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AM Collaboration

New perspectives can help push adoption

Additive manufacturing (AM) is being used in engines, cabin interiors and airframe structures, but feedback from end users and understanding of their pain points is critical for the technology to advance.

This became clear after a recent conference of airlines, manufacturers and 3D-printing suppliers at the Etihad Airways Engineering Innovation Center for the RedCabin Aircraft Cabin AM summit.

Outside the expected benefits of AM—light weight, waste reduction or topology optimization, to name a few—the airlines ask questions such as, "How will this technology help improve the passenger experience?"

These unique views and new ways of thinking about AM help to build a better business case for the technology and provide guidance for promoting its adoption.

Celebrate successes of new AM adopters while leaning on AM pioneers' lessons learned.

THE AIRLINE VIEW

"The [aircraft] cabin is the image of the airline. Why is it so inflexible?" asks Bernhard Randerath, vice president of engineering at Etihad Airways Engineering, which says it is the only MRO with Part 21 G & J approval. The Etihad team developed and certified the first approved AM part, a Boeing 777 LCD shroud, in five months. Etihad managed the entire process from material selection and qualification, machine and process qualification and part testing. The 3D-printed part is 20% lighter, 30% cheaper and has an improved turnaround time (TAT) compared to a conventionally manufactured part.

For Etihad, most success in AM is in targeting small-volume, long-TAT or customized parts; the issue lies in certification. To date, Etihad has developed its own standards for certification. Its goal is to print 60% of the aircraft cabin in the next six years, which it cannot do if it must continue writing its own AM certification processes. This highlights the urgent need for clear and consistent industry standards.

Wayne Thomas, AM project manager at Air New Zealand, asks: "What can AM offer the airline industry in the future?" Today, ANZ uses AM for rapid prototyping, part customization and product differentiation.

The value proposition of AM in the cabin for ANZ comes from non-critical parts. Its AM road map looks for parts that affect passenger experience, have no critical safety effect, require limited post-processing and offer assurance that any quality escape would not affect part performance. This maturity-model approach helps build understanding and confidence in the technology, paving the way for growth in AM applications at the airline.

ANZ also sees the value of AM in offering quick replacement for worn or broken cabin parts. The airline aims to use AM to promote decentralized logistics and add AM design and manufacturing instructions to an illustrated parts catalog, too.

THE MRO VIEW

Magnetic MRO offered insights into similar AM pain points and challenges, including the lack of suitable AM materials, immaturity in the Part 21 J design process, challenges in post-processing, surface treatment durability in high-wear areas in the cabin and concern about intellectual property (IP) protection. Similar to Etihad, Magnetic MRO focuses on AM for non-structural, cosmetic parts and manages the full AM process in-house.

MROs use AM in tooling and replacement parts in the cabin. The benefit of AM replacement parts lies in a shortened lead time of the overall repair cycle and eventually a shorter scheduled or unscheduled check. But this benefit does not come without challenges, for which Magnetic MRO requests better guidelines and acceptance from regulators and OEMs.

NEXT STEPS

To translate the pain points into areas for growth these steps should be taken: Standardize AM certification processes; mature material (flammability, selection, certification); establish processes for IP ownership and protection; increase availability of qualified service bureaus; and prepare for a new, rapidly changing supply chain.

Many of these pain points are not new to the AM industry and will take a collaborative effort to resolve. What needs to happen this year or in the near future to maintain momentum?

- Include airlines and MROs in developing certification standards.
- Train workers—AM will touch many new people who will need training to cover design, manufacturing and strategy.
- Reconsider OEM business models to facilitate decentralized logistics.
- Invite airlines and MROs to join the AM industry to discuss development of AM technology and application.
- Promote better understanding of MRO by AM industry leaders.

It is critical to welcome new ways of thinking and celebrate successes of new AM adopters while leaning on lessons learned by seasoned AM pioneers. If everyone can work together across industries to solve some of the key issues, there will be rapid maturation across multiple points in the AM industry,enabling quicker and easier adoption at airlines and MROs.