

Press release
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AWATAR will develop key technologies for an advanced wing concept

The aeronautical industry is committed to a collective goal of net-zero carbon emissions by 2050. In addition to optimized flight operations and Sustainable Aviation Fuels deployment, two fundamental enablers to reach this target are the introduction of LH2 technologies and new solutions increasing aircraft and engine efficiency. In order to accelerate the Entry Into Service of ultra-efficient SMR aircraft, the three-year research project AWATAR (Advanced Wing MATuration And integRation), which will start on 1 January 2024, has the mission to develop key technology bricks and anticipate future certification processes.

The scope of AWATAR is to mature the design of an advanced wing featuring

- A Very High Aspect Ratio and a Strut-Braced architecture;
- Laminar portions in the outer areas;
- Integrated advanced leading-edge systems (de-icing);
- An optimized integration of an Open Fan propulsion system.

The targeted maturation relies on high fidelity simulations, Wind Tunnel Tests (ETW, S2MA, Collins Aerospace's wind tunnel) and a Ground Based Demonstrator with the purpose of enabling rapid implementation of the solutions into successful future SMR product.

In order to assess the benefits at aircraft level, AWATAR completes an Overall Aircraft Design sizing loop integrating all new technologies including LH2 propulsion by an Open Fan (direct burn) carrying 250 passengers over a range up to 2000 nm.

Impact

In terms of energy consumption, progress to be made in AWATAR leads to substantial gains with respect to a 2020 state-of-the-art aircraft. First, the novel aerodynamic configuration characterized by a very high aspect ratio and laminar outer wing areas enables drag reduction at aircraft level. Besides, the Leading-Edge solution integrating the innovative ice protection system allows a reduction of the energy budget needed for a fully evaporative system. In addition, the optimized integration of the Open Fan engine limits installation drags.

Considering all these various benefits at mission level, AWATAR aims at an integrated SMR aircraft (250 passengers - 2000 nm) offering an 18% reduction in block energy.

The consortium

Under the leadership of ONERA, the AWATAR consortium reunites a unique set of skills enabling scientific investigations and technical developments up to integrated component tests in order to make key steps in technology maturation. Industry partners including Airbus, Dassault Aviation and Collins Aerospace provide indeed an important know-how in component design, manufacturing and integration. In addition, 3 RTO (ONERA, DLR and NLR) and one association (ETW) bring the required scientific knowledge to progress on physics-based challenges. Last, 2 university partners (TUD and UM) contribute in specific areas with the addition of lower TRL

academic research activities. The participants are spread over 5 EU countries (France, Germany, The Netherlands, Ireland, Poland), and the US.

For optimal alignment and for certification, AWATAR will be supported by EASA and will establish relationships with related projects in the Clean Aviation Programme, notably UPWING, ACAP and CONCERTO.

The Official Project starting date is on 01-01-2024. The project kick-off meeting took place on 23-01-2024 at ONERA in Toulouse (France). The total project budget is 15 258 320€ with a total grant of 13 225 143€.

ONERA, the French Aerospace Lab

ONERA is the French national laboratory for aeronautics and space R&T, staffed by 2000 people. Under the supervision of the French Ministry of Armed Forces, ONERA has an annual budget of 289 million euros (2023), over half of which comes from study, research and testing contracts. As the French expert in aerospace technologies, ONERA prepares tomorrow's defenses, meets the aerospace challenges of the future, and contributes to the competitiveness of the European aerospace industry. ONERA masters all the disciplines and technologies in its aerospace fields.

All major civil and military aerospace programs in France and Europe contain "DNA" from ONERA: Ariane, Airbus, Falcon, Rafale, missiles, helicopters, engines, radars, etc.

<http://www.onera.fr>



Contact ONERA :

Guillaume Belan

Guillaume.belan@onera.fr

Tél: +33 1 80 38 68 54 / +33 6 77 43 18 66