domminio

Digital method for improved manufacturing of next-generation multifunctional airframe parts

Digital method for impr0ved Manufacturing of next-generation MultIfuNctI0nal airframe parts

ABOUT THE PROJECT

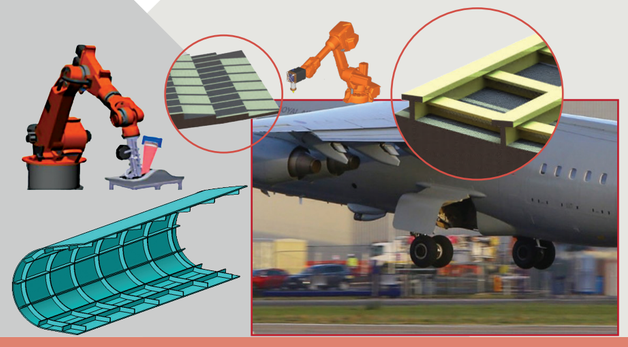
DOMMINIO is an EU funded collaborative research project focused on the development of an innovative data-driven methodology to **design, manufacture, maintain and precertify** multifunctional and intelligent airframe parts.

In the last few decades there has been a transition to the usage of advanced composite materials in the aeronautical industry, due to their **lightweight properties, strength and durability**.

DOMMINIO sets out to develop a cost-effective, flexible and multistage manufacturing system, based on:

- Robotized technologies (ATL, FFF)
- Advanced simulation tools
- On-line process & quality monitoring
- SHM (Structural Health monitoring) methods enabled by real time data-driven fault detection

The methodology developed within the DOMMINIO project will be further validated at lab scale, by manufacturing two representative airframe parts as demo cases: i) Wing leading edge prototype and ii) Multifunctional airframe access panel prototype.



Holistic and user friendly software-assisted methodology

OBJECTIVES

Enable flexible multistage robotic-based production processes for manufacturing of multifunctional composite airframe parts

Develop novel data-driven pipeline supporting the design, simulation and production planning of multifunctional and intelligent composite airframe components

Create a Quality-by-Design (QbD) manufacturing strategy, based on the development of process control and advanced quality monitoring systems

Deliver a new digital-combined-physical driven methodology for Monitoring and Management of the Health of multifunctional airframe parts

A step closer to cost-effective, efficient and sustainable manufacturing of multifunctional airframe parts

KEY FEATURES

Cost-Effective

- ✔ Savings in time, materials and energy, during manufacturing, usage, maintenance, and recycling stages
- ✔ At least 20% reduction in CO_2 and NO_x emissions

Efficient

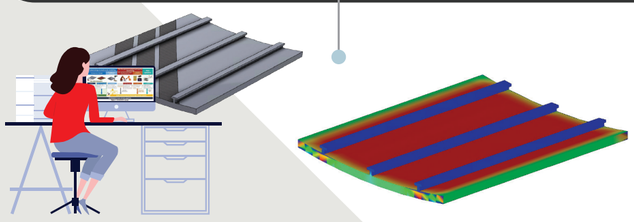
- ✔ Right-first-time and zero-defect manufacturing approaches
- ✔ Standardized design methodology
- ✔ Low buy-to-fly ratio

Sustainable

DOMMINIO CONCEPT

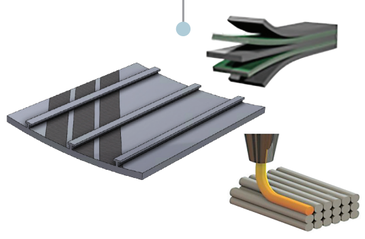
Product design & multi-scale modelling

Component Design



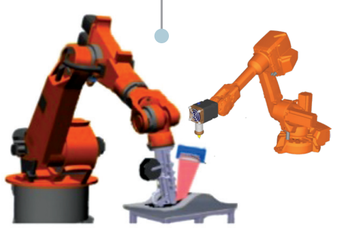
new and high fidelity MDO framework

Production planning

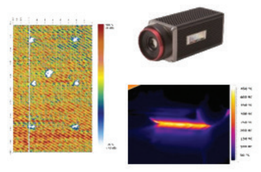


On-line process control and quality monitoring

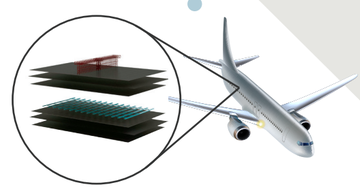
ATL and FFF Manufacturing



Quality Control



Field operation



MDO

INPUTS

- Original design
- System properties
- Materials
- *Optimized design*

Multi-scale modelling

- Numerical & process simulation
- FEM & CFD simulation

Multidisciplinary optimized design

Enriched CAD/CAM

- Tape placement
- Filament trajectory
- Process parameters

Path planning & parameters

<AutomationML/>

Manufacturing

- New laser heating system and novel nozzle

QbD

- Surface roughness and topography
- Quality monitoring of 3D printing

SHM&M

- Digital and virtual representation
- Micro, Meso and Structural mechanics

Self-adaptive system

Process parameters

In-line NDT & Metrology

Sensor data

Data Analytics & Knowledge-based system

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101007022.

OUR TEAM

aimen TECHNOLOGY CENTRE · R-NANO · Arts et Métiers Institute of Technology · INNOVATION LASTURGIE COMPOSITES · instituto IMDEA materials · INCAS · TORTECH nano fibers · DASEL sistemas · IRES · easn · BAE SYSTEMS · esi www.esi-group.com · ACITURRI

CONNECT WITH domminio

101007022 · Pablo Romero · AIMEN · 1/1/2021 · 42 months

info@domminioproject.eu · @Domminio_H2020 · domminioproject.eu · domminio-project