

## AEROSPACE PRE-PRODUCTION PROJECT



**ROLLS-ROYCE AND THE MTC COLLABORATIVELY DESIGNED, SET-UP, AND OPERATED AN ADDITIVE MANUFACTURING PRE-PRODUCTION FACILITY THAT SUPPLIED ALL OF THE TITANIUM ENGINE SECTION STATOR (ESS) COMPONENTS REQUIRED FOR THE ULTRAFAN™ ENGINE DEVELOPMENT PROGRAMME.**

### THE CHALLENGE

With the launch of the UltraFan™ Engine development programme (EDP), Rolls-Royce identified Electron Beam Melting (EBM) as the lead technology for production of Engine Section Stator (ESS) components. The UltraFan™ engine will deliver further fuel efficiency and CO<sup>2</sup> reductions, and provide a significant reduction in engine noise.

Building on the experience of a previous EBM programme with Rolls-Royce, the MTC were able to launch a pre-production facility in tight timescales that would enable delivery of the 240 Engine Section Stators required for the UltraFan™ EDP.

### MTC'S SOLUTION

- ▶ Created a 4500ft<sup>2</sup> AM production cell that included: AM build workshop (housing six Arcam Electron Beam Melting machines running Ti6Al4V), powder handling, post processing, inspection, and office space.
- ▶ Developed a method of manufacture and a traceability management system, from powder to part, suitable for flight trials.
- ▶ Embedded an integrated project team with the machine manufacturer, the MTC and Rolls-Royce working together.
- ▶ Used technical expertise to solve AM process challenges to enable doubling of part size leading to part consolidation and enhanced part functionality.

## THE OUTCOME

- ▶ Initial part optimisation, cell refit, operational ramp up and ESS component production run completed over a three year period.
- ▶ Tens of thousands of equipment run hours with extensive data capture.
- ▶ Delivered 240 aerospace standard components complete with full traceability for the flying test bed programme.

## BENEFITS TO THE CLIENT

- ▶ Rapid scale up of production capability to meet complex customer requirements.
- ▶ Full method of manufacture based on-site, with relevant process experts on hand across the full AM process chain.
- ▶ Fast iteration and design change implementation throughout project.
- ▶ Customer based on-site working hand in hand with NCAM team, enabling enhanced knowledge transfer.

Great teamwork between the MTC and Rolls-Royce is what made this project such a success. The challenge of building such large parts with EBM should not be underestimated!

Alan Pardoe, Partnership Manager, Rolls-Royce



AM build processing room, housing six Arcam EBM machines

## PROJECT PARTNERS



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