offers technical support for airlines, ranging from airframe maintenance to engine overhaul and repair and supply of components. Barfield is an FAA and EASA Certified Repair Station offering maintenance services to major passengers, cargo and regional airlines in the Americas. Barfield's support services are organized into the following three main activities: Adaptive services, Distribution and Ground Support Test Equipment (GSTE). Barfield is also an authorized repair facility for major European and U.S. Original Equipment Manufacturers (OEMs). More specifically, through its Airline programs division, Barfield supplies complete customized support programs for Airbus, Boeing, Regional jet and Turboprop aircraft, as well as helicopter operators. These programs support operators in need of inventory, logistics solutions, repair management programs, engineering fleet support and component reliability management. Barfield is also a GSTE manufacturer of Air Data/Pitot Static testers, RVSM Air Data testers, Cable Tensiometers testers, Fuel Quantity testers, Pressure testers, Nav/Comm Transponder test sets, Pitot/Static Adapters and Turbine Temperature testers.

bavAIRia
Booth: 1113

In 2006 bavAIRia e. V., based in Oberpfaffenhofen, was given responsibility for management of this cluster. The primary mission of bavAIRia e. V. is to link actors in the relevant fields from the business, research, education, and public policy sectors. Central goals focus on strengthening the international competitiveness of the Bavarian aerospace industry. This is being accomplished in the areas of technology transfer, supply chain management, basic and advanced training, and internationalization/marketing. The various formats bavAIRia e. V. employs for its organised events include working groups, seminars, and bavAIRia business breakfasts. The aviation fora are currently addressing the topics:

Supply Chain Excellence

Unmanned Flights

Initiatives for Innovation and Cooperation

bavAIRia e. V. has over 300 members that together represent the entire value chain of the aerospace industry, and it has created an extensive network of contacts with companies, research institutions, ministries and public offices in Germany and abroad. This network is being increasingly employed to increase the international visibility of Bavarian expertise and to support the globalization of the members.

Becker Avionics
Booth: 707

Becker Avionics is a privately held German high-tech company that develops, manufactures and distributes the latest communications, navigation, surveillance and search & rescue equipment for airborne and ground operations. The company is a leader in digital avionics technology and has a long standing history of 65 years in providing equipment to general and corporate aviation, air traffic control, law enforcement and military organizations around the world.

Boeing
Booth: 506

Boeing is the world's largest aerospace company and leading provider of commercial airplanes, defense, space and security systems, and global services. As the top U.S. exporter, the company supports commercial and government customers in more than 150 countries. Boeing employs more than 150,000 people worldwide and leverages the talents of a global supplier base. Building on a legacy of aerospace leadership, Boeing continues to lead in technology and innovation, deliver for its customers and invest in its people and future growth.

Catalyst Aerospace Technologies
Booth: 615

Catalyst Aerospace Technologies provides certifiable hardware and software stack for creating aircraft autonomy and automation assisted by an online collaborative web application. Web app serves as a no-code system and software engineering solution for 10x faster integration.

Cetrac
Booth: 817

CetraC designs, sells and supports high-performance FPGA & ASIC IP networking products for distributed architectures embedded in critical systems.

Reliable communication networks is a common requirement for many industries, among which, of course, the Aeropsace world. Although protocols and characteristics may differ, CetraC is a versatile technology that adapts itself to all kinds of industrial needs, with a wide range of supported protocols and functions.

CetraC is a proven technology, previously certified by EASA. Our company is EN9100/ AS9100. Please visit our web site for all details.

Come and Visit us at Toulouse Aerospace Tech Week. – Booth 817

EXHIBITOR DETAILS

CIVITANAVI SYSTEMS SRL
Booth: 510

Civitanavi Systems is a High-Tech Italian company fully dedicated to design, develop and manufacture a wide range of performance-scalable and ITAR-Free geo-reference, stabilization and Inertial Navigation Systems (INS) based on Fiber Optic Gyro (FOG) designed, developed and manufactured internally.

Climats
Booth: 130

Climats has been a french specialist in environmental test over 45 years.

Climats designs and manufactures chambers than can simulate extreme and reproductible environments such as hot-cold-humidity chambers fast temperature variation, vibration chambers, benchtop, thermal shock, salt spray walk-in and customised products.

Cobham
Booth: 413

Cobham is a market leading provider of radio and satellite communication equipment at the forefront of the connected cockpit revolution, delivering avionics, connectivity and satcom solutions for the aviation sector. Cobham will be showcasing its latest tech including AVIATOR S, which provides secure segregated Cockpit Safety, IP data and voice communications over the Inmarsat SwiftBroadband-Safety (SB-S) satcom network.

Collins Aerospace
Booth: 296 & 1000

Collins Aerospace, a unit of United Technologies Corp. (NYSE: UTX), is a leader in technologically advanced and intelligent solutions for the global aerospace and defense industry. Created in 2018 by bringing together UTC Aerospace Systems and Rockwell Collins, Collins Aerospace has the capabilities, comprehensive portfolio and expertise to solve customers' toughest challenges and to meet the demands of a rapidly evolving global market.

Comply365
Booth: 204

Comply365 is the leading provider of enterprise SaaS and mobile solutions for content management and document distribution in highly regulated industries including aviation, rail, and energy. Comply365 supports the world's most mobile and remote workforces with personalized and targeted delivery of job-critical data that enables safe, efficient, and compliant operations. Every day, hundreds of thousands of pilots, flight attendants, maintenance technicians, rail conductors and engineers, as well as energy workers, rely on Comply365 for digital delivery of operational content, including OEM and internal company manuals. Having played an instrumental role in the regulatory approval of electronic flight bags (EFB) to replace the traditional, paper-based, pilot flight bags, Comply365 partners with clients to transform their industries.

Comply365 offers a new approach to manage operational manuals and other documents that enables safe, efficient, and compliant operations in highly regulated industries such as aviation and rail.

The Comply365 content management and document distribution platform improves operational efficiency, compliance, and end-user effectiveness through an integrated solution that covers the entire document lifecycle from authoring to personalized and targeted distribution of your content.

An Integrated and End-to-End Solution

ConsuNova
Booth: 703

There is a name for best in class certification and compliance engineering services: ConsuNova. Practical, cost-effective and optimized solutions for the aerospace and defense industries including training, strategic compliance consultancy and certification liaison for DO-178C, DO-254, ARP 4761, ARP 4754A and other avionics standards.

Core Avionics & Industrial Inc.
Booth: 914

Core Avionics & Industrial Inc. ("CoreAVI") is a pioneer in the military and aerospace sector with a proven track record in providing entire software and hardware IP platform solutions that enable safety critical applications. A global leader in architecting and supplying real-time and safety critical graphics, compute, and video drivers, "program ready" embedded graphics processors, and DO-254/ED-80 certifiable COTS hardware IP, CoreAVI's suite of products enables the design and implementation of complete safety critical embedded solutions for aerospace, automotive, and industrial applications that achieve the highest levels of safety certification with long-term support. CoreAVI's solutions are deployed in commercial and military avionics systems, and support rapidly emerging compute applications in the automotive, unmanned vehicle, and internet of things markets. CoreAVI's products may be purchased with certification data kits for the most stringent levels of safety certification, including RTCA DO-254/DO-178C, EUROCAE ED-80/ED-12C, and ISO 26262. www.coreavi.com

Daedalean
Booth: 703

Daedalean develops AI software powering autonomous piloting and pilot aid systems for civil aircraft of today and advanced aerial mobility of tomorrow. The company has partnered with incumbent avionics system providers, including Honeywell Aerospace and Avidyne, to bring to the market the first ever machine learning-based avionics.

DDC-I
Booth: 900

DDC-I provides DO-178C certifiable software and tools for safety critical avionics. Deos™ is a time and space partitioned RTOS, which has been certified to DO-178 Design Assurance Level A (DAL A) since 1998. Developed from day one using DAL A plans and procedures, Deos features hard real-time response, superior multicore technology, industry standard ARINC653 and FACE Safety Base APIs, and shared resource partitioning to deliver the highest CPU utilization and performance possible in the industry. Additionally, Deos' innovative SafeMC technology for multicore processors is unmatched, delivering maximum safety-critical performance across multiple cores.

Some key advantages of Deos are:

DO-178 Certification Artifact Reuse Through Software Modularity (leveraging certification credit from prior certifications)

Industry Leading SafeMC™ Technology for Safety Critical Systems on Multicore Processors

Time & Space Partitioning (allows mixed levels of criticality running on the same device)

Extensive Certification Pedigree (Certified to DAL A Since 1998)

Patented Slack Scheduling Technology (allows for full processor utilization)

Scalable from Simple LRUs to Complex IMA Systems

ARINC-653, Priority Preemptive, and/or Rate Monotonic Scheduling Available

Industry Standard Application Programming Interfaces (API's)ARINC-653 & POSIX

DextraData GmbH

Booth: 617

Following agile principles, fast and according to individual requirements – this is how we at DextraData develop our software solutions. Our clients benefit from years of experience and the broad spectrum of our portfolio. As an owner-managed IT consulting company and independent software vendor, we have been supporting our clients with IT solutions for 25 years. Our team also brings more than 15 years of experience in the aviation industry.

In 2002, Logipad, an »Electronic Flight Bag« solution developed in-house, was launched. Logipad Electronic Flight Bag is the right choice if you are looking for a highly customizable, flexible, and comprehensive information management solution. The complete solution package focuses on three main areas: Briefing, Documentation, and eForms which support your processes before, during, and after the flight. In addition, it helps you to support and enhance existing business processes.

The EFB application with its administrative environment integrates seamlessly into existing IT infrastructures. Logipad provides interoperational functionalities with homogeneous IT infrastructures such as data exchange with third-party server systems as well as data exchange with existing applications on the client side.

Providing efficient process support is our guiding principle and it is important to us to understand the business of our customers and their requirements. For these reasons, we are in regular dialogue with our customers. Our work does not end with the implementation; we accompany our customers beyond it. We continuously ask for feedback and directly optimize our solution according to the individual requirements.

Druck

Booth: 300

Druck, a Baker Hughes business, is a global technology company that designs, develops and manufactures the highest quality, most accurate and reliable customized pressure sensing devices and instruments, software and services. We leverage innovation, continuous improvement and unprecedented quality, to enable our Customers to successfully operate, produce systems, monitor and/or control mission-critical assets in tough environments across the world's most challenging applications. We are Druck. We provide peace of mind in the toughest environments. To learn more visit druck.com

DynamicSource AB

Booth: 509

DynamicSource AB DynamicSource Performance is the next generation suite of applications for pilots, dispatchers and flight operations engineers for take-off, dispatch landing and time of arrival landing aircraft performance calculations. We have an in-depth knowledge of airline flight operations and advanced system development within EFB and Flight Operations. DynamicSource provides user centric solutions with the high reliability demanded by the aviation industry. We have supplied systems to airlines since 2009, we look forward to partner with you to meet the future demands and challenges of the industry together. The company was founded by people who themselves work in the aviation industry both on the flight deck and in the back office. With the help of a team of talented engineers and programmers they challenged an otherwise conservative industry with innovative and modern solutions.

ECA Group

Booth: 502

The ECA GROUP is renowned for its expertise in robotics, automated systems, simulation and industrial processes.

Ever since 1936 it has been developing complete innovative technological solutions to perform complex missions in hostile or restrictive environments.

Its products are used by a demanding international clientele requiring the highest levels of safety and efficiency, mainly in the sectors of defence, maritime, aerospace, simulation, energy and industrial equipment.

EikoSim

Booth: Aerospace Valley Pavilion 1101

EikoSim is a start-up founded in 2016 after several years of research, by Florent MATHIEU and Renaud GRAS, two PHDs in mechanics from the LMT in Cachan, one of the most prestigious mechanical laboratories in Europe.

Since 2018, we have been developing and marketing EikoTwin, a software suite designed to reduce the gaps between tests and simulations, in particular by seeking to reduce risks within the validation phase of the design digital thread, in order to help build more predictive models. Thanks to the use of digital image correlation technology (DIC), we are able to image mechanical tests in order to measure the displacement fields of the visible surfaces directly on the finite element mesh of the tested parts.

