Newsletter August 2016

Additive manufacturing in practice for Engine Parts Repair

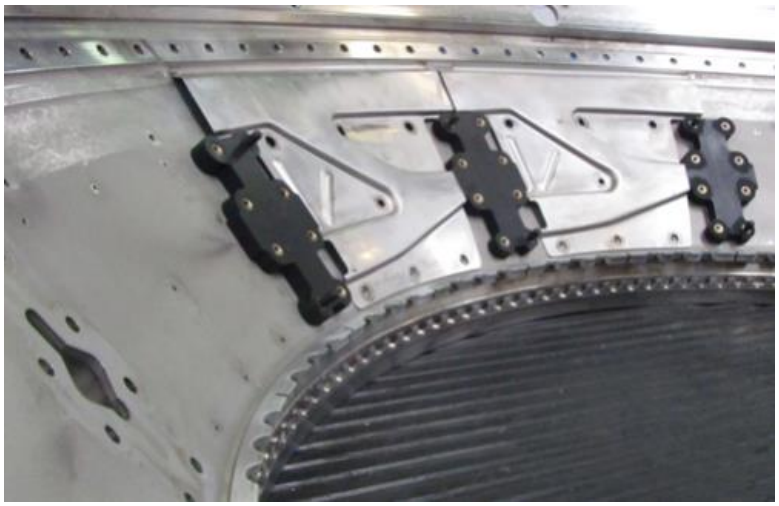
CRMA's Innovation Team

From Left to Right : Gilles Ferreri, Thac-Si Do, Antoine Martin, Jessica Labrouquere, Antoine Poutord, Maël Mollard, Xavier Quinet, Caroline Guinard, David Chambard & Boris Foule.

Innovation & Development

CRMA's stance is to anticipate and to adapt its offer to the market needs in order to provide new repairs that are offering cost savings while ensuring flight safety. This is why a dedicated innovation & development team (composed of 10 PhDs and engineers) is in the urge of finding new repairs methods and develop solutions to provide to its customers.

Tailored tools with Additive Manufacturing



Precision and Efficiency

Additive manufacturing is becoming more prevalent in OEM industry but this is just the beginning for the MRO industry.
For now CRMA is using additive manufacturing in the repair development process to make tools that were previously made by machining operations, this in order to improve time-to-market while guaranteeing precision and efficiency.

Some of the advantages:

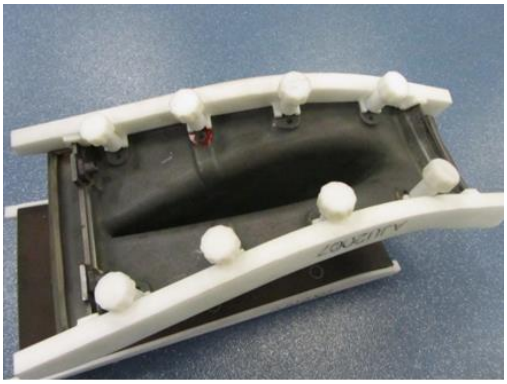
- Tooling prices have been seriously reduced depending on size,
- Availability of final tools is divided up to 10,
- Tools are made using scan laser for design: less defects.

Measurement by 3D scanning

Using 3D FaroArm and specifically developed software, CRMA can perform 3D scanning for detailed surface measurements. This metrology equipment has been set up to have reliable CAD (Computer Aided Design) drawings. Indeed a detailed measurement is needed to design precise tools and have accurate measure of engine parts.

Parts mesurement by 3-D scan

One of the outcome



In application, sandblasting of the Turbine Center Frame's fairings was too corrosive for the parts, for this reason a protection was needed. A tool was developed internally (AJU 2007 & AJU 2004), it is working as a mask to preserve the interface surfaces.

Covers fitted on TCF Fairing GP7200

R&D Consortium Project

NENUFAR

The NENUFAR project ambition is to develop an additive manufacturing technique regarding repair of non-weldable alloys by powder projection. The project will more particularly focus on the repair of casting parts that are scrapped because of multiples cracks appearing on these materials after manufacturing.

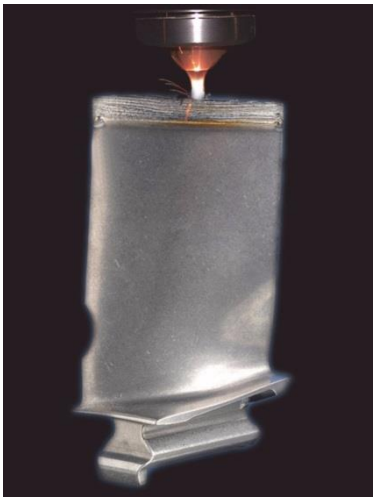
"Through this project launched in 2015, we will make it possible to repair elements that could not be before, by welding alloys that were non-weldable. Our ambition is to develop with manufacturers and researchers new repairs methods using additive manufacturing to provide solutions regarding those parts that cannot be saved yet. "

Dr Maël Mollard : Development Project Manager, PhD
- Innovation & Repair Development Department -

Laser Metal Deposition

In aerospace industry, to improve turbine efficiency, alloys characteristics are optimized to operate at increasingly high temperature. The parts are also made of complex geometry based on these materials with very high added value (Nickel, Aluminum, and Titanium). Due to the complexity of the parts shape and alloys reaction to a local heat treatment, conventional overlay welding methods are not suitable.

To solve this problem, recent developments in powder projection's machines for additive manufacturing make it possible to consider new technologies of overlay welding thanks to a better control of metal deposition.



Blade with Laser Metal Deposition

This will allow saving much more scrapped parts that are for now replaced instead of repaired. Cost savings are just at their beginning but already valued 90k$ per parts for engines where it applies.