EcoPulse paves the way for more sustainable aviation

2024/12/10 17:53 στην κατηγορία INTERNATIONAL

EcoPulse, the distributed hybrid-electric propulsion aircraft demonstrator developed jointly by Daher, Safran and Airbus – has concluded its flight test campaign, delivering crucial insights to meet the decarbonization goals for air transport by 2050.

This collaborative project, which is emblematic of the French aerospace sector, has provided unique experience in the design, certification, production, and operation of hybrid-electric aircraft.

Pioneering flight tests

EcoPulse performed its first hybrid-electric test flight on November 29, 2023, from Tarbes-Lourdes-Pyrénées Airport. Since its maiden flight, EcoPulse accumulated 100 flight hours and performed some 50 test flights with the distributed hybrid propulsion system, the last of which took place in July 2024. These tests enabled the demonstration of unprecedented onboard electric power levels for distributed electric propulsion, with a network voltage of approximately 800 volts DC and a power output of 350 kilowatts.

The flight tests yielded significant findings, including an objective evaluation of hybridization technologies' maturity, a performance assessment when integrated into the aircraft, and an identification of operational limitations.

For instance, the tests showed that the synchro-phasing of the ePropellers (electric motors) can reduce interior noise. This synchro-phasing is an additional benefit of the innovative flight control computer, primarily designed to maneuver the aircraft – substituting traditional control surfaces –by adjusting the distribution of electric power among the ePropellers.

Technological challenges for the future

More broadly, EcoPulse identified key challenges in decarbonizing aviation:

- Electric and hybrid-electric architectures;

- Development of key components: batteries (performance and operational range) and high-voltage management systems (>400 V);
- Pilot assistance with specialized interfaces;
- Demonstration logic for airworthiness;
- Optimization of weight and noise; and
- Skills associated with managing complexity.

The flight test campaign laid the groundwork for compliance documents to meet regulatory requirements for hybrid-electric propulsion flights, establishing the basis for certifying the safety of innovative aircraft configurations.

An exemplary collaboration at the heart of aerospace innovation

The EcoPulse project showcases the strength of high-level cooperation between Daher, Safran, and Airbus. By pooling their expertise and test resources, the partners demonstrated significant synergies between general aviation and commercial aviation.

“We are particularly pleased with the success of the EcoPulse program and its results. This was the first time we tested a complete hybrid-electric propulsion system in flight, and these trials represented a significant milestone in our technology roadmap,” said Eric Dalbiès, Senior Vice President – Strategy & Chief Technology Officer at Safran. “The lessons learned enable us to continue validating decarbonization technologies.”

“EcoPulse has enabled Daher to take a crucial step forward in developing a low-carbon aircraft. This project not only helped us design an operational system for a demonstration prototype but also tackle critical technological hurdles. Thanks to this rich and unprecedented collaboration, we have made significant progress toward hybridization,” emphasized Pascal Laguerre, Chief Technology Officer of Daher.

“This EcoPulse campaign allows us to advance certain hybrid-electric technologies, such as high-voltage batteries, and integrate them into future aircraft, helicopters, and air mobility solutions,” said Jean-Baptiste Manchette, Head of Propulsion of Tomorrow at Airbus. “With distributed electric propulsion, we achieved our goal of modeling flight physics and energy management at the aircraft level, key elements for shaping the next generation of aircraft,” he added.

(Airbus)