The second step of the process is the creation of a Digital Twin, where simulation and test data are expressed on the finite element mesh. The test-simulation comparison becomes immediate, and the validation of simulations easier and faster. Calibration of the model is enabled by integrating new measured boundary conditions into the simulation model, but also by parameter identification.

Our software solution is now implemented in various industrial customers in the aeronautics, aerospace, defense and automotive sectors as well as in university research laboratories, thus validating the relevance of our offer, particularly with test & simulation teams and design offices.

Element Materials Technology

Booth: 120

Element delivers a comprehensive range of testing, inspection and certification services to the global Aerospace;

EXHIBITOR DETAILS

Transportation, Fire, Oil & Gas and Infrastructure sectors.

Our team of more than 6,700 Engaged Experts operate out of more than 189 laboratories in more than 33 countries on five continents strive every day to help our customers to develop better products; get to market on time, save time and money and minimize the risk associated with their materials and product development activities.

We exist to help our customers to make certain that the materials and products we test and certify for them are safe, quality, compliant and fit for purpose.

That is the Certainty of Element.

Ellidiss Technologies
Booth: 804

For more that 15 years, Ellidiss Technologies has been providing advanced model driven software design tools for the avionic and space industry.

During Aerospace Tech Week 2021, we will put the focus on our Architecture Analysis and Design Language (AADL) tools:

– Stood for AADL: AADL graphic modeling tool enhanced by the industry proven HOOD methodology

– AADL Inspector: real-time, safety and security analysis framework for AADL projects, with customisable SysML, Capella and FACE import features.

EmpowerMX
Booth: 134

In 1999, EmpowerMX launched its first software solution, focused on production control. Since then, the company has grown significantly, moving from that first product launch to a robust set of software tools that are used by the world's largest airlines and MROs.

Our technical and non-technical competencies stem from our origins as an aircraft maintenance industry-inspired software development startup owned and operated by aircraft maintenance industry experts.

Since then, we have surrounded our aircraft maintenance specialists with the IT experts that have allowed us to mature and focus on supporting only the aircraft maintenance industry.

EUROCONTROL
Booth: 714

EUROCONTROL is the European Organisation for the Safety of Air Navigation. Founded in 1960, it is an international organisation working for seamless, pan-European air traffic management. EUROCONTROL coordinates and plans air traffic control for all of Europe. This involves working with national authorities, air navigation service providers, civil and military airspace users, airports, and other organisations. Its activities involve all gate-to-gate air navigation service operations: strategic and tactical flow management, controller training, regional control of airspace, safety-proofed technologies and procedures, and collection of air navigation charges.

EVOMESURE
Booth: 500

EvoMesure is a supplier of innovative instrument for Pitot Static tests, aerodynamic flight and wind tunnel tests, and Fluid mechanic.

EvoMesure is the specialist of D.MARCHIORI (DMA) a recognized manufacturer of top class Air Data Test Sets for RVSM avionic test, and Part-145 maintenance. The DMA Pitot Static testers cover both civilian and military application and are combined with a complete catalogue of Pitot Static kits and unique leak free adapters for more than 900 different models of aircrafts.

EvoMesure is also a specialist for aerodynamic measurement with a range of high accuracy pressure scanners from SCANIVALVE for wind tunnel, flight test, and engine test bench applications.

We also are the exclusive distributor of EVOSCANN a manufacturer of miniature pressure scanner selected in the Clean Sky II project for the Racer helicopter.

Finally, our partner VECTOFLOW provides unique customized metal 3D printed flow probes for flow measurements both in test bench or flight test applications.

With EvoMesure, solve your measurement challenges and "Measure with passion"!

EXSYN Aviation Solutions
Booth: 200

EXSYN Aviation Solutions provides Industry leading technology and knowledge to efficiently manage aircraft data in order to drive insights in airworthiness compliance, aircraft reliability and maintenance costs. Our leading aircraft data operations platform provides capabilities to safely and easily integrate aircraft data between systems used in airline operations and maintenance. With Avilytics our platform provides out of the box capabilities for advanced reliability analytics and predictive maintenance.

FLIGHT SUPPORT
Booth: 137

International Flight Support (IFS) is a modern Danish software company, set to bring tech innovation to the aviation industry. We help our clients reduce workload and increase efficiency by digitizing paperwork and providing a customizable platform that seamlessly integrates all your flight operation requirements in one place. We introduced our first Electronic Flight Bag in 2008. Now, we've completely reinvented it and we call it EFBOne. Our goal is to be the One platform to support all your operational requirements.

FlightAware
Booth: 606

FlightAware (flightaware.com) is the leading provider of real-time and historical flight information and insights to the global aviation community. FlightAware serves all segments of the aviation marketplace through best-of-breed applications and data services that provide comprehensive information about the current and predicted movement of aircraft. Through the collection, interpretation, and enrichment of hundreds of sources of data, including data from FlightAware's own proprietary terrestrial ADS-B network spanning seven continents and in 200 countries and territories, the company is able to transform millions of raw flight data elements and deliver them as coherent, easy-to-consume flight stories. As a single source of accurate and actionable data for aviation players large and small, FlightAware is central to aviation.

FlightWatching SAS
Booth: 150

In 2013, convinced of the potential of a unique feature embedded on

all aircraft types, two engineers that previously worked at the Airbus flight test department created FlightWatching, a privately owned start-up.

FlightWatching has developed a ground based software platform that interfaces with aircraft in real time during flight to identify abnormal scenarios and predict degradation. Their solution makes it possible to anticipate servicing actions to avoid the occurrence of unplanned costly alerts. Predictable outages that prevent flight delays and cancellations are avoided. They increase the lifecycle of engines, APUs and detect abnormal behaviors on systems before an alert appears in the cockpit. They control the use of planes so that they can last longer providing more flexibility to airlines.

FlightWatching screened their first aircraft in 2013 and built a preventive diagnostic software platform. Focusing at first on engines and APUs installed on Airbus and Boeing aircraft (more than 40% of direct maintenance costs), customer results exceeded all their expectations with a 20% savings on engine maintenance costs.

Engine / APU overhaul are usually imposed by manufacturers or MRO further to sensed alerts transmitted by the aircraft. Airlines are looking to postpone revisions and reduce customer notification requests that require engine removal/inspections and disrupt flights. Airlines also seek to maximize the use of limited-life parts that are very expensive to replace. Flightwatching will reduce the number of revisions and thus reduce maintenance costs for both airlines and engine / MRO.

Flightwatching provide services to find the key aircraft parameters that customers would never have imagined to exist. They offer to customers: data acquisition and analysis algorithms on aircraft systems they are having trouble with so that they can predict and get alerted before anything appears in the cockpit. FlightWatching's expertise in avionics allows to identify all observable data on all in-service aircraft worldwide (old models or latest generation) and whatever their manufacturer.

They provide affordable solutions to spread on fleets without any aircraft modification: we get the best out of what is already available.

We make your data come alive

flydocs

Booth: 132

flydocs is an asset management solution provider with the aviation industry's most comprehensive solution for creating value out of aircraft maintenance data. We offer the tools and expertise that allow all industry to drive sustainable innovation to help build the future of the commercial aviation asset lifecycle.

Recognised as a global leader in digital records management, we were founded in 2007 and are 100% owned by Lufthansa Technik. With over 280 employees in multiple locations spread across the globe, we are trusted by over 75 airlines, lessors and MROs to deliver measurable long-term operational and cost efficiencies.

FLYGPRESTANDA AB

Booth: 149

Flygprestanda (FlyGP) offers a wide selection of services, all based on high quality airport and aircraft specific performance data used by more than 200 airline operators around the world. Flygprestanda specializes in take-off and landing calculations configured in accordance with each customers Aircraft Flight Manual (AFM) or SCAP/ CAFM. The aircraft performance data is then integrated by chosen service with Flygprestandas proprietary worldwide airport database containing over 8000 airports. Flygprestanda offers a tablet application (perf & W&B) for iOS and Win that works completely offline for any aircraft type. For operators who don't have an EFB approval, Flygprestanda offers papercharts through our website that can either be used electronically or printed.

FLYHT

Booth: 409

FLYHT's unique ability to capture, process, and transmit data, coupled with real-time alerts provides airlines with direct insight into the operational status and health of their aircraft and enables them to take corrective action in order to maintain the highest standard of operational control.

Gamit Limited

Booth: 134

Gamit was founded in 1990 with the purpose of providing technical support to operators, MRO's and leasing companies.

The spectrum of support includes:

Digitalised airworthiness records

Spare parts

Technical support

Records auditing

On site representation

Through years of experience, Gamit developed ROAM – the aviation industry's best airworthiness records management solution. ROAM is an online enterprise solution. ROAM uses the most advanced technologies in the World to deliver the best aviation specific document management solution in the aerospace market.

GE Aviation

Booth: 709

GE Aviation, an operating unit of GE, is a world-leading provider of jet engines, components and systems for commercial and military aircraft. GE Aviation has a global service network to support these offerings.

Great River Technology

Booth: 611

Great River Technology is the global leader in development tools and flyable products for ARINC 818, the Avionics Digital Video Bus. Engineers in commercial and military aviation worldwide tap GRT's expertise and products to simplify design, implementation, and testing of mission-critical high-speed video and data transmission. The company was at the table when ARINC 818 was created, and its innovations drove the protocol's 2013 upgrade. GRT offers training and certification in ARINC 818.

HCL OneTest

Booth: 821

HCL OneTest supports functional, performance and integration testing throughout a project lifecycle. It features a script-less, wizard-driven test authoring environment and support for more than 100 technologies and protocols.

HCL OneTest belongs to the DevSecOps product domain of HCL Software which is a division of HCL Technologies (HCL) that operates its primary software business. It develops, markets, sells and supports

EXHIBITOR DETAILS

more than 20 product families in the areas of DevSecOps, Automation, Digital Solutions, Data Management, Marketing and Commerce, and Mainframes.

HCL Software has offices and labs around the world to serve thousands of customers. Its mission is to drive ultimate customer success with their IT investments through relentless innovation of its products.

HDG Human Design Group

Booth: Aerospace Valley Pavilion 1101

We connect Human & Technologies: Smart, Simple, Safe®

Through our expert human-centered approaches, Human Design Group helps its clients create the conditions for the success of their transformation and innovation processes through high-value usage solutions.

Human Design Group puts Humans at the heart of aeronautical performance : Smart factory / MRO / Training / Cockpit / Cabine / ATM

Human Design Group – Key point:

+ Pioneer and French leader
+ 100 human science consultants: digital ergonomics, UX design, human factor, neuro sciences
+ 40 years of experience
+ 30 large customer groups

Human Design Group is the missing link of your competitiveness !

HENSOLDT

Booth: 610

HENSOLDT is a German champion in the defence industry with a leading market position in Europe and global reach. The company, headquartered in Taufkirchen near Munich, develops sensor solutions for defence and security applications. As a technology leader, HENSOLDT is also continuously expanding its portfolio in cyber and developing new products to combat a wide range of threats based on innovative approaches to data management, robotics and cybersecurity. With more than 5,600 employees, HENSOLDT generated revenues of EUR 1.2 billion in 2020. HENSOLDT is listed on SDAX index of the Frankfurt Stock Exchange.

iBASEt

Booth: 207

iBASEt is a software company that simplifies how complex products are built and maintained. Founded in Southern California in 1986, iBASEt solutions ensure digital continuity across manufacturing, quality, and maintenance, repair, and overhaul (MRO) operations on a global scale. The iSeries, powered by Solumina, is a cloud-native platform that establishes a digital ecosystem to drive innovation and improve operational performance.

iBASEt's Maintenance, Repair and Overhaul (MRO) optimizes the execution of scheduled and non-scheduled maintenance operations, along with detailed planning and tracking of MRO workflows. iBASEt customers include Lockheed Martin, Northrop Grumman, Rolls Royce, Pratt & Whitney, and Textron. Learn more at iBASEt.com.

iCare M&E solutions by AMC Aviation

Booth: 153

iCare AMS® is a cost effective M&E, CAMO, MRO and Logistic & Purchase software solution dedicated to Airlines and Maintenance Repair Organizations.

