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Access Granted, Ownership Optional

A more in-depth look into component pooling

Mature Engines
The question is to repair or replace it?

Line Maintenance
Is it worth building inhouse capabilities?

P2F Conversions
Aircraft availability remains the key challenge

White tail freighter
© *Shutterstock*

Dear industry colleagues,

we have some interesting stories for you again this month. we report on the current challenges of P2F conversions. Airbus estimates that 2,500 freighters will have to be produced in the next 20 years. The majority of these aircraft will have to come from converted passenger aircraft. The question is where the aircraft from the conversions will come from? We have spoken to industry experts.

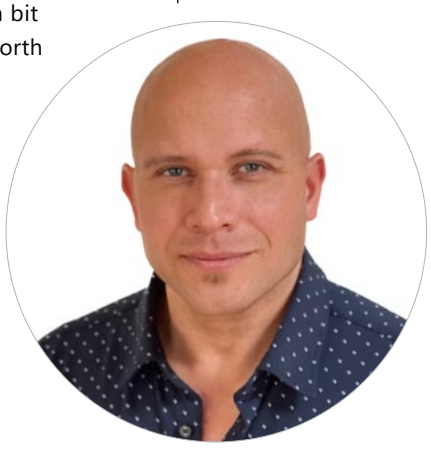
You can also read the opinion of experts on the subject of component pooling. This topic is a bit controversial. And last but not least, we look at the topic of mature engines. How long is it worth repairing old generation engines?

Happy reading.

By the way - will we see you at MRO Americas in Chicago in April?

Your

Peter Jorssen
Publisher



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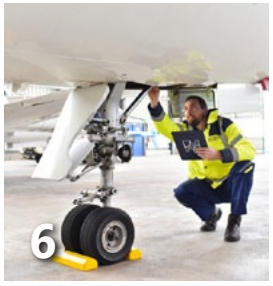

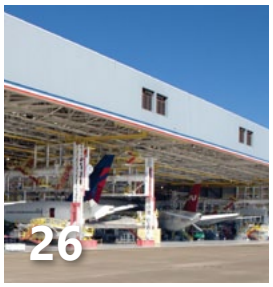

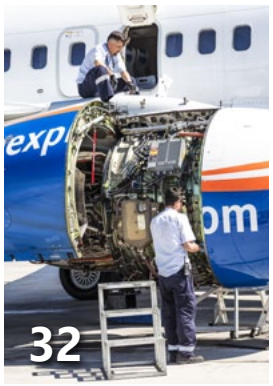

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P&W's Eagle Services Asia boosts GTF engine overhaul capacity

Pratt & Whitney (P&W) has officially opened a 48,000 ft² expansion of its Singapore-based engine centre, Eagle Services Asia (ESA). The facility is set to increase its GTF (Geared Turbofan) capacity by two-thirds this year. "This expansion demonstrates our commitment to building industrial capacity by continuing to invest in our strategic sites around the world to support our customers," stated Shang Meleschi, Vice President of Aftermarket Operations – Asia Pacific and Türkiye at Pratt & Whitney. The transformative technology applied at ESA integrates robotics, automation and machine learning to enhance efficiency, reduce stress on operators and improve safety for crucial MRO (maintenance, repair and overhaul) processes. Innovations include fully automated high-pressure compressor (HPC) rotor stacking, a receive-in-check cobot (a collaborative robot) assisting human inspectors and a robotic arm for installing and removing HPC bearing sleeves. ESA, a joint venture between SIA Engineering Company and P&W, is a key member of the company's GTF™ MRO network. Having introduced GTF MRO capability in 2019, ESA has completed over 500 GTF engine overhauls. Pratt & Whitney's expansion plan aligns with the company's global strategy, with 15 active GTF MRO engine centres worldwide, including ESA in Singapore, Korean Airlines in Korea, IHI and MHIAEL in Japan, MTU Maintenance Zhuhai and AMECO in China and China Airlines in Taiwan. By 2025, Pratt & Whitney aims to have 19 active GTF MRO shops worldwide.

© P&W

EngineStands24 introduces PW1100 engine stands in Asia-Pacific

PW1100 engine stand © *EngineStands24*

In a strategic move to meet the local demand within the Asia-Pacific region, EngineStands24, a member of Magnetic Group, announced the launch of its latest product line – the highly anticipated PW1100 engine stand. This launch is not just an expansion but a direct response to the growing need for specialised equipment necessitated by the widespread inspections required for PW1100G-powered A320neo-family aircraft engines. With many PW1100G engines needing varying levels of checks, EngineStands24's new offering will play a supportive role in addressing these challenges, especially considering more than half of the affected A320neo engines are stationed within the APAC region. Daiva Žemaitė, the head of EngineStands24, emphasised the significance of this expansion, "The current engine stand market state has been affected by PW1100G-powered engines requiring checks and, hence, a lot of them are or will be out of service between now and 2026. While all the needed checks will be completed, the location plays a key role. It's important to note that more than half of these A320neo engines reside in the APAC region. To adapt to the ever-increasing need for PW1100 stands, we allocated them to our recently opened hub in Singapore. Consequently, their lead times (from booking to pick up), then can be as efficient as possible. Also, based on our year-over-year comparison, the number of clients' inquiries for PW1100 types of stands has increased nine-times compared to 2022 demand." The EngineStands24's recently opened Singapore hub will help to serve the growing demand, providing needed support for narrow-body aircraft engines, including models such as theCFM56-5A/B, CFM56-7B, V2500, and PW1100, a new addition to its portfolio.

Condor and Lufthansa Technik expand successful cooperation

Airbus A321 aircraft © *Condor*

Condor Flugdienst GmbH (Condor) and Lufthansa Technik (LHT) have signed comprehensive component support agreements for the airline's new Airbus A32Xneo fleet and extended support for the carrier's A32Xceo fleet. In addition, Lufthansa Technik will also assist Condor during the production process of its growing A32Xneo fleet with its aircraft production inspection programme (APIP) at its production site for more than 40 aircraft. The APIP covers everything from initial sub-assembly inspections to final aircraft acceptance. Both total component support (TCS) agreements will come into effect in May 2024 and have a term of twelve years. They include comprehensive MRO services as well as spare parts pooling and homebased services for the required components. With the newly signed contracts, Lufthansa Technik is thus becoming the component support provider for Condor's entire Airbus fleet, having already supported the Airbus A330neo fleet with component services since 2023. Christian Schmitt, COO & Accountable Manager at Condor: "With Lufthansa Technik, we will continue to rely on a reliable partner who supports our ambitious goals with the most suitable services for us. Based on our previous cooperation, we have decided to further strengthen our partnership in order to benefit from Lufthansa Technik's expertise for our existing fleet and, in future, the new fleet. This puts us in a good position for fleet modernisation."

BAE Systems concludes acquisition of Ball Aerospace

Following regulatory approvals for the acquisition of Ball Aerospace, BAE Systems has now successfully concluded the acquisition of Ball Aerospace from Ball Corporation. The transaction has been finalised at a purchase price of US$5.5 billion (approximately £4.4 billion), financed through existing cash reserves and new external debt. The newly acquired entity will operate under the name Space & Mission Systems, aligning within the Electronic Systems reporting segment. Ball Aerospace is a provider of spacecraft, mission payloads and optical and antenna systems with decades of proven success underpinned by world class advanced technologies. The business has trusted customer relationships in the Intelligence Community, U.S. Department of Defense, civilian space agencies and with major aerospace and defence primes and is well positioned in highly attractive markets, including military and civil space, C4ISR and missiles and munitions. The business is based in Colorado, with more than 5,200 employees, many of whom hold U.S. security clearances. Commenting on the acquisition, Charles Woodburn, Chief Executive of BAE Systems, stated, "In recent years, we've said that we would seek out opportunities to grow our portfolio in advanced technology areas that meet our customers' most urgent needs, and completing the acquisition of Ball Aerospace is an example of that strategy in action. We look forward to welcoming the employees of Ball Aerospace to BAE Systems, bringing one of the industry's most respected and capable businesses into the group. The addition of this quality, fast-growing technology-focused business will significantly expand our presence in this increasingly critical space domain and further enhances our value compounding model of top-line growth, margin expansion and high cash generation."

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AJW Group expands A350 support and launches Mexico City hub

AJW Group, a global leader in independent aircraft component parts and supply chain solutions, has made a strategic entry into the Airbus A350 support market by acquiring a substantial package of over 2,500 spare parts. This move positions AJW Group to offer comprehensive support to A350 operators worldwide, with strategically located inventory in hubs across Europe and North America. The company's extensive network of warehouses and logistics capabilities aims to ensure efficient distribution, minimising aircraft downtime and providing uninterrupted operations for operators. Christopher Whiteside, Chairman at AJW Group, emphasised the significance of this acquisition, highlighting the alignment with the company's commitment to sustainability and eco-friendly practices. The move reinforces AJW Group's dedication to providing top-tier support solutions and its strategic focus on the latest and most sustainable aircraft types. Simultaneously, AJW Group announced the inauguration of its new regional support hub and office in Mexico City, marking Latin America and The Caribbean as a priority market. With a strong track record, recent support contracts, and industry recognition, AJW Group solidifies its position as a market leader for end-to-end supply chain solutions in the region. Led by Wilmer Lopez, Regional Sales Director - Latin America, AJW Latin America is poised for remarkable growth and business development, offering immediate access to a global inventory of Airbus and Boeing spare parts, engines, major assets, contractual support negotiations, MRO services and complete nose-to-tail support solutions.

