

Uber and Hyundai's plan to develop air taxis hinges on mass production

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- Is Hyundai serious about building eVTOL taxis for Uber?
The two companies have made some bold claims.
Hyundai/Uber
- Hyundai calls this the S-A1 Personal Air Vehicle.
Hyundai/Uber
- It only seats four passengers, which means it will probably be quite expensive to ride in.
Hyundai/Uber
- It's a tilt-rotor like the MV-22 Osprey, but it's electric.
Hyundai/Uber
- A design for a Vertiport.
Hyundai/Uber

The joint announcement at this year's Consumer Electronics Show (CES) by Uber Elevate and Hyundai Motor Company that the companies will partner to develop Uber Air air-taxis for a future aerial ride-share network is news, but just as importantly, it's corporate messaging. At the crux of the announcement is Hyundai's reputation as an automotive OEM with a perceived ability to leverage economies of scale. For an

urban air mobility (UAM) market to emerge at any sort of scale, Uber and industry observers believe that hundreds of thousands of four-passenger electric vertical takeoff and landing (eVTOL) aircraft will have to be built.

Their numbers, along with theoretically cheap eVTOL operating costs, are the key to getting the cost per seat at or near the level of ground transportation. But passenger air vehicles aren't built in taxi-cab-like numbers. So the prospect of a car maker churning out air taxis like sedans is an attractive one.

"We believe Hyundai has the potential to build Uber Air vehicles at rates unseen in the current aerospace industry, producing high quality, reliable aircraft at high volumes to drive down passenger costs per trip," Eric Allison, head of Uber Elevate, said at CES.

Jaiwon Shin, executive vice president and head of Hyundai's Urban Air Mobility Division said, "Our vision of Urban Air Mobility will transform the concept of urban transportation."

That's what Uber Elevate hopes will happen—and happen relatively quickly.

But how Hyundai—or any of the other seven companies which are building eVTOL air taxis for Uber Air—will cost-effectively manufacture hundreds of thousands of piloted and eventually autonomous aircraft to airworthiness/certification standards set by the FAA and other regulators is one among many open questions.

Fundamentally different manufacturing

Uber Elevate has boldly staked its reputation on operating commercial urban air taxis by 2023, promising Uber Air service in Dallas, Los Angeles, and Melbourne, Australia. At CES,

Uber's head of aviation product, Nikhil Goel, reiterated that massive numbers of air taxis operating globally will be the foundation of Uber Air's business. "Electric aircraft manufacturing needs to be fundamentally different from how aircraft are manufactured today," Goel said.

If Uber does commercially operate eVTOL air taxis in 2023, they will likely be few in number and very expensive. None of Uber's air vehicle partners have so far committed to a mass production timeline.

Ars spoke with Hyundai's UAM Division, and the answers we received could fairly be described as vague. With respect to a timeline, Hyundai says that it expects to "commercialize" its S-A1 air taxis (Hyundai and Uber call them Personal Air Vehicles, or PAVs) around 2028. It does not say it will be mass-producing PAVs by then.

The S-A1 is an eight-rotor/tilt rotor aircraft. As with air taxis in development by other Uber partners, it's initially envisioned as carrying four passengers plus a pilot with a cruising speed around 180mph (290km/h), an electric range of 60 miles (97km), and requiring only five to seven minutes to charge. Like other eVTOL craft, it will have to be certified for airworthiness by the FAA and other international organizations.

Jaiwon Shin is one of few people at Hyundai with aerospace experience. Hired last August, he comes to Hyundai from NASA, where he was associate administrator for aeronautics research. It will be his job to flesh out the design of S-A1 and usher it through international airworthiness certification. The company says it will seek US and Korean certification in parallel but offers no schedule. "This will be affected by when the regulations are made and relevant infrastructure matures," Shin told Ars.

At present, there is no UAM infrastructure—no vertiports, air

traffic management, noise/environmental standards, security regulations, nothing.

The S-AI's design is a collaboration by Uber and Hyundai according to the former which offers a development model built on NASA data which it has shared with all its vehicle partners. Ars specifically asked Hyundai's UAM team if it has done its own S-AI design work. The company would only say that "Hyundai has [an] in-house engineering environment which is capable of system design and optimization including electric powertrain, propulsion, aerodynamics and structure in order to satisfy Uber Elevate mission requirements."

Hyundai has scads of experience with mass production of cars, but an all-new aircraft design is another thing entirely.

With Nikhil Goel's admonition firmly in mind, Ars asked how Hyundai will manufacture S-AIs in a "fundamentally different" way. "Manufacturing UAM vehicles in large volume is like building tens of thousands of Formula 1 cars," the company told Ars. "Hyundai will make a breakthrough in volume production of aircraft with innovative methods."

So the plan is for Hyundai to "make a breakthrough." In quest of answers from a firm with real-world aviation experience, Ars put the same questions to helicopter manufacturer Bell, which is designing and building its own eVTOL air taxi for Uber—the Nexus E4X, an electric or hybrid tilt-rotor.

Bell could not provide us with a projected certification date for Nexus by our deadline. Nor would it explain how it will cost-effectively manufacture thousands of Nexuses (Nexi?). If a highly experienced aerospace firm like Bell has yet to work out such crucial questions, Hyundai surely has a mountain to climb.

Substance or symbolism

If we're ever to see a UAM mass market, the manufacturing mountain will have to be scaled. But ubiquitous UAM won't happen in a vacuum. Aerial ridesharing will still have to compete with increasingly cost-efficient ground transportation. Most experts see a widespread UAM market by 2035-2040 at best. Until then, air taxis will likely be fashionable limousines for the rich, much like private jets or helicopters today.

In that respect, the Uber Elevate-Hyundai announcement from CES is at least as much symbolism as substance.

Wyatt Smith, Uber Elevate's Head of Business Development, insists that the announcement is significant, telling Ars "the Hyundai relationship is a real step forward as it relates to bringing an experienced manufacturer of safe and reliable electric vehicles into the ecosystem."

Hyundai's team says it will work with Uber but that it will pursue other opportunities as well. Given the many unresolved questions about UAM we asked, does Hyundai consider the announcement with Uber Elevate to be an imminent business partnership or more of an aspirational joint statement? "Neither," Hyundai says. "The biggest goal of the recent partnership with Uber was to help accelerate the growth of UAM market... Hyundai will work toward developing PAV and Uber will prepare for related service."

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