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February 2021

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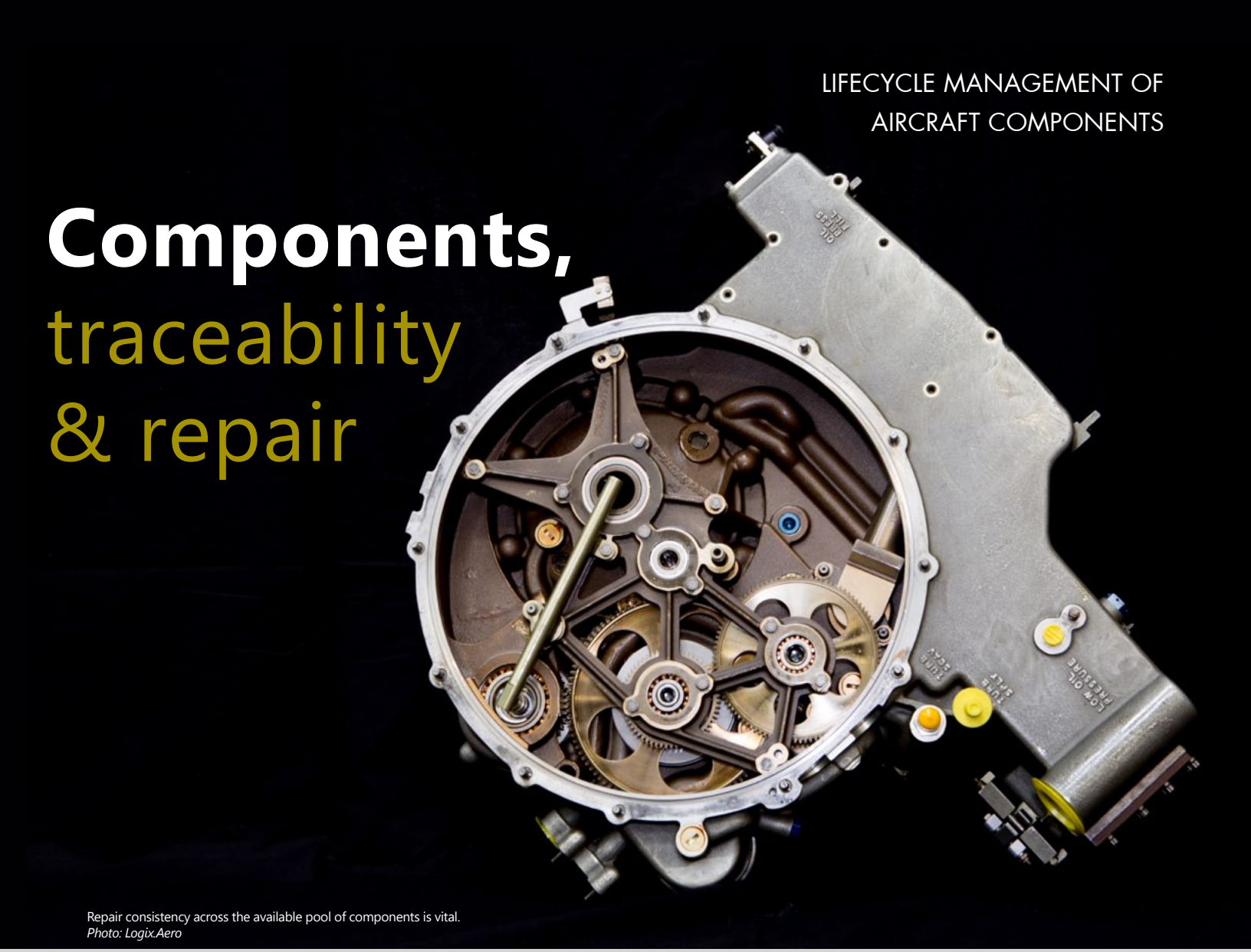

Repair consistency across the available pool of components is vital.
Photo: Logix.Aero

Tracking the component lifecycle and ensuring traceability of some aircraft parts are enormously vital processes. **Keith Mwanalushi** examines how current trends in the industry are impacting these operations.

During the COVID pandemic, industry experts have seen several things trending with aircraft component management. Firstly, its apparent that multiple aircraft types are being pulled forward for retirement, which has caused market and OEM concerns of material oversaturation. "Also, there has been a very dramatic slowdown in both the procurement and repair investment of inventories worldwide from a supplier perspective and the airline side," states Jason Reed, President at Flight Solutions Group, a division of GA Telesis. As a result, Reed reckons the consequences are starting to create an environment where replacement of components, rather than repair, is going to become the norm due to the said saturation. "There is also a serious push from OEMs to sell mass volumes of new parts to the aftermarket suppliers to continue making budgets knowing there is a longer-term effect on their sales."

Jason Reed, President, Flight Solutions Group

At AerFin they see many unserviceable parts removed from aircraft and being held pending repair. "As we exit the global restrictions on flying there is potential for this to result in extended turn times at the repair shops due to backlog, compounded by the effect on the supply chain for access to piece parts required to support the repair," notes Chris Hooley, Director – Airframe Division at AerFin.

