

DLR at a glance

DLR is Germany's national research centre for aeronautics and space. Its extensive research and development work in Aeronautics, Space, Energy, Transport and Security is integrated into national and international cooperative ventures. As Germany's space agency, DLR has been given responsibility for the forward planning and the implementation of the German space programme by the German federal government as well as for the international representation of German interests. Furthermore, Germany's largest project management agency is also part of DLR.

Approximately 7000 people are employed at 16 locations in Germany: Cologne (headquarters), Augsburg, Berlin, Bonn, Braunschweig, Bremen, Goettingen, Hamburg, Juelich, Lampoldshausen, Neustrelitz, Oberpfaffenhofen, Stade, Stuttgart, Trauen, and Weilheim. DLR also operates offices in Brussels, Paris, and Washington D.C.



DLR

**Deutsches Zentrum
für Luft- und Raumfahrt**

German Aerospace Center

Institute of Technical Thermodynamics

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Antares DLR-H2

Antares DLR-H2

Take-Off with
the Power of Fuel Cells



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Antares DLR-H2: Fuel Cell On Board

Fuel cell technology offers a vast field of new possibilities to reduce fuel consumption and pollutant emissions of air traffic. The Federal Ministry of Transport, Building and Urban Development (BMVBS) entrusted German Aerospace Center (DLR) within an aeronautical research program with the required development work.

Flying High-tech Test Carrier

Antares DLR-H2 is the first manned research airplane with the capability to take off solely using fuel cell power. Based on the power glider Antares 20E, it has been developed to flexibly and cost-efficiently test airborne fuel cell systems. The propulsion system has been allocated in two additional external pods that have been placed under specially reinforced wings.

Depending on the mission they can be flexibly equipped with a fuel cell system and the corresponding hydrogen tank or with high energy batteries. Furthermore fuel cells and batteries can be used in hybridized mode. This offers the possibility to benefit from the advantages of both energy systems, thus offering an even wider spectrum of mission types for this experimental plane.

On-board Power Supply with Fuel Cells

Within near future, fuel cells will not be primary energy source for propulsion of commercial aircraft. The aim of research work at DLR's Institute for Technical Thermodynamics is to develop fuel cells as a reliable on-board power supply for commercial airplanes under real-life conditions.

Fuel cells offer an interesting alternative to common energy supply systems as they combine the advantages of high efficiency together with low emissions and reliable in-flight operations.

During an initial stage of development, DLR realized together with Airbus Germany, a fuel cell system that provides back-up power for the hydraulic pumps of the DLR research aircraft Airbus A320 ATRA in case of a main power outage. In a second step, continuous operation of fuel cell systems was demonstrated on ground, propelling an electrical nose wheel drive for emission free taxiing at airports. Main focus will be on a further efficiency enhancement and longer system life cycles.

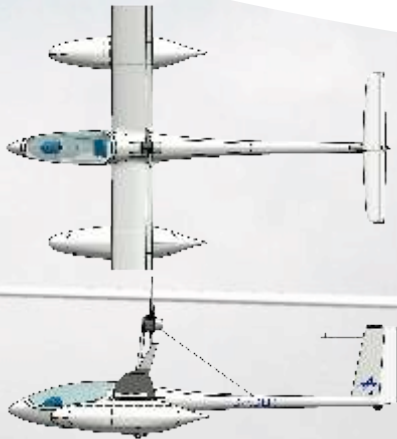
The flying test facility Antares DLR-H2 provides a cost-efficient platform for research under real aeronautical conditions, while optimizing test time of the A320 ATRA.

Flying Test Facility as a Joint Venture

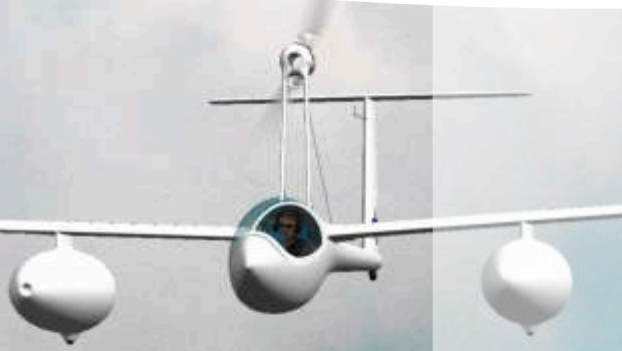
To safeguard and enhance the specific aeronautical know-how regarding fuel cells, the DLR signed a longterm cooperation with Lange Aviation GmbH, developer and manufacturer of the Antares 20E motor glider.

The fuel cell system of Antares DLR-H2 is almost identical to the ones used for the energy supply on board of DLR's A320 ATRA. It provides power for the electrical propulsion system developed by Lange Aviation consisting of power electronics, motor and propeller.

An Additional project partner is Hydrogenics Corporation from Canada.



Antares DLR-H2: First piloted aircraft capable of taking off using fuel cell power only



Antares DLR-H2: cost-effective platform for the development of fuel cell systems

Technical Data	
Wing Span:	20m / 66ft
Wing Area:	126m ² / 1311ft ²
Sized Main Body:	74m / 243ft
Length POD:	287m / 943ft
Diameter POD:	06m / 19ft
Basic Weight:	appr. 460kg / 1011lb
Weight of Fuel Cell System:	appr. 60kg
Operation Temperature of Fuel Cell System:	<45°C is 40°C
Maximum Weight of Antares DLR-H2:	825kg (>800kg in 4 POD version)
Range:	>750km (>2000km in 4 POD version)
Max. Power of Fuel Cell System:	appr. 33kW (upto 45kW in 4 POD version)
Continuous Rating of Fuel Cell System:	>30kW
Power for Straight and Level Flight:	appr. 11kW
Maximum Speed:	appr. 170km/h
Flutter-free Flight:	upto 300km/h
Max. Height:	>>4000m / >>12000ft
Rate of Climb:	appr. 25m/s
Total Efficiency:	appr. 50 Percent