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ecube are developing measurement processes to assess their sustainability performance more accurately.
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Developing pathways for **sustainable** disassembly

The aircraft disassembly market faces unique challenges in the race for more sustainable operations but there are advances taking place in line with global greener practices and experts say closer collaboration with suppliers, OEMs and airlines could see even more economical solutions.

By Keith Mwanalushi

The aviation business is one of the most dared industries to achieve stringent sustainability targets. Airlines, airports and aircraft OEMs have led the charge in applying initiatives aimed at achieving net zero operations and transitioning to greener practices. The aircraft aftermarket and end-of-life segments are also getting more assertive in pushing efforts to achieve similar goals.

At end-of-life specialists AerFin, they are taking sustainability very seriously. "When it comes to an airline's decision to retire an aircraft, AerFin's objective as a business is to help them maximise the residual value of those assets and to do so in a sustainable manner," declares James Bennett SVP Sales. Bennett says by recycling aircraft and engines on a global scale AerFin can offer used serviceable

James Bennett, SVP Sales at AerFin

> **"By integrating recycled components into their fleet maintenance strategy, airlines mitigate lengthy lead times, avoid price fluctuations, and reduce their global footprint associated with the movement of the goods."**
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> *James Bennett, AerFin*

material (USM) to airlines and lessors that then reduces the requirement for the manufacture of new parts, which in turn helps to eradicate waste.

Bennett stresses the importance of giving airlines the flexibility to recall components from the airframe thus helping operators avoid additional investments in purchasing new components, and to encourage them towards circularity by reusing their own material. "Also, by integrating recycled components into their fleet maintenance strategy, airlines mitigate lengthy lead times, avoid price fluctuations, and reduce their global footprint associated with the movement of the goods," Bennett adds.

Moreover, AerFin are building a pool of serviceable inventory to support existing and new customers who are looking for cost-efficient and sustainable solutions for their fleet. The company has an established link with AFRA (Aircraft Fleet Recycling Association) with a vision for making aviation more sustainable.

When ecube first came to market over a decade ago, they saw an opportunity to give aircraft owners and managers a more efficient and professional option than may have been available then. "Our value proposition was rooted into our removal processes, the efficiencies we innovated, and the resulting time savings achieved, our customer service levels and our ability to pack, store and ship material, all done within the confines of a heavily commodified marketplace," says Paul Murray ecube's new VP Sustainability and Business Development. "Frankly, as long as all of this was achieved within the existing environmental legislation, we and our customers were content with the environmental aspect to our work."

EirTrade uses AFRA best management practices eliminating any threat to the environment from the end-of life process.
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The landscape has changed utterly in the last decade as the climate crisis began to dawn on wider society. About five years ago, the folks at ecube began to understand that in order to survive in business in the long term, they needed to robustly improve their sustainability platform and to go beyond the acceptable standards of the day. "We sought to get out in front of the issues associated with aircraft dismantling, anticipate what our customers would need from us in the future and to take a leadership position in the market. Effectively, we began to transition from an aircraft end of life operation to an aircraft recycling business and that coda now informs our entire operation," Murray explains.

At ecube, they are developing measurement processes to assess their sustainability performance more accurately. Murray adds: "It is important that we are able to measure carbon footprint, both that of our own and that of our suppliers. We have established Plane Reclaimers.aero to develop new pathways for the future reuse and repurposing of aircraft parts."

The range of parts that ecube are currently requested to remove from aircraft varies hugely, ranging anywhere between 300 to 1500 parts and the company wants to develop opportunities for operators to maximise the component harvest by developing new pathways for those parts. "We deepened our linkages to our carefully selected suppliers to ensure they are aligned with our sustainability objectives. We have invested in a new senior management function of VP Sustainability, not just to consolidate our progress but also to develop new channels both within aviation and in other industries."

Paul Murray, VP Sustainability and Business Development at ecube

Murray indicates that ecube are also on the board of the AFRA and pushing to drive up the standards across the industry.

According to Goutham Ramdas, Director- Aircraft Trading at Universal Asset Management (UAM) they consider all aspects in sustainability specifically through their recycling processes for any aircraft undergoing disassembly. This begins at the very first stage when evaluating how to recycle the fluids from the aircraft, all the way to the copper wiring when the aircraft hull is finally recycled. "Our goal is to maximise recycling as much as possible, and to minimise the carbon footprint on the environment as part of our disassembly processes," comments Ramdas.

He says most of the opportunities in the end-of-life process comes down to how players in this space can process aircraft aluminium, and the 5% of material on the aircraft that are more difficult to recycle. "While we fully comprehend the notion that not everything can be fully recycled, the onus remains on aftermarket companies to figure out how to prolong the usage of materials that cannot be recycled at the moment until that technology has been brought to the market," Ramdas points out.