AJW Group expands into the A350 support market © *Airbus*

Electra Airways opts for Cobalt Spectrum LED drop-in mood lighting for A321 fleet

Electra Airways have chosen Cobalt Spectrum LED drop-in mood lighting for its A321 fleet © Electra Airways

IFPL Group has released that Electra Airways has chosen Cobalt Spectrum LED drop-in mood lighting for its A321 fleet. Electra Airways is a Bulgarian airline which provides services to leading tour operators, airlines, and brokers within the aerospace industry, and since 2023, the airline has become part of the Vector Group. We are thrilled to be invited to collaborate on their fleet upgrade program and to be a partner in this extraordinary cabin refresh. Cobalt Spectrum mood lighting is an innovative drop-in system, designed from the ground up to meet the needs of every commercial airline. Deployed and flying with multiple carriers worldwide, Cobalt Spectrum delivers an unrivalled feature set and provides the very highest in reliability. It is a true "plug and play" system and a direct replacement for fluorescent tubes. Designed to be lightweight and long-lasting, Cobalt Spectrum lighting offers operators substantial weight and fuel savings while requiring no changes to the aircraft wiring. It will offer Electra the ability to illuminate the interior of each aircraft with its brand colours, and provide additional light settings for boarding, meal services, sleeping, waking, and more. Matvey Koloturskiy, Deputy CEO of the Vector Group Ltd, said: "We have strategically decided to refurbish all cabins in Electra Airways' fleet with the aim of achieving multiple objectives: delivering an exceptional product to our customers and integrating cutting-edge technologies that enhance sustainability and reduce weight in our operations. The LED lighting, supplied by Cobalt Aerospace, aligns perfectly with these goals. We are confident that our passengers and partners will appreciate the cosy and colourful lighting features, enhancing their onboard experience. Additionally, from an operational standpoint, the installation of this new lighting system will further reduce the overall weight of our A320 aircraft by an additional 50 kg. We eagerly anticipate unveiling the final result to our passengers in the coming weeks." IFPL Group is the parent organisation of Inflight Peripherals Ltd and Cobalt Aerospace. Both companies are specialist aerospace design and production companies. IFPL and Cobalt Aerospace develop and manufacture products that enhance aircraft cabin interiors and deliver an outstanding passenger experience. Products span entertainment, power, connectivity, lighting and safety and each is designed to optimise air travel for passengers, crew and operators.

Air India selects RECARO seats for wide-body aircraft

Air India premium-economy seats *© RECARO Aircraft Seating*

RECARO Aircraft Seating has been selected by Air India as the premium-economy and economy seating partner for its wide-body aircraft. This partnership will see more than 22,000 RECARO seats installed in both line-fit and retrofit programmes over the next five to six years. India's leading global airline Air India chose the CL3710 and the brand-new CL3810 for economy class, while the premium PL3530 will outfit the premium-economy cabin.

The first phase of this collaboration involves the retrofitting of 40 B787 and B777 aircraft with CL3710 and PL3530 seats, set to enter service in 2024. The same seat configuration will be maintained for 12 A350 and B787 line-fit aircraft entering service in 2025. Most recently, Air India has expanded its commitment with an additional order for 34 A350 and B787 aircraft, featuring a new layout with CL3810 and PL3530 seats in the economy and premium-economy cabins, respectively. "We're happy to get into this partnership with RECARO Aircraft Seating," said Campbell Wilson, CEO and MD, Air India. "This will help us offer an enhanced experience for our passengers at this transformative time for Air India and add value to our passenger-centric focus making us more competitive on the global aviation stage." All seats will showcase Air India's signature custom trim and finish. The latest in-flight entertainment (IFE) systems will also be integrated into each seat. All three seats uphold an ergonomic and sustainable approach and signature RECARO comfort features ensure a relaxing passenger experience. The unique seat design is built with durable and light-weight materials that contribute to the long life cycle of the seat while simultaneously supporting a reduced carbon footprint for the aircraft.


SETNA
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> **"By sharing a common pool of spare parts, airlines can achieve several benefits."**
>
> *Mike Cazaz, CEO & President, Werner Aero*

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AviTrader takes a more in-depth look into component pooling

By David Dundas

In former times, airlines were obliged to hold extensive inventories of aircraft components to sustain their fleet, both at primary stations and at outstations where critical components were vital for Aircraft on Ground (AOG) situations. In instances where an aircraft found itself stranded at a distant location, the process of acquiring the necessary component(s) to restore the aircraft to service often proved to be protracted and cumbersome. Consequently, airlines began extending mutual assistance by loaning parts to one another.

Prompted by financial constraints and the need to manage costs effectively, airlines initiated a formal pooling of their aircraft components. Under this arrangement, components were collectively owned and accessible to members of the airline component pool.

The significant advancement in extensive component pooling occurred when both component original equipment manufacturers (OEMs) and maintenance providers ventured into this domain. They procured existing airline component inventories and rendered them accessible to their pool members, typically coupled with a Maintenance, Repair, and Overhaul (MRO) agreement to service the components removed from the fleet due to unserviceability.

Mike Cazaz, CEO & President, Werner Aero

Component pooling is now an indispensable aspect of the aftermarket. There is currently a multitude of providers offering such services. We have conducted market research to gain further insights into this topic and have spoken to industry experts in order to get a more comprehensive understanding of the situation.

How are significant cost savings generated with component pooling?

Our first question involved revealing how component pooling can lead to cost savings both for airlines and maintenance providers. Mike Cazaz, the CEO and president of Werner Aero commented that: "By sharing a common pool of spare parts, airlines can achieve several benefits

Martynas Staknys, Vice President, Trading and Business Development, Setna iO

> **"There are a number of components that are currently sold at above new material prices."**
>
> *Martynas Staknys, Vice President, Trading and Business Development, Setna iO*

by reducing their major upfront capital expenditure and the on-going overhead of managing their inventory of spare parts, while guaranteeing availability and predicting costs. Airlines save money if they don't have to spend a significant amount of cash to procure the spares in the pool, outright. They can also save by predicting their monthly costs of spare parts." He added that money can also be saved on reducing personnel and the cost involved in managing spare parts.

Martynas Staknys, Vice President – Trading and Business Development at Setna iO, was keen to highlight the current problem of supply chain issues, stating that: "Component pooling helps to minimize risk of significantly overpaying for parts that are affected by supply chain issues", adding that, "AOG's are unavoidable. There are a number of components that are currently sold at above new material prices as new material is often available only on long lead times."

Toby Clouston, Director of Strategic Business Development, AerFin focused on the advantage of reallocating capital expenditure away from purchasing and storage of parts, while fixed pooling costs allow for more efficient cashflow management. "Further cost benefits include reduction in operator overheads by outsourcing the management of pool support, providing a single supplier for multiple PN's. AerFin's service includes managing approved suppliers, logistics management and quality assurance." He adds that: "Pooling can include on site stock provisioning, tailored to meet operator AOG requirements and reducing operational impact/restrictions. This has a knock-on effect in the reduction, for example, of exposure to pax compensation schemes. Pool providers such as AerFin have greater economies of scale with their vendor networks, with access to preferential rates and terms, the benefits of which can be passed on to the customer under the related pool providing rates."

How component pooling helps reduce lead times for acquiring critical spare parts

Mike Cazaz highlights that the key to success is data, as this can help to ensure critical parts are always available. "A pool provider utilizes data from airlines to build a model that will ensure on-time inventory replenishment which helps to guarantee TAT to customers," he states.

Martynas Staknys says that Setna iO gives priority to contracted customers. "Companies such as Setna iO, that provide components pooling agreement, must have a vast inventory of components at their disposal and components pool is strictly reserved for contracted customers; this helps to assure availability of critical components," he comments, while Carlos Garofalo, Manager, Asset Life Cycle and Components at AMROS Global points out that, "by having the part available, if the required part is within the contracted spare part list, then it would be available from the pool provider at an agreed service level (lead time) to the airline operator.

Toby Clouston points out that: "Pool contracts are based around service levels and guaranteed delivery based on criticality as agreed by both parties. The pool provider takes on the responsibility to support pool requests, even where not covered by existing stock (noting certain providers may alternatively have the customer source and recharge back). Pool contracts can include on-site stock, with related composition based on the

Toby Clouston, Director of Strategic Business Development, AerFin

> **"Pool contracts are based around service levels and guaranteed delivery based on criticality as agreed by both parties."**
>
> *Toby Clouston, Director of Strategic Business Development, AerFin*

applicable airline MEL and AOG parts removal history. Replenishment service levels are set to restock within an agreed timeframe."