It is entirely designed in accordance with the requirements of EASA part M sub-part G regulation and EASA part 145 and is successfully operating within several Airlines and acquired the approval of the most respective Airworthiness Authorities.

iCare SMS® is a cost effective Quality management and SMS management software solution dedicated to Airlines and Maintenance Repair Organizations.

It is entirely designed in accordance with the requirements of EASA part M sub-part G regulation and EASA part 145 and is successfully operating within several Airlines and acquired the approval of the most respective Airworthiness Authorities.

iCare iTech® is a cost effective paperless mobile application for aircraft engineers.

With iCare AMS and enjoy paperless maintenance on your fleet, line maintenance and MRO (Base) operation, it includes logistics, and it synchronises with iCare AMS in real time.

IFS

Booth: 201

IFS is a leading software vendor to the Aerospace & Defense sector globally.

We provide full-spectrum enterprise, project & program-centric manufacturing software to tier 1, 2 and 3 manufacturers & vendors serving the A&D sector.

IFS has extensive knowledge of the A&D industry. Independently recognized as a leading, global supplier of enterprise software, we provide solutions for:

Aerospace and defense manufacturing

Commercial aviation

Defense

Fleet and asset management

Military logistics

Services and performance-based logistics

Our aerospace and defense industry experts are committed to ensuring the future success of our customers by providing best-in-class solutions and industry expertise to prepare them for what's next.

Inmarsat Aviation

Booth: 402

Inmarsat is the leading provider of global satellite communications for the aviation industry. We are trusted by airlines, leading OEMs, the business aviation community and regulatory authorities across the world to keep the cockpit and cabin connected at 35,000 feet. We offer a range of powerful connectivity solutions, from vital operations and safety communications, to high-speed inflight broadband for passengers and beyond visual line of sight communications for unmanned aerial vehicles (UAVs). With 30 years' experience in aviation connectivity, our solutions are renowned for their innovation and performance. Whatever your challenges, wherever you fly, Inmarsat is ready to help you take advantage of the vast potential of the connected aircraft.

Interface Concept

Booth: 808

Founded in 1987, Interface Concept has been developing and manufacturing Commercial-Off-The-Shelf (COTS) Single Board Computers, FPGA boards and Ethernet switches for Industrial and Mil-Aero applications.

The company markets Commercial Off-

The-Shelf (COTS) board-level products, based on industrial standards (3U/6U VPX, cPCI, VME, FMC, XMC, PMC) and high-end technologies.

Our product range includes:

Gigabit, 10 and 40 Gigabit Ethernet switches and IP routers

Single Board Computers based on Intel and NXP processors

FPGA boards based on Xilinx devices

Analog and digital acquisition mezzanine cards (ADC/DAC)

Storage modules and 2D/3D graphic solutions

Mezzanine XMC/PMC carrier cards

Services
Technical support has become a key aspect of Interface Concept services to its customers, especially since products are more and more complex and integration phase is critical. Other services include COTS product customization (MCOTS), custom solutions according to specifications, long-term product support, obsolescence management and product support in operational conditions.

Quality and commitments
Customer confidence cannot be decreed, it has to be earned.

Interface Concept has established long-lasting transparent and honest relationship with its customers and leverages its 30 years expertise in embedded computing to supply major OEMs with best-in-class solutions. Certified ISO 9001:2015, IC has been involved in a quality process aiming at earning and maintaining customer confidence by supplying quality products and services.

Interface Concept products comply with major European environment requirements including RoHS, REACH and WEEE rules and regulations, etc.

Interface Concept is a French independent company established in 1987 and headquartered in France (Quimper).

Technological partners
Interface Concept has been working closely with major standard organizations (VITA, PCISIG) and industry's leading companies such as Xilinx, WindRiver, Intel and NXP, in order to leverage the architectures for the next-gen computing platforms and ensure the support for long lifecycle programs. Interface Concept is a member of the SOSA Consortium (Sensor Open Systems Architecture™ (SOSA).

Intland Software
Booth: 706

Intland Software is a software solution vendor offering industry-leading Engineering & Application Lifecycle Management software tools to simplify complex product and software engineering at scale. Our enterprise-grade platforms help accelerate the development of technology products and simplify regulatory compliance. Intland's solutions are used by leading companies including top automotive, aviation, medical, pharma, and life sciences developers worldwide to manage their innovative, compliant product engineering processes

Invest in Toulouse
Booth: Aerospace Valley Pavillion 1101

Toulouse is the cradle of aeronautics industries with :

* 2 aircraft manufacturers : Airbus and ATR

* international OEMs (R&D, design and manufacturing of their equipment's)

* and a large array of SME's

Additionally, Toulouse is also the Capital of Space with the French Space Agency (CNES), Thalès Alenia Space and Airbus Defence & Space, and fosters new kinds of transportation, which offers a large range of potential industrial partnerships.

Invest in Toulouse helps international companies to successfully set up in Toulouse since 2013. With a core of experienced consultants, the agency provides free and confidential assistance during each step of your company's local development.

Customized case-to-case guidance includes :

- provision of viable economic information and business opportunities
- support in recruiting, public funding, site-selection or immigration procedures
- as well as an introduction into a strong local network to boost your project launch

ISP System
Booth: Aerospace Valley Pavilion 1101

ISP System is a specialist of electrical embedded actuators for aeronautic, space and defense markets.

ON-OFF or smart actuators, motor customized, DO160 or MIL-810 certified

Design, qualification and manufacturing services for mechanic, electronic and firmware

iXblue
Booth: 108

iXblue is a global high-tech company specializing in the design and manufacturing of advanced autonomy, photonics and marine technologies. The group in-house expertise includes innovative systems and solutions devoted to inertial navigation, subsea positioning, underwater imaging, as well as test & simulation. iXblue technologies support Civil and Defense customers in carrying out their space, land and sea operations with maximum safety, efficiency and reliability. Employing a workforce of 650 people worldwide, iXblue conducts its business in over 60 countries.

JANA, Inc.
Booth: 820

JANA, Inc. is dedicated to providing best-in-class authoring, engineering and technical documentation solutions. We focus on our customers' short- and long-term needs with high quality services that are customizable, fairly-priced and delivered on time—that's "The JANA Way."

Kappa optronics GmbH
Booth: 605

Kappa optronics | Business Unit Aviation: Let your vision fly!

Kappa optronics has more than 40 years of experience in cameras and vision systems in rugged and certifiable designs for anything that drives or flies. Our Business Unit Aviation is thrilled to work 100% focused on cameras and vision systems in the Aerospace field. We focus on flight test cameras (FTI cameras), cameras for ED-155 compliant crash recording, cameras for space applications (cameras for launch vehicles and vacuum applications), HUD cameras for flight visualization, aircraft surveillance cameras (e.g., cargo, cabin/cockpit door surveillance) and vision systems for air-to-air refueling. Our qualified aviation cameras and system

EXHIBITOR DETAILS

solutions are ready for certification to aviation norms and can be flexibly adapted to specific applications. We are leaders in technology and meet all safety requirements on design assurance procedures in hardware and software development, qualification, and certification. As one of the very few camera suppliers, we are certified to EN / AS 9100. In 2019 we were granted the "Best Innovator Overall" Award by Airbus Defence and Space.

Kappa Aviation Cameras: extremely rugged design | high integration capability | ITAR-free | certifiable | maximum safety | vision (sub-) systems, glass-to-glass, board-level cameras | latency-free images | long-term availability & functional warranty | day & night vision (VIS / LWIR), 24/7

KGS Electronics
Booth: 707

KGS Electronics has been designing and manufacturing AC and DC solid state power conversion products since 1959. Our company pioneered the application of solid state static inverters for aerospace applications and today provides advanced airborne certified AC and DC power conversion products to both civil and military aviation customers worldwide.

We have a full line of airborne 400Hz and 50/60Hz static inverters, voltage/frequency converters, DC to DC power converters, light dimming power supplies and AC to DC power supplies designed for a variety of aerospace & military applications such as cockpit, cabin, galley, navigation, radar, special mission, medical and lavatory.

KRONO-SAFE
Booth: 1017

KRONO-SAFE develops and markets a tool chain named ASTERIOS®. The engineering tool suite ASTERIOS includes a DO-178C DAL-A certifiable real-time kernel (RTK) for safety-critical real-time embedded systems. ASTERIOS provides an IDE to simulate exhaustively the application's time behavior, to generate automatically the run-time scheduling and to deploy the runnable on any single or multi-core hardware platform. ASTERIOS can be linked to a model based design tool to offer a complete integrated environment.

KRONO-SAFE serves markets in need of a safer and more efficient solution to develop complex real-time embedded applications. These extend to both well-established markets such as aerospace, defense, automotive, industrial automation, transportation, energy, medical and new markets springing up where safety and security converge like the Industrial Internet of Things. KRONO-SAFE is currently based in France.

Kutleng Engineering Technologies (Pty) Ltd
Booth: 1111

Kutleng Holdings (Pty) Ltd, trading as Kutleng Engineering Technologies is an electronics engineering company founded in 2008 in the Republic of South Africa. We design and manufacture computer, electronic and optical products, used in safety critical applications in the automotive, aerospace, and defense sectors. We offer, in addition to our products, professional; scientific; and technical services including the design of electronic schematics; safety certification assistance; development and testing of software for various functions.

LDRA
Booth: 905

For more than 40 years, LDRA has developed and driven the market for software that automates code analysis and software testing for safety-, mission-, security-, and business-critical markets. Working with clients to achieve early error identification and full compliance with industry standards, LDRA traces requirements through static and dynamic analysis to unit testing and verification for a wide variety of hardware and software platforms. Boasting a worldwide presence, LDRA is headquartered in the United Kingdom with subsidiaries in the United States, Germany and India coupled with an extensive distributor network. For more information on the LDRA tool suite, visit www.ldra.com

Lufthansa Technik
Booth: 211

Lufthansa Technik is the world's leading provider of maintenance, repair and overhaul services (MRO) for civilian commercial aircraft. The Lufthansa Technik Group comprises 37 plants offering technical aviation services worldwide. The company also holds direct and indirect stakes in more than 60 companies.

In 2020, Lufthansa Technik AG served more than 4.500 aircraft from more than 800 customers worldwide, including airlines, aircraft leasing companies and operators of VIP jets, as well as OEMs. In fiscal year 2020, revenue* plummeted by 43% year-on-year to €3,747 million (prior year: €6,572 million) due to the effects of coronavirus pandemic. About one-third of its business is with Lufthansa Group companies and two-thirds of its business is with external customers.

Lufthansa Technik holds international licenses for maintenance, design and production. The range of services comprises a broad spectrum: engine services, aircraft maintenance services, aircraft component services, digital fleet services, original equipment and special aircraft services.

The portfolio covers a variety of differently structured products and product combinations, from the repair of individual components to consultancy services and the fully integrated supply of entire fleets. It comprises the support for the most modern airliners such as the Airbus A220, A320/A320neo family, A330/340, A350, A380, Boeing 737 CL/NG, 737 MAX, 747, 777 and 787 as well as total support for smaller regional airliners.

Digitalization is in the focus of Lufthansa Technik to create new business and to meet the challenges of the future MRO market. The company grasped this trend very early and is now continuing its consistent progress on multiple levels in the digitalization of processes. One of the core products in this area is AVIATAR, an open, neutral and modular digital platform. In a secure web-based environment, AVIATAR serves as an integrating hub for digital fleet solutions in the aviation industry, with a focus on the technical and operational side of the airlines. AVIATAR can be used for predictive maintenance solutions, condition monitoring and fault analytics. In addition, operators and other players in the aviation industry are digitally enabled by AVIATAR to collaborate for the optimization of airline operations, reduced consequential costs and safer as well as more reliable fleet management.

