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Senior Aerospace Takes FDM Additive Manufacturing to the Skies

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Darren Butterworth

CEO, Senior Aerospace BWT





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Having completed and approved the necessary qualification reports, Senior Aerospace BWT is now fully capable of 3D printing interior aircraft components to meet the needs of aircraft manufacturers.

Part of Senior plc, [Senior Aerospace BWT](#) is an AS/EN/JISQ 9100:2016 accredited global manufacturer of ultra-lightweight, low-pressure air distribution systems for aerospace. Located in Greater Manchester, UK, Senior Aerospace BWT serves customers across regional, military, private jet and rotorcraft markets.

With over 10 years of experience in additive manufacturing, the company began investigating the commercial viability of Stratasys FDM® 3D printing to produce components for low pressure air ducting systems and air handling in aircraft interiors several years ago.

Through a technical partnership with a service bureau, Senior Aerospace BWT learned that FDM technology offered an opportunity to substitute certain traditionally manufactured aluminum

parts. Initial studies demonstrated the potential for significant savings in component weight, cost, and lead time compared to aluminum – all with a relatively inexpensive setup.

In 2018, with its technical partner, Senior Aerospace BWT delivered its first parts for air supply ducts incorporating a 3D printed part for flight use on regional passenger jets. Made of traceable [ULTEM™ 9085 resin](#), the pitot tube was specifically designed for additive manufacturing and connected to a duct for smoke detection. Since then, the company has supplied its customers with hundreds of lightweight, flight-ready interior aircraft parts using FDM technology, often incorporating highly complex geometries.

Securing Self-Sufficiency With Dual Fortus® Installation

The company's success with FDM technology ultimately laid the foundation for the investment in its own in-house capability. In 2019, through its local partner [Tri-Tech 3D](#), Senior Aerospace BWT installed two [Stratasys Fortus 450mc™ 3D printers](#) in its dedicated additive manufacturing facility.

After two years of intensive R&D work, Senior Aerospace BWT qualified the associated products and processes to achieve AS9100 accreditation. This means it can now quickly and cost-effectively produce certifiable interior aircraft sub-assemblies of top assembly components to meet the needs of customers for specific aircraft. These comprise OEM aerospace manufacturers in the regional, military and private jet markets.

Senior Aerospace BWT credits Statasys aerospace-grade materials as a key success factor, resulting in several fundamental benefits.

"Stratasys' FDM additive manufacturing effectively sold itself to us with its ULTEM™ 9085 resin material," says Darren Butterworth, CEO, Senior Aerospace BWT. "It's one of the most advanced and recognized materials for flight-



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Producing components in Stratasys' aerospace-grade ULTEM™ 9085 resin ensures a robust, repeatable and traceable production process for BWT's customers. Picture shows development component used in low pressure air ducting systems.

ready aerospace parts, importantly offering batch traceability from part to source."

BWT's additive manufacturing team has seen significant and quantifiable savings in component weight, cost and lead-time with FDM additive manufacturing – particularly in place of traditionally sourced aluminum. This is exemplified in projects comprising multiple different parts, some of which may only measure a few centimeters.

AS9100 accredited, Senior Aerospace BWT is 3D printing certifiable interior aircraft sub-assemblies for top assembly components to meet the application needs of customers for specific aircrafts.



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Efficiency Savings Up to 75%

In many cases, minimum order quantities for off-the-shelf aluminum parts make traditional manufacturing unviable when the need for one aircraft is very small. With additive manufacturing, BWT uses the full build space of the Fortus 450mc to print the necessary quantity to minimize inventory, even within a tight timeframe.

“In many instances, we are saving as much as 75% in cost when designing and producing parts on our Fortus 450mc printers,” says Butterworth.

In addition to designing and manufacturing production parts in-house, the team can fulfil various tooling and development requirements with its 3D printers. For these applications, Senior Aerospace uses durable [polycarbonate thermoplastic](#) and [ABS](#) materials to create tough, yet lightweight jigs and fixtures and other production aids on-demand.

Building for the Future

With its certified in-house additive manufacturing capability, Senior Aerospace BWT is on a mission to drive increased adoption of 3D printed parts for aircraft, enabling customers to benefit from the technology for low volume production and customization. The company also plans to leverage this capability across other industries beyond aerospace, such as automotive and mobility, to expand its customer base and drive new revenue streams.



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Using the full build space of the Stratasys 450mc, Senior Aerospace BWT can print the part quantities needed, enabling it to minimize inventory.

Looking ahead, Senior Aerospace BWT is already planning to invest in additional Stratasys FDM 3D printers. A key part of its strategic objective is to use 3D printing to drive further product development innovation to facilitate long term growth by exploiting the capabilities only additive manufacturing offers.

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