> "Component exchange activity has increased whilst operators seek a more economical solution to meet immediate demand."
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> *Chris Hooley, Director – Airframe Division, AerFin*

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AerFin recognise the importance of airlines having reliable access to high-quality stock and therefore they have a large inventory available for immediate dispatch in advance of exchange activity. "This supports airlines and MRO's with an economical solution to ensure minimal impact to airline operations. Additionally, we are also seeing prolonged inactivity of the operating aircraft and therefore resulting in increased removal rates particularly on external sensors, pitot, static and AOA sensors."

Sajedah Rustom, CEO at AJW Technique

Owing to reduced fleet operations and cash constraints, Hooley observes that there has been a reduction in high-cost component and major asset purchases. "However, component exchange activity has increased whilst operators seek a more economical solution to meet immediate demand."

Certainly, due to the significantly reduced level of flying and the resulting financial stress on airlines, cost control at all levels has been the key focus. This applies equally to component maintenance, comments Sajedah Rustom, CEO at AJW Technique. "Repair volumes are down significantly due to the reduced flying hours, and the high number of parked aircraft. And for those components which are in the repair cycle, there is a trend to avoid high-cost repairs. Those which do require a high-cost repair will typically be put on hold for now, or even scrapped and cannibalised to support lower cost repair on similar components."

Rustom continues saying the early retirement of aircraft and uptake of teardowns have resulted in a surplus of used serviceable components at relatively low prices. "However, we have steadily witnessed an increase in component removal since the beginning of COVID. We created solutions to help reduce customer costs and mitigate against risk exposures for instance, we implemented a Quote and Hold solution which allows customers to send components to AJW Technique for test and evaluation and then hold the units until they need the unit back in their stock, which has enormously helped customers maintain cashflow."

Aircraft do not do well while inactive, requiring daily, weekly, and monthly checks to keep them in a "serviceable" condition. These checks can sometimes lead to replacement of LRUs/components while they are grounded causing the operator to either replace within their own stock or rely on components in the market, according to James Palacios Vice President and General Manager at The Aircraft Group, a business unit at Kellstrom Aerospace. "In order to keep costs down and to continue to conserve cash, the option to exchange components will be seen as a more viable option as the operator will typically only be liable for a smaller percentage of the outright purchase of the component itself."

Palacios sees another trend that will likely become more popular is the leasing of components as another option. He

James Palacios, VP and General Manager at The Aircraft Group

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Generally, industry repair volumes are down due to reduced flying hours.
Photo: Patrick Delapierre

says typically leasing is synonymous with a whole asset itself, whether it would be the airframe, engines, APU, and landing gear. "This same concept will now be applied to the components themselves, just on a smaller scale which will then save the operator money and conserve liquidity further. The proverbial JIT buying is what most operators are looking for in today's environment, part suppliers are challenged with having the material needed by the operators ready to go. Furthermore, once the demand signals have been initiated buyers are looking to exchange units to save time and money."

Despite the scaled down operations, airlines still have some planes flying and business continues. Consequently, operators are consciously striking a balance of conserving cash-out while optimising the usage of their fleets. "Therefore, they prefer to move from PBH models and the purchase of new parts to utilising used parts and repairs on time and material basis as well as loans and exchanges to focus on the short-term needs," comments François de Larambergue, Head of Engineering, AOG Desk and Procurement at Spairliners.

While seeing the market prices of used serviceable parts on a downward trend due to continued teardown of retired aircraft, De Larambergue also sees a rise in prices for logistics services to send requested components to customers. "Therefore, the savings from lower component prices are often absorbed by the higher transportation costs. Spairliners is of course always aiming to profit from favourable market conditions to purchase components and we are using the opportunity to right-size our stock where possible."

François de Larambergue, Head of Engineering, AOG Desk and Procurement at Spairliners

Since the introduction of the COVID vaccine in December it is giving the industry optimism and MRO aftermarket players like Werner Aero Services are starting to see increased demand for components, at least for budgeting reasons now, from airlines and lessors who are making plans to remove aircraft out of storage.

Traceability for life limited parts and lease agreements

Full life history (or back to birth) is critical for life limited parts (LLPs) as the air operator requires a full understanding of the components history to ensure all life limits are understood and adhered to. As part of a lease return check, Rustom from AJW explains that it is normal practice to perform an audit of all life limited components, and so it is essential the operator maintains accurate records to support this process. "This is relatively straightforward when components are repaired or overhauled and returned to the same operator, as all the records and traceability is held within one system. However, when exchanges are made it is essential to validate all required records are available and accurate, and to ensure all information is recorded within the operators tracking system.

"Note, however the majority of components are on condition, with those that are life limited being focused mainly on landing gear, engines and safety equipment."