How component pooling can reduce aircraft downtime and increase fleet availability

It's all about availability according to Werner Aero's Mike Cazaz. "Good pool management ensures spares availability 24 hours a day. Guaranteeing availability of spares pretty much guarantees the reduction or non-AOG times. Better upfront planning and prediction help decrease aircraft down time and increases aircraft availability" he advises. Where the availability of aircraft is concerned, AerFin's Toby Clouston comments: "Pool provider pool/part number standard, maintaining high standard of the pool, i.e., modification status, engineering collaboration and interaction with OEM's to keep parts on wing longer, improve availability of aircraft."

Setna iO's Martynas Staknys was more focused on reallocation of funds. "Customers don't need to invest money in building their own component stock, those funds can be invested into their core business such as fleet expansion. Aircrafts downtime risk is also reduced because of granted access to critical inventory at any given time," he points out.

Are there disadvantages to joining a component pool?

The general consensus is that there are few disadvantages. Toby Clouston was keen to point out that as component pools are dominated by OEMs and single sourced, therefore: "there is a higher exposure to cost increases beyond the providers control and ability to negotiate given the lack of alternative solutions." He also noted that: "there is reduced protection from reduction in utilisation below minimum flight hours (e.g. during COVID). An alternative is to select a hybrid model of support, providing pool coverage on a pay per use basis with charging on a time and material basis."

Carlos Garofalo was predominantly concerned you might end up paying for something you never need, saying that: "The pool access fees are calculated based on several factors; it is comparable to taking up insurance to mitigate a risk. Mike Cazaz adopts a wholly positive outlook where component pooling is concerned. "I don't see any major disadvantages. But for airlines that like to have full control of their inventory, a pool option does not allow that. However, a good and reliable pool provider can mitigate that risk. Also, airlines must have greater emphasis on contract management and must learn to create and manage strategic supplier relationships," he comments.

> **"The pool access fees are calculated based on several factors; it is comparable to taking up insurance to mitigate a risk."**
>
> *Carlos Garofalo, Manager Asset Life Cycle and Components, AMROS Global*

What about component quality and compatibility?

Toby Clouston advises that quality assurance is critical. "Quality assurance should be a key tenement in the negotiation of any pool support structure.

Carlos Garofalo, Manager Asset Life Cycle and Components, AMROS Group

Operators should take into consideration, for example, any available data points on pool Mod standard, the age of components, prior history of supporting aircraft type, part number reliability issues and the vendors used for MRO activity. You get what you pay for, and customer should always question deltas in package offerings. That said, pool providers are incentivised to mitigate higher removals by ensuring stock quality to meet the expectations and service levels required by the customer."

Carlos Garofalo conceded that component pooling isn't a suitable solution for everyone: "Depending on the form, fit and function and particular requirements like date of manufacturing, certification or even modification levels, it could be that a pool solution would not fit all," while Mike Cazaz was very much in favour of the benefits of component pooling, commenting that: "There should be no concerns. Pooling contracts outline the conditions and quality of the parts required by the airlines. A good pool provider should ensure they adhere to the contract and manage parts reliability, as well."

How does a component pooling network mitigate problems with spikes in demand or supply chain problems?

Setna iO's Martynas Staknys has concerns over the fact the component pool provider can find themselves at a disadvantage, primarily because: "material replenishment is more difficult and expensive, however at the same time this is the reason why such a contract is beneficial for airlines and MRO's; they minimize risk of overpaying for material or not being able to procure material

> **"Typically, the cost per tail reg is higher for capital spend for small fleets than larger fleets."**
>
> *Toby Clouston, Director of Strategic Business Development, AerFin*

at all." Toby Clouston highlights the importance of careful analysis of usage data. "AerFin has inventory management tools to analyse usage data over set periods to better understand supply and demand requirements. As well as ensuring a healthy pipeline of USM from its whole asset and package purchasing function, AerFin proactively manages its supply chain to mitigate spikes in demand and output."

AMROS Global's Carlos Garofalo identifies that in certain circumstances, spikes in demand and lack of supplies are unavoidable. "It is basically the party holding the engineering responsibility over the aircraft that should be proactively checking and communicating with the OEM, and coordinating with the airline operator to foresee and avoid such situations. There are cases where this it could be planned well in advance, like with modification campaigns, but certainly other cases like airworthiness directives are issued providing short or no time to react."

So, is component pooling more beneficial for those with smaller or larger fleets?

Curiously, this is where we found the answers to one of our questions more diverse. Toby Clouston saw advantages and disadvantages for carriers with small fleets. "Typically, the cost per tail reg is higher for capital spend for small fleets than larger fleets, with economies of scale being a key consideration", he comments. He then adds: "That said, smaller fleet operators likely will benefit from saving in outsourcing overheads associated with pool management, across multiple suppliers and credit limits, supplier approvals. Operators should, wherever possible, press suppliers to provide bespoke solutions that fit their needs."

Carlos Garofalo was more of the opinion that there are too many variables to provide a definitive answer. "It is all relative and depends on a series of jointly factors within the fleet like aircraft type, aircraft age, engine type, fleet planning, historical removal data, expected utilization, etc. Ultimately, it is the pool provider that will have the last word on deciding on the minimum fleet size required to provide a pool service or not." Conversely, Mike Cazaz was very clear that there was a minimum fleet size below which component pooling is not financially beneficial. "In research that we have done internally at Werner, a few years back, we concluded that a pool is not economically beneficial for airlines with a fleet of under ten aircraft. At this size, we believe the airline is better off owning its inventory since the cost of joining a pool can to too expensive."

And which, if any, are not suitable categories for component pooling?

The answers we received all made logical sense. For example, Setna iO's Martynas Staknys pointed out that: "It depends on the customers' needs. However, exclusions for the most part are for components that are not repairable, are life limited parts, or are major components such as engines, landing gears and APU's." To a degree this was confirmed by AMROS Global's Carlos Garofalo, who mentions that: "Those that have on-condition criteria for removal are typical candidates for being excluded from a pool. For example, wheels and brakes."

AerFin's Toby Clouston was very specific, while also commenting on potential alternatives to component pooling for certain items, indicating that: "Flying controls, insurance spares are standard exemptions and not likely offered as pool solutions." His suggestions for alternatives are: "Certain ATA chapters and Part classification can be removed from a standard pool structure, although there are PBH or CPAL options for W&B's, Galley Equipment, IFE, APU's etc. These will provide same benefits as a pool concept but are tailored more specifically to product, usage and costs. Additionally certain providers offer solutions on consumables and expendables. Certain ATA chapters and part classification can be removed from a standard pool structure, although there are PBH or CPAL options for W&Bs, galley equipment, IFE, and APU's etc. These will provide the same benefits as a pool concept but are tailored more specifically to product, usage and costs. Additionally certain providers offer solutions on consumables and expendables."

And finally, we asked our contributors to reveal which aircraft models for which they specialise in providing inventory support.

Toby Clouston confirmed that: "AerFin's primary component support solutions are focused on theE170/175, E190/195, A320CEO / NEO, A330CEO / NEO, and B737NG." Martynas Staknys advised that: "Setna iO specializes and has extensive inventory of material for the Airbus A320/A330/A380 families, and the Boeing 737, 747,767, 777, 787. However, we also have an inventory of ATR and Embraer components."

AMROS Global's Carlos Garofalo indicated that his company covers: "Mainly all Airbus, Boeing, ATR and Embraer manufactured aircraft types," while Mike Cazaz advised that "Werner Aero specializes in three platforms, the A320, B737NG and E-Jet. We carry inventory in stock to support all these models and support them with the pooling option through our NIRVANA program."

Engine Maintenance at Aero Norway
© *Aero Norway*

Mature Engines – Replace or Repair?

Effective strategies are necessary to maximize operational cost efficiency

By David Dundas

Mature aircraft engines necessitate a distinct approach compared to new-generation engines. While modern engine types are typically restored to serviceability during overhauls through the incorporation of new replacement parts and the repair of unserviceable components, the scenario is markedly different for mature engines.

When an aircraft type is increasingly retired, it marks the commencement of a new phase of life for all valuable components, including the engines. While engines with sufficient remaining life on their life-limited parts are preserved intact as spare engines, those with limited remaining life are in most cases dismantled into their individual components, which are then reintroduced to the market as replacement parts. As the availability of mature engines and used serviceable material (USM) increases, the importance of utilising used replacement parts during overhauls or even considering the complete replacement of an engine with a suitable used one becomes more significant.

To get a better understanding of the situation, we approached a number of key players in the industry sector to obtain a clearer insight into the challenges faced. To begin with, clearly there are multiple factors which have to be taken into consideration when deciding whether or not to repair an engine. We asked what the primary factors were.

