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The ONEiRE R&D initiative, focused on pioneering the next generation of hydrogen-powered aircraft with low to zero emissions, has successfully concluded.

The objective of the ONEIRE project -OPTIMUM NEXT GENERATION AIRCRAFT & INTEGRATED REAR END- was to delve into the early design phases of the new generation of hydrogen-powered aircraft with low to zero emissions. The project concentrated on four key areas:

- Product
- Manufacturing and assembly systems
- Digitalization and design tools
- Advanced exploration of "Zero Emissions" configurations and associated technologies.

Over its two-year duration, the ONEiRE project primarily investigated the entire rear part of the aircraft, including the pressure bulkhead, the entire rear fuselage and the tail stabilizers. The project also encompassed the study and definition of the wing-fuselage fairing.

Led by Airbus Operations, the consortium included CT, Tecnilógica Ecosystems, D3 APPLIED TECH, Empresarios Agrupados Internacional, and AERTEC. Together, they have successfully forged new design capabilities that will benefit the next generation of aircraft. The teams also crafted tools that ensure proper design from the aircraft sizing phase, enabling quick iteration of various configurations.

Moreover, CT has achieved significant advances in creating surrogate models, which approximate the relationship between design variables and their outcomes with a limited number of complete analyses. These models streamline the design process, avoiding costly computer analyses and enhancing multi-objective optimization efforts.

CT has explored the design space through three practical use cases: developing a multi-spar torsion box for aircraft lift elements using AI techniques; eliminating mechanical joints; carbonizing metal fittings using detailed FEM for virtual testing; and the ultra-compaction of mechanical elements, such as optimizing and manufacturing a heat exchanger through metal additive processes to reduce weight.

CT played a pivotal role in developing methodologies and tools for the early design phases of these aircraft. For this purpose, automatic optimization tools for aerostructures using AI-based calculation processes (surrogate models) and automations of finite element models and CATIA geometry, development of methodology to create virtual tests through detailed FEM models and methods

to reduce equipment, specifically heat exchangers, optimized and manufactured through additive manufacturing.

About ONEiRE

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About CT

CT is a leading engineering company throughout the complete product lifecycle. For more than 35 years, our mission has been to provide innovative services and technological solutions that help our clients be more effective and competitive. Today, CT´s success is driven by 2.000+ engineers in seven countries providing end-to-end expert support to leading customers in the aeronautical, space, naval, automotive, railway, energy and industrial plant sectors. www.thectengineeringgroup.com

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