

Automated and highly flexible thermoplastic composite structures manufacturing processes for zero-emission sustainable aviation

AERNNOVA COMPOSITES ILLESCAS (ACI) is participating in the FUTURE project in consortium with IGESTEK and eProject4, supported by CDTI’s “Misiones Ciencia e Innovación 2024” program, within the “Sustainability and efficiency in air transport” area. The project has a duration of 16 months, ending in December 2025, with a total budget of nearly €2M. Research organizations involved include Fundación CIDETEC and AIMEN (Asociación de Investigación Metalúrgica del Noroeste).

The main goal of FUTURE is to research thermoplastic composite manufacturing processes that enable more sustainable, flexible, and automated production of aerostructures required for new aircraft models such as UAVs and eVTOLs, as well as new single-aisle aircraft models demanding high production rates. The project addresses the full manufacturing chain, from automated lamination and 2D laminate consolidation to 3D forming and joining through welding. All developments are integrated into a representative demonstrator to validate the feasibility of producing variable-thickness thermoplastic composite structures under industrially relevant conditions, promoting sustainability both in manufacturing and in the final product.

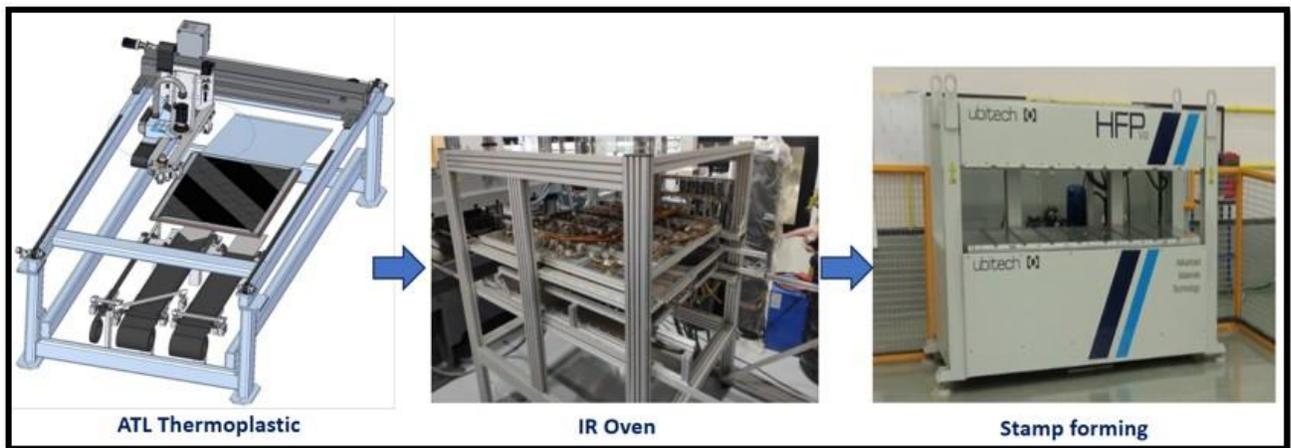


Figure 1 Manufacturing system for thermoplastic parts, from layup to stamp-forming

ACI’s activity in the project focuses on the development and validation of scalable manufacturing systems for thermoplastic aerostructures, including automated tape laying, 2D consolidation of variable-thickness laminates, 3D forming of structural demonstrators, and the integration of welded stiffeners. ACI is responsible for the design and manufacturing of the representative wing rib demonstrator, as well as for the industrial-scale validation of process parameters and tooling solutions. For this purpose, ACI has an approximate budget allocation of €1,200,000. This project is strategically aligned with Aernnova’s roadmap

toward high-rate, automated thermoplastic aerostructure manufacturing for next-generation aircraft platforms.



Figure 2 Thermoplastic Rib manufactured by stamp-forming

Through its participation in FUTURE, ACI aims to strengthen its capabilities in industrializing thermoplastic composite technologies, reducing manufacturing cycle times, improving process repeatability, and enabling flexible tooling concepts adaptable to variable geometries and thicknesses. These developments will enhance Aernnova's competitiveness in the advanced aerostructures market and contribute to the transition toward lighter, more sustainable aircraft with reduced environmental impact.

FUTURE PROJECT

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AERnova *Project⁺* **GESTEK**

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