

## **ZeroAvia Hydrogen Flight Paves Way to 2023 Service Entry**

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A hydrogen-powered Piper Malibu made the first flight from Cranfield Airport in the U.K. to launch ZeroAvia's efforts to achieve service entry by the end of 2023. (Photo: ZeroAvia)

ZeroAvia this week flew its Piper Malibu technology demonstrator for the first time with its new hydrogen propulsion system, including hydrogen fuel cells. On September 24, the aircraft made an eight-minute flight from the company's research and development base at the U.K.'s Cranfield Airport, reaching an altitude of 1,000 feet and a speed of 100 ktas.

During a September 25 press conference, ZeroAvia founder and CEO Val Miftakhov said his team had had discussions with seven aircraft manufacturers about possible retrofit and new-build applications for the propulsion system. He said the company had signed letters of intent with ten airlines that have expressed an interest in the program based on presentations made to around 30 different prospective operators.

The same six-seat Piper has previously flown in the U.K. and U.S. with some elements of ZeroAvia's powertrain, but the company has now acknowledged that these flights were powered by electric batteries. The earlier flights were used to evaluate different elements of the powertrain, and some of these have been significantly revised for the next stage of flight testing.

The company said that by the end of 2020 it intends to make a flight of up to 300 nm with the full propulsion system from the island of Orkney, where there is a hydrogen production plant, to the U.K. mainland. It had aimed to achieve this milestone by the end of the summer.

According to ZeroAvia, by the end of 2023, it will have secured a supplemental type certificate to retrofit an as-yet-unspecified 10- to 20-seat aircraft with its hydrogen propulsion system with a range of around 500 nm. CEO Val Miftakhov said that aircraft such as the Cessna Caravan (including the latest SkyCourier model), the Twin Otter, and the Dornier 228 are being considered as possible early adopters of hydrogen power.

By 2030, the company says that its technology could be powering a 50- to 100-seat aircraft in commercial service and that by 2040 a hydrogen-powered aircraft could be carrying 200 passengers on flights of up to 3,000 nm. Miftakhov said that the Dash 8 and ATR42 regional airliners had been identified as possible early contenders for conversion to hydrogen.

Under a flight test plan approved by the UK Civil Aviation Authority, ZeroAvia will now further modify the Piper Malibu to increase its hydrogen storage capacity. Miftakhov indicated that, as early as 2021, there may be opportunities to use this aircraft type for some early applications prior to full certification, such as trial operations in rural areas and limited cargo services.

The power rating for the Piper Malibu's propulsion will increase from 230 kW to 260 kW, which is close to that of the aircraft's existing piston engine. The powertrain for the larger aircraft ZeroAvia is targeting the rating will be around 600 kW.

In September 2019, California-based ZeroAvia was awarded a £2.7 million (\$3.4 million) grant from the U.K. government-backed Aerospace Technology Institute under its HyFlyer project to support the country's goal of achieving zero carbon air transport by 2050. The September 24 flight was witnessed by U.K. business and industry minister Nahdim Zahawi and newly appointed aviation minister Robert Courts.

ZeroAvia, which now has a U.K. subsidiary employing ten people, has matched this investment to fund the development program with an initial £5.5 million budget (\$7 million). Miftakhov acknowledged that it is still uncertain how a UK-based company will be able to navigate the EASA certification process at the end of the Brexit transition period on December 31, 2020. He is now a member of the U.K. government's new JetZero council, established in June to support initiatives to achieve the zero-carbon objective.

Through the HyFlyer program, ZeroAvia is partnered with green hydrogen producer European Marine Energy Centre (EMEC) and fuel cell specialist Intelligent Energy. EMEC is supply hydrogen for the flight tests and has developed a mobile refuelling platform for aircraft. ZeroAvia and EMEC have developed the Hydrogen Airport

Refuelling Ecosystem at Cranfield to demonstrate its concept for the production, storage, and distribution of hydrogen fuel for airports.

On September 21, Airbus unveiled three concepts for hydrogen-powered airliners and announced plans to have an airliner ready to start commercial service in 2025. The European aerospace group said that it would be ready to fly a technology demonstrator for the planned new-build aircraft by 2025.

Meanwhile, earlier this month, rival hydrogen propulsion pioneer Universal Hydrogen unveiled plans to retrofit Dash 8 and ATR42 regional airliners with hydrogen modules. The company claims that its technology would avoid the need to have costly refuelling infrastructure because the fuel modules would interface directly with the new propulsion system, albeit with the loss of around ten passenger seats.