

MAKING FASTER FLIGHT MAINTENANCE POSSIBLE

Satair, an Airbus services company, wanted to expedite aircraft maintenance through on-demand tools manufacturing. During a joint pilot project, Fast Radius worked with Satair to deliver an innovative multi-process manufacturing solution that has the potential to transform the aerospace market.

THE CHALLENGE:

Getting grounded aircraft back in flight faster

Satair came to Fast Radius with a vision: Reduce flight delays by transforming the speed and sustainability of aircraft maintenance tool delivery.

Satair serves customers in the global aerospace value chain by delivering parts management, distribution, and support solutions. The company prides itself on anticipating individual customer needs. In aircraft maintenance, that means delivering the parts and tools customers need to get aircraft back in the air quickly. Satair envisions a world with fewer flight delays, faster travel, and the highest standards of safety.

In the traditional maintenance process, maintenance, repair, and overhaul organizations (MROs) or airlines can sometimes wait up to several weeks for a new, conventionally manufactured maintenance tool. This wouldn't normally be an issue, but sometimes tools are needed much more quickly than anticipated. Currently, Satair services hundreds of airlines and MROs worldwide.

Satair wanted to expedite Airbus aircraft maintenance by significantly reducing the lead time for delivery of the necessary tools while also exploring potential ways of reducing resource and material waste along the way. Satair was already operating at the highest level of safety and security, and any product or supply chain changes had to meet that same standard.

THE PLAN:

Exploring advancements in the manufacturing supply chain with the Virtual Warehouse.

THE SPEED TO PRODUCTION PILOT:

From weeks to days

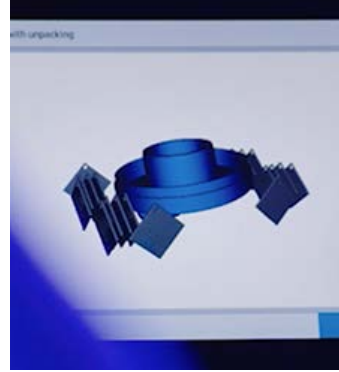
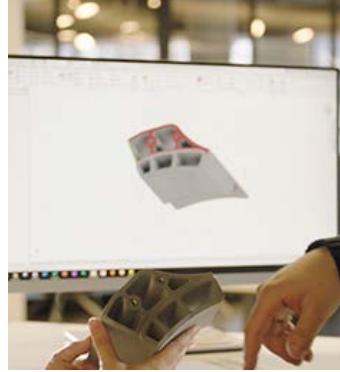
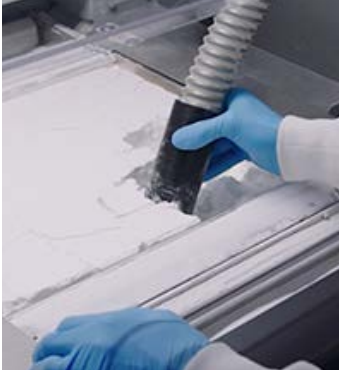
Over the course of this project, Fast Radius manufactured, inspected, packaged, shipped, and fulfilled two complete tools in under 48 hours. The pilot hinged on Fast Radius's logistics partnership with UPS, which allowed Fast Radius to ship parts from its factory in Chicago to Satair's distribution facilities in Hamburg, Germany in less than 48 hours from receipt of order to delivery. Production timing went from:

1,000+ hours to **48** hours



Want to learn more about how Fast Radius can help grow your manufacturing business? [Contact us today.](#)

MAKING IT POSSIBLE: TOOL REDESIGN AND RAPID ITERATION



01 A MULTI-PROCESS SOLUTION

The Fast Radius team recommended a multi-process approach that included both additive manufacturing processes (HP Multi Jet Fusion) and traditional ones (CNC) to give Satair the best price, reduce the total part numbers in the bill of materials (BOM), improve design robustness, and enable the integration of new functionalities.

