

## WHO WE ARE

With **over 25 years** of expertise, AMADE is a leading center in the **characterization, development, and simulation of composite materials**. Our work bridges academic research and industry, delivering solutions tailored to complex engineering challenges across sectors such as aeronautics, automotive, construction, and renewable energy.

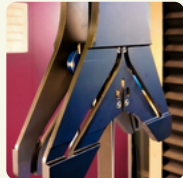
Our facilities include state-of-the-art laboratories for material testing, thermomechanical characterization, inspection, and advanced manufacturing:



### Mechanical Testing Laboratory



Our mechanical testing lab is fully equipped to perform **static and fatigue tests** on coupons and small components under various environmental conditions. We adhere to the **highest quality standards, ensuring rigorous management practices**.



Our lab is also equipped with an **in-house-built cryostat** designed to perform material characterization and thermal fatigue tests at **cryogenic temperatures (down to 20K)**. In addition, we are developing advanced testing methods to analyse crack networking patterns, permeability, and bi-axial stress responses. These efforts represent a pivotal step towards the zero emission goals through the development of hydrogen powered aircrafts.



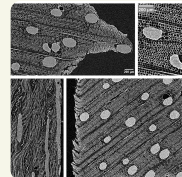
### Thermomechanical Characterization Laboratory



We provide a **complete thermomechanical profile** of composite materials using advanced equipment such as TGA, DTA, DMA, DSC, and TMA. Our expertise includes determining transition temperatures, thermal conductivity, heat capacity, and material degradation.



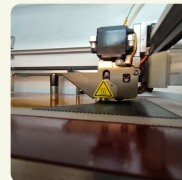
### Inspection Laboratory



Our inspection lab offers both **microstructural analysis** (optical fluorescence microscopy, SEM, TEM) and **non-destructive testing techniques** (A, B, and C ultrasonic-scan, X-ray radiography and microcomputer-tomography) to analyze the damage morphology of composite structures.



### Additive Manufacturing



Specializing in **prototype and functional part production** with both standard 3D printing materials and high-performance composites, including continuous fiber reinforcement.

## Our Research and Academic Programs

AMADE offers two specialized one-year master's programs focused on numerical modeling and finite element methods:

**MASTER**  
OF SCIENCE IN MECHANICS OF  
MATERIALS & STRUCTURES

**FRP++**  
Advanced structural analysis and  
design using composite materials



These programs equip students with the skills to address real-world engineering challenges through advanced computational tools and materials expertise.

### PhD. Research

AMADE offers a PhD program aligned with our core research lines, providing flexible pathways to suit both academic and industrial interests.

Students have the opportunity to pursue:

- **International PhDs** with research stays at partner universities worldwide.
- **Industrial PhDs** by conducting research directly within a company, fostering industry-academia collaboration.

In the last 10 years:

**+43**

Theses  
defended

**29**

International  
Theses

**4**

Industrial  
Theses

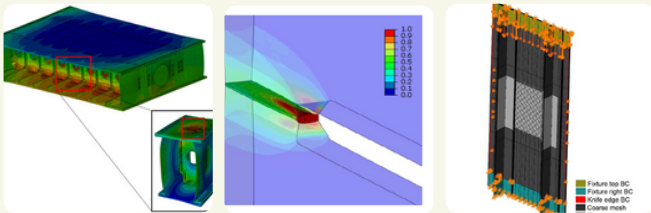


# Our Research Lines

## Numerical Modeling

We specialize in the development of numerical tools to solve complex structural problems efficiently, bridging academic methods and industrial needs:

- Analytical methods for structural reliability.
- User-friendly tools at an industrial scale.
- Fast tools that provide results within critical timeframes.



## New Concepts and Material Design

We pursue innovative material solutions to address future engineering challenges:

- External reinforcement of concrete structures.
- Multifunctional structures integrating various functionalities into a single design.
- Non-conventional composite materials for specialized applications.
- 3D printing with bioinspired materials.



## Material Characterization and Inspection

We provide in-depth characterization and inspection of materials through a variety of advanced techniques:

- Laboratory mechanical characterization of composite materials.
- Enhanced capabilities: Characterization of composites at cryogenic temperatures.
- Thermal characterization of polymers.
- Composite characterization for concrete structure reinforcement.
- Material inspection using X-ray tomography and laminography.



## Sustainability

Our research addresses the growing need for sustainable solutions in composite materials:

- Development of recyclable thermosetting composites.
- Recycling and reutilization of end-of-life structures.



## Advanced Numerical Simulation

AMADE is a reference center in advanced numerical modeling, with a focus on constitutive models for composite materials, adhesive joints, high-deformation scenarios, and impact analysis.

Our expertise covers the development and application of nonlinear, anisotropic models tailored to industrial needs.

We also provide consulting services, including model implementation guidelines and customized training for industrial partners.

AMADE stands as a **reliable partner in both academic and industrial R&D projects**, offering comprehensive support for the design, testing, and optimization of composite materials and structures. We are committed to driving innovation and delivering practical solutions that meet the evolving demands of high-performance industries.

International projects in the last 10 years:

6

Clean Sky 2

4

Horizon Europe

1

Clean Aviation

Some of our active projects:



Financed by:

