SURE5.0

Webinar SURE 5.0 "How can Additive Manufacturing improve manufacturing process in EU SMEs“

Advances in metal additive manufacturing: use cases

Funded by the European Union

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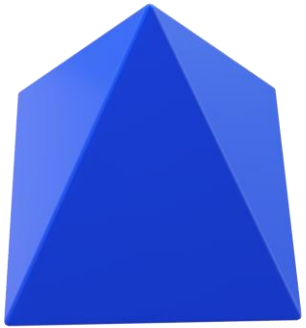
Industrial challenges

Lightening

Reduce use of materials



Increased functionality/performance

Flexible manufacturing (customisation)

Repairing and spare parts

What LORTEK does to provide solutions:

- New design concepts (topology optimisation, generative design)
- Simulation
- Process optimisation
- Digitalisation: monitoring and inspection, platforms, digital twin, etc.
- Use of new and substitution of materials
- Industrialisation

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UC1: Hydraulic block

Lightening

Sector

Industry and energy

Challenge

Optimize the design to reduce weight maintaining the same functionality

Solution

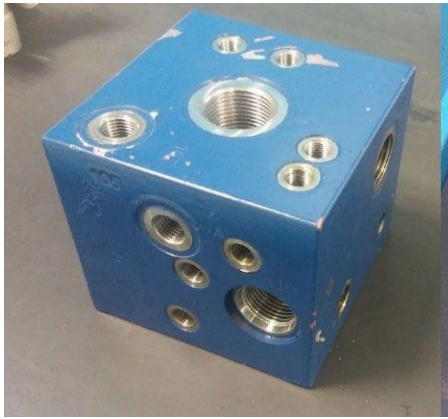
Application of topology optimisation to achieve a design with an optimised functionality and manufacturable by LPBF

Results

Lightening of 71% with the same functionality

Industrial company

HINE (Spain)



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UC2: Flow control actuator

Increased functionality

Sector

Aeronautics

Challenge

Manufacture a new design of a flow control actuator to improve the fluid flow in future UHBR engines

Solution

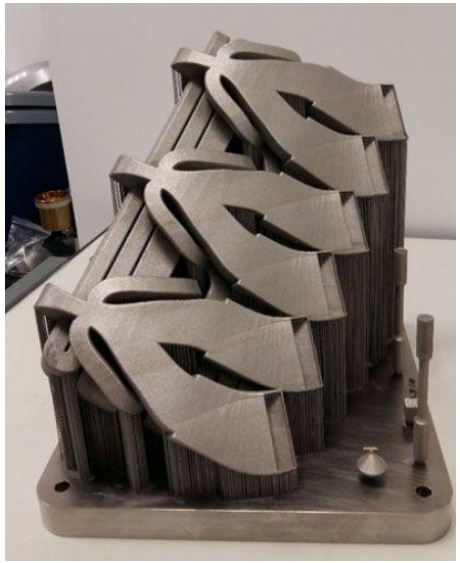
Simulation of the LPBF process and optimization of manufacturing parameters to avoid defects

Results

Manufacture by LPBF a flow control actuator with complex design to be installed in small spaces in aircraft with high-efficient engines

Industrial company

AIRBUS (Germany)



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UC3: Manual electric-hydraulic tools

Lightening & performance

Sector

Tooling

Challenge

Reduce the weight of the head of the tool and improve its usability

Solution

Optime the design in terms of performance and manufacturability by AM and manufacture the prototypes

Results

Reduction of weight by 25%, optimum technical performance, tool size reduction and ergonomic improvement

Industrial company

ALKAR (Spain)

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UC4: Sealing rings

Substitution of toxic materials

Sector

Aeronautics

Challenge

Substitution of cobalt alloys in sealing rings to avoid health potential issues in cabin air

Solution

Selection of alternative materials and optimization of DED-LB process using monitoring systems

Results

Manufacturing of NiCrSiFeB alloys with a similar high temperature wear resistance, and less weight (33%) and toxicity to its actual counterpart

Industrial company

LIEBHERR (France)

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UC5: Heat exchanger

Increaseed performance

Sector

Aeronautic

Challenge

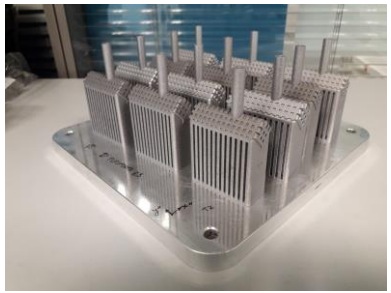
Improve the aerothermal properties of heat exchangers by reducing the wall thickness of the fins

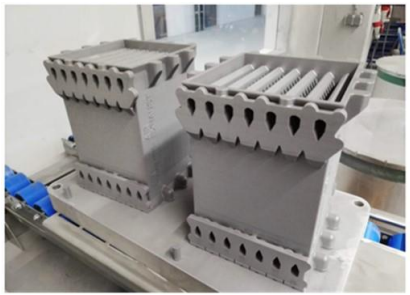
Solution

Develop manufacturing strategies for LPBF to reduce the wall thickness of Inconel 718 and AlSiMg0.6

Results

Wall thicknesses below the state of the art (<0.2mm) were manufactured. The real scale heat exchangers showed better aerothermal performance (>15%) maintaining the mechanical properties





Industrial company

SAFRAN (France)

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UC6: Aeronautic component with sensing capabilities

Functionality

Sector

Aeronautic

Challenge

SHM of metal parts using embedded optic sensors

Solution

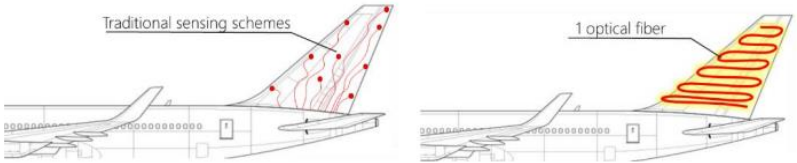
Development of a system to embed metal coated optical fibers in aluminum structures by WAAM

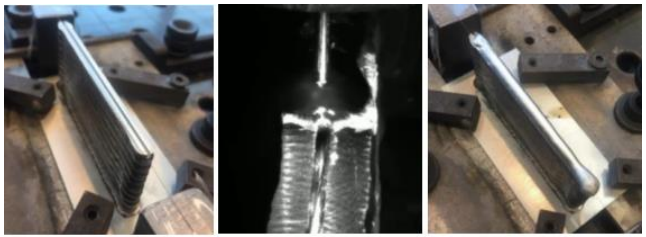
Results

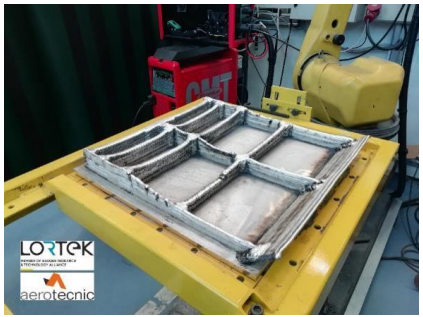
Capacity to measure temperature and strain. Demonstrator: bulkhead panel

Industrial company

AEROTECNIC (Spain)







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UC7: AM applied on wind farm components

Lightening & repairing

Sector

Wind energy

Challenge

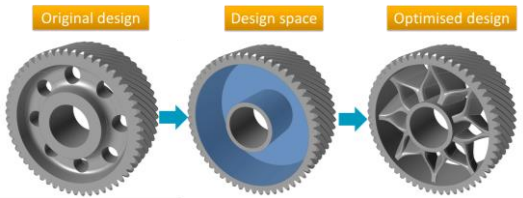
Redesigning and repairing of a sun gear of the planetary gear box

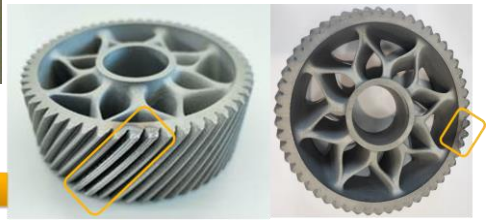
Solution

Topology optimisation of the design to be manufactured by LPBF and repair of two teeth by DED-LB using path planning trajectories.

Results

Optimised design reduced weight 37% and manufacturing time 25%. Repairing of each tooth required 1 minute, without needing post-processing and with an efficiency of deposited material of 90%.





Repaired teeth

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What can AM do for SMEs?

Production level

- Cost effective prototyping of new products
- Customisation for small batches
- Reduced lead times
- Reduced waste
- Complex geometries
- On-demand manufacturing
- Rapid tooling (custom jigs, fixtures and tooling) for more efficient and precise manufacturing

Business level

- Differentiation from competing products (better performance)
- Market advantange (new products and quicker manufacturing)
- Possibility to reach new customers by offering innovative products
- Access to niche markets and meet specific customer demands
- Cost savings : (i) less waste and use of materials, (ii) reduction of storage costs

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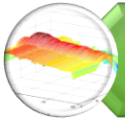
Service provision

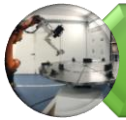
S1: Flexible robotics for welding, repairing and inspection processes

S2: Metal additive manufacturing solutions



S3: Data driven solutions for manufacturing processes

S4: Advanced joining technologies and materials



S5: NDT for inspection processes

S6: Manufacturing of welding and metal additive manufacturing prototypes

S2/S6: PBF-LB, DED-LB, DED-Arc

- Design of products
- Process simulation, on-line monitoring, part inspection
- Prototyping and validation
- Needs for industrialisation and industrial strategy development
- Training

Service category: access to infrastructure, R&D support, prototyping
TRL: 7-8

Funde… European Union

Thanks for your attention

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