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**Fuel Cell Demonstrator - A320 ATRA**

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Together with its partner, Airbus, the Institute for Technical Thermodynamics of the German Aerospace Center (DLR) has equipped the DLR aircraft carrier A320 ATRA with a Michelin fuel cell system. Prof. Johann-Dietrich Wörner, Chairman of DLR Executive Board commented: "Fuel cell technology provides an improvement in fuel efficiency for aircraft, minimising environmental pollution and increasing comfort and safety."

He added: "DLR has, because of its long-term research experience, developed a high degree of expertise in all aspects of fuel cell technology from theory, to system development, commissioning and integration."

In July 2007, the first flight experiments were made in which the function of the fuel cells under flight conditions were tested and demonstrated. The system worked consistently below 3G, with enough in store for a standby system. Since February 2008 the same fuel cell system has been used to power a hydraulic circuit pump, with the necessary power to steer the aircraft.



The aim of the Federal Ministry of Economics and Technology (BMWi) funded project ELBASYS, is the introduction of environmentally-friendly technologies to minimise emissions and to increase passenger comfort. For instance, an auxiliary turbine unit (APU) can in the future be used without conventional air conditioning. In order to install the carbo bay with its 20-kilowatt fuel cell, DLR's first research aircraft had to be equipped with a bespoke cargo system. After that, the fuel cell had to be connected to both the aircraft and the powered units. There were challenges here - alongside building a portable infrastructure for the supply of oxygen and hydrogen fuel, there was the development and implementation of approved flight test measuring instruments. Using these instruments, the behaviour of the fuel cell system during the flight could be observed and analyzed.

However, before the plane with its fuel cells on board could take off for the first test flight, the system underwent extensive acceptance tests on the ground, to make sure that the system was airworthy. The combination of existing science and systems expertise in the aviation field allowed the systems to be qualified and certified, with DLR's research and development work on aircraft fuel cell applications being notable.

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