

eDrone Air Cargo

By John Benson

March 2023

1. Introduction

Most people do not realize how truly huge the transportation vehicle segment is. One way to emphasize this is to start slicing and dicing this segment into sub-segments. I'm performing this exercise because I need to take two deep dives into transportation sub-segments.

Let's start by dividing the segment into its largest parts:

- Road vehicles
- Airborne vehicles
- Water vessels
- Off-road vehicles
- Rail vehicles

I would guess that, although the above list may roughly ordered by size, this strongly depends on criteria.

As you've probably already guessed, we will be looking at airborne vehicles. Drones are generally considered unmanned and non-passenger vehicles (I believe pilotless craft that carry passengers might be called pilotless air taxis, not drones).

Drones can perform many functions. The small ones are mainly limited to surveillance, but that is not what we are looking at here. Medium-sized drones have been used for cargo transport, and that is the main subject of this post (as you can probably tell by the title). Crop-spraying by drones is another application (bet you didn't see that coming).

2. A Complex Journey

Michael Norcia says he wasn't planning to make a cargo plane. When he started Pyka in his parents' SF Bay Area garage in 2017, the game plan was to build an electric autonomous crop sprayer as a stepping stone toward the holy grail many aviation startups are pursuing: zero-emission, unpiloted passenger aircraft.¹

Norcia and his cofounders decided that crop spraying offered better initial business prospects than hauling cargo, in part due to fewer regulatory and safety concerns. Flying over farm fields, a crash would only harm produce, not people.

But after early success in 2021 spraying banana fields in Costa Rica with Pyka's Pelican plane, Norcia tells Forbes that companies looking for a big freight-hauling drone began knocking. "They kept coming back to us saying, 'Your technology is further along than anyone's. Can you retool this to make a cargo aircraft?'"

¹ Jeremy Bogaisky, Forbes, "Plane Could Be The Start Of A Wave That Transforms Shipping," Jan 30, 2023, <https://www.forbes.com/sites/jeremybogaisky/2023/01/30/this-robot-electric-cargo-plane-could-be-the-start-of-a-wave-that-transforms-shipping/>

On Monday (Jan 30), Pyka unveiled a cargo version of Pelican with a maximum range of 150 miles when carrying a full load of 400 pounds. It has a sliding tray to load cargo through the nose into its belly, which has 66 cubic feet of interior space, enough to fit five soft-shelled e-commerce totes. Pelican Cargo had its first test flight in December 2022, and Pyka expects launch customer, Skyports, will begin daily trial services in the U.K. to undisclosed offshore islands in the second half of 2023.

Norcia, the CEO of the Oakland-based startup, says it has 80 orders and options for Pelican Cargo from Skyports and two other customers it isn't identifying. Some of the orders—a "minority," Norcia says—are firm with deposits. One customer is looking to use the plane in the Caribbean. As with the crop sprayer, Pyka is leasing out the aircraft at terms it won't disclose. The company says the electric plane's low operating costs—expected to be \$15 a flight-hour due to lower energy and maintenance costs—and its ability to take off and land in just 500 feet on rough dirt or grass airstrips will enable it to serve remote communities that currently depend on boats or ground transportation for necessities.

Targeting isolated, underserved rural populations initially is the easiest way to get safety regulators to allow the robot airplane to fly, says the 30-year-old Norcia. It's a step toward convincing officials that Pelican Cargo is safe enough to serve more populated areas.

3. The Pyka Pelican

I copied an image of the Pelican Cargo below from the Pyka site referenced at the end of this paragraph. This site is a good one, with many videos.²



A few details on Pika:

3.1. Location

West Oakland, CA, directly across the San Francisco Bay from San Francisco.

3.2. History, etc.

Founded in February, 2017: In classic startup-fashion, Pyka was started in Michael's parents' garage. The garage was not large enough to fit Pyka's proof of concept vehicle, "Big Bird," so the company moved to the backyard, where they maintained a decidedly laid back 'shoes optional' corporate culture.

² Pyka, <https://www.flypyka.com/>

June 2017: Pyka was accepted into Y Combinator's summer 2017 batch. Over the course of three months, the team of five designed, built, and flew Big Bird, a bespoke 400lb UAV.

March 2018: After raising a \$3 million round out of Y Combinator, the team set about designing and building its first product, the "Egret," which was a 200lb-payload, 100% autonomous electric crop duster.

May, 2019: Pyka certified the Egret for commercial operation in collaboration with the New Zealand Civil Aviation Authority in mid-2019, making the first-ever human-scale autonomous electric aircraft certified for commercial work.

October, 2019: Pyka raised an \$8 million Seed+ round.

January, 2020: Four months after raising their Seed+, Pyka flew its second generation electric autonomous agriculture airplane, the "Pelican". The new aircraft incorporated dozens of design and feature improvements and carried over three times the liquid payload of its predecessor.

Pyka started serial production of the Pelican in late 2020, after completing structural load testing and flight testing programs. Most of the aircraft is manufactured at Pyka's facility in Oakland, California.

First Customer Delivery of a Pelican (serial number 3) in April 2021 was to one of two major launch customers in Costa Rica where the aircraft would soon go to work spraying Bananas.

The Pelican successfully completed the final stage of flight demonstration for commercial approval in the US in May 2021.

September 2021: Pyka and EmbraerX, the R&D arm of Embraer, joined up to accelerate the future of autonomous aerial application operations in Brazil.

April 2022: Pyka raised \$37 million in Series