



Pulsate

Funded by



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

In partnership with



Pulsate project: empowering SMEs competences in Laser-Based Advanced and Additive Manufacturing

Pablo M. Romero, Project Coordinator

26th - Sept. 2023, Manufacturing Partnership Day



Presentation Overview

Introduction to AIMEN

About PULSATE project

- **Objectives**
- **Project partners**
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Introduction to AIMEN

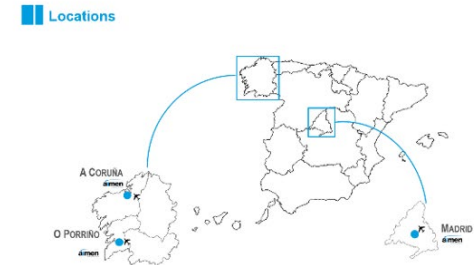
Introduction to AIMEN

Innovation and technology centre specialized in the field of **MATERIALS, ADVANCED MANUFACTURING PROCESSES and INDUSTRY 4.0**



We are experts in

- Joining Technologies
- Laser Technologies applied to Materials Processing
- Industrial Robotics



1967 Founding of AIMEN	1995 Opening of the Armando Priegue building in O Porriño	1998 Official recognition as a Innovation and Technology Centre	2002 Creation of a Pilot Joining Technology Plant	2004 Comissioning of the Laser Technologies Research Plant	2014 Opening of the Laser Applications Centre	2017 50 years associated with innovation
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Industry supported, private centre. Applied R&D in:





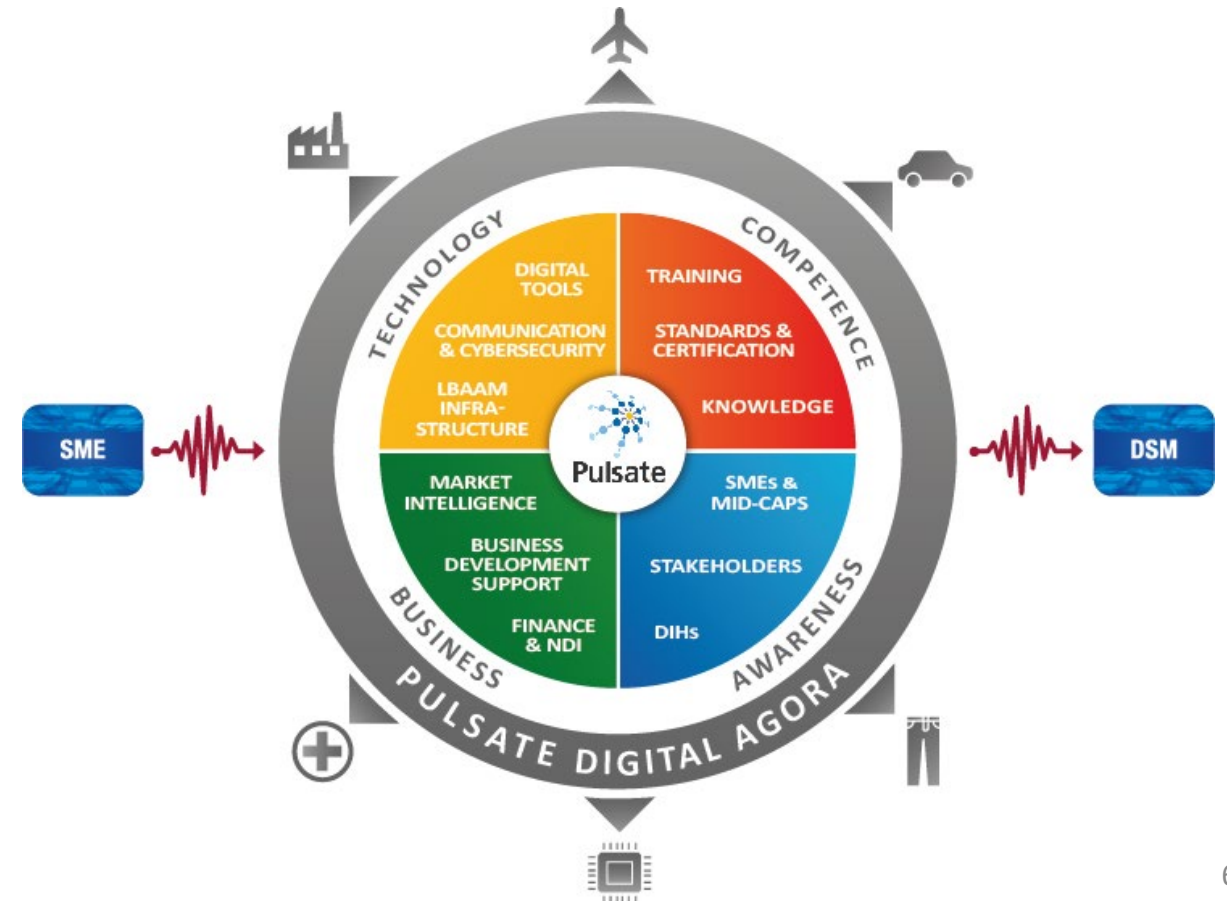
About Pulsate Project

About PULSATE

PAN-European Network for Laser-Based Advanced and Additive Manufacturing

The main objective of PULSATE is to set up and consolidate a robust and open PAN European Network, sustainable beyond the project timeframe, to promote and facilitate the adoption of Laser-Based Advanced Additive Manufacturing (LBAAM) technologies by SMEs and Mid Caps.

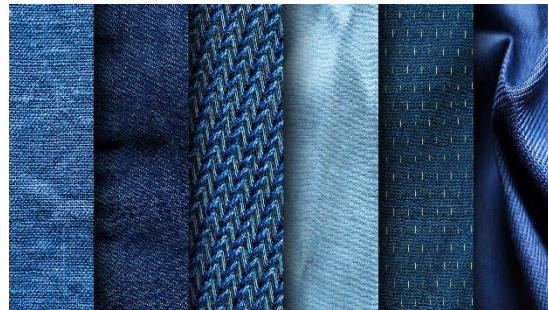
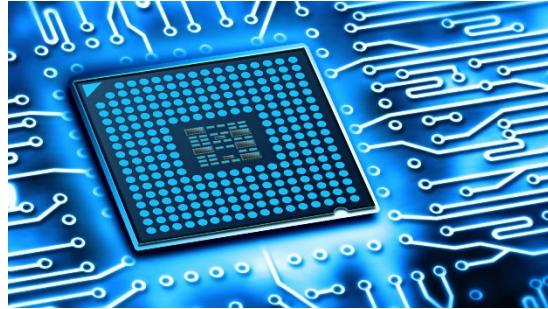
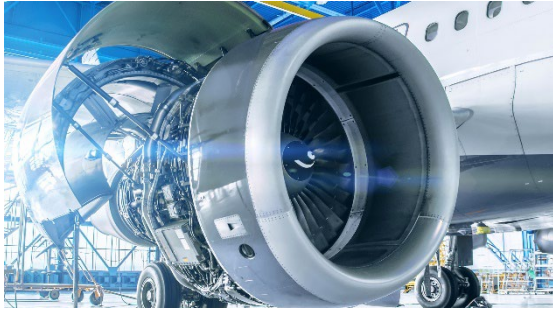
The network will connect DIHs, top class Competence Centres, Public Institutions, Standardization Organizations, Financing and Business Development entities through a Single Entry Point.



Revolutionising Markets

LBAAM provide maximal benefits towards flexible manufacturing and highly digitalized production environments

LBAAM technology is particularly beneficial for sectors like aerospace, automotive, medical devices, industrial machinery, customised electronics, and textiles & clothing.

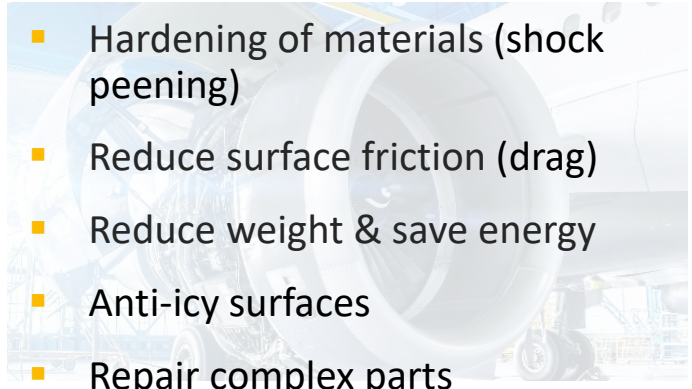


Revolutionising Markets for LBAAM

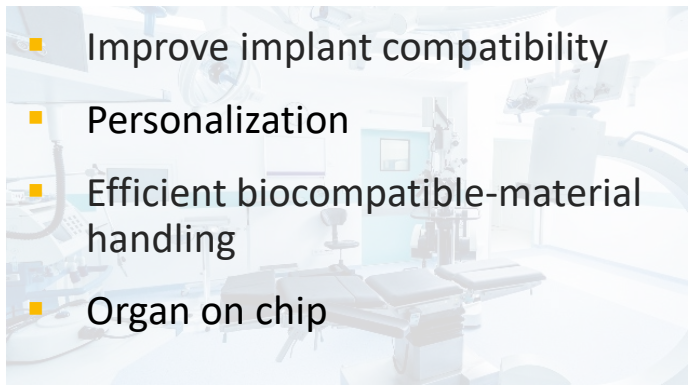
PRESENT US YOUR CHALLENGE!

What can LBAAM provide to your industry sector?

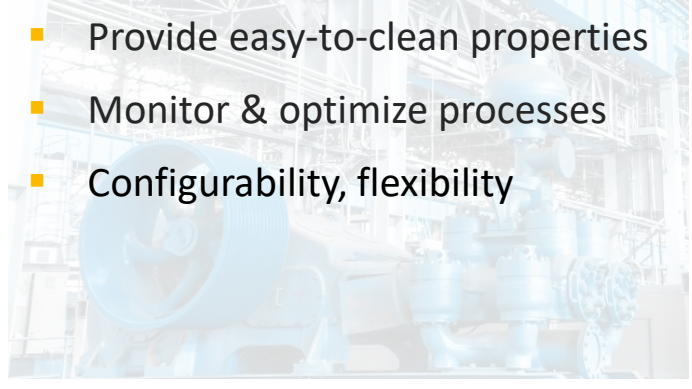
Aerospace

- 
- Hardening of materials (shock peening)
 - Reduce surface friction (drag)
 - Reduce weight & save energy
 - Anti-icy surfaces
 - Repair complex parts

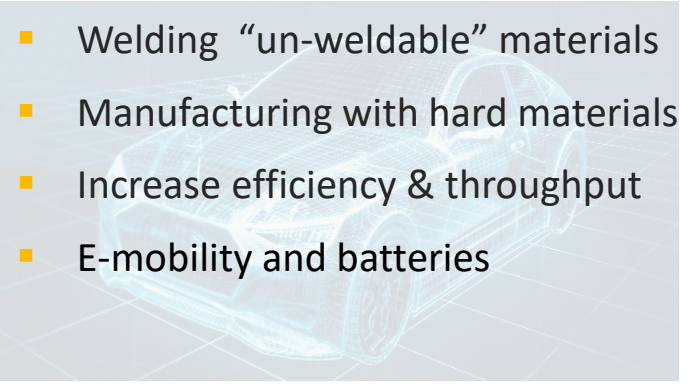
Medical Devices

- 
- Improve implant compatibility
 - Personalization
 - Efficient biocompatible-material handling
 - Organ on chip

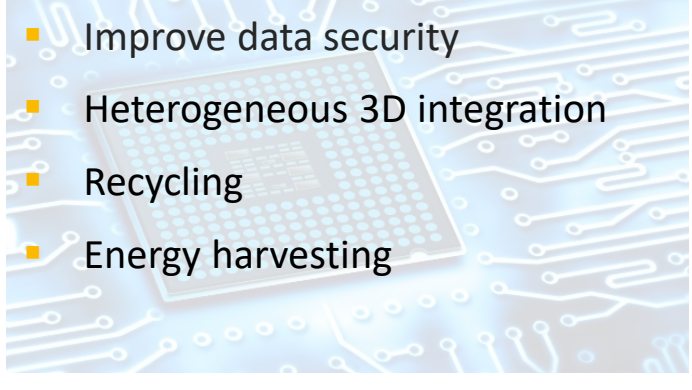
Industrial Machinery

- 
- Provide easy-to-clean properties
 - Monitor & optimize processes
 - Configurability, flexibility

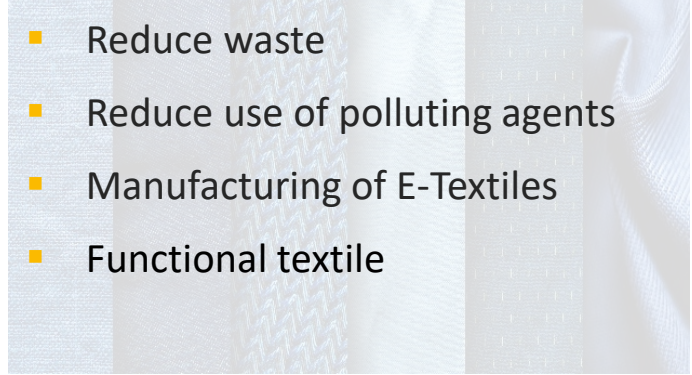
Automotive

- 
- Welding “un-weldable” materials
 - Manufacturing with hard materials
 - Increase efficiency & throughput
 - E-mobility and batteries

Customized Electronics

- 
- Improve data security
 - Heterogeneous 3D integration
 - Recycling
 - Energy harvesting

Textile & Clothing

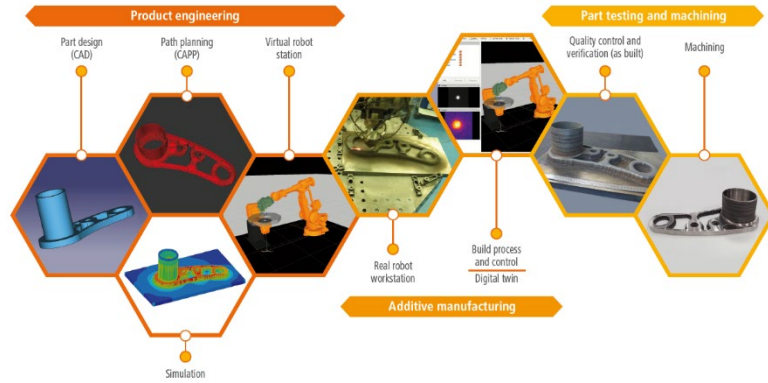
- 
- Reduce waste
 - Reduce use of polluting agents
 - Manufacturing of E-Textiles
 - Functional textile

About us

We are a strong consortium to support you with any need for implementing LBAAM technologies

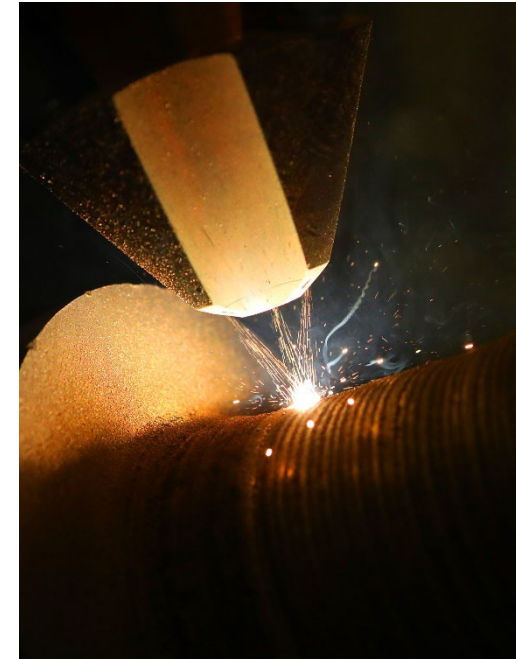
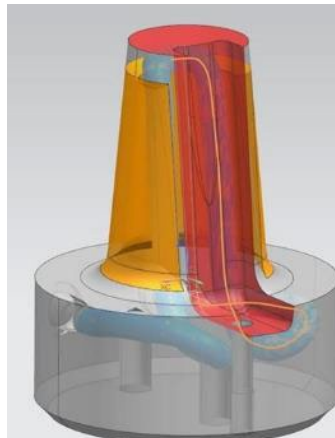


Exemple of capacities: hybridization of AM processes

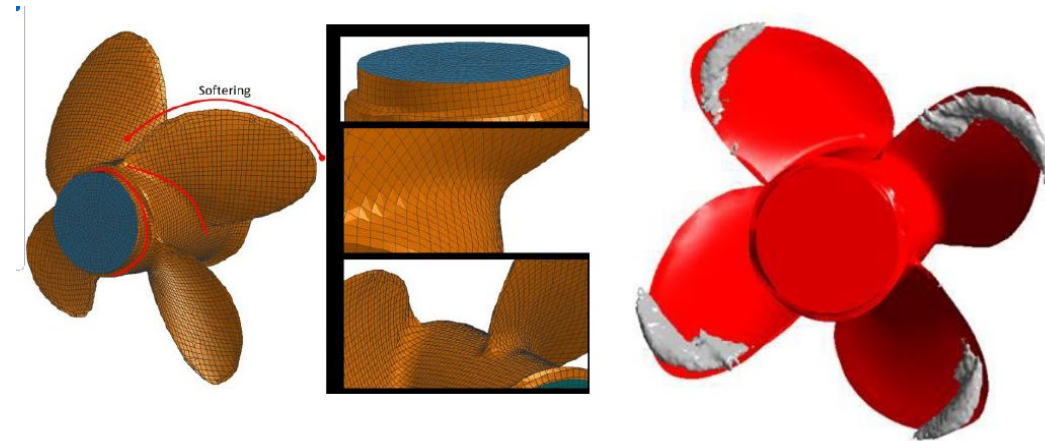
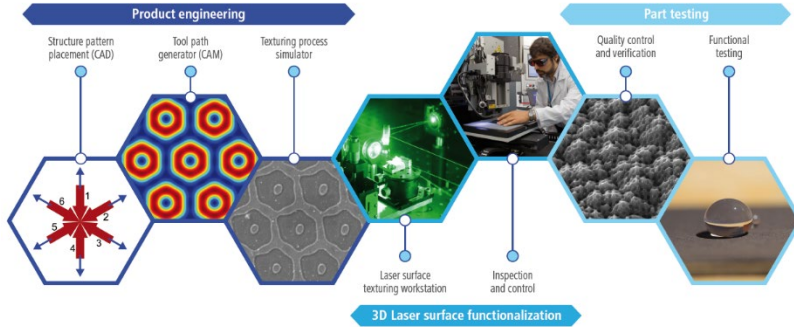


Designed to test the collaboration between us:

- Designed at MTC
- Simulated at FhG IWS
- PBF at MTC
- DED at AIMEN
- Inspected at CEA

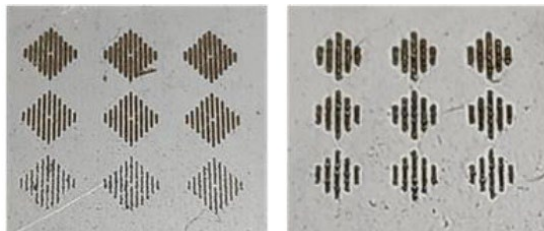


Exemple of capacities: 3D Surface functionalization



Designed to test the collaboration between us:

- Different structuring strategies at 4 laser institutes
 - FhG IWS: DLIP
 - MTC: cross hatch and dimples
 - FTMC: riblets
 - AIMEN: micro cladding
- Simulated at AIMEN



Implementing Services

Through our PAN-European Network for Laser-Based Advanced and Additive Manufacturing PULSATE aims to support the industry by:

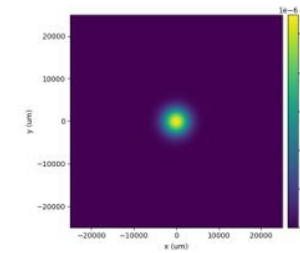
- Financing and supporting SMEs' projects through open calls:
 - 2 Open calls to develop Technology and test it into manufacturing environment called Transfer Experiments (TTEs): **22 experiments** were funded involving **48 companies** from **15 countries**. (up to 150k€ funding / project)
 - 2 Open calls focused on technical and/or economic feasibility assessment for the implementation of lasers called Adopters Use Cases (AUCs): **38 experiments** were funded involving **38 companies** from **18 countries**. (up to 25k€ funding / project) and results of the second OC to be published in a few days (around 20 additional experiments)
- Consolidate technological and business offering through a catalogue of services including: access to infrastructure, software services, business support services, training...
- Organization of technical webinars, brokerage and matchmaking events, Open house event in laser labs.
- Dedicated online community members to share info, experience, questions...
- **NEW** Digital Agora where any tech provider can offer its services to the manufacturing community
- **NEW** Expression of Interest mechanism for companies to test the services from the project's partners at no cost



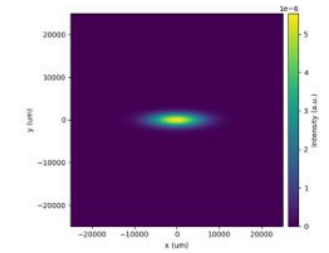
Success stories

Success stories: AMLABS - Additive Manufacturing with Laser Beam Shaping

- **Aim:** Beam shape optimization to increase productivity and material processability of the LASER Powder Bed Fusion Additive Manufacturing Process (LPBF).
- **Technology:** LPBF is a promising additive manufacturing technology, but with two main limits: very low productivity and a high number of non-processable materials. These can be tackled by beam shaping optimization.
- **Results:** A plug-in mechanism was developed to change between different beam shapes. Three different beam shapes (elliptical, ring, and top flat) have been tested, the best results have been obtained with top flat.



Input beam



Output beam



Success stories: SUBAR - Scale up of biomimetic antireflective surface laser structuring

- **Aim:** The assessment of Biomimetic's Tettix AR glass treatments in real imaging applications related to optical microscopy.
- **Technology:** An anti-reflective or anti-reflection coating is an optical coating applied to the surface of optical elements to reduce reflection and improve quality. Usually, developing anti-reflective coatings for new materials is a long and challenging process with many iterations to reach the desired properties.
- **Results:** Automated and sustainable AR treatment of curved optical elements with direct laser nano-texturing, which can reduce the reflectivity <math><1\%</math> for broad spectra of the visible and the NIR.

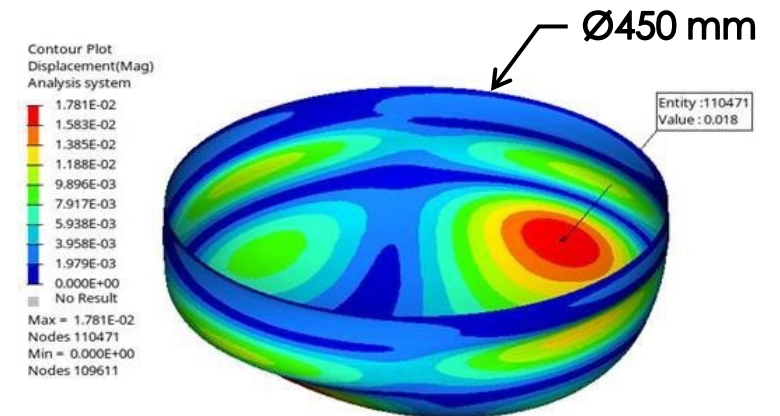


Success stories: SUPER MAM

SimUlation of DED ProcEss foR the Additive Manufacturing of lArge and coMplex parts

Aim :

- 1) Development of an **industrial simulation tool** to estimate the residual stresses and deformations of a part produced by DED additive manufacturing. The analysis of the results will be used to optimize the design and the manufacturing parameters.
- 2) The project's ambition is to **produce a first-time-right part** thanks to the identification of distortions ahead of the manufacturing process which will allow :
 - To control production costs,
 - To make the DED process even more competitive,
 - To accelerate the industrialization phase for DED AM parts.



Success stories: SUPER MAM

SimUlation of DED ProcEss foR the Additive Manufacturing of lArge and coMplex parts

Technology :

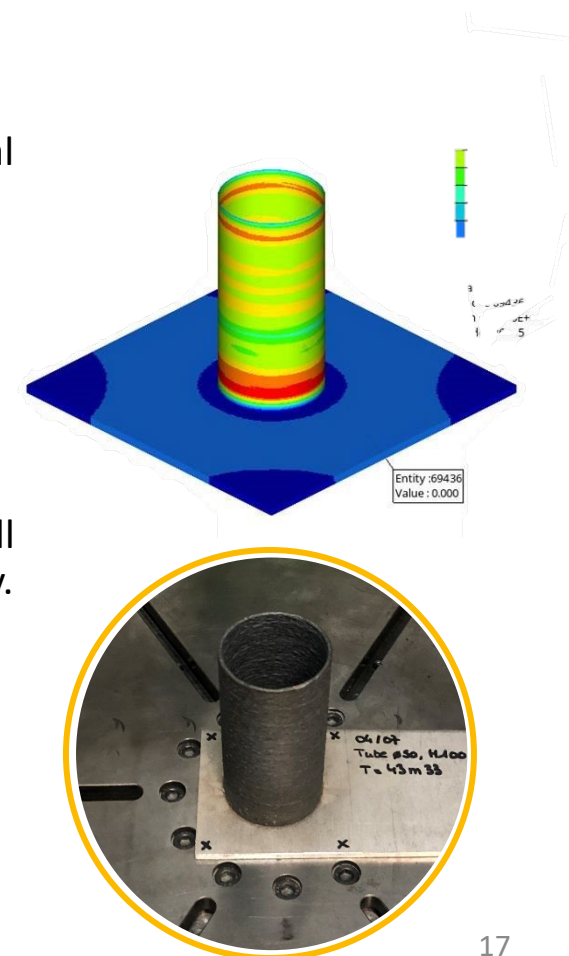
During DED manufacturing distortions and cracks can be created in parts due to residual stresses (thermal cycling). SUPER MAM will employ a **macroscale approach** using cutting-edge technology in order to :

- **Optimize critical manufacturing parameters** : power, material, dwell time, strategy and geometry,
- Estimate residual stresses,
- **Assist in the manufacturing or repair** of parts with precision using DED technology.