Lynx Software Technologies
Booth: 802

Lynx Software Technologies is the premier Mission Critical Edge company that enables safe, secure and high-performance environments for global

customers in aerospace and automotive, enterprise and industrial markets. Built on the LynxSecure separation kernel hypervisor, LYNX MOSA.ic supports a variety of operating systems such as LynxOS-178®, Linux®, Windows®, third-party RTOSes, and bare metal applications including Lynx Simple Applications. LYNX MOSA.ic runs on Intel®, Arm® and PowerPC®. LYNX MOSA.ic is offered as tailored bundles to support specific use cases: LYNX MOSA.ic for Industrial, LYNX MOSA.ic for UAVs/Satellites, and LYNX MOSA.ic for Avionics for aerospace and defense. Since 1988, companies have trusted Lynx's real-time operating system, virtualization and system certification experience, which uniquely enables mixed criticality systems to be harnessed and deliver deterministic real-time performance and intelligent decision-making. Together with a growing set of technology partners, Lynx is realizing a new class of Mission Critical Edge systems that keep people and valuable data protected, at every moment.

MathWorks

Booth: 616

MathWorks is the world's leading software vendor for Technical Computing and Model-Based Design. Aerospace and defense companies worldwide rely on MATLAB® and Simulink® across all technology readiness levels, from prototypes to their most important safety and mission critical systems (up to and including DAL-A software). MathWorks products are used in major programs across all domains, accelerating research and development in areas like autonomous systems, hypersonics, advanced wireless systems, and hybridization and electrification of aircraft.

Digital engineering with Model-Based Design helps to reduce program risks through early design simulation and code generation. Simulink's systems engineering tools also establish a digital thread, providing traceability between requirements, architecture, design, auto-generated code, and test artifacts. This ensures design completeness and eases change management of complex systems, all within the same environment, and supporting Aerospace certification requirements.

Engineers are also using MATLAB and Simulink to develop AI solutions to make earlier predictions and improve decision making, from predictive maintenance and digital twins to tasks like multimodal target identification. MathWorks tools allow teams to incorporate a variety of data sources and accelerate the implementation of machine learning, deep learning, and data science algorithms into their applications that can be deployed to hardware or the cloud.

MB Electronique

Booth: 815

Since 1972, MB Electronique is a B2B Technology Trading Company which resells electronic systems and equipment dedicated to the T&M market. We design on demand innovative solutions for test and offer In-house Tests (HALT/HASS, SAM).

We supply exclusive services linked to the carried systems and equipment.

As a middle-man organization, we provide a customer satisfaction carrying « best-in-class » suppliers' products and integrated solutions, designing and supplying MBE support and services. We provide also a supplier satisfaction offering access to a large, segmented, targeted customer base and outsourced services.

Thanks to our technology expertise and our knowledge, we are able to respond to various needs on several market segments: Aerospace & Defense, Automotive and Transport, Energy, Industrial manufacturers, Research and Universities, Semiconductor, Services and Telecommunications.

« Customer relationship and service delivery… on the side, it is our commitment to supporting our customers' project realization »

MBS Electronic Systems GmbH

Booth: 505

The German MBS Electronic Systems GmbH will be exhibiting its small state-of-the-art portable data loader mini-PDL and its advanced, secure, reliable and affordable Software Management System FLS-Desk, providing many unique features which made it the data loading and fleet management system of choice of many of the world's largest and most prestigious airlines.

Since 2013, over 80 airlines and aircraft operators are benefitting from MBS' e-enabled data loading solutions with more than 700 mini–PDLs and over 2000 PDL Adapters in the field. It solves the floppy disk obsolescence and brings a complete, innovative, networked system which has revolutionized aircraft configuration control, remote update, administration and data loading for ARINC 615, ARINC 615A, PCMCIA, CF, USB, EFB and IFE and is helping aircraft operators to better access, manage and utilize their data, helping them achieve higher goals in safety, performance and efficiency and reduce time and cost.

With innovative technologies and close customer support and cooperation MBS is continually improving the features and adapting its system to the changing requirements of the industry.

Also, MBS was the first company worldwide to provide interfacing of traditional military and commercial aerospace data busses to Gigabit Ethernet giving platform independent solutions many years before the so-called Internet of Things (IoT).

Mercury Mission Systems International S.A.

Booth: 812

Mercury Mission Systems International S.A. (also referred as "MMS Intl", previously CES Creative Electronic Systems) is a swiss legal entity part of Mercury Systems Inc. based in Chelmsford, Massachusetts, USA. MMS Intl is Mercury's Center-of-Excellence for safety-critical product development. MMS Intl designs and manufactures in Switzerland rugged embedded computers engineered to meet the most demanding performance needs for optimal Size, Weight and Power (SWaP) considerations. Our Commercial Off-The-Shelf (COTS) products are made to withstand the extremes of temperature, shock and vibration associated with deployment in Aerospace & Defense as well as Rugged Industrial markets. The ability to deliver products supporting mission-critical or safety-critical functions has created a high demand for our services. With 30+ years of existence we leverage our technology expertise and know-how to solve the challenges of today in the following market segments: C4ISR, Radar / EW, Rugged Industrial, Commercial Aircraft, Unmanned Vehicles. From Single Board Computers, Signal Processors, Avionic Interfaces and Graphics Boards up to Safety Certified Mission Computers, we look forward to working with you on your next project.

EXHIBITOR DETAILS

Midi Caoutchouc
Booth: 717

Depuis plus de 50 ans, Midi Caoutchouc (une société du Groupe Efire) fabrique et distribue des solutions en :

Transfert de Fluides : tubes, tuyaux, gaines, flexibles sur mesure, raccords, colliers

Calage en mousse : aménagement de valises, caisses, servantes, protection en mousse, pièces trempées PVC

Protection technique : acoustiques, antivibratoires, profilés, plastiques, anti-pince doigts, protections, tapis de de sols

Étanchéité : découpe de joints en caoutchouc, graphite, fibre, PTFE, joints métalliques

For more than 50 years, Midi Caoutchouc (an Efire Group company) has been manufacturing and distributing solutions in:

Fluid transfer: tubes, pipes, ducts, custom-made hoses, fittings, clamps

Foam cushioning: storage of suitcases, crates, trolleys, foam protection, PVC hardened parts

Technical protection: acoustic, anti-vibration, profiles, plastique's, anti-finger pinch, protection, floor mats

Waterproofing: cutting rubber, graphite, fibre, PTFE, metal seals

Muirhead Avionics – AMETEK MRO
Booth: 612

Muirhead Avionics is a subsidiary of AMETEK Inc, a global manufacturer of electronic instruments and electromechanical devices with annual sales of approximately $4 billion. Our facility, conveniently located near to London Heathrow Airport, is one of the largest independent repair facilities in Europe, offering an extensive range of services including sales, repair, overhaul, modification and flight data recorder transcription capability. The breadth of the services offered by Muirhead Avionics' OEM approved repair facilities allows the company to be a major supplier to many fixed and rotary wing operators world-wide. Our capability covers radio, radar, navigation, communication, flight data and cockpit voice recorders, instrumentation and test equipment.

NAG – Netherlands Aerospace Group
Booth: 520

The Netherlands Pavilion is organised by the NAG (Netherlands Aerospace Group). The NAG is the trade association for national and international organisations established in the Netherlands and active in aerospace & airport development. The NAG has more than 100 members who together represent 95% of the Dutch aviation industry's revenue. The NAG's mission is to continuously optimise the Dutch aviation industry's ability to compete internationally. To realise this collective ambition worldwide, the NAG supports this sector through the development of expert knowledge, advocacy, access to the national and international market, and an extensive network.

Nolam Embedded Systems
Booth: 800

Nolam Embedded Systems Designs and manufactures board level products and systems, our product portfolio includes IP Cores (MIL-STD1553, ARINC429, H264,…), FPGA Design & manufacturing, Customized Embedded Motherboards, Managed & Unmanaged Rugged Ethernet Switches, Rugged Panel PCs, Consoles and Customized Systems.

North Atlantic Industries Inc
Booth: 815

Since 1955, NAI's vertically integrated design, manufacturing and verification capabilities have been built with the intense focus of an organization that defines every action and investment based on our ability to Accelerate Your Time-to-Mission™.

Offering a portfolio of rugged embedded COTS products, including over 70 pre-integrated modules, Multifunction I/O Boards, Single Board Computers (SBCs), Systems, and Power Supplies, NAI has built a reputation for supporting the world's most demanding defense, commercial aerospace and industrial applications.

The business and expertise of NAI is deeply rooted in the military industrial and commercial aerospace industries. NAI is now present worldwide with partners in major European, American and Asian countries.

Northrop Grumman Italy / Defence
Booth: 603

Northrop Grumman Italy is the Italian subsidiary of Northrop Grumman Corporation, a leading company in the world in the field of defense electronics.

Northrop Grumman Italia (NGI) is a company specialized in ITAR FREE Integrated Navigation Systems. The Northrop Grumman Italy expertise , ranging from development to production of inertial navigation systems and electronic systems, used in aerospace applications, avionics, land, and maritime missile in all the military applications. The development and production include both the research , design and implementation of experimental models and prototypical demonstration, manufacturing, assembly, integration and testing of production units . In addition, Northrop Grumman Italian designs and manufactures all the electronic equipment necessary for inertial systems testing as well as all additional equipment and complementary parts. The skills also extend to maintenance, repair, calibration, training and logistical support for the use of navigation equipment

Products

Inertial Navigation Systems – INS

Attitude & Heading Reference Systems AHRS

IMU – Stbilization

Hybrid Systems INS / AHRS / GPS

Rate Sensors

Capabilities

Development and Production of Navigation Systems for Military Applications

Software Development DO- 178B Levels A-D

Development Hardware DO-254 Levels A-D

Computerized Systems Development and Design CAD

Test & Simulation

Environmental Tests

SMD Assembly Automatic Line

Cleanroom Sensor

Build to Print

Test Equipment Design and implementation

Training

Logistic Support

Northrop Grumman LITEF
Booth: 518

LITEF is one of the leading companies in the development and manufacturing of navigation and sensor systems. The company's expertise is based on German technology for mechanical, fibre optic and micromechanical inertial sensors. This enables ITAR-free distribution of LITEF products around the globe.

Founded in 1961 and headquartered in Freiburg im Breisgau (Germany), the company's product range includes sensors, inertial measurement units, attitude and heading reference systems, inertial navigation systems and inertial reference systems. In close dialogue with the customer, specific product solutions are developed for measurement and navigation tasks with maximum precision and reliability requirements.

LITEF products are in use worldwide with applications ranging from civil and military aviation, land and marine applications to industrial solutions.

Novulo
Booth: 151

STARTED TO MAKE THE DIFFERENCE

From the start we believe in the fact that people in the workplace know themselves and determine what kind of software they need to streamline their business processes. Why do we waste hundreds of hours of custom work every year? Why can't people and organizations design their own software without any knowledge of programming and software development? With this in mind, we created the Architect 10 years ago. Revolutionary at that time and the basis of our success. The Architect makes it possible to 'draw' software fast and efficiently, instead of typing thousands of lines of code.

Constant and fast change
The combination of ready to implement best of breed solutions and next gen low code development enables Airlines and MROs to quickly implement change, thereby resulting in continuous optimization and innovation.

Industry know-how
Ample aviation knowledge to understand your processes and consult accordingly to maximize aircraft utilization.

Lower costs
Novulo's low code weaving approach aims to quickly replace legacy to rigorously reduce costs for licensing and maintenance while digitally transforming the organization. With Novulo, abundant functionality is banned.

OASES
Booth: 145

OASES (Open Aviation Strategic Engineering System) from Commsoft is the all-in-one software for airworthiness maintenance control, meeting strict regulatory requirements. It enables airlines, fixed wing and rotary operators, MROs, and CAMOs to increase efficiencies in the management and monitoring of every procedure or intervention.

OASES is used by 130 aviation organisations – national carriers, large third-party maintenance providers, and independent operators – and supported in 55 countries across 6 continents. Commsoft Limited is an MIT group company, a part of the Valsoft Corporation portfolio.