02 RAPID DESIGN ITERATION

During the project, Satair and Fast Radius collaborated to investigate ways to redesign and improve selected aircraft maintenance tools to ensure manufacturability with additive technology. The teams worked closely to create new geometries for the tools that reduced material usage and improved functionality. They achieved new efficiencies through assembly consolidation, lightweighting, and unique design architectures only possible with additive manufacturing. During this process, Fast Radius teamed up with Satair engineers through intensive working sessions that employed rapid prototyping with production-grade technologies and used a combination of digital simulation and physical testing to quickly iterate and refine the designs.

03 HP MULTI JET FUSION TECHNOLOGY

The HP Jet Fusion 580 Color 3D Printer was selected for this application due to the machine's ability to produce full-color parts with optimal mechanical properties. The machine was able to produce multiple design iterations in the same time it would normally take to print a single part, which significantly cut down on the development time. Because of the harsh

environments these tools would need to endure, the material selected was HP 3D High Reusability PA 12 – an engineering-grade thermoplastic with excellent chemical resistance to oils, greases, aliphatic hydrocarbons, and alkalis.

04 ACHIEVING HIGH AEROSPACE STANDARDS

Satair operates at the highest level of safety and security, so any product or supply chain changes need to maintain that standard. For example, in addition to its existing AS9100 certification for aerospace quality, Fast Radius implemented a rigorous production part approval process to ensure the company sent consistent, quality parts to Satair. Fast Radius developed ongoing control plans for each tool and implemented a continuous improvement plan to ensure that the parts continue to meet rigid aviation standards.

“ Airlines rely on us when it comes to on-time delivery of urgently needed parts, and to keep this promise we have to constantly challenge our supply chain and logistics setup.

– FELIX HAMMERSCHMIDT,
HEAD OF ADDITIVE MANUFACTURING SOLUTIONS – ASYM, SATAIR

DISCOVERING THE VALUE OF COLOR 3D PRINTING

Through its partnership with HP, Fast Radius gave Satair access to technology that could enhance their production process. For example, Fast Radius used the HP Jet Fusion 580 Color 3D Printer to print Satair tools in full color, which improves safety by ensuring that tools are not left behind after use. Color also introduces new ways to convey information, such as company logos, part numbers, serial numbers, or even scannable QR codes printed directly on to the tool.



THE TOOLS

Redesigned for faster flight maintenance



PINTLE BEARING ALIGNMENT TOOL

Used for bearing in the rear spar prior to installing it during Main Landing gear installation.

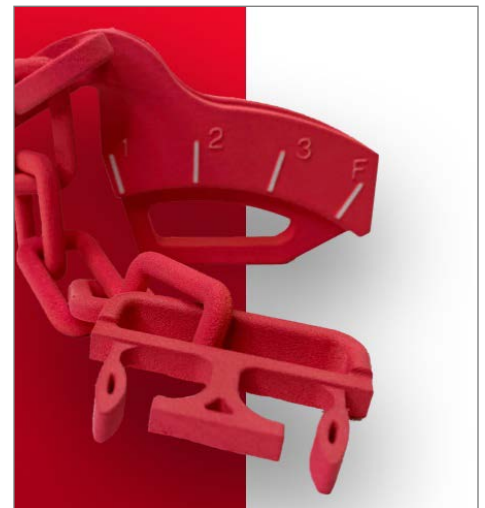
- **Assembly reduced from four parts to two**



GAGS TOOL PADS

Used for main landing gear maintenance on the A380, gaging the main landing gears.

- **Improved strength-to-weight ratio**
- **60% mass reduction**



FLAP ZERO LOCKING TOOL

Used for flap maintenance in the A320 cockpit, locking the Flaps control lever in Zero position.

- **Assembly reduced from six components to two**
- **50% lead time reduction**

THE RESULTS

A faster, more sustainable future for aircraft maintenance

Satair and Fast Radius are in the early days of exploring what's possible with the Virtual Warehouse, enabled by HP's Multi Jet Fusion 3D printing technology and a logistics partnership with UPS for the delivery of parts produced during this pilot. So far, outcomes from this program point towards a bright future where Satair will deliver world-class innovative solutions to its aircraft maintenance customers. Satair and Fast Radius are investigating further ways of working together to redesign more tools with additive manufacturing. As awareness increases with other aerospace manufacturers, airlines, and MROs, the benefits of faster, more sustainable aircraft maintenance will begin to transform the entire industry.