

Technology
Startups

Hydrogen Plane Startup Plans First Test Flight This Week

Universal Hydrogen converted a regional plane to hydrogen and is readying the aircraft for takeoff.



Loading a Universal Hydrogen module onto a plane. *Source: Universal Hydrogen Co.*

By Ashlee Vance

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As far as company headquarters go, Universal Hydrogen Co.'s is both unique and fitting. The startup has taken over a hangar at the Hawthorne Municipal Airport near Los Angeles. Its next-door neighbor is the actor and sometimes wayward pilot Harrison Ford, and a bit more down the way is Elon Musk, who often keeps his private jet at the airport. For a company hoping to remake air travel, it would be hard to do better than having Han Solo and the SpaceX founder as inspirations.

Universal, which has raised \$100 million, wants to play a major role in the airline industry's potential shift from kerosene to more climate-friendly hydrogen fuel. Its long-term plan is to supply a new generation of aircraft with hydrogen-filled containers made by Universal that can be delivered to airports and placed in planes using existing cargo equipment. It's seeking to eventually provide a key part of fueling infrastructure at airports throughout the world.

In a bid to show off what's possible, Universal produced a conversion kit capable of running a small, regional aircraft on hydrogen fuel cells. The company plans to fly one of these converted planes, a Dash 8-300, for the first time this week, performing two passes over Grant County International Airport in Moses Lake, Washington. "It will be the largest hydrogen-fuel cell airplane by far ever to fly," said Paul Eremenko, Universal's 43-year-old co-founder and chief executive officer.

Universal is eyeing more regional aircraft to shift toward hydrogen as well as larger ones similar to the Boeing 737 and Airbus A320. Those types of planes cover the vast majority of flights in the US, Europe and China. A technical breakthrough would be needed to make it practical for planes flying international routes to run on hydrogen due to the volume of space it requires. But that's OK for now, said Eremenko. "Somewhat counterintuitively, most of the CO2 emissions are from relatively short flights."

Eremenko said hydrogen is the best solution to help meet western greenhouse gas reduction targets. A coming wave of synthetic and biofuels are "probably the biggest fraud ever perpetrated by the industry," Eremenko said, because he views them as inefficient and not actually very climate friendly. "I've been doing this and studying this for a very long time, and there is no other scenario besides using hydrogen that gets us near the goal of zero aviation emissions by 2050," Eremenko said.

In the past, Eremenko has worked for Google, the US Defense Department's research and development arm (DARPA) and Airbus SE, where he served as chief technology officer. He co-founded Universal Hydrogen in 2020, hoping to make it easier for airplane manufacturers and airlines to consider designing their future fleets around hydrogen-powered engines.

The startup is backed by Playground Global, the venture capital firm co-founded by the Google Android creator Andy Rubin, and by Coatue. Airbus Ventures, JetBlue Technology Ventures, GE Aviation and American Airlines are also backers.

The first part of Universal's approach seems simple. The company has aimed its R&D efforts at building containers – or what it calls "modules" – that can hold both gaseous and liquid forms of hydrogen. The containers for gas are made out of carbon fiber, while the liquid containers are made of metal, and both are designed to be lightweight, sturdy and safe. Hydrogen would be produced at a plant, placed into the containers and then delivered to airports where the containers would be slotted into planes just like typical cargo.

Eremenko argued that this model would mean airlines and airports could shift to hydrogen without drastic changes to their existing fueling infrastructure. “We can ship the modules on trucks, trains and boats,” he said. “And, once at the airport, they’re handled like standard freight.”

The massive challenge, of course, is that airplanes actually need to have engines that can run on hydrogen. That could take a long time. Airbus, the world’s biggest planemaker, recently revealed plans to deliver a hydrogen model around 2035. The company’s CEO, Guillaume Faury, has expressed doubts about having enough so-called green hydrogen, produced by electrolysis, to fuel a fleet of planes anytime soon. “The availability, or lack of availability, of green hydrogen at the right quantity, at the right place, at the right price in the second half of the decade is a concern for me,” he said last November.



Universal’s conversion kit is one component of proving the viability of hydrogen. Connect Airlines, a startup that plans to offer flights between Chicago, Philadelphia and Toronto this year, intends to convert 75 ATR 72-600 regional airplanes to hydrogen powertrains with Universal’s help starting in 2025. Universal has a total of 247 orders for the conversion kits from 16 customers, including Air New Zealand.

The live demonstration this week is an important test, said John Thomas, the CEO of Connect and former head of Virgin Australia Airlines. “We see this test flight as a pivot point for the industry,” he said. “I think people will sit up and pay attention.”

For Universal to succeed, an awful lot of things have to go right and to do so in a timely fashion. Being in the fuel infrastructure business also means the company will likely require a lot of investment as it heads toward the first sales of its containers in 2025.

At least one of its investors is betting that Universal will win out because the airline industry has too few other choices if it wants to be seen as environmentally responsible. “Boeing and Airbus will not shift until they have to,” said Peter Barrett, a founder and general partner at Playground Global. “Well, they do have to because the world is on fire and drowning. Once these types of options exist, it becomes harder and harder to push back.”