Olympus France SAS
Booth: 1108

Olympus is an international group, and has been specialized in optics and imaging since 1919. Our devices are used in the context of numerous industrial and research activities extending to the aeronautical, petrochemical, manufacturing, energy production, automotive and consumer products fields. Thanks to its products, Olympus contributes to the quality control of numerous products, in addition to guaranteeing the safety of numerous infrastructures and installations.

OpenAirlines
Booth: 146

We help airlines to reduce their fuel consumption and CO2 emissions by treating all data located in the black boxes (and also many other sources: weather, air traffic control, maintenance, etc.) with Big Data and Artificial Intelligence algorithms.

By analyzing these data, we give recommendations targeted to companies and their pilots that reduce their consumption by 2 to 5%.

Orlando
Booth: 136

Orlando Suite for Tech Pubs is a cloud-based Document Management Solution designed for Airlines, MRO and Manufacturers.

It is the only solution handling company manuals, and OEM manuals (Mixed-fleet for Flight ops and M&E) in one system. It is natively compliant with OEMs' schemas and with the main aviation technical data standards (ATA Spec 2300, ATA iSpec 2200, S1000D).

Presented in 7 modules, it streamlines the manual lifecycle: Library (Cloud CMS), Editor (OEM and company manuals), Merger (Automated revision reconciliation), Analytics (reports), Dispatcher (Distribution over the air), Publisher (XML, PDF, HTML), Explorer (Web and Mobile viewer).

Orolia
Booth: 614

Orolia is the world leader in Resilient Positioning, Navigation and Timing (PNT) solutions that improve the reliability, performance and safety of critical, remote or high-risk operations. With locations in more than 100 countries, Orolia provides virtually failsafe GPS/GNSS and PNT solutions to support military and commercial applications worldwide. Time and Location You Can Trust™.

PACE GmbH
Booth: 415

The next great advance for en-route flight optimization is multi-dimensional, combining vertical flight profile and lateral route analyses to help you reach your destination as efficiently, timely and safely as possible. And it is integrated, connecting and synching flight and dispatch teams in real time to make collaborative decisions in constantly changing operational conditions and to achieve your airline's broad company objectives.

So don't waste your time and resources on isolated, small-scale solutions – visit us at booth #415 to discover the unparalleled scope of a new generation of holistic decision-making support developed with our route optimization expert partners Route Dynamics Corp.

Step into a larger vision – we look forward to inspiring you!

EXHIBITOR DETAILS

PACE – a TXT company are pioneers of en-route flight profile optimization. Our flagship product Pacelab FPO is the original and market-leading onboard decision aid, relied on every day by major airlines such as Air France, Finnair, Hawaiian Airlines, Icelandair and Lufthansa Group to reduce the workload of their flight crews and to support their environmental and sustainability strategies.

Parasoft
Booth: 1002

Parasoft's technologies reduce the time, effort, and cost of delivering secure, reliable, and compliant software, by integrating static and runtime analysis; unit, functional, and API testing; and service virtualization.

Pivot
Booth: 206

PIVOT is the world leader in portable, protective EFB cases and mounting solutions. Designed by a commercial airline pilot from a user's perspective, PIVOT products enhance EFB function and user experience, all while providing robust device protection and preserving IT flexibility when selecting new EFB devices. The patented PIVOT universal mounting system provides EFB operators with the aviation market's truly "future-proof" mounting solution, essentially protecting client airlines and military users from the ever-changing form factors of EFB devices. Managing Director Mike Schulter's group of 15 incredibly talented team members at PIVOT service over 160 airlines and 400,000 daily users.

Presagis
Booth: 613

PRESAGIS is a recognized leader in development tools for interactive display graphics. We offer intuitive and robust software tools to develop safe and certifiable cockpit graphics for the aerospace, defense, security, and critical infrastructure markets. Since 1985, we have been delivering first in-class cockpit graphics design tools and for the last 15 years delivering DO-178 certifiable solutions. PRESAGIS' technology, developed in conjunction with major aircraft OEMs, provides leading-edge capabilities (such as touch and gestures and video streaming) to enable the development of products that support the ARINC 661 Standard.

PRESAGIS Embedded Graphics team serves hundreds of customers worldwide, including many of the world's most respected organizations such as Boeing, Airbus, Collins Aerospace, Lockheed Martin, BAE Systems, Leonardo, Thales and CAE among others. For more information, visit www.presagis.com.

ProvenRun
Booth: 1008

ProvenRun's mission is to provide customers with the Trusted Products and Services that will help them embed security within their infrastructure of connected devices wherever this is required, at the chip, device, edge or cloud levels. With our security consulting services and secure-by-design off-the-shelf product solutions, we resolve the security challenges arising from the IoT revolution while dramatically improving the protection against remote cyberattacks.

We serve customers across industries mainly in the Automotive, Aerospace/Defense, Transport, Industrial, Telecom sectors, the IoT/Consumer device OEMs and the Semiconductor & IP suppliers.

QOCO Systems
Booth: 142

QOCO Systems Ltd helps the aviation industry to succeed in the changing world by creating new ways to work, to communicate, and to utilize data. We have been a trusted partner of airlines, MROs, and aircraft OEMs for over ten years.

Our solutions provide significant improvements to the industry's complex processes. They enable our customers to achieve more by doing less and to realize time-savings in labor-intensive tasks. We also bring visibility to customers' operations to support decision-making based on real-time information.

Our offering includes the following SaaS solutions: MROTools.io for tool management in aircraft maintenance and EngineData.io for intelligent integrations between different operators in the aviation industry. We also provide a wide range of consulting services for our customers' unique needs in the areas of digitalization, process improvement, data analytics, and more.

All this is realized by our team of professionals with expertise in aviation and software development, with a customer-centric approach in everything we do. Agility is built-in to our way of working, and we always aim to fulfill the customer's real needs, quickly. On top of this, we are committed to a high level of quality and information security, which is supported by a certification of ISO 9001 and ISO 27001 compliant management system.

Ramco
Booth: 400

With 1900+ employees spread across 24 offices, Ramco Systems is a global enterprise software provider offering HR and Global Payroll, ERP and M&E MRO for Aviation. Part of the USD 1 billion Ramco Group, Ramco focuses on innovation to differentiate itself in the marketplace. Ramco Aviation Software is trusted by over 22,000 users to manage more than 4,000 aircraft globally. Accessible on cloud and mobile, the innovation-rich aviation solution is a comprehensive software with modules for engineering and programs, maintenance, finance, compliance and quality, flight operations and integration gateway (iRIS), that comes with advanced visualization dashboard on a mobile-ready platform. Ramco is changing the paradigm of enterprise software with zero user interface (Zero UI) powered by features such as chatbots, mail bots, HUBs and cognitive solutions.

Rapita Systems Ltd
Booth: 701

Rapita Systems Ltd develops on-target embedded verification software solutions for customers in the avionics and automotive electronics industries. Our tools help to reduce the cost of measuring, optimizing and verifying the timing performance and test effectiveness of their critical real-time embedded systems.

Real-Time Innovations
Booth: 807

Real-Time Innovations (RTI) is the largest software framework company for autonomous systems. RTI Connext is the world's leading architecture for developing intelligent distributed systems. Uniquely, Connext shares data directly, connecting AI algorithms to real-time networks of devices to build autonomous systems. RTI technology and expertise are proven in over

EXHIBITOR DETAILS

1,000 Aerospace and Defense (A&D) applications to safely and securely integrate mission-critical systems. RTI Connext DDS supports open architecture systems by providing fast, scalable, reliable, and secure connectivity within and between land, sea, air and space-based systems, and accelerates safety certification with commercial-off-the-shelf (COTS) RTCA DO-178C and EUROCAE ED-12C DAL A certification evidence. RTI embraces A&D industry standards, like DDS and FACE, and have the first FACE Transport Service Segment (TSS) certified conformant solution. Connext DDS also meets also the stringent requirements of Modeling, Simulation and Training (MS&T) applications by providing interoperability between distributed simulation components, regardless of where they are located.

Royal Netherlands Aerospace Centre

Booth: 517

Royal NLR operates as an unaffiliated research centre, working with its partners towards a better world tomorrow. As part of that, Royal NLR offers innovative solutions and technical expertise, creating a strong competitive position for the commercial sector.

Royal NLR has been a centre of expertise for over a century now, with a deep-seated desire to keep innovating. It is an organisation that works to achieve sustainable, safe, efficient and effective aerospace operations.

The combination of in-depth insights into customers' needs, multidisciplinary expertise and state-of-the-art research facilities makes rapid innovation possible. Both domestically and abroad, Royal NLR plays a pivotal role between science, the commercial sector and governmental authorities, bridging the gap between fundamental research and practical applications. Additionally, Royal NLR is one of the large technological institutes (GTIs) that have been collaborating since 2010 in the Netherlands on applied research as part of the TO2 federation.

From its main offices in Amsterdam and Marknesse plus two satellite offices, Royal NLR helps to create a safe and sustainable society. It works with partners on numerous (defence) programmes, including work on complex composite structures for commercial aircraft and on goal-oriented use of the F-35 fighter. Additionally, Royal NLR helps to achieve both Dutch and European goals and climate objectives in line with the Luchtvaartnota (Aviation Policy Document), the European Green Deal and Flightpath 2050, and by participating in programs such as Clean Sky and SESAR.

For more information, go to www.nlr.org.

Mission
Royal NLR makes aerospace more sustainable, safer, more efficient and more effective. The innovative solutions and practical advice strengthen the competitiveness of the business community and contribute to solutions for social issues. NLR works in an objective manner, for and with the (inter) national business community and government agencies.

Vision
The challenges in aviation are always greater than the possibilities of today. Only the continuous connection of an in-depth understanding of customer needs with leading knowledge and research facilities enables rapid innovation. NLR is the connecting link between science, industry and government.

Safety Line

Booth: 143

Paris based Safety Line offers digital solutions that enable airlines and airports to leverage existing data for safer and more efficient operations. The combination of a solid expertise in aviation associated with patented research in data science applications allows Safety Line to offer uniquely innovative and practical solutions, with a focus on better managing risks and reducing fuel and CO_2 emissions.

Since July 2021 Safety Line is a SITA Group company.

SAFRAN Electronics & Defense

Booth: 504

Every day, Safran Electronics & Defense helps airlines, operators and Original Equipment Manufacturers by collecting, processing and analysing an increasing amount of flight data. Cassiopée is a twofold offer that combines flight data management software packages and analysis solutions for all types of airplanes and helicopters. Our services enable fuel consumption reduction, maintenance costs optimization and flight safety enhancement.\n\nOur aim? Improve our clients' operational efficiency by providing an array of services that allow a better understanding of performance of their aircraft and systems.

Scandinavian Avionics A/S

Booth: 601

Scandinavian Avionics A/S (SA) is the headquarters of The SA Group. The SA Group provides complete turn-key solutions within avionics, design and training, for fixed wing, rotary wing and UAV applications in both the civilian and governmental sectors. The SA Group is represented in 8 countries, on 12 locations in Europe, the Middle East, India and Southeast Asia. The headquarters, which was established in 1978, is located in Billund, Denmark.

Approvals

EASA Part-145 | EASA Part-21J | EASA Part-21G | EASA Part-147

FAA Part-145 | TCCA Part-145 | BCAA Part-145 | GAR Part-145 | DOT RIN N083

ScioTeq

Booth: 608

ScioTeq has a 35 year heritage (from Barco to Esterline to ScioTeq) of designing and manufacturing the most innovative solutions for the Avionics, Air Traffic Control and Defence & Security markets.

ScioTeq advanced visualization solutions help pilots get the best situational awareness of the aircraft, in most demanding environment. The scalability of ScioTeq products allows aircraft manufacturers and system integrator to provide unique experience to aircraft operators.

ScioTeq has been serving the Avionics market for 35 years, being now present on more than 150 aircraft types, both civil and military platforms, both fixed wing and rotor wing, cumulating millions of flight hours. Our deep vizualisation technology heritage combined with a unique independent positioning, allows us to provide to aircraft manufacturers and system integrators the best image quality in a scalable manner, supported by an open system solution (MOSArtTM). Our scalable product portfolio, combined with unique agility allows us to adapt and solve any visualization need.