At EirTrade's facility in Ireland, using AFRA best management practices eliminates any threat to the environment from the end-of life process. The products of aircraft recycling are re-used to greatest extent possible, for instance, the fluids are removed for recycling at approved facilities and components are carefully removed, repaired, or overhauled, and returned to service with airline operators. Some unusable components and materials are distributed for educational purposes.

Goutham Ramdas, Director- Aircraft Trading, Universal Asset Management

Also, the fuselage of the aircraft is cut into sections to create pods for use as offices, sheds and living spaces, while remaining structures are shredded, metals segregated and recycled at an approved facility.

Jim Maguinness, Technical Manager -QAM at EirTrade Aviation explains that fuel and oil are removed from the aircraft using the procedures in the aircraft maintenance manual. "Drip trays are used to contain any possible spills during removal of components and all hazardous materials are segregated into assigned

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areas, racking, bins, bunded pallets, for example to comply with our waste facility permit."

As Maguinness highlights, fire extinguishers containing halon and other gases are components which are overhauled and re-used and the export and import of Ozone Depleting Substances (ODS) is licensed.

Handling hazardous materials sustainably

In terms of the process, AerFin have an internally developed software programme that provides data to optimise the yield of serviceable components. Bennett explains that those components are typically the high value engine and airframe components and major assets such as APUs, landing gears and nacelles, and avionics and interiors. These are identified, removed and segregated and what is left is an empty fuselage which is typically divided into four categories: 1) metal, steel, stainless steel and titanium; 2) recyclables, such as flight deck glass and tyres; 3) hazardous components such as fire extinguishers and batteries; 4) lastly, composite materials such as the interiors and seats.

"We are then left with a small amount of waste, which in turn is disposed of in a sustainable manner," Bennett notes.

As for aircraft hazardous components, besides batteries and fire extinguishers, Bennett says these also include various fluids and chemicals (such as lubricants) and repellents, which keep an aircraft operational. "One of the initial phases of tearing a plane down is depleting its hazardous fluids and materials. It involves a specialised process that is done very cautiously to meet environmental safety requirements."

Components that are destined for recycling are then re-certified either by AerFin, or by third-party component repair partners. They are then sold to the network of operators to support their immediate and future operational needs, thus completing the circle.

At UAM, they have a robust group of vendors who specialise in the ability to handle hazardous materials from

The industry is keeping a close eye on new development for the recycling of advanced composites.
© *EirTrade*

Jim Maguinness, Technical Manager -QAM at EirTrade Aviation

disassembles. "For us to reduce the impact on the environment, we ensure that any of our processes and vendors are fully in compliance with the local and EPA standards along with our AFRA requirements" says Ramdas. He adds that UAM's industry-first Diamond KPI accreditation through AFRA was driven by the impact on the environment as part of these processes.

Are recycling technologies developing fast enough?

Some materials, for instance those found in cabin interiors may contain embedded flame retardants so safety regulations would preclude them from recycling. Ramdas suggests that while there are certainly advancements in recycling technologies, there is still more work to be done to attain 100% recyclability.

There is need for more cabin materials to be easily recyclable at end of life.
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"This is even more important when considering its not far off when aircraft with carbon-fibre composites will need to be recycled," but Ramdas heeds that the technology is not quite ready to achieve that.

Maguinness says the development of recycling technologies is dependent on commercial viability and end-of-life and recycling should be taken into consideration during the design of any product. EirTrade is keeping a close eye on new development for the recycling of advanced composites and carbon fibre, which are increasingly replacing metals in aircraft manufacturing.

Murray from ecube observes that in recent decades the technologies for the design of new aircraft and the development of new materials was some way ahead of the technologies available to effectively recycle what was made. "We are actively engaging with partners in a number of different channels to explore better ways to reuse carbon fibre," he says.

When aircraft airframes containing large amounts of carbon fibre start to mature the quest to repurpose these materials effectively and economically becomes a major challenge, as Murray suggests. "This element of the process is in its infancy, its complicated and complex and it will take multi party collaboration to find a solution. We think the aircraft OEM's need to take a lead role here. The automotive industry established design conventions to determine the amounts of material used in new vehicles which comes from already recycled material and also determines how much material available at the end of a vehicle's life that is easily recyclable."

For instance, Murray argues that aircraft undergo substantial cabin interior refreshes at some point in their life cycle and surely, it is reasonable to insist that the OEM's, the interior's suppliers, the airlines, the aircraft owners and the regulatory authorities collaborate to ensure that all such upgrades use a minimum percentage of material from recycled sources and also that the material installed is easily recyclable at end of life.

Murray says: "It is credible to believe that this is something that future airline passengers would expect. Consumers are becoming far more eco conscious in their buying habits so service providers and manufacturers would do well to build in a level of compliance to satisfy a growing demographic."

With industry data indicating that aircraft retirements will double in the next few years, the need for airlines to collaborate with sustainable end of life managers is and will continue to be greater than ever.