

MANUFACTURE OF VERY THICK THERMOPLASTIC COMPOSITE PARTS

MATCH PROJECT

The project aims to study a manufacturing and machining process for very thick thermoplastic composite parts (8 to 35 mm). It will also correlate the process simulation results with the experimental results.

TECHNICAL AND ECONOMIC IMPACTS

The MATCH project has provided demonstration that use of thermoplastic composites on the engine pylon demonstrator is beneficial in terms of cost, performance (mass), and buy-to-fly ratio compared to the current titanium solution.

PARTNERS

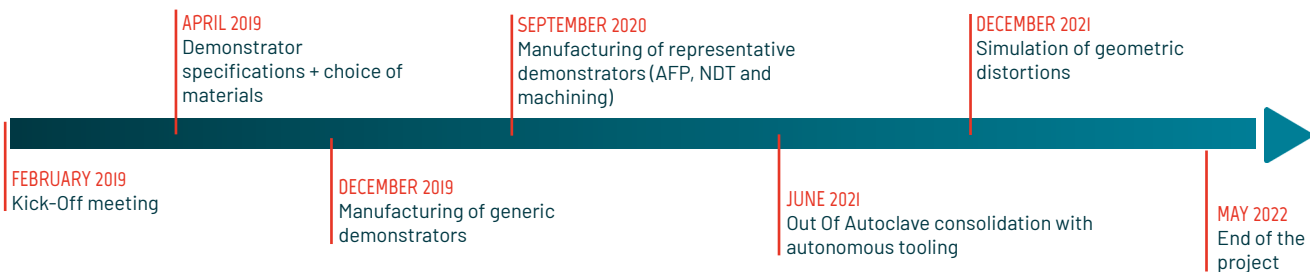
AIRBUS, DAHER, LOIRETECH, NANTES UNIVERSITY (LTEN, LS2N), ENSAM (LAMP), IRT JULES VERNE

BUDGET

€5,066k

KEYWORDS

High thickness - thermoplastic composites - machining - AFP manufacturing processes - modeling and monitoring



INDUSTRIAL CONTEXT

In aeronautics, the main industrial challenges are to integrate new technologies in order to reduce production costs while maintaining mechanical performance. Thermoplastic composites offer real advantages: prospects for automation (assembly), and structural and environmental performance.

The industrial interest of this project is to develop thermoplastic structural composite solutions that meet aeronautical requirements: manufacturing cost, performance, robustness, and speed of production.

APPLICATIONS & INDUSTRIAL PERSPECTIVES

A new project was launched (MATCH II) in October 2022 to develop a manufacturing process for thermoplastic composite parts for use in primary aeronautical structures.

Essential levers and areas of work consistent with the continuity and complementarity of the MATCH project were identified in order to master the manufacture of thick composite parts while fully meeting industrial, economic and environmental constraints.

Two key areas of development were identified:

- Optimisation of tape laying by fibre placement machine and control over material health and geometry.
- Development of the process will be based on the creation of simulation and control tools.

PROJECT ACHIEVEMENTS

The main achievements of the project were:

- Development of an AFP strategy to address production rate and quality issues
- Gap and overlap detection at bench scale and associated data analysis
- Consolidation of parts with autonomous tooling
- Optimised machining parameters and an analytical model
- A multiphysics model to predict shape distortion after consolidation
- Butstrap demonstrator with compliant material health

// The MATCH project enabled IRT Jules Verne to strengthen its skills in the following areas:

- digital chaining and thermo-elastic modelling
- consolidation of thick thermoplastic composites and acquisition of strategic equipment: autonomous temperature and pressure tooling and a thermomechanical simulation platform.

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