With sales, engineering and manufacturing locations throughout the world, we are able to provide solutions designed to operate in the environments you need them to.

ScioTeq, your trusted Partner for Advanced Visualization Solutions used in the World's most Demanding Environments.

Seabury Solutions
Booth: 148

Seabury Solutions is a leading global aviation software development and consultancy company. It was established in 2002 and forms part of the Seabury Capital. Seabury Solutions has built its reputation in the market by delivering world class aviation IT solutions from the smallest operator to the largest airlines across the world. We have built upon our decades of aviation expertise in-house, to leverage this knowledge into a suite of products that enhance the decision-making process for Airlines, Regulators, Defense Airports and MROs.

Seabury Solutions Aircraft Maintenance Software, Alkym, is an integrated MRO IT Solution specifically designed for the Management & Control of Aircrafts within Airlines and MROs.

Designed for regulatory, compliance, productivity and efficiency, eAuthority is the leading safety oversight software for Civil Aviation Authorities & Airports. Inspired by ICAO, EASA and FAA regulations, eAuthority is designed to increase efficiency of internal staff while giving real-time information to the management on a multi-platform dashboard.

The third product within the Seabury Solutions, digital transformation platform is an Enterprise Performance Analysis Tool (EPAS) designed for Route Profitability. EPAS is used by some of the worlds largest airlines such as American Airlines, Southwest, Delta, Aero Mexico to name but a few.

SELA
Booth: 410

Cockpit and cabin lighting systems - SELA is a leading supplier of cockpit & cabin lighting systems for civil & military aircraft. Located in Vic-en-Bigorre city (south of Toulouse – FRANCE), SELA is a EN9100 approved company. We offer state-of-the art lighting and made to measure solutions for military applications, airlines seat lighting, business jet interiors, corporate and VIP aircraft. Our Engineering department working under CATIA & SOLIDWORKS software is an open platform to your lighting design requirements. We design, develop and manufacture our products in house. Thanks to our agreements PART 21 G & PART 145, we deliver directly our lighting products with corresponding certification documents. Our sister company, BIGORRE AEROSPACE CORPORATION (BAC) located in Pinellas Park (Florida – USA) is a FAA approved company. SELA and BAC are permanently linked to guarantee a worldwide lighting production and support to our customers. A network of SELA-BAC exclusive representatives in the world (Asia/South Africa/Brazil/Middle-East/Europe) enlarge our worldwide support and direct deliveries to operators.

Siemens
Booth: 713

Siemens Digital Industries Software is driving transformation to enable a digital enterprise where engineering, manufacturing and electronics design meet tomorrow. The Xcelerator portfolio helps companies of all sizes create and leverage digital twins that provide organizations with new insights, opportunities and levels of automation to drive innovation. For more information on Siemens Digital Industries Software products and services, visit www.sw.siemens.com. Siemens Digital Industries Software – Where today meets tomorrow.

SITA FOR AIRCRAFT
Booth: 303

SITA is the air transport industry's IT provider, delivering solutions for airlines, airports, aircraft and governments. Our technology powers more seamless, safe and sustainable air travel.

With around 2,500 customers, SITA's solutions drive operational efficiencies at more than 1,000 airports while delivering the promise of the connected aircraft to customers of 18,000 aircraft globally. SITA also provides technology solutions that help more than 70 governments strike the balance of secure borders and seamless travel. Our communications network connects every corner of the globe and bridges 60% of the air transport community's data exchange.

SITA is a certified CarbonNeutral® company in accordance with The CarbonNeutral Protocol – the leading global standard for carbon neutral programs. We are reducing our greenhouse gas emissions for all our operations through our UN recognized Planet+ program, while also developing solutions to help the aviation industry meet its carbon reduction objectives, including reduced fuel burn and greater operational efficiencies at the airport.

SITA is 100% owned by the industry and driven by its needs. It is one of the most internationally diverse companies, providing services in over 200 countries and territories.

For further information, go to www.sita.aero

Skayl
Booth: 904

Skayl is a small business proving software, device, and capability interoperability solutions for large complex system-of-systems with a need for unsurpassed integration scalability, flexibility, dependability, security, and value. Skayl has been actively supporting the Future Airborne Capability Environment (FACE™) Consortium since 2012 in many key technical and leadership roles. As recognized leaders in data architecture, we are constantly innovating on approaches that leverage these semantic data models to fundamentally address the scalability challenges present in integration.

Skypaq
Booth: 401

Enable Digital Tranformation using Skypaq.

Supporting and developing essential Flight Ops and MRO solutions since 2004.

Allow IT Developers and Business Subject Expert extend their capablilites by building apps on the low-code platform 'Zudy/Vinyl' utilizing Skypaq industry expertise. For instance, enable the 'Connected Aircraft', by building apps that utilize cockpit wi-fi to send workorder directly during flight.

Skypaq's Secure Data Hub enables real-time integration with systems such as AMOS, LIDO and also ACARS messages, while also utilizing 'Zudy/Vinyl' low-code application development platform. to provide the complete digital solution for your airline.

EXHIBITOR DETAILS

Speedgoat
Booth: 616

Speedgoat provides customers in the aerospace & defense domain the quickest way to design with Simulink, prototype and test complex controls, DSP, and vision applications with hardware. The modular and high-performance architecture of Speedgoat target computers and the broad range of I/O and protocol interfaces are especially well-suited for innovations towards electrification and automation.

sol.one
Booth: 708

sol.one, located in Belgium, builds platforms and instruments for aircraft cockpits, avionics and ground stations. sol.one focuses both on MANNED and UNMANNED business. Its employees have decades of relevant experience in Aerospace, Space and embedded systems.

sol.one provides CERTIFIED hardware and software on demand for manned and unmanned cockpits / groundstations with an 80% reduction in time, risk and cost by using our certified platform.

sol.one holds following certificates: ISO9001, EN9100, ISO14001, DO-178C and DO-254.

START PAC
Booth: 106

START PAC is the leading global manufacturer for reliable and cost-effective ground support equipment, capable of starting any electrically started aircraft. START PAC has the engineering expertise in house to develop specialized equipment. Its Patented designs reduce overall operating costs while securing safe starts. Its team provide unparalleled after sale support.

STEP Lab
Booth: 117

STEP Lab is specialized in the production of test systems for mechanical static, dynamic and impact tests. Our product range is divided into Electrodynamic actuators for dynamic fatigue testing based on ballscrew or linear motor technology, drop weight towers and customized testing systems. All our systems are based on our own developed electronic platform and Test Center software.

Swiss Aviation Software Ltd
Booth: 133

AMOS is a comprehensive, fully-integrated software package that successfully manages the maintenance, engineering and logistics requirements of modern airlines and MRO providers by fulfilling demanding airworthiness standards.

Swiss AviationSoftware unites more than 30 years of IT experience with profound MRO expertise and offers its customers a functionally unsurpassed and technologically state-of-the art maintenance system.

Swiss-AS has succeeded in offering the market a system that meets the fast changing demands of a highly dynamic industry and has attracted more than 190 customers worldwide. The number and size of customers who newly select, or continue to place their trust in AMOS, speaks for itself.

SYSGO GmbH
Booth: 805

Europe's Number 1 in embedded Operating Systems

SYSGO is Europe's leading supplier of real-time operating systems for safety-critical embedded systems. Our software platform PikeOS, an RTOS with hypervisor functionality, enables the secure execution of critical and non-critical applications on the same hardware, thus reducing footprint requirements, hardware costs and energy consumption.

PikeOS – Wherever Safety & Security matters

PikeOS was developed from scratch for mission-critical projects with certification requirements according to various safety and security standards such as DO-178B/C, IEC 61508, EN 50128, ISO 26262 or IEC 15408 (Common Criteria). Currently, PikeOS provides developers with improved single and multi-core CPU handling (scalability), efficient power and resource management, as well as secure / optimised task handling in processor cores (fine-grained locking). This makes PikeOS the ideal basis for certification projects with high demands on Safety and Security.

In terms of Security, PikeOS is currently the only separation kernel certified according to Common Criteria (EAL3+). In addition, PikeOS offers a fully-certified programming interface and thus enables application development according to the principle "Safe & Secure by Design". More information also here: www.sysgo.com/common-criteria

ELinOS – Embedded Linux Development Environment

SYSGO will also present ELinOS 7 – an "industrial Linux" – designed to easily realize "out-of-the-box" software projects. ELinOS is SYSGO's own Linux distribution and 100% compatible with PikeOS. The ELinOS kernel provides the latest industrial drivers, connectivity stacks, real-time extensions, support for industrial hardware and a state-of-the-art embedded development environment. Customers receive direct support from SYSGO engineers with extensive experience in industrial applications.

Safety & Security is not an Option – it's an absolute Must!

Certification of software according to Safety and/or Security standards is a complex process. SYSGO has the expertise to guide its customers from the first step through the entire development process and prepare them for efficient and successful certification. 80% of SYSGO's engineers have experience with certification projects where customers are supported throughout the certification process.

SYSGO's customers are leading players in the fields of Aerospace & Defense, Avionics, Railway, Automotive, Industrial Automation and safety-critical applications in the Internet of Things (IoT). SYSGO has locations in Germany, France, the UK and the Czech Republic and is certified according to ISO 9001:2015 and ISO/IEC 27001:2013.

TDM
Booth: Aerospace Valley Pavilion 1101

TDM is a study office for electronics cards. Our main activity concern video treatment but also magnetometry, power of electronics, IoT… Our activity just lead us to become a rank 1 supplier for a major Aircraft company !

TDM also own their own products such as video recorder, video splitter…

We will have our material with us on the booth, come to see us !

Techtest (HR Smith)
Booth: 810

The HR Smith Group of Companies is an independent avionics manufacturing company which has been serving the aircraft industry for over 50 years. The Group consists of four companies and has capabilities in Airborne Antennas, Static Dischargers, Radomes, Emergency Locator Transmitters, Direction Finding Systems and Avionics Test Sets.

All products utilise advanced technology and are manufactured to the highest standards by a dedicated team of professionals at our UK and US factories, offering solutions for both commercial and military applications.

TECHWAY
Booth: 611

TECHWAY is a high-tech digital electronics supplier specializing in the acquisition and processing of signal and video data. Our mission is to deliver innovative solutions and top-level support to our clients.

Since 15+ years, we are recognized as an ARINC 818 expert on Avionics market thanks to our partnership with Great River Technology, co-inventor and global leader of the ARINC 818 protocol, Avionics Digital Video Bus. TECHWAY is today the European leader in the ARINC 818 protocol and continues to develop innovative projects and products for AIRBUS, SAFRAN, BAE, DASSAULT, SAAB and more.

We design advanced solutions based on FPGA and high-speed optical communications. Our engineers' team develops products to simplify the use of real-time technology.

Thanks to our expertise and our partnerships, TECHWAY offer a wide range of solutions for multiple high-end applications such as signal and video acquisition, RFSoC and FPGA boards, ARINC 818 video protocol solutions, sFPDP platforms, embedded servers, rugged recorders and mission computers, and Edge computing solutions.

Our activities are covered by our ISO 9001:2015 Quality Management System which aims to guarantee our clients that our products and services meet their requirements, come in on time and within budget, effectively managing any risk.

Avionics applications

Provider of advanced solutions for Avionics key players, TECHWAY launched in 2008 the first ARINC 818 10×10 switch – digital video bus in aircraft cockpits – for the A350 certification program.

The ARINC 818 protocol, based on the FC-AV (Fiber Channel Audio Video) standard, allows the video stream to be transported with determinism and very low latency. The ARINC 818 Supplement 3 standard supports streams from 12 Gbps for 64b/66b encoding, up to 28 Gbps for 256b/257b encoding.

TECHWAY and Great River Technology offer product lines dedicated to the ARINC 818 generation or acquisition equipment testing.

