Additive Manufacturing at MTU

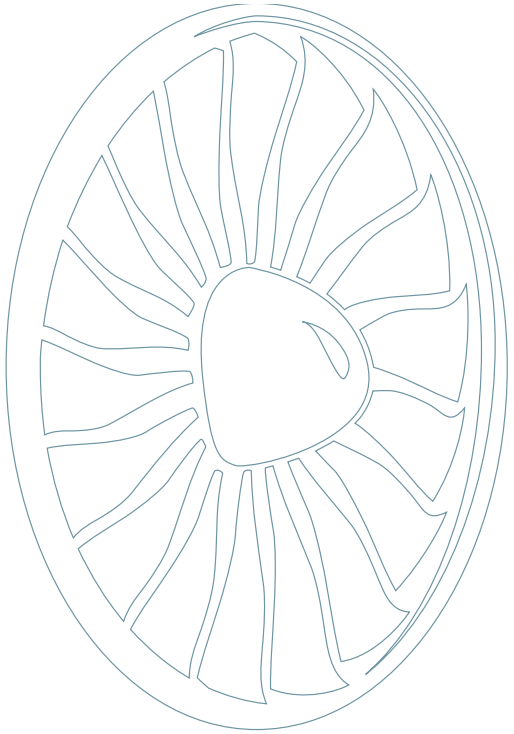
2nd Munich Technology Conference on Additive Manufacturing

10/10/2018 - Lars Wagner, COO MTU Aero Engines

Proprietary Notice

This document contains proprietary information of the MTU Aero Engines AG group companies. The document and its contents shall not be copied or disclosed to any third party or used for any purpose other than that for which it is provided, without the prior written agreement of MTU Aero Engines AG.

MTU Aero Engines at a glance



Leading German engine manufacturer
and key partner to OEMs for military and commercial engines

A leading provider of engine services
for various military and commercial engines

€ 5.1 billion revenue in 2017
with ~ 10.000 employees

Worldwide network
with 14 major facilities and representative offices

Leading-edge AM technology is established with more than 10 years of experience

First serial production part: Borescope eye

In service since January 2016 at PW1100G-JM (A320neo)

Production ramp-up since 2017

More than 2.000 parts produced

Very positive field experience

Learning

Lower cost benefits with a only-substitution-approach

Post-process essential to achieve target costs

High scrap rates due to machine imperfections

Center-of-excellence established


Borescope eye


PW1100G-JM


Airbus A320neo

Parts portfolio will consistently increase in volume and complexity

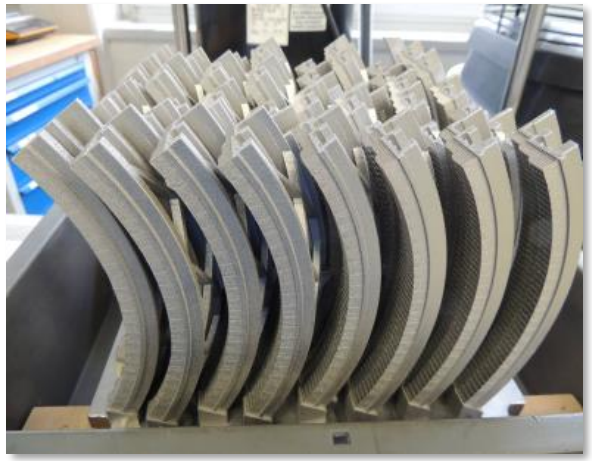
Compressor sealing carrier

Approach of substitution and new design

Less effort due to integral honeycomb design

Increase of compressor stability and efficiency

30 to 40% cost benefit



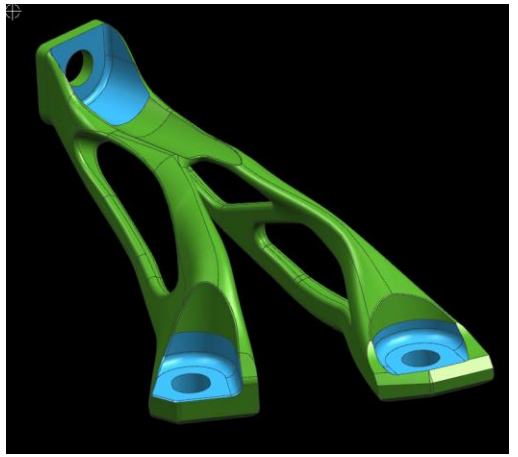
Oil tube bracket

Full bionic design

Less effort due to drastically reduced machining

50% weight reduction

80% cost benefit



Securing aviation quality standards and further industrialization are key factors

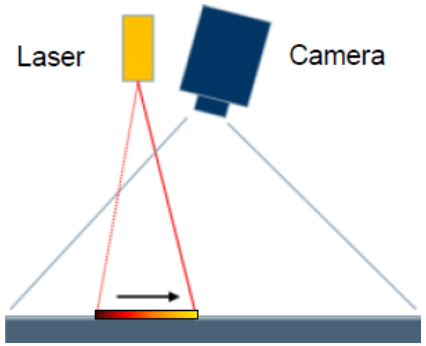
Optical tomography as enabler for quality control

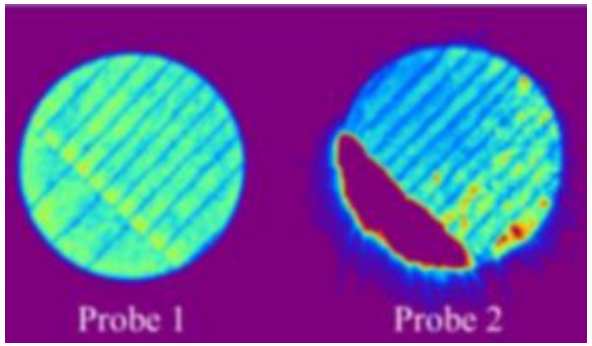
Reduction of quality control related costs

Very sensitive system for process control

On-line detection of typical AM defects

Off-line detection of such defects with µCT very difficult





Next industrialization step at MTU Aero Engines Polska

Production start in Rzeszów (Poland) in 2020

Investment budget more than € 20 Mio.

Headcount ~ 90 employees

Shop floor area ~ 3.000 m²

Manufacturing method with a great potential – further cost reduction and quality improvements are necessary for extended economical production

Potential

- 30% AM produced parts feasible within next generation aero engines
- Extension of the available material portfolio will be necessary

Process improvements

- Industrialization and automation of post-process
- Surface roughness out of AM machines
- On-line quality control of AM process

Machine improvements

- Build rates, productivity and machine dimensions (currently limiting the portfolio extension)
- Constant material quality over build platform

Cost reduction and funding

- Cost of powder still too high
- Public funding conditions in Germany good, local funding could be improved