According to David Blackburn, Senior Vice President Asset Leasing & Trading at StandardAero, availability of engine MRO induction slots can be crucial. "Availability of engine MRO induction slots is a key factor when considering the strategy to repair or replace an aircraft engine. In the case of the CFM56 turbofan, many overhaul and hospital engine shops are currently at full capacity, and an induction slot may therefore not be available for three or four months, possibly longer. This puts an airline or operator in a difficult situation, especially when a lift is needed to support the steady growth that airlines have been experiencing as the economy continues to improve and expand.

"Repair capacity at component overhaul and repair shops can also be a significant factor when deciding to repair or replace an aircraft engine. Delays in the supply chain and/or excessive turn-times in material repair and overhaul processes can dramatically affect an engine's lead-time and recertification schedule. Availability of desired and/or needed serviceable whole engine assets at financially acceptable price levels can drive the necessity for engine repair vs. engine replacement. The market inventory of well-traced, strong-performing serviceable time-continued engines is currently limited for many engine types. This fact,

> "Availability of engine MRO induction slots is a key factor when considering the strategy to repair or replace an aircraft engine."
>
> *David Blackburn, Senior Vice President Asset Leasing & Trading, StandardAero*

David Blackburn, Senior Vice President Asset Leasing & Trading, StandardAero

Spare engines storage. © *EirTrade*

combined with limited availability of USM at acceptable and/or reasonable market pricing to support the growing engine MRO market, is impacting efficient and cost-effective engine builds (and, hence, engine availability) for aircraft operators worldwide."

John McKirdy, Chief Commercial Officer, Kellstrom Aerospace Group

John McKirdy, the Chief Commercial Officer at Kellstrom Aerospace Group, looks more to the owner's operating model. "Engine repair or replacement decisions are often influenced by the operating model that the owner is considering. If the purpose of the owner's portfolio is to generate leasing revenue and for their operating strategy, the time and or cost of completing a repair themselves, versus selling and deploying that cash into an additional ready-to-fly asset, is of great importance to that owner. Others along that same value chain but in a different operating model then perhaps a lessor may be more suitably able to repair that asset due to either an existing supply of material and a well-functioning engineering department that can effectively manage the shop visit. Sources of serviceable assets such as a pool of modules and or serviceable spare materials at a cost basis that is cost effective can provide additional advantages. Ultimately, the same asset can follow a different path based on the mission and needs of the owner given the mindset and purpose for that owner."

Bruce Ansell, Technical Manager Engine Division, APOC Aviation focuses on probably the most critical element. "At APOC, we are currently seeing that spare engine availability is a key driver in this decision,

> "Engine repair or replacement decisions are often influenced by the operating model that the owner is considering."
>
> *John McKirdy, Chief Commercial Officer, Kellstrom Aerospace Group*

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Bruce Ansell, Technical Manager Engine Division, APOC Aviation

after that it is cost and time. Generally, if an engine can be repaired within a suitable timeframe and budget then it will be. But both of these criteria are now being stretched due to shop visit availability and the material costs involved."

Aero Norway's Global Business Development and Marketing Manager, Jeremy Colin, believes there are four principal factors: type and severity of damage, economic considerations, remaining useful life (LLPs) and whether the asset is owned or leased. "Regarding findings, if the damage is extensive or vital components are impacted, certain repair tasks / scope of work may be prohibitively expensive. Consequently, it is essential to factor in the overall budget for a potential shop visit. The challenge lies in potential findings post-induction. Thus, the pre-induction phase and inspection are vital for assessing the prospective total invoice. Certainly, a substantial portion of the engine's residual value is tied to the Life

> "The challenge lies in potential findings post-induction."
>
> *Jeremy Colin, Global Business Development and Marketing Manager, Aero Norway*

> "At APOC, we are currently seeing that spare engine availability is a key driver in this decision."
>
> *Bruce Ansell, Technical Manager Engine Division, APOC Aviation*

Limited Parts (LLPs) and parts with soft life (HPT Blades). These elements significantly contribute to the overall financial assessment and are crucial factors in determining the engine's total value."

At Werner Aero, Cliff Topham, Senior Vice President Sales and Business Development points out that the overall condition of available engines certainly has to be factored in, stating that: "the cost of the repair or overhaul of the existing engine may include labor costs, replacement parts, and any additional materials or services required during the repair process. The time taken for repair or overhaul is crucial and the availability of parts can be a critical factor, especially in industries where downtime is costly. The availability of serviceable engines in the marketplace is also influenced by other circumstances such as demand, supply, and the overall condition of the available engines.

Wasim Akhtar, Director of Engines, AJW Group is keen to point out that the life left remaining in an engine is key to making an informed decision, commenting that: "Different engines have distinct life phases, ranging from the production and take-off phase for new products to the settled phase for engines cruising smoothly with resolved issues. For example, the sunset engines like the 737 classics CFM56-3, PW2000, and RB211-524 are in a mature stage of their lifecycle. Older engines may face increased maintenance requirements, and their financial viability depends on factors such as market demand, financing, leasing options, and the availability of used serviceable material (USM). Investing millions in repairs may not be justified if there is limited life remaining. Assessing which phase of life an engine is in becomes crucial for making informed decisions on whether to repair or replace. Compliance with regulatory requirements plays a significant role while lease contracts with airlines are also determining factors, as they often specify acceptable life-remaining conditions upon the engine's return."

Jeremy Colin, Global Business Development and Marketing Manager, Aero Norway

We then decided to look at the significance of the availability of used serviceable material (USM) and wondered how this affected respondents when it came to overhauling mature engines.

John McKirdy is quite clear on the matter. "In the current landscape, the availability of used serviceable material plays a pivotal role in the decision-making process when overhauling mature engines. Beyond considerations like the availability of maintenance slots, where the confidence in the selected repair and overhaul facility regarding the expected downtime and workscope creep management, revenue generation potential of that repaired asset would be the effective key objective related to the total cost of making that asset serviceable. The pivotal decision

> "For MROs, access to USM can shorten lead times for the overhaul of engines."
>
> *Christen Grant, Marketing and Business Development Manager, EirTrade*

arises between reinvesting in the overhaul, including time, or opting to sell the asset outright or dismantle it for the sale of used materials. In this context, the reparability of the engine's material during maintenance significantly influences the demand for used materials, either elevating or diminishing the cost of the maintenance effect. A high yield from repairs on high-value material increases the likelihood of the engine completing its maintenance cycle, as the demand for used material decreases, making the maintenance event economically viable."

Wasim Akhtar is convinced that USM is critical to the whole point of overhauling mature engines, commenting that: "You must have USM available as replacement using new parts is highly costly and is not economically viable for an operator. Without steady access to USM, engine repairs don't make sense, so this is critical in the overhaul decision making process. By tapping into the engineering knowledge and experience of our Engine and Major Assets Teams, AJW proactively sources and has USM parts on hand for the overhaul of its engines.

Wasim Akhtar, Director of Engines, AJW Group © *AJW Group*

"Operators are holding on to their mature engines for extended periods or utilising aging fleets to meet additional capacity needs. Consequently, there is a reduced inventory of engines available for parting out, causing a substantial increase in the demand for USM for mature engines. The prolonged operation of these aging fleets necessitates maintenance checks, presenting a demand for overhauling mature engines that may not have been as prevalent in the past. Compounding these challenges are persistent supply chain issues and shortages of skilled labour post-COVID, exacerbating the demand for used material."

Christen Grant, Marketing and Business Development Manager at EirTrade sees the availability of spare parts through engine disassembly critical from a cost-saving perspective. "Due to the increased availability of spare parts through engine disassembly, USM offers significant cost savings versus new material offered by OEMs. For MROs, access to USM can shorten lead times for the overhaul of engines thus avoiding supply chain delays in getting new material from OEMs. In the case of CFM56-3 engines, and similar mature engine types, there is currently a shortage of material as freight and PAX operators continue to extend the usable life of these reliable engines. However, due to their age and the gradually declining numbers being operated, new material can be very difficult to acquire. Through the disassembly of these engine types by specialists like EirTrade Aviation, operators can extend the life of more engines and keep their fleet flying while they wait for newer aircraft types in production."

Christen Grant, Marketing and Business Development Manager, EirTrade

Interestingly, Bruce Ansell points to a shift in the remaining life of engine parts as having a big say. "More and more engines are being built to maximise the remaining life. A few years ago LLP components with less than 7,000 cycles weren't being considered, whereas at APOC we have seen requests this year for parts with as little as 3,000 cycles remaining. The demand for USM is driving lessors and operators to consider strategic changes to their operations and business plans to ensure that these mature engines remain available, albeit for a much-reduced period of operation."