Teledyne Controls
Booth: 412

At Teledyne Controls, we built our name on intelligent solutions that collect, manage and deliver aircraft data more efficiently. Our innovative technology and collaborative customer relationships have revolutionized the way aircraft operators access, manage and utilize their data, helping them achieve higher goals in safety, performance and efficiency. Our adaptable suite of products include Data Acquisition & Management Systems, Wireless Data Transfer Systems, Flight Data Analysis & Investigation Solutions, Data Loading Solutions and Aircraft Network Systems. Combined together, these products provide comprehensive data management solutions that leverage aircraft data intelligence and create value for our customers.

Teledyne e2v Semiconductor
Booth: 702

Teledyne e2v, an aerospace qualified manufacturer of advanced semiconductors, will showcase its Qormino® line of Common Compute Platform solutions.

Qormino brings design simplifications and SWaP optimizations (Size, Weight and Power) to Aerospace & Defense customers.

Teradyne
Booth: 122

Teradyne is the leading supplier of automatic test equipment for defense and aerospace electronics manufacturers, depots, and intermediate-level facilities. Teradyne's test systems and instrumentation provide the performance and capabilities of full custom solutions, but with lower start-up costs, faster test program development, proven migration, and reduced obsolescence. Our products help to standardize today's most advanced DoD-based automatic test system programs.

Testek Solutions
Booth: 119

Aircraft component OEMs, MRO facilities, and operators depend on Testek Solutions for highly reliable aerospace test equipment to certify hydraulics, power generation, avionics, fuel, lube, actuator, and pneumatic components. With a 50-year track record of success, Testek uniquely holds long-term OEM partnerships, provides the industry's leading equipment warranty, and support from a dedicated worldwide team.

Thommen Aircraft Equipment
Booth: 901

THOMMEN AIRCRAFT EQUIPMENT Ltd is a world-leading Swiss manufacturer of mission equipment, displays, air data displays and air data computers, digital clocks and chronographs for helicopters, fixed wing aircraft & UAV. THOMMEN also offers superior aviation qualified Flashlights and supplies innovative night vision compatible aircraft lighting products.

The entire product line serves both the OEM production of new aircraft as well as the retrofit market for existing fleets.

THOMMEN maintains the following quality Approvals and Certifications and our equipment and systems are manufactured according to the EASA Part-21 G – Production Organisation Approval Certificate, the EASA Part-145 Maintenance Organisation Approval Certificate, the EASA Part-21 O Capability for Design – the ETSO Authorization and the EN 9100:2009 / AS 9100 Rev. C – Quality Management System Aviation Certificate.

For more information about THOMMEN visit www.thommen.aero.

EXHIBITOR DETAILS

Toray Advanced Composites
Booth: 520

Toray Advanced Composites is a leader in the development and production of advanced thermoplastic and thermoset composites for high-end industries. With production facilities and operations in Europe and North America, Toray Advanced Composites manufacture a market leading range prepregs, UD tapes, and laminates. Our diverse portfolio is incorporated into a variety of expanding market segments including aerospace structures, aircraft interiors, space and satellite, radomes, automotive, autosport and Formula 1, consumer electronics, sporting goods, and medical devices.

TTTech
Booth: 803

TTTech is a leading provider of safe networked computing platforms. The company's solutions improve safety and reliability of networked electronic systems in the industrial and transportation sectors.

Within the aerospace industry TTTech provides solutions based on TTP®, AFDX® and TTEthernet® (combining IEE 802.3, ARINC 664 part 7 and SAE AS6802 standards in one product).

TTTech's aeronautics products are certifiable to the highest certification standards in the aerospace and space industries.

Besides aeronautics, TTTech's radiation-hardened TTEthernet Controller ASICs and its full line of radiation-hardened TTEthernet switches and network interface cards are offered for deep space applications.

Ubisense
Booth: 147

Efficient process means bringing your people, tools and assets together at the right time, in the right place to get the job done. Easy to plan, hard in reality.

Ubisense helps you optimize complex process flows by combining real-time location intelligence with business systems so your plan and reality are never out of sync. Our SmartSpace™ platform creates a real-time digital twin of your physical environment using the best location-sensing technology and gives you the power to easily analyze, error-proof and automate great processes. The world's leading brands rely on Ubisense to optimize their operations and deliver quality on schedule.

Ultramain Systems
Booth: 407

For nearly 40 years, Ultramain Systems has provided superior M&E/MRO software products and professional software implementation services to leading aviation companies worldwide. Our flagship product, ULTRAMAIN®, is a comprehensive airline maintenance and logistics solution that delivers comprehensive functionality to create a SIMPLE MOBILE PAPERLESS operation. In addition, Ultramain Systems offers a series of mobile products that work in conjunction with ULTRAMAIN M&E/MRO Suite as well as other maintenance systems. ULTRAMAIN Mobile Mechanic™, ULTRAMAIN ELB™, Mobile Inventory™, Mobile Executive™ and GATe work to provide accurate real-time data entry by pilots, flight crews, and mechanics, thereby eliminating thousands of paper records which would normally be created on a daily basis. Because ULTRAMAIN is mobile and paperless, we can help you see your aircraft data FAST, ACCURATELY and in REAL-TIME. Ultramain Systems headquarters is located in Albuquerque, New Mexico with offices in Europe, Asia and India. For more information about Ultramain Systems and our products, please visit www.ultramain.com, send an inquiry to sales@ultramain.com, or call us at 1.505.828.9000.

United Electronic Industries
Booth: 111

United Electronic Industries (UEI) collects real-world data so our customers can build smart systems that are reliable, flexible, and rugged. UEI's family of rugged chassis and extensive selection of over 85 I/O boards dominates the simulation, test, and data acquisition markets in aerospace, defense, and transportation applications. UEI's customers include tier 1 aerospace, defense, space, and industrial companies, and all branches of the military. UEI's world-class customer support and service enable rapid customer deployment and seamless integration into virtually any popular software environment including LabVIEW, Simulink/MATLAB, .NET, Java, as well as C/C++. UEI headquarters is located at 249 Vanderbilt Avenue, Norwood, MA 02062. Additional UEI offices are located in the UK and Germany. www.ueidaq.com

Vector
Booth: 809

Vector Informatik is the leading manufacturer of hardware and software tools for the design and test of embedded electronics and their networking via CAN, Ethernet and AFDX up to ARINC 429.

Since 1988 Vector has been a partner of manufacturers and suppliers to the aerospace and automotive industry. Design and test engineers in the aerospace environment benefit from the Vector tools for system, integration and flight testing as well as monitoring and analysis of bus communication. Worldwide customers in the automotive, commercial vehicles, aerospace, transportation, and control technology industries rely on the solutions and products of the independent Vector Group for the development of technologies for future mobility.

Vector worldwide currently employs more than 3,000 people with sales of EUR 770 million in 2019. With its headquarters in Germany (Stuttgart), Vector has subsidiaries in the USA, Japan, France, Great Britain, Italy, Austria, Sweden, South Korea, India, China, and Brazil.

VIAVI Solutions
Booth: 815

Global Leadership in Test, Measurement, Assurance Solutions and Advanced Precision Optical Solutions, VIAVI is a company steeped in a diverse, rich, and technologically-savvy history.

You've known us by another corporate name (JDSU), and over the years have seen us strategically execute many key technology acquisitions – including Cobham, Aeroflex, Agilent, Arieso, Network Instruments, OCLI, RPC Photonics, 3Z Telecom, and Trilithic – to advance our already expansive offerings.

Now, and together with 350+ global Channel Partners, VIAVI sells an incredibly broad portfolio to network, communications, and electronics technology leaders across the globe. We don't just offer individual products, we work with our customers to solve critical issues affecting end users, such as quality of service.

Through our use cases, we are able to help customers identify opportunities to use data and analytics to improve their business. It's why we are the #1 or #2 leader in every space in which we offer solutions – including industry game-changers like 5G, Fiber and 3D Sensing.

Visure Solutions, Inc.

Booth: 819

Visure Solutions has been a global industry leader of requirements management software for almost twenty years. Visure provides specialized, innovative and user-friendly solutions to implement efficient requirements management processes, aimed at guaranteeing the highest quality in the development of our clients' products, systems and services. Visure Requirements ALM Platform supports requirements management, test management, bug & issue tracking, change management, risk management, collaboration management, reports and dashboarding, variant management and certification management.

Visure Requirements ALM Platform's value proposition is nothing less than the total innovative and disruptive technology that we've developed in several key functions: system performance, standard compliance, and solution economics for engineering requirements of safety-critical and business-critical systems.

Users utilize advanced functionality by leveraging modern, best-of breed technologies, integrated with other tools such as IBM DOORS, Polarion, Jama, JIRA, Bugzilla, Enterprise Architect, MATLAB Simulink, SCADE, HP/ALM, Test RT, VectorCAST, TFS-Team Foundation Server, Microsoft Project, Siemens, PTC, Dassault Systems and others.

Unrivaled system economics guarantees the highest quality of requirements and drastically reduces total life cycle costs.

Visure Solutions is also a worldwide certified IREB (International Requirements Engineering Board) training provider of CPRE (Certified Professional for Requirements Engineers). Please visit us at https://visuresolutions.com.

Vistair

Booth: 210

Vistair delivers business-critical operational content management for operational processes and safety management solutions combined with data driven insight to the Commercial Aviation and Aerospace & Defence sectors.

Combining technology, development expertise and service delivery, Vistair's suite of aviation technology solutions support the delivery of improved safety, compliance, and operational efficiency that results in significant commercial savings to aviation organisations.

Founded in 2001, Vistair's aviation software management credentials are known the world over. This has led them to becoming the technology partner of choice to over 40 aviation partners worldwide. Such long-standing partnerships have enabled solutions to be enhanced and improved through both customer feedback and commercial insight.

Each of these aviation management solutions are interlinked and supportive of an industry focused upon cost efficiency, safety management and compliance.

Operational Content Management
DocuNet™ is the aviation industry's leading end-to end operational content management solution, streamlining the complexities associated with content authoring, management, distribution and viewing.

DocuNet™ supports clarity, simplicity, and efficiency in operational content management, and provides both flight and ground operations with a single-source, end-to-end solution for managing "front-line" technical documentation.

DocuNet's unrivaled technology can manage all content formats, including non-structured (PDF) and structured data (including XML, SGML, ATA iSpec 2200 and S1000D) and meets technical information management requirements for existing and new generation fleets.

With over 20 Years' experience of working with leading fleet operators, airlines, and military organisations worldwide, Vistair understands both the current state and future vision for the industry.

In essence, DocuNet will simplify the associated complexities of operational content management, delivering a return on investment with the net result being a more efficient, compliant and safer airline.

Safety and Quality Management
Vistair's also provides an integrated suite of safety, risk, and quality management solutions.

SafetyNet is an aviation reporting system and investigation solution that drives real change in the management of safety-related occurrences. It is currently deployed by a number of global airlines including easyJet, Breeze and Delta Air Lines, and also counts the military among its user base. Complementing this is advanced, change and aviation risk management capability that provides hazard identification. Integrating with both, is a comprehensive aviation compliance module that enables Quality Managers to manage audit schedules, checklists, and non-compliances through an intuitive interface.

Operational Data Analysis and Insight
The final piece of the Vistair technology suite is Vistair Intelligence, a data analysis and insights tool that provides dashboard access to specified operational data sets across all of Vistair's product suite. Not only does this allow aviation organisations to unlock value and context from operational data, it accelerates operational decision making, whilst increasing performance and accuracy along the way.

For more information visit stand 210 or take a look at our website **https://www.vistair.com**

VODEA

Booth: Aerospace Valley Pavilion 1101

VODEA, Your multimedia embedded Solutions partner: ON BOARD EQUIPMENT SUPPLIER Video management & processing computer for SECURITY, SURVEILLANCE & ENTERTAINMENT: ARTIFICAIL INTELLIGENCE EDGE COMPUTING & REAL TIME THIRD PARTY ANALYTICS HOSTING

VODEA, Your multimedia embedded Solutions partner:

ON BOARD EQUIPMENT SUPPLIER

Video management & processing computer for

SECURITY, SURVEILLANCE & ENTERTAINMENT

ARTIFICIAL INTELLIGENCE EDGE COMPUTING

REAL TIME THIRD PARTY ANALYTICS HOSTING

Since 2003, VODEA design and manufacture on board multimedia equipment for Security, Surveillance and Entertainment.

