



# TURBOTECH, SAFRAN AND AIR LIQUIDE VALIDATE FEASIBILITY OF LIQUID HYDROGEN-FUELED TURBINE FOR LIGHT AVIATION

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**In September 2024, Turbotech, Safran and Air Liquide completed ground demonstration testing of a hydrogen-fueled gas turbine aeroengine based on an ultra-efficient regenerative cycle and fed from a liquid hydrogen tank. This demonstration follows a first test phase in January 2024 using hydrogen fuel stored in gaseous form in order to perform an initial characterization of the engine. In this second test phase, the engine was coupled to a cryogenic ( $-250^{\circ}\text{C}$ ) liquid storage system developed by Air Liquide to demonstrate the end-to-end integration of a propulsion system replicating all functions on a complete aircraft.**

Damien Fauvet, CEO of Turbotech commented: “This is a major step forward in the transition to fully decarbonized aircraft propulsion, which will be ready to fly as soon as the world mass-produces green hydrogen. The aim of this work was to achieve a similar energy density to a conventional Avgas or Jet A-1 fuel system, while taking account of the constraints associated with the retrofit, operability and certification of a cryogenic hydrogen propulsion solution. The project has been a complete and rapid success, thanks to a remarkable team effort by the aerospace

majors and SMEs involved.”

Pierre-Alain Lambert, VP Hydrogen Programs, Safran stated: “This second stage marks the successful culmination of the project. By coupling our technology to Air Liquide’s cryogenic storage system, which provides the energy density needed for aircraft applications, we’ve demonstrated that a complete high-tech propulsion solution with zero carbon emissions in flight is possible and that it can be directly integrated into light aircraft. For Safran, it rounds out the range of small-scale, agile exploratory projects we’ve been conducting, which are particularly valuable for addressing specific challenges in hydrogen propulsion for commercial aviation.”

Xavier Traversac, VP Air Liquide Advanced Technologies, added: “Decarbonization calls for close collaboration between the various industry players. We’re proud to be involved in this project as a recognized expert in hydrogen technologies and a partner to help accelerate innovation, thanks in particular to our test facility at the Grenoble Technologies Campus. Hydrogen is one of the key elements in the energy transition — and this success is another step toward low-carbon flying.”

Turbotech, Elixir Aviation, Safran, Air Liquide and Daher formed the BeautHyFuel joint research project in June 2022. The aim of this project is to design and ground test a hydrogen propulsion system rated for light aviation and develop a methodology so it can be certified for retrofit. BeautHyFuel benefits from the unique combination of Turbotech’s ultra-efficient light turbine technologies, Safran’s expertise as an aeroengine manufacturer and fuel system designer, Air Liquide’s cryogenic hydrogen storage technologies for aerospace propulsion, Elixir’s role as a manufacturer of innovative light planes and Daher’s experience in aircraft development, certification, production and maintenance.

The BeautHyFuel project is supported by the French government through DGAC within the framework of the country’s post-pandemic stimulus program. It complements other initiatives by Safran to reduce the greenhouse gas emissions of air transport.

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