The focus of Jeremy Colin is very much on the CFM56 engine. "Utilising used serviceable material (USM) is crucial when conducting overhauls on mature CFM56 engines. In the context of ageing CFM56 engines, where certain components may become scarce or expensive, USM plays

> "You must have USM available as replacement using new parts is highly costly and is not economically viable for an operator."
>
> *Wasim Akhtar, Director of Engines, AJW Group*

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a pivotal role. It provides a cost-effective alternative by integrating previously used but still serviceable parts. Efficient project cost management involves strategic planning for overhauling mature engines with USM. The complexity arises from various configurations, multiple part numbers, and the necessary remaining cycles, making it challenging to identify the right parts for the supply chain. Additionally, comprehensive documentation linked to the USM is now more critical than ever. Certain global regions are frequently rejected by lessors to prevent devaluation of the engine's potential."

David Blackburn makes it clear that savings can be as high as 40% when using OSM as opposed to new parts. "The availability of used serviceable material has an enormous impact when estimating the cost to overhaul and recertify an aircraft engine. Considering that engine material typically accounts for 60% to 80% of a mature engine shop visit cost, properly purchasing and/or allocated qualified overhauled and/or serviceable material to support engine repairs and overhauls can save an engine owner anywhere between 15% to 40% when compared to using new parts." Chris Topham puts it all very succinctly: "The availability of USM is critical particularly if replacing LLPs at an LLP expiry visit."

CFM56-5B engine

We then focused on identifying the factors which determine the purchase price of a mature, unserviceable engine.

APOC Aviation's Bruce Ansell feels the answer lies in whether the engine is fit for a rebuild or part-out. "If it is to be rebuilt then a cost/value calculation is required for the additional period of operation, before looking at the part-out value. If it is going directly for part-out then each engine component will have a value assigned to it; historical component yields are also essential criteria as some parts are always going to be declared BER (beyond economical repair). Thirdly is the cost of repair. These factors are all included, and a comparison is made to OEM list prices for new, and also current market pricing for USM."

StandardAero's David Blackburn considers a thorough "unserviceable engine analysis" to avoid costly mistakes. "This analysis must involve a full commercial, technical and physical review of the engine by experienced and knowledgeable personnel. All historical digital and physical records must be reviewed from the time of new engine manufacture to the time of last engine removal. Operational data, ownership documents, commercial statements and technical records must be authentic and reviewed for accuracy and completeness. Accurate part number configuration and installation must be confirmed, since PN obsolescence and/or PN revisions can change engine valuations by hundreds of thousands of dollars.

"Life-limited parts with marketable (i.e. valuable) cycles remaining must be fully traced back to birth to ensure future acceptance and marketability. Cycles since new and cycles remaining on hard- and soft-cycle life-limited components, coupled with physical borescope inspections to potentially reveal internal FOD, BOMD or excessive component degradation (especially on critical parts that include fan blades, HPC vanes & blades, combustion chambers, HPT nozzles & blades, and LPT nozzles & blades, etc.) can significantly alter engine purchase values and remarketability."

Kellstrom Aerospace Group's John McKirdy is also focused on effective analyses. "When gauging the feasibility of repairing and reintroducing the unserviceable engine to generate additional revenues, the potential buyer must carefully assess the anticipated cost of the maintenance event plus the asset acquisition cost. This evaluation is crucial in relation to

the potential to generate sufficient revenue, either through leasing the asset until the end of its green time plus teardown value (residual value) or through an outright sale after refurbishment.

"Alternatively, if the decision is to proceed directly to tear down, a similar analysis is essential, focusing on the expected yields of what can be categorized as sellable material. In the current market with asset valuations at an all-time high, possessing a profound understanding of probable yields becomes a decisive factor for the buyer. Accurate analysis and an appropriate purchase price can lead to a successful financial outcome in a teardown scenario. Conversely, if the analysis is flawed and the purchase price is inflated, the risk of a negative financial impact looms large in today's market."

At AJW Group, Wasim Akhtar is focused on the remaining life of Category A USM. "The decision to purchase, or not purchase, is highly dependent on how much life remains in the Category A material of the engine in addition to the demand for this material. Supply and demand dynamics play a pivotal role, with prices surging during periods of high demand and limited supply, while they may decline when demand is low, and supply is abundant. The intrinsic value of the engine/engine system contributes to higher prices due to their complexity and crucial role in aircraft operation. Market conditions, economic fluctuations, and external factors like fuel prices further influence pricing."

Jeremy Colin at Aero Norway recognizes that various market participants employ diverse methods to assess the value of mature engines. "Parts companies tend to evaluate most engine components, anticipating a return on investment through long-term returns on teardown, including Tier 1, Tier 2, and Tier 3 parts. On the other hand, operators and maintenance, repair, and overhaul (MRO) shops adopt a shorter-term perspective, considering the overall engine value with a focus on critical parts such as Life Limited Parts (LLPs), airfoils (HPT Blades, Fan Blades), QEC, and accessories."

Werner Aero's Cliff Topham concludes: "Determining the purchase price of an unserviceable mature engine involves considering various elements related to the condition, market demand, and potential for refurbishment. Cyclic life left on LLPs is one example or if there is a low-cost hospital visit available to restore serviceability without expending money on a major shop visit, extending its operational lifespan."

Finally, we wanted to look at the channels and sources used to acquire serviceable mature engines.

Wasim Akhtar feels that having the right contacts is what matters most. "We have spent the past nine decades building relationships and collaborating with industry partners, customers, and lessors. These well-established relationships are what allows us to procure and supply components and parts delivering the service excellence for which we are known. Our agility and rapid service delivery are what makes us an industry partner of choice," while David Blackburn is of the same opinion. "Airlines, lessors, investors, traders, and engine MRO facilities are all entities that may possess at any time a serviceable and/or unserviceable engine asset which could be made available for sale, lease, or trade. Facilitating continuous dialogue with old and new contacts while building and enhancing supplier and customer relationships within the engine marketplace are vital to success in the aviation business."

Jeremy Colin once again focuses on the CFM56 engine and advises that Aero Norway obtains mature engines from multiple sources, including: "Online platforms (bidding): Engaging in online platforms where engines are listed, and transactions may involve a bidding process. Directly from customers based on Fleet Management Programmes: Airlines and operators may directly offer engines for sale based on their fleet management programmes. From lessors (lease return, for example): Engines returned at the end of a lease agreement may be available for purchase from leasing companies. Engine trading companies: Specialised companies involved in buying, selling, and trading engines often serve as intermediaries in the acquisition process, and networking: Building connections through networking and participation in industry events can provide opportunities to discover available engines."

Like many others, for Bruce Ansell it is mainly about contacts. "It is a small industry where everybody has contacts, or contacts of contacts, and engines may be offered to the market in the form of RFQ's from aircraft lessors. The bigger lessors are usually keen to start moving out of the mature engine market and free up funding for the new technology becoming available. It is also fairly common for aircraft teardown companies to advise that they are inducting an aircraft and serviceable engines will be available."

> "Determining the purchase price of an unserviceable mature engine involves considering various elements related to the condition, market demand, and potential for refurbishment."
>
> *Cliff Topham, Senior Vice President Sales and Business Development, Werner Aero*

Cliff Topham, Senior Vice President Sales and Business Development, Werner Aero

Mammoth Freighters Hangar
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High Demand, Limited Supply
Challenges for the P2F Conversion Market

By David Dundas

The demand for efficient cargo transportation has surged, leading to a burgeoning market for passenger-to-freighter aircraft conversions. This transformation, though promising, comes with a myriad of challenges that shape the landscape of the conversion industry. Airbus foresees a demand for over 2,500 new freighter aircraft over the next two decades, necessitating fleet expansion and the retirement of older aircraft. About 1,600 of these new deliveries will be passenger-to-freighter converted aircraft. But the market of P2F conversions is facing challenges.

Airbus has estimated that there will be a need for 2,500 new freighter aircraft over the next twenty years, with roughly 1,600 of these being passenger-to freighter conversions. We wanted to know if there would be sufficient passenger aircraft available for conversion.

Brian McCarthy, VP of Marketing & Sales at Mammoth Freighters feels that while there is currently an abundance of converted freighters and committed conversion activity, the feedstock appears to be drying up. However, he is confident that in certain areas, there will be no shortage of supply. "For the 100-tonne (777-300ER) wide-body market the answer is an absolute, 'yes'. We have 800 aircraft in the current world fleet, and we are anticipating a market of approximately 200-220, 777-300ERs converted in the decade ahead. Mammoth appears to have the 200LR all but cornered with orders of 29, and more in process which will conclude at about 48-50. The 200LR variant has a limited production build but the variant was an ideal foundation for Mammoth's 300ER plan because both variants are close sisters that share the same wing, engine, wing box and landing gears." He added that: "The bow wave of production and orders will be intense for the next ten years and then it will slow to a steady stream with lower production levels extending for another ten years. The aircraft converted in the back half of our production cycle will provide operators with additive aircraft and replacements of the same freighters that get long in the tooth. Programme life cycles are in direct relation to engine feedstock and the 777-300ER will have no issues."