Additionally, Rustom says there has been a huge transition towards digital solutions to proactively manage and forecast repairs on life limited parts via traceability. She states with the development of predictive and preventative maintenance, aggregations of historical and real-time data enable just-on-time parts replenishment and proper manpower capacity planning for MROs; and predicts the condition of the unit based on its historical behaviour. "This in turn drives efficiency for MROs but also helps airlines provision for timely removals, reduces parked aircraft intervals and reduces maintenance costs. AJW has been investigating the area of both predictive and preventative maintenance to streamline the repair process and foresee customers' requirements."

Mike Cazaz ,CEO at Werner Aero Services

Mike Cazaz, President and CEO at Werner Aero Services believes ensuring the traceability of LLPs will guarantee that these items will be overhauled or replaced at the due time and hence ensure the continued safe operation of an aircraft. "Usually, under an aircraft lease agreement there are restrictions for the utilisation of LLPs or the age of LLPs to be reinstalled on a leased aircraft. But since the value of an LLP is measured by the lifetime or cycle, it is important from an economic perspective to keep track of the utilisation of the LLP."

Regardless of a leased or owned asset, trace is fully required by airlines to ensure their passengers are getting from point A to B safely. But when it comes to leases, Reed form Flight Solutions Group observes that most lessors have return condition requirements that are essential to ensure the asset value after a certain period – "Lessors want less PMA, DER, or aged life products on their aircraft to make the asset as marketable as possible for the next operator."

Lease agreements generally have well defined trace and minimum life remaining requirements for LLPs upon return. Although life remaining can generally be commercialised, Palacios reminds that the lack of acceptable back-to-birth trace can quickly make an asset unsellable, non-remarketable and the LLP itself unusable. He says depending on the return conditions stipulated in the agreement itself, it could in extreme cases constitute a breach, but use of the word "acceptable" above versus "required" was purposeful. "As well known, our industry suffers from a self-created problem of regulatory requirements for trace versus perceived requirements for trace with that latter having become the default by which auditors conduct back-to-birth trace investigations. Therefore, the importance of back-to-birth trace conducted to the level of expectations and perceived requirements of the market has become an absolute must despite actual regulatorily mandated trace being less demanding on the auditors and actual ability to use or re-market the LLP," Palacios explains.

Patrick Leopold, Director of Leasing and Trading at Vallair

Generally, where traceability is not gapless, or is lost, it is difficult to remarket or sell, comments Patrick Leopold, Director of Leasing and Trading at Vallair – "A lease agreement can specify the traceability requirements to different levels, sometime partial traces are acceptable, but it depends on each lease agreement negotiations and what is required by the lessee."

At Spairliners, they have standards in place for the documentation of LLPs and maintain the data digitally as well as on paper whenever a part is handed over. However, De Larambergue calls for an industry-wide template or platform to be available to ensure the standards are aligned globally and that could be easily exchanged across operators and suppliers. "While we do see that further evolution of the track and trace technologies, for example RFID tags, will continue to boost supply chain performance, we could imagine that block-chain technology could be a great tool to help build such an industry standard, not just for the physical traceability of parts, but also for the documentation of their entire lifecycle."

Cost control is being applied to component maintenance.
Photo: Patrick Delapierre

Hooley from AerFin adds, as well as LLPs, there are also several components with hard and soft time thresholds (recommended by OEM but not mandated) which require similar controls. "Due to the range of adoption of such recommended thresholds by the operators, AerFin maintain such components to the highest standard in order to maintain consistency across our available pool of components, particularly in relation to the recommended thresholds for component removal."

Failure analysis on components

With some components exposed and operating in extreme conditions, for instance, sand, high temperatures, snow, and ice, they can be subject to failure.

At AerFin, as with any component removed due to failure, regardless of operating conditions, they are inducted into their approved Part-145 facilities and firstly undergo incoming visual inspection to check for any outward signs of damage and/or discrepancy, before moving onto functional testing in accordance with the relevant OEM CMM to confirm failure. Then, using the results of the functional testing and the reported failure information from the operator, troubleshooting per the CMM commences to identify, isolate, and correct the defect. After the initial repair, the units then undergo further functional testing to ensure that all faults have been corrected and no additional faults are present, and that the unit is operating fully to the OEM specifications.

Hooley further adds that if any unusual failure/removal trends are identified during regular reviews from a specific operator or region, then AerFin takes a proactive approach to look further into them, in conjunction with the relevant operators and OEM's, to attempt to firstly identify if any external forces (such as extreme operational conditions) have contributed to an increase in defects/faults and then secondly to identify and recommend any preventative actions that can be taken either during the workshop visit or by the operator in order to address the root cause of the failure in an attempt to reduce or eliminate any future failures.

Another trend lies in the management of components that form part of an aircraft that is in long term storage. Leopold from Vallair notes the challenge here is to make sure they are kept in serviceable condition whilst being in on the ground. "There is of course the management of the parts with regards to their calendar time expiry once the aircraft will need to go back into service, but also there are the environmental conditions to consider [humidity, moisture, potential corrosion, erosion when parked in the desert], as well as issues that arise out of lack of operation, especially on electrical components. With utilisations being down and sometimes aircraft being flown just to keep them serviceable, parts may fail or become unserviceable unpredictably."