Especially, our FOCUS product line is dedicated to video and image processing with artificial intelligence capabilities.

EXHIBITOR DETAILS

More than 200 FOCUS are installed (line-fit or retrofit) in military aircraft, UAV, helicopters and commercial aircraft.

FOCUS can be tuned / customized according to customer video applications:

- Cockpit management system
- Streaming with augmented reality for cabin entertainment
- Aircraft surveillance using image processing and Artificial Intelligence analytics algorithms (person/posture and mask wearing detection, tracking, …)
- Push-back / taxi monitoring

– Main businesses of VODEA cover multimedia embedded solutions: Design of Edge embedded computer (DO160) with Video & metadata management, multiplexing, transcoding, recording, streaming, overlay, display, image processing with Deep Learning capabilities (Artificial Intelligence)

WEBMANUALS

Booth: VIP airlines lounge Sponsor

Web Manuals specializes in developing digital document management solutions for the aviation industry. It is revolutionizing aviation manuals and regulatory compliance by making the digitization, authoring, and distribution of operational documentation easy and accessible to operators of all sizes. What used to be a laborious manual task is now made simple: the rapid authoring, reviewing, publishing, distribution, and control of an entire manuals library is now a seamless operation. This brings significant savings in time and administrative costs, while improving regulatory compliance and flight safety.

Web Manuals is rapidly expanding its global footprint. It has more than 400 customers and partners worldwide, and offices in New York, San Diego and Malmö, Sweden.

Weigele Aerospace

Booth: 503

Weigele Aerospace is the Inflight Power Company. We are a leading global provider of power supply products and services for aviation. We design, source and qualify leading edge, modular power supplies that enable customizable solutions for and by our aviation partners. Our mission is to power equipment, to power efficiency and to power your future.

Wind River

Booth: 704

Wind River is a global leader in delivering software for the intelligent edge. The company's technology has been powering the safest, most secure devices in the world since 1981 and is found in billions of products. Wind River offers a comprehensive portfolio, supported by world-class global professional services and support and a broad partner ecosystem. Wind River software and expertise are accelerating digital transformation of mission-critical intelligent systems that will increasingly demand greater compute and AI capabilities while delivering the highest levels of security, safety, and reliability. To learn more, visit Wind River at www.windriver.com.

wolfSSL

Booth: 903

wolfSSL focuses on providing lightweight and embedded security solutions with an emphasis on speed, size, portability, features, and standards compliance. Dual licensed to cater to a diversity of users ranging from the hobbyist to the user with commercial needs, we are happy to help our customers and community in any way we can. Our products are Open Source giving customers the freedom to look under the hood.

Yonder AG

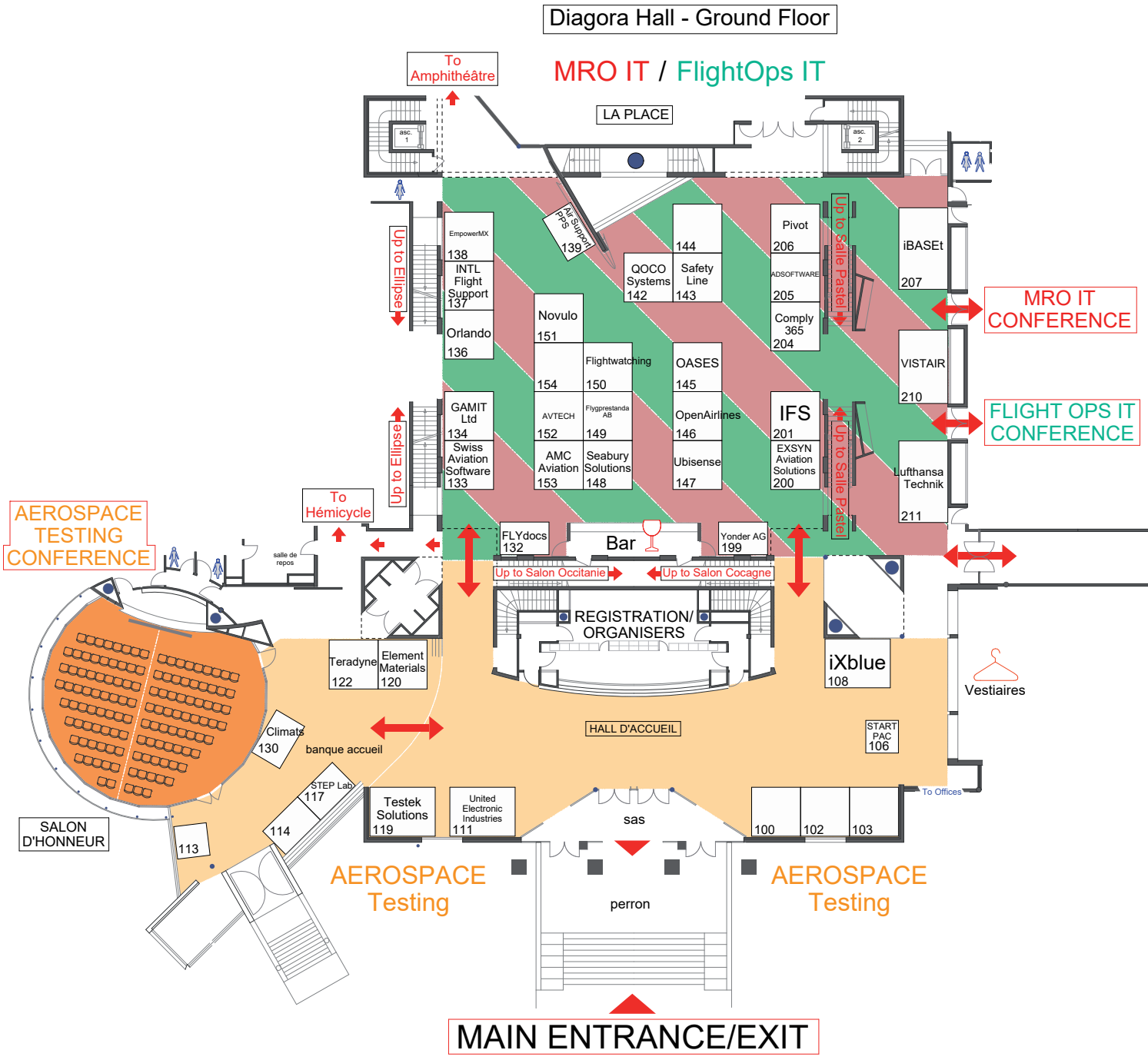
Booth: 199

Yonder Mind is a cloud based solution that features everything an airline may depend on to account for seamless documentation management. From creating and publishing content, all the way to revising it based on your internal revision and approval procedures via dedicated workflows: Yonder Mind delivers reliable, role-based information to your frontline employees at all times, both via web client and the offline app that is available for tablets and smartphones.

Manage your documentation more efficiently. Be it by reusing content from different sources or by leveraging Yonder Mind's capabilities to automate the reconciliation management between the manufacturer's OEM manuals and your customized documentation. And never miss a change in regulations again, thanks to Yonder Mind's ability to link content directly to the underlaying regulations and standards.

webmanuals welcomes these airlines:

FLOOR PLAN



SESSIONS:	
3rd - Amphitheâtre Joint Opening Keynote	4th - Ellipse Certified Training
3rd - Hemicycle Avionics Conference	4th - Salon Occitanie Certified Training
3rd - Salle Pastel 1 Connected Aircraft Conference	4th - Salon Cocagne Certified Training
3rd- Salle Pastel 2 FACE Conference	
3rd - Ellipse Certified Training	
3rd - Salon Occitanie Certified Training	
3rd - Salle Cocagne RaeS Workshop	

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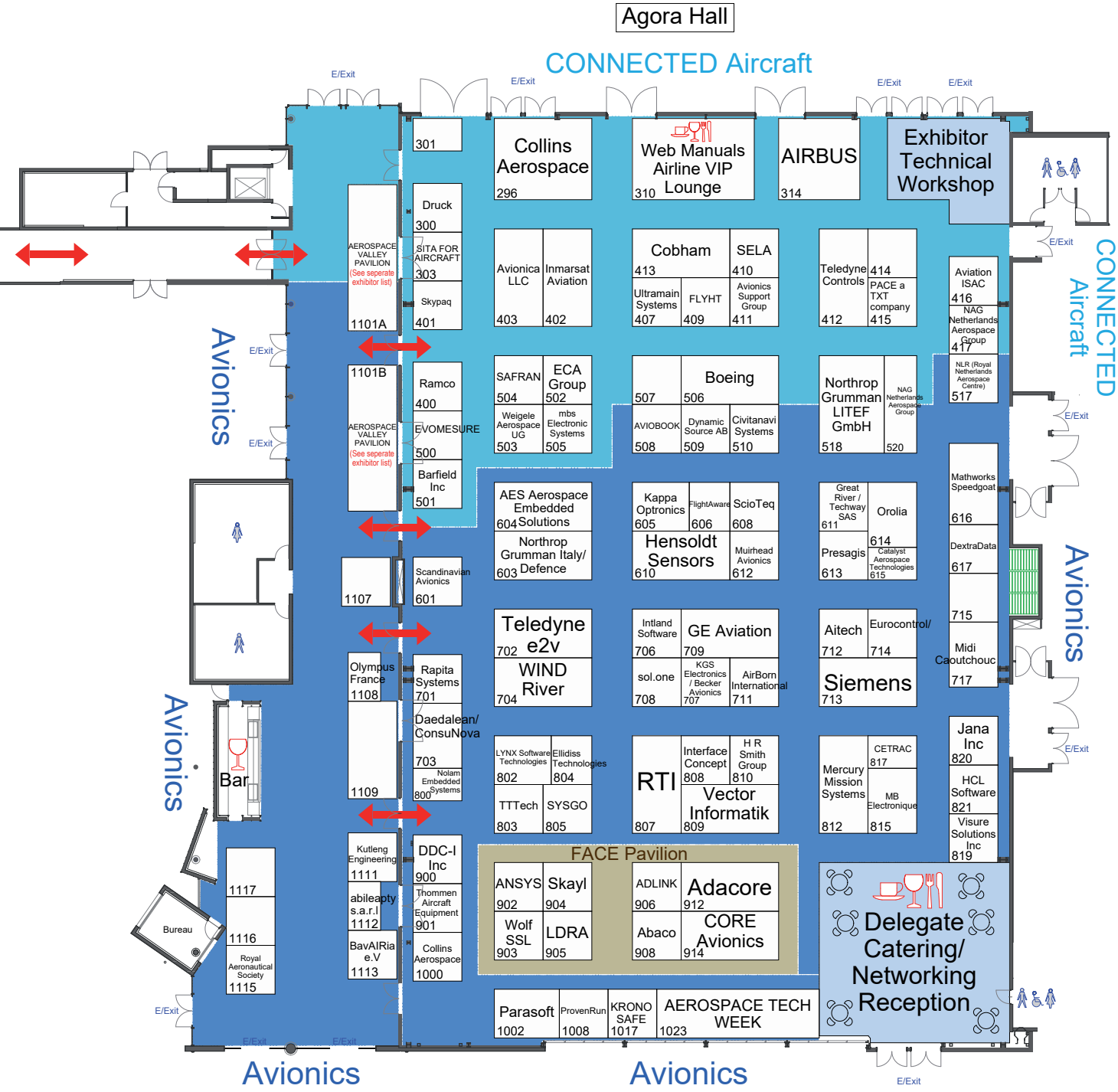
1101A	Aerospace Valley
1101A	Agence Regional de Development Ecconomic (ADOCC)
1101A	Atmosphere
1101A	EikoSim
1101A	HDG (Human Design Group)
1101B	AEROSPACE VALLEY PAVILION
1101B	ISP System
1101B	TDM
1101B	Trade in Occataine & Invest in Toulouse
1101B	VODEA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