NEWSLETTER

HERFUSE

Hybrid Electric Regional Fuselage & Empennages

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Welcome, Readers!

We are glad to present the inaugural edition of the HERFUSE Newsletter. Depart on a high-anticipated journey of the future Hybrid-Electric Regional (HER) flights with HERFUSE, a pioneering project focused on revolutionizing regional aircraft propulsion systems.

At our core, we strive to create innovative fuselage and empennage designs that are optimized for the next generation of Hybrid-Electric Regional aircraft.
Our ultimate goal is to reduce Green House Gas emissions and contribute to a more sustainable future for our planet.

As we wrap up the first year of our 36-month journey, it is time to share the key developments and milestones we achieved so far.

Join us on this promising journey and witness how we look forward to innovation.

The project is supported by the Clean Aviation Joint Undertaking and its members.
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Project Overview

HERFUSE (Hybrid-Electric Regional Fuselage & Empennages) focuses on designing **advanced structures** tailored for hybrid-electric propulsion systems in **regional aircraft**.

The project aims to:

- **Reduce weight:** Achieve a weight reduction at the component level at full fuselage and empennage.[
- **Lower environmental impact:** Support **Clean Aviation's** target of a 50% reduction in greenhouse gas (GHG) emissions.
- **Increase readiness:** Mature technologies to TRL 5, enabling integration into full-scale demonstrations.

HERFUSE's innovations are part of the broader **Clean Aviation initiative** and align with **Europe's Green Deal** and **Horizon Europe's** sustainability goals.

Technical Progress

HERFUSE has worked closely with related Clean Aviation projects such as HERA and HERWINGT to ensure alignment with the broader Ultra-Efficient Regional Aircraft (UERA)vision. This collaborative approach ensures that structural innovations contribute meaningfully to Clean Aviation's 2035 entry-into-service targets for hybrid-electric regional aircraft.

The first year of the HERFUSE project has laid a strong foundation for developing advanced fuselage and empennage solutions tailored to hybrid-electric regional aircraft. Significant progress has been made in structural design, material innovation, and manufacturing techniques, as described below.

Structural Design and Integration

HERFUSE has advanced two distinct aircraft configurations inherited from the HERA project: the UERA, a new generation aircraft concept is based on several advanced design features that affect most of the critical systems and major components, plus an innovative powerplant with hybrid-electric capability based on batteries; the other employing distributed propulsion with multiple smaller engines spread across the wing and aimed to support H2 integration with fuel cells.

These configurations not only address weight and aerodynamic challenges but also integrate complementary systems such as thermal management and energy storage.

Material and Manufacturing Innovations

Significant strides have been made in material selection, including the use of third-generation Al-Li alloys, which offer up to a 15% weight reduction and superior mechanical properties compared to traditional alloys. Thermoplastic composites have also been tested for corrosion resistance and manufacturability.

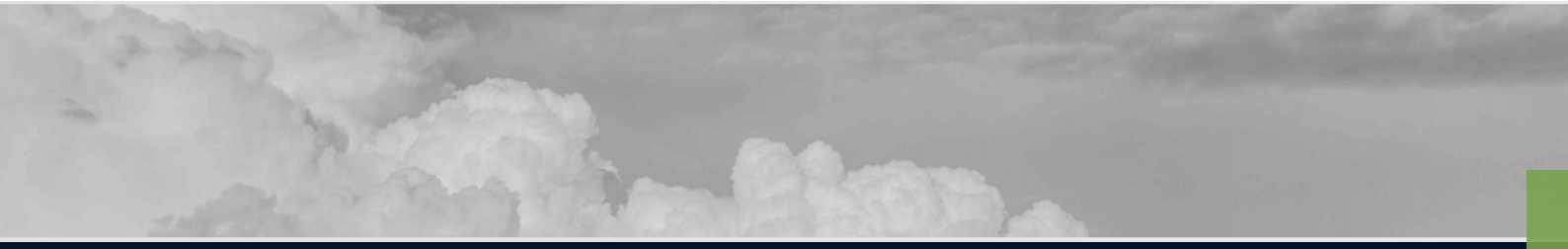
Advanced manufacturing methods, such as cocured multirib torque boxes and additive manufacturing, will reduce weight and assembly times by over 10%.

Testing and Validation

The project has also a defined test plan at coupon and subcomponent levels. Simulations are and will be used extensively to ensure realistic validation environments. For example, pre-simulations for lateral panels and upper shells confirmed the robustness of these structures under operational loads. A structured testing pyramid has been established, from materials to components, to validate technologies up to TRL 5.

Battery Integration Feasibility

The ongoing feasibility study focuses on integrating batteries into the fuselage. Challenges include determining optimal battery placement, thermal management, and structural impacts of distributed propulsion. This is critical for ensuring balanced weight distribution and safe operation in hybrid-electric aircraft



Next Steps

In its second year, HERFUSE will transition from conceptual design to preliminary and stressed ones with the goal to manufacture advanced demonstrators, focusing on full-scale components like cocured lateral panels, upper shells, and lightweight thermoset floor beams.

TRL 5 testing will validate their performance under operational conditions, while a feasibility study will optimize battery placement within the fuselage, addressing weight distribution, thermal management, and safety.

System integration efforts will refine joining methods and processes to ensure seamless hybrid-electric propulsion integration while tackling challenges like load balancing and aerodynamics in distributed propulsion.

HERFUSE will align with Clean Aviation's Phase 2 goals, contributing to Ultra-Efficient Regional Aircraft development. TRL 6 testing and EASA collaboration will ensure readiness for certification and flight demonstrations, meeting the highest safety standards.

Consortium

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