Waleed Sirrag, Director of Technical Services, The Aircraft Group

Waleed Sirrag, Director of Technical Services at The Aircraft Group feels there are too many 'unknowns' to give a definitive opinion. "The adequacy of passenger aircraft for P2F conversions will depend on several factors, including the pace of retirements of older passenger aircraft, the introduction of new passenger aircraft into the market, and airlines' decisions about fleet renewals or expansions. Concurrently, the demand for passenger travel, economic conditions, and the impact of global events (such as

> ***"The bow wave of production and orders will be intense for the next ten years."***
>
> *Brian McCarthy, VP of Marketing & Sales, Mammoth Freighters*

Fedex Freighter
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pandemics or economic recessions) can accelerate or decelerate the retirement of passenger aircraft. These factors could directly affect the availability of aircraft for conversion."

Robert T. Convey, Senior Vice President Sales & Marketing at Aeronautical Engineers Inc. sees shorter-term problems with supply of aircraft for conversion that will ease off over time. "The question about feedstock should be broken into two. Feedstock over the next three years, especially for the narrow-body aircraft will be very hard to come by and quite expensive as the Airframe and Engine OEM's work through their reliability and manufacturing issues. From 2028 onward I believe there will be an abundant supply of feedstock to support the number of conversions needed."

Lucia Soffientini, Continuing Airworthiness Manager at Air Worthy acknowledges there is a current shortage of available aircraft for conversion but holds a similar view on the future as others. "It is well known that currently the industry is suffering a shortage of aircraft. Most of the operators are extending their leasing agreements due to the fact that there are no new aircraft available. It may be that in a couple of years this situation will be resolved. If so, the number of available aircraft for cargo conversion may be sufficient to meet the demand. For some models, such as the B777, there are many older aircraft already available for cargo conversion. These would, however, require a specific retrofit in order to comply with future operational mandates."

With regard to the future distribution between narrow-body and wide-body freighter aircraft, Waleed Sirrag feels that

Lucia Soffientini,
Continuing Airworthiness Manager, Air Worthy

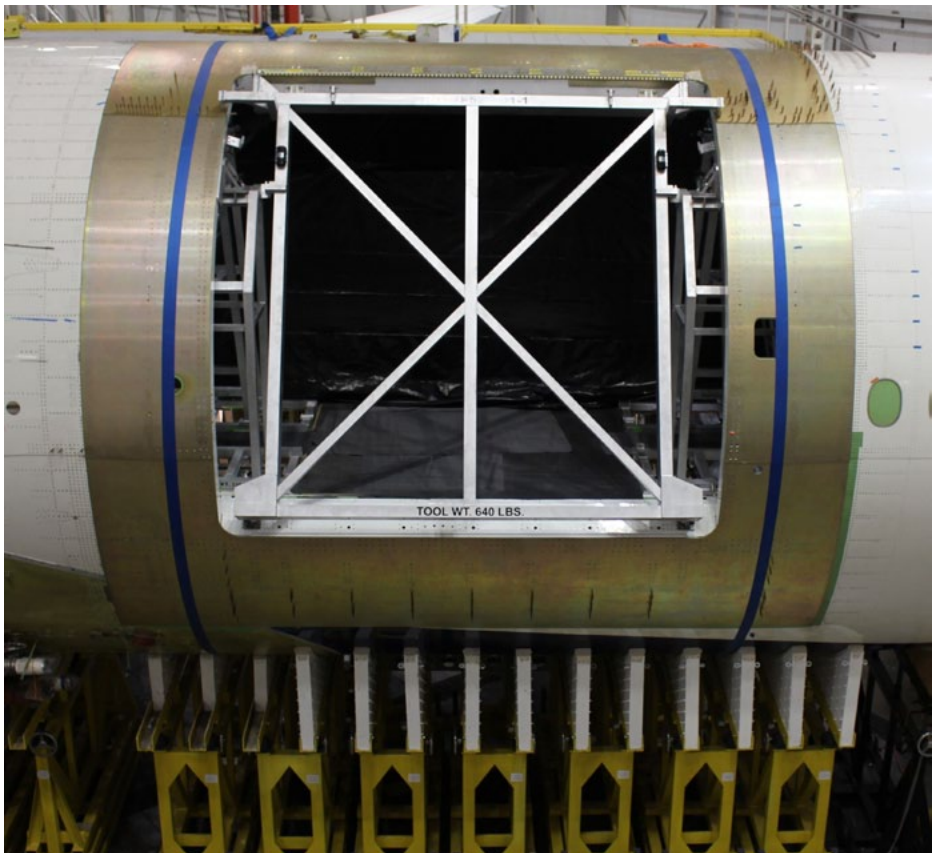
> ***"It is well known that currently the industry is suffering a shortage of aircraft."***
>
> *Lucia Soffientini, Continuing Airworthiness Manager, Air Worthy*

the split will be dependent on increasing demand for rapid transportation versus the need for transportation of heavier cargo over longer distances. “The future balance between wide-body and narrow-body freighter aircraft is expected to evolve in response to the contrasting needs of the global cargo industry. With the boom in e-commerce demanding speedy, flexible deliveries, narrow-body freighters will become increasingly vital for their ability to serve short-haul routes and provide quick turnarounds. Meanwhile, the ongoing requirement for transporting large, heavy cargo over long distances will continue to underscore the importance of wide-body freighters. Environmental and technological advancements are likely to influence this dynamic further, steering the industry towards more efficient aircraft to meet emission and cost-saving goals. Ultimately, a strategic approach to deploying both aircraft types will emerge, optimizing efficiency and sustainability for various cargo needs.”

Brian McCarthy takes a logical approach to the assessment of demand between the two freighter types. “Congested skies, route authority and emissions in the future will drive operators and air networks to consolidate more cargo into larger aircraft if possible. Aircraft have historically gotten bigger in good times when there has been an abundance of cargo. Tonne-mile costs and emissions will play a huge role going forward for obvious reasons.

“We are in a world rapidly moving towards a world where every drop of fuel and every pound of cargo being flown by air will matter. The operators that have enough cargo to fill larger aircraft will do so as long as the cost per cycle per engine can stay in line with sector lengths planned. Meaning, you can't operate a huge aircraft on short sectors unless you have the highest yield cargo on board or unless the operator can keep the cycles and flight hour ratios healthy by balancing long and short sector missions every week or month they operate.

“The air cargo industry has historically made the jump to larger and larger aircraft as density of cargo started falling. The operators of 727s eventually graduated to a 757. The DC8F became an A300B4 then an A300-600 followed by a 767-200. Then the Bigger 767-300F took over and is currently dominating the regional wide-body market. As the 767-300 starts to wind down in the decade to come, operators will have a choice in the A330-300 or will it be a 777 for missions at or above say, eight hours.”



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Robert T. Convey is very clear and succinct in his beliefs. “Of the estimated 2,500 freighter aircraft that will be needed over the next 20 years I believe 1,200 will be narrow-body, 700 will be medium wide-body and 600 will be wide-body.” Lucia Soffientini is equally clear in her expectations. “Wide-body freighter aircraft will be in demand more than narrow-body freighter aircraft. This is because the major needs for freight transportation are on long-haul flights.”

When it comes to the key challenges being faced by the conversion market, Aeronautical Engineers Inc’s Robert T. Convey comments: “Over the next three years the primary challenge for the narrow-body conversion market will be the availability of feedstock. Following in a close second will be the uncertainty that the global conflicts in Ukraine, the Middle East and Tiwan will bring.”

The Aircraft Group’s Waleed Sirrag feels that innovation will play an important role in future decisions. “The conversion market for passenger-to-freighter aircraft faces key challenges, including the technical and financial complexities of modifications, such as floor reinforcement and cargo door installation, alongside regulatory compliance hurdles. The limited availability of suitable aircraft for conversion, influenced by airline fleet strategies and the entry of newer models, further complicates the market. Additionally, fluctuating air cargo demand due to economic cycles and trade dynamics, as well as environmental regulations pushing for sustainability, impact both the feasibility and demand for conversions. “Addressing these challenges will require innovative approaches, strategic industry collaboration, and adherence to evolving standards to sustainably meet the increasing need for freighter aircraft.”

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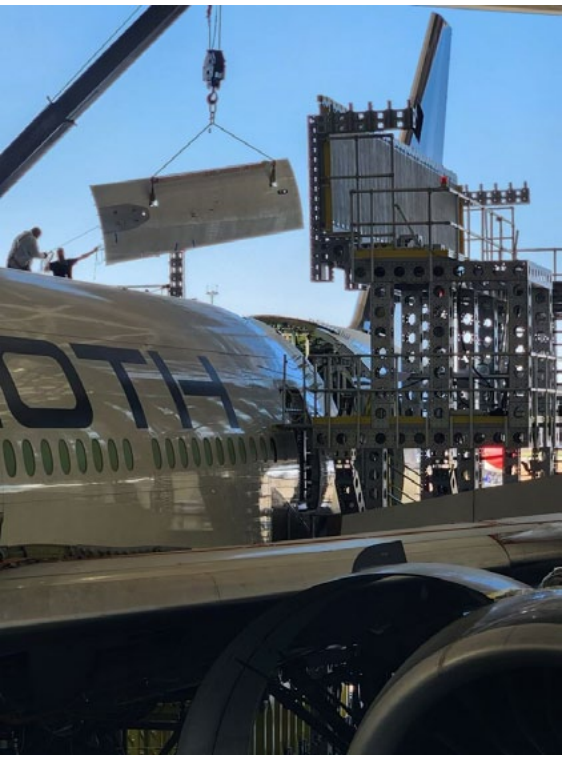
Mammoth Freighters' Brian McCarthy sees multiple challenges looming ahead, pointing out that: "The inflation of aerospace labour and material will remain a challenge in the near term which is increasing the costs for all converters.

"We see some signs that raw material and component pricing are coming down slightly, but the labor component is pretty alarming for just about any skill level including aircraft mechanics and installers. Engine shop visits are pretty unhinged for all engines and troubling for the future operators of our products. We need more competition and for the OEMs to license, designate, partner with and authorize more providers into the engine repair and overhaul arena. For narrow-body converters, it is clearly a log jam of oversupply and a growing shortage of feedstock for some platforms such as the A321 and 737-800. Too many private-equity players jumped into the market too rapidly thinking that COVID-induced cargo euphoria would continue forever."

Air Worthy's Lucia Soffientini is more concerned about the availability of parts, explaining that: "One of the main challenges that the market will have to deal with is a parts shortage. Another one is avionics retrofit and software upgrades of older aircraft. Retrofits will be mandatory in order to be able to operate worldwide but the industry does not support avionics retrofits on older aircraft, especially if the cargo conversion is performed by a third party and not the original type certificate holder (TCH)."



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> **"Aeronautical Engineers Inc. was founded in 1958 and has converted over 600 aircraft."**
>
> *Robert T. Convey, Senior Vice President Sales & Marketing, Aeronautical Engineers Inc.*

We were also interested to know how long those who have contributed to this article have been carrying out passenger-to-freighter conversions and how many aircraft they have converted. According to Robert T. Convey, "Aeronautical Engineers Inc. was founded in 1958 and has converted over 600 aircraft. We are the oldest continually operating conversion house that has converted twice as many aircraft as our closest competitor and focuses exclusively on narrow-body and regional freighters." Lucia Soffientini confirmed that "So far, we [Air Worthy} have completed one B767 P2F conversion and we have two more projects in progress." With regard to capability and capacity, Mammoth Freighter's Brian McCarthy advised that: "Our entire engineering and certification team and many of our people have been hand selected from previous programmes including the 727, 737, 757, 767, 747, MD10, MD11, and A321. Mammoth Freighters has 280 Engineers and 16 DERs on the 777 program now. We are certifying both 777-200LR and 300ER over the next year or so. The 200LR Should be certified by 4Q 2024 and the 300ER in early 2025."

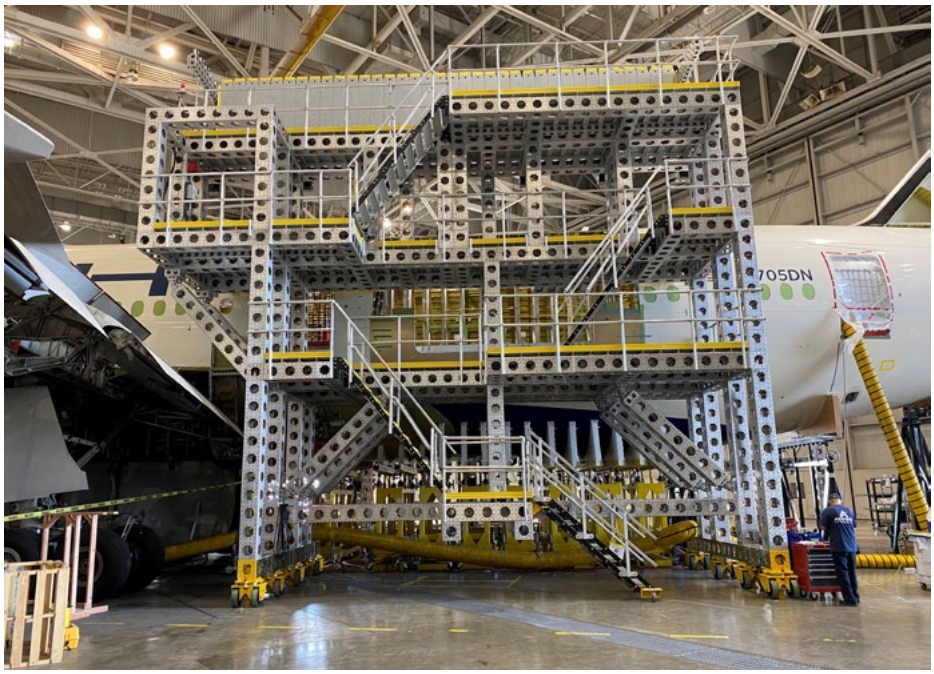
Waleed Sirrag advised that: "Our focus on transforming A321s and B777s has led to the successful completion of two A321 conversions, with a B777-300ER conversion currently underway. This showcases our deep understanding of the intricate processes involved in adapting passenger aircraft for cargo use."

With regard to aircraft our respondents converted, Lucia Soffientini confirmed that: "As a specialist technical consultancy, we do not hold supplemental type certification (STC) for cargo conversion ourselves, but we are able to support operators, MROs or leasing companies on any model conversion." Brian McCarthy advised that Mammoth Freighters currently works solely on the 777-200/300ER, while Robert T. Convey confirmed that Aeronautical Engineers Inc.'s "current product offering includes the B737-800SF, B737-400SF, B737-300SF, MD80SF and the CRJ200 SF." According to Waleed Sirrag, The Aircraft Group's proficiency "extends beyond the specialized transformations of A321s and B777s to include a wide array of aircraft models, from narrow-body jets like the Boeing 737 and Airbus A320 families to wide-body behemoths such as the Airbus A330 and Boeing 767."

We were also curious to know how many aircraft could be worked on in a year. For Mammoth Freighters, Brian McCarthy commented that: "We have four aircraft in conversion and at our Fort Worth Facility, we should get this to about 15 aircraft per year once we achieve a steady state in 2025/2026-time frame. We have additional lines planed at STS in Manchester so this capacity should get us to 21 conversions per year." The Aircraft Group has a capacity of up to three aircraft per year, while Aeronautical Engineers Inc. can handle up to 40 aircraft.

We then asked our respondents what specific modifications and upgrades were typically included in a passenger-to-freighter conversion. According to Mammoth Freighter's Brian McCarthy, "Typically, heavy maintenance events are

accomplished, and some avionics work is expected for standardization of flight decks to an operator's current fleet. This may consider avionics systems and displays and satcom systems as an example." Waleed Sirrag advised us that: "The Aircraft Group's comprehensive transformation process begins with the removal of passenger seating and amenities to create a cargo-friendly interior. Key structural modifications include reinforcing the aircraft floor to accommodate heavy freight loads and installing a large cargo door on the side of the fuselage for easy loading and unloading of goods. Additionally, we request to upgrade the aircraft's electrical, cooling, and fire suppression systems to meet the specific requirements of cargo operations. Avionics systems are also updated to support the unique navigation and communication needs of cargo flights. To ensure the aircraft can operate efficiently in its new role, we might also recommend modifying its fuel systems for extended range capabilities." Lucia Soffientini informed us that: "Air Worthy deals with all avionics modifications needed for current and future mandates." For Aeronautical Engineers Inc. Robert T. Convey confirmed that: "The typical narrow-body conversion consists of the installation of a main deck cargo door, 9G barrier, reinforced floor beams and installation of a new main deck interior."



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We then asked our respondents to walk us through the steps they take during the conversion process. Walleed Sirrag advised: "It starts with a comprehensive assessment where our team examines the aircraft for its structural soundness, system operations, and conversion feasibility, including an in-depth review and documentation of its condition. Once the aircraft is brought into the hangar, we work with the MRO to initiate the conversion work by stripping down the passenger amenities to prepare for cargo use. This involves reinforcing the structure, installing a cargo door, and upgrading the electrical, cooling, and fire suppression systems to meet the demands of freight operations. Avionics and potentially the fuel systems are enhanced for improved navigation and extended range. The conversion process is stringent, with ongoing testing and certification to adhere to aviation standards. Upon passing all inspections and quality control, the aircraft is then painted and branded according to client requirements, culminating in a handover that marks its readiness for cargo service."

At Aeronautical Engineers Inc. Robert T. Convey walked us through their operations, providing a simplified version of the conversion process: "Base line the aircraft, engine runs and pressure test. Aircraft enters the hangar and is jacked and shored. Main deck cargo door surround skin is replaced with thicker gage material. Main deck cargo door jamb is then installed. Main deck floors are reinforced and or replaced. 9G barrier is installed. Main deck cargo door is installed. Main deck liner structure and liner is installed. Lower deck liner structure and liner is installed. Main deck cargo loading system is installed. The freighter is then painted."

Lucia Soffientini shared Air Worthy's processes, commenting that: "The hardest part of the process is keeping the aircraft configuration under control. Cargo conversion does not just involve adding a door and emptying the fuselage. Any modifications that were previously installed need to be removed and some are only partially removed or modified themselves. Also, Airworthiness Directive (AD) and Service Bulletin (SB) assessment can be highly complex, which requires a very good technical understanding of the whole process."

To complete the understanding of the passenger-to-freighter services, our final question was to ask how long it took to carry out a conversion. For Aeronautical Engineers Inc. this depends on the type of aircraft but is typically between 100 and 13o days. For Air Worthy: "For a B767 it is normally around 5 months, but it all depends on the complexity of the project, so this could stretch to 10 months." The Aircraft Group advised us that it would take them between 90 and 120 days.

> ***"It starts with a comprehensive assessment where our team examines the aircraft."***
>
> *Waleed Sirrag, Director of Technical Services, The Aircraft Group*

Line maintenance mechanics
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Examining the Pros and Cons of In-house Line Maintenance for Aircraft

By AIda – carefully edited by our editors

Typically, line maintenance refers to daily safety and maintenance checks and procedures performed on an aircraft to ensure its airworthiness and readiness for its next flight. The work is normally carried out at the airport where the aircraft operates from and that is referred to as "on the line". Unlike more comprehensive heavy maintenance, which is carried out at specialist maintenance bases, line maintenance involves system checks, visual inspections, minor repairs, component replacement, and servicing tasks as recommended by both the manufacturers of aircraft and also the aviation authorities. The upside of line maintenance is the aircraft does not have to be taken out of service, so there is minimal financial impact, and such tasks are carried out in between scheduled heavy maintenance works.

Aside from maintaining an aircraft in an airworthy and operational condition, line maintenance ensures an aircraft is compliant with regulatory requirements and can therefore remain an integral part of a carrier's fleet. As for who carries out line maintenance tasks, these are normally performed by licensed aircraft maintenance engineers or technicians who are trained and certified to execute specific maintenance procedures in accordance with established guidelines and procedures.

So, the question remains. Is it better to carry out line maintenance in-house, or is it better to contract it out to a third-party specialist? For every individual carrier, there should be a clear answer to the question. However, there is no one-size-fits-all solution but instead a series of factors exist that first have to be taken into consideration.

To begin with there is cost. For carriers with a large fleet, it may well pay to invest in setting up in-house line maintenance capabilities. This cost could be recouped over time with the money saved through reduced maintenance costs when compared to the costs of utilising a third-party contractor. However, when we look at a small regional carrier,

> **"For carriers with a large fleet, it may well pay to invest in setting up in-house line maintenance capabilities."**

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> **"There are pros and cons associated with in-house line maintenance."**

it may be that investing in the necessary infrastructure for in-house line maintenance just does not make financial sense where a small fleet of aircraft is concerned. One of the major problems with in-house maintenance is that because your overheads remain fixed – e.g., premises and staff wages – the per-unit maintenance costs only become competitive when there is sufficient, regular work.

Particularly with smaller carriers, it may be that the capital outlay to bring line maintenance in-house places too much of a strain on the finances, or the finance required could be better used elsewhere and achieve a better ROI.

There is no question that carrying out your own line maintenance affords greater flexibility, adaptability and responsiveness. A change in schedules, dealing with emerging issues and a change in task priorities are easier to deal with when a third party does not have to become involved. The result can lead to minimal disruptions and less downtime for aircraft. However, in-house facilities are usually designed to cope with a certain volume of throughput, with space created for the occasional additional requirements. The operations of a third-party provider will have a greater capacity and therefore a greater ability to deal with unforeseen challenges.

There are additional long-term benefits to in-house line maintenance, and one of those is the ability to create an experienced team of qualified engineers and staff who can grow with the business. While small regional carriers tend to have a restricted market that precludes expansion, other carriers will look to seize on opportunities to expand. It is far easier to subsequently expand your own in-house maintenance facilities with an established team overseeing such growth, rather than trying to create substantial maintenance facilities from scratch.

There is one area where third-party maintenance can be beneficial, and that is when it comes to ensuring all the regulatory compliance is adhered to. In many cases, this can require advanced training, maintenance of critical documents and frequent audits. One has to decide whether it is safer for a third party who ensures that their facilities, procedures, and personnel meet the stringent criteria set forth by regulatory bodies such as the Federal Aviation Administration (FAA) or the European Aviation Safety Agency (EASA). In addition, arming out line maintenance to a third-party contractor can help cut down on bureaucratic paperwork, even if that paperwork is now being replaced by digital operations.

In conclusion, there are pros and cons associated with in-house line maintenance, where one aspect is beneficial to one carrier, yet disadvantageous to a second. However, if the principal benefits of in-house line maintenance can be met – reduced maintenance costs – then it is hard to put up a convincing case for leaving it in the hands of a third-party contractor.

About this article

Rapid technological developments are changing our work environment. We at AviTrader also do not want to ignore these developments and trends. Therefore, we have decided to launch AIda, an AI based article writer. However, AIda's drafts are thoroughly fact-checked by our editors.

on the move


Owen Mc Clave

MRO service povider SR Technics has released that **Owen McClave**, currently COO of SR Technics, will be appointed as the new CEO with immediate effect. He succeeds **Matthias Düllmann**, who has left the company. McClave joined SR Technics in 2019 as Senior Vice President Engine Services. His professional experience includes key leadership roles at Pratt and Whitney and Lufthansa Technik in Ireland and Vector Aerospace UK (Airbus Helicopters) where he held the position of Managing Director. “Owen brings a wealth of expertise and a proven track record in the core business of SR Technics that supports him well to lead the company through its growth process and foster further development of SR Technics as the leading Engine MRO service provider,” said **Feng Wu**, Chairman of SR Technics. McClave's role as COO will be taken over by Deputy CEO **Ruixiang Gong** with immediate effect. Gong has served in several leadership positions, including Chairman of the Board at SR Technics, Vice President of Maintenance at Hainan Airlines and General Manager of the Maintenance Department at HNA Aviation Group Co. Astronautics.


David Ropper

AJW Group has announced the appointment of **David Ropper** as Vice President of Business Development for the North American region. Bringing a wealth of international experience to the role, Ropper has successfully navigated roles with OEMs and lessors, including 13 years at BAE Systems and five years at Elix Aviaton. As a seasoned consultant within the aviation industry, his expertise in leasing and relationship-building positions him perfectly to foster customer connections while elevating the AJW brand and its comprehensive suite of services. In his new capacity, Ropper will spearhead the company's strategic business growth throughout North America, showcasing the capabilities of its state-of-the-art MRO facility, AJW Technique, in Montreal, Canada. AJW Technique serves as the central hub for AJW Group's component maintenance, repair, and overhaul services, collaborating directly with leading airline customers to enhance component reliability, optimise time on-wing, and minimise direct maintenance costs. With facilities located in Canada and the UK, AJW Technique provides global coverage. Commenting on this appointment, **Scott Symington**, Chief Commercial Officer of AJW Group, expressed his confidence in Ropper’s ability to grow the reach of the company in the region, saying, "We are delighted to welcome David as the new Vice President of Business Development for North America. With his extensive background in leasing and sales within the aviation industry, we are confident that he will not only drive our business development goals but also cultivate and strengthen our customer relationships."


Eoin Connaughton

Aquila Air Capital (Aquila), a lessor focused on end-of-life solutions, announced the addition of a new member to its commercial analysis and pricing team, **Eoin Connaughton** as AVP, Commercial Analysis and Pricing. Connaughton will be based out of the company’s Irish office, focusing on the analysis, structuring and pricing of transactions for various aircraft and engine types in collaboration with the commercial and origination teams. “We are thrilled to add Eoin to our expanding global team, as we continue to execute on our strategy to be a trusted partner to all players in the value chain, while zeroing in on solutions to enhance the economic returns of transactions,” says **Al Wood**, Aquila Air Capital’s Chief Executive Officer. Connaughton joins Aquila from SMBC Aviation Capital (SMBC), where most recently he served as VP, Commercial Analysis, working closely with the marketing and trading teams to ensure all transactions were appropriately structured, accurately priced and completed in a timely fashion. Prior to SMBC, Connaughton was Business Analyst at Goshawk Aviation, where he acted as functional lead for all trading and corporate finance transactions and opportunities. Connaughton started his aviation finance career with Standard Chartered Bank as an analyst. Connaughton received a diploma in Aviation Leasing and Finance from the Law Society of Ireland, a professional diploma in Data Analytics from University College Dublin, and a diploma in Actuarial Techniques, including his designation as Associate Actuary and certificate in Finance and Investments, from the Institute and Faculty of Actuaries. He earned his Bachelor of Science in Mathematical Science degree from University College Dublin.