Benefits :

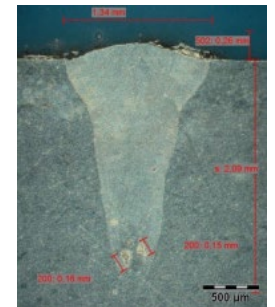
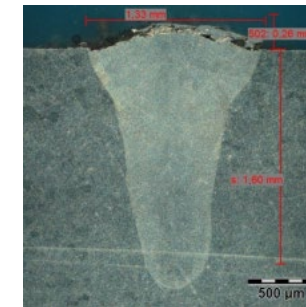
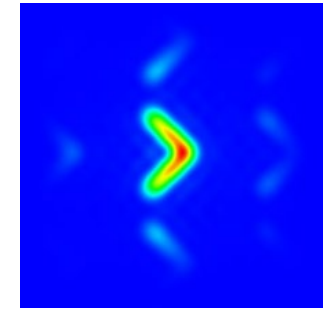
Manufacturing process simulation is key for the quality of DED parts. With a practical tool, SUPER MAM will provide comprehensive and industrial responses to new manufacture or repair requests using DED technology.

- **Works on pre-industrialization** of small series, looking for performance, repeatability and reproducibility,
- Use of simulation to **validate the DED process** and integrate it into production cycles,
- **Reduce the industrialization time** by decreasing the number of test error cycle.



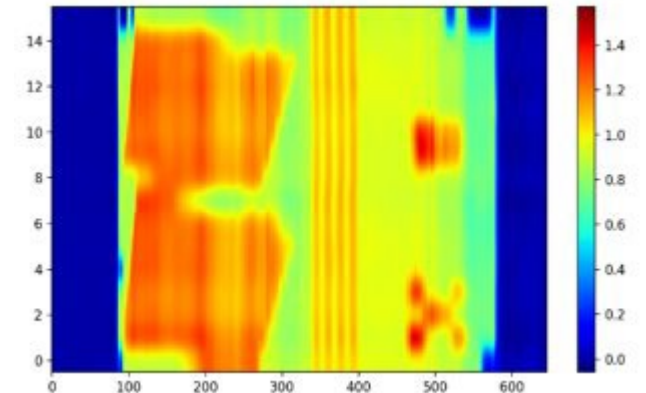
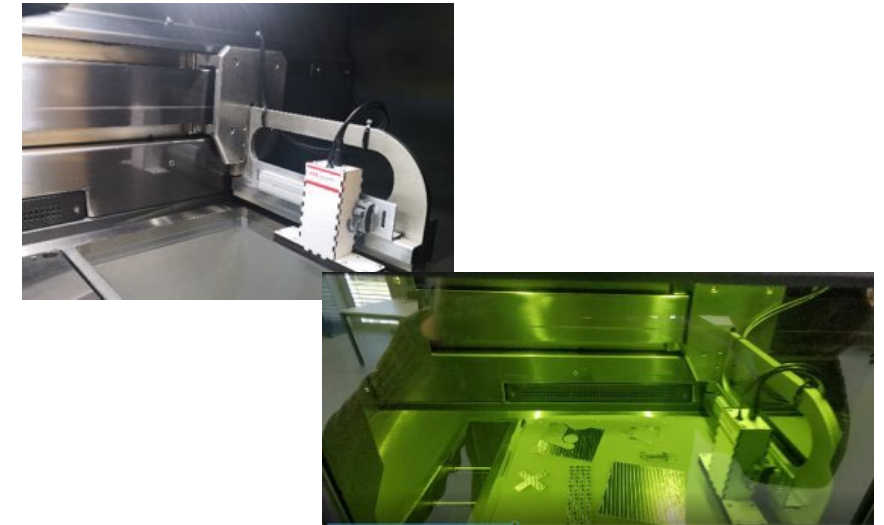
Success stories: WELDSHAPE - Laser welding of hard to weld aluminum alloys

- **Aim:** The development of a unique and innovative remote welding machine that operates using a special single-mode fiber laser.
- **Technology:** In conventional laser welding processes, high-power fiber laser sources are commonly used as light sources along with heavy laser welding head that restricts the processing speed, and hence the productivity. The remote laser material processing is proposed as the technology to solve this problem, where a longer focal length than a conventional related process is used. This enables a high possible welding speed and beam shaping possibility (wobbling).
- **Results:** BBW started to weld hard-to-weld materials, like crack-sensitive aluminum alloys, in a special machine integrating both Smart Move scanner and Civan laser.



Success stories: ADDINSPECT - Digital in-process NDT for Laser based powder Additive Manufacturing

- **Aim:** Develop the technology enabling the direct in-machine part certification, saving high postprocessing costs and delay, to increase the applications of the laser powder bed fusion technology.
- **Technology:** Qualification of Metal AM processes and the certification of the resulting parts require costly and time-consuming X-Rays tomography technologies and many samples for destructive testing. It is an offline process, and it can represent 30-40% of the total production cost.
- **Results:** The key components of compliant measurement technology have been developed (hardware and software), integrated into commercial machines and performed several pilot projects.



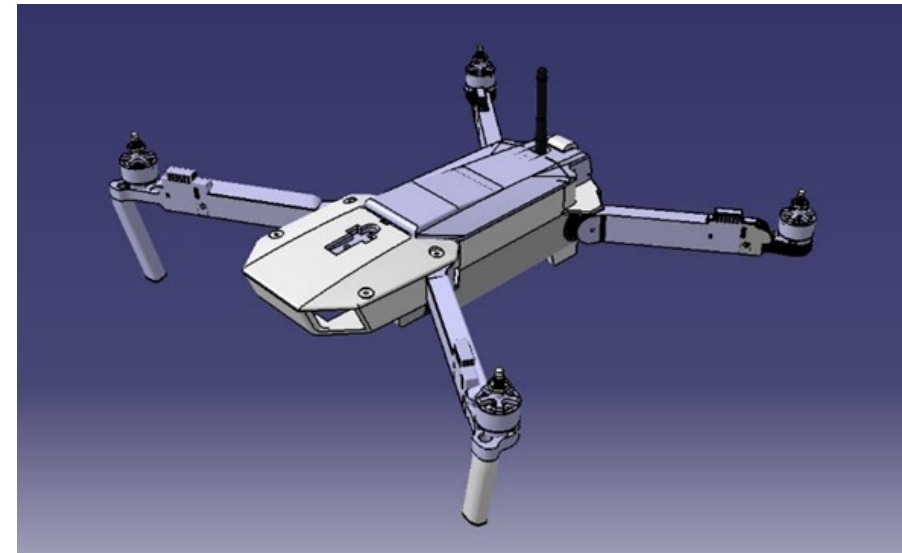
Success stories: Loom-State

- **Aim:** A technical feasibility study using Laser-based Advanced and Additive manufacturing technology to improve the zero-waste design capability of Weffan's 3D woven trousers using laser cutting.
- **Technology:** The project focused on a new area of research into LBAAM technology applied to 3D woven garment finishing. The aim is to create a sustainable, competitive, and resilient alternative to wasteful cut & sew garment production at an industrial scale using LBAAM technology to finish garments off the loom.
- **Results:** An accessible, near zero-waste, localized clothing manufacturing alternative that integrates LBAAM technology for a lower carbon footprint, lower waste, and resilient nearshore production.



Success stories: QUADLAM

- **Aim:** Design production of a customized quadcopter (drone) with key parameters: low weight (flight time, power-to-weight); low drag coefficient; good finish
- **Technology:** For the construction of the structural parts of the drone, it was deemed appropriate to use AM methods beyond FDM (Fused Deposition Modeling) and consider more advanced AM methods such as LBAAM (Laser-Based Advanced and Additive Manufacturing) methods.





What's next?

Become part of PULSATE network

Join Digital agora

Becoming a partner of PULSATE network will enable you to participate in the adoption of laser-based advanced and additive manufacturing, either as an adopter or a provider (of services, equipment, or knowledge), and benefit from the largest European community of the whole value chain in Laser Manufacturing.

Members

- Learn more about LBAAM with our courses, consulting and apps, filtered by categories
- Didn't find what you looking for – request tailor-made solution through our matchmaking system

Sellers

- Offer your services through your courses, consultings and apps.

Everyone

- Engage in community by subscribing to those discussion panels matching your interests or create your own panel



ABOUT ▾ MARKETPLACE ▾ ENTERPRISE ▾ COMMUNITY ▾ GET FUNDED ▾ EVENTS ▾ ACCOUNT (Ambrose) ▾



Participate in the *Expression of Interest* - for service vouchers

New tool working on a “first come –first served” basis

Planned for the last Quarter of 2023

This EoI will enable any company to use PULSATE partners’ services through the Agora. It will be based on a voucher principle, giving services at no cost, and the companies will not receive direct funding.

Estimation of 10 services / companies to be supported. Just request a service through the PULSATE web, and indicate you are interested in funding.

Very fast process, and event simpler than the previous Open Calls.

Evaluation will consider:

- Impact on the company: how the provision of the service would improve the adoption of laser technology for my company
- Impact on the manufacturing community
- Impact on the laser community



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