## MAIN INNOVATIONS

**INTEGRADDE** relies on the development of a smart data-driven pipeline addressing the following **key innovations:**

- Cybersecured digital thread enabling a holistic system approach for seamless integration of entire AM workflow.
- State-of-the-art and open-source CAx technologies supporting the design, modelling and process planning for additive manufacturing (AM).
- Quality-by-design (QbD) manufacturing strategy combining online quality control systems, self-adaptive systems and minimised consumption of raw materials.
- Data Analytics and machine learning for operational optimisation and efficiency in the product design and AM process simulation by manufacturing of new certified metal parts.
- Hardware-independent CAD/CAM supporting both novel and legacy infrastructure.
- Hybridisation of the AM technologies with previous and subsequent manufacturing technologies.
- Standardization and product certification procedures endorsed by the information flow provided by the digital thread along the product manufacturing chain.

## CONSORTIUM

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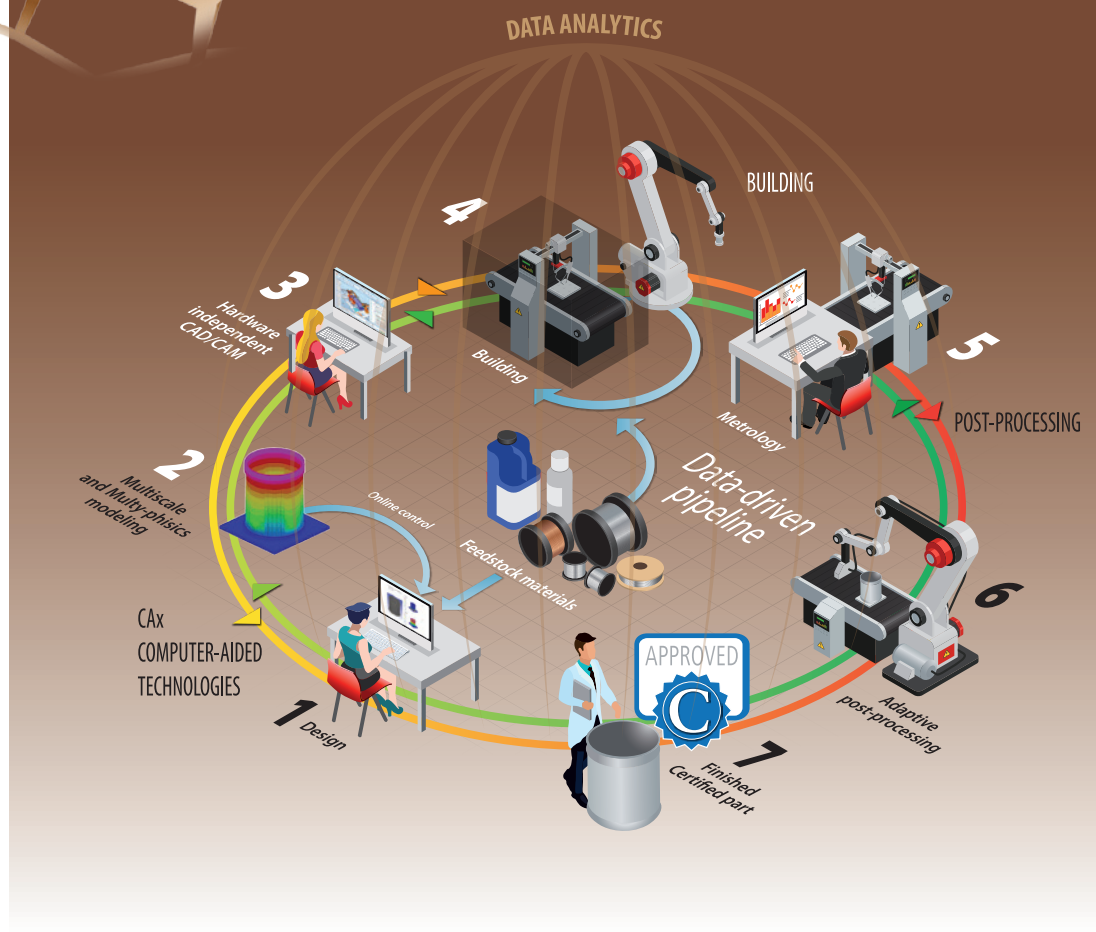


# Intelligent data-driven pipeline for the manufacturing of certified metal parts through Direct Energy Deposition process


www.integraddeproject.eu

# integradde

**Integrade Digital thread for Addictive Manufacturing**

**Intelligent data-driven pipeline for the manufacturing of certified metal parts through Direct Energy Deposition process.**

**The major goal of INTEGRADDE is to develop a novel end-to-end solution capable of demonstrating the potential of Directed Energy Deposition (DED) processes in strategic metalworking sectors.**

## OBJECTIVES Needs targeted by INTEGRADDE

**To show the full potential of metal AM in real manufacturing conditions**

- Ensuring the manufacturability of a component from the initial product design.
- Integration and interoperability of AM processes into multistage production systems.
- Improve quality of AM products.
- Certification, regulatory and standardisation.

**Novel approaches are required, capable to deal with:**

- Prediction and minimisation of distortion.
- QbD manufacturing strategy.
- Intelligent data-driven pipeline, enabling bidirectional dataflow.

## OPEN PILOT LINES NETWORK

aimen TECHNOLOGY CENTRE

list cea tech

UNIVERSITY WEST

IREPA LASER INSTITUT CARNOT MICA

**Network of open-pilots** offering services to EU industry of consultancy and proof-of-concept of DED technologies for the manufacturing of specific metal components**.**

- Supporting the adoption of AM in European Industry.
- Providing services and testing facilities for the uptake of AM in EU industry ecosystem (mainly SMEs and MidCaps).
- Demonstrating INTEGRADDE on different equipment schemes and AM processes, ensuring interoperability and usability of INTEGRADDE concept in a generic way.

**THIS NETWORK WILL BE EXTENDED TO OTHER RTOS AND TO PREVIOUS EU INITIATIVES**

**+ INFO:** **www.integraddeproject.eu**

## APPLICATION-DRIVEN PILOT LINES

LOIRETECH

- Hybridisation of WAAM with coexisting manufacturing processes
- **Target component:** Panel moulding tooling for thermosetting component
- **Material**: INVAR.

MX3D

- Manufacturing of new structural support beams and steel connectors for optimised structures by WAAM
- **Target component:** 3D printed steel structural components
- **Material**: Steel.

GKN AEROSPACE

- manufacturing of titanium components for aeronautics by LMD-w
- **Target component:** Engine case
- **Material**: Titanium

ArcelorMittal

- Manufacturing of graded components by LMD-p
- **Target component:** Large parts for the steelmaking process
- **Material**: Carbides in a metal-alloy matrix

CORDA

- Hybrid manufacturing of tooling by graded materials (LMD-p)
- **Target component:** Cutting tools for automotive part manufacturing
- **Material**: Tool-steel

## MAIN TECHNOLOGIES

**INTEGRADDE** combines research on building strategy optimisation, multi-scale and multi-physics modelling, hardware-independent building process, online control and inline quality assurance for the manufacturing of certified metal parts. In this regard, a self-adaptive control will be adopted focused on the implementation of a non-propagation of defects strategy. Finally, a Data-Analytics system, endorsed with cognitive abilities gaining knowledge from overall process, will assist in the design and manufacturing of new components, addressing mass customisation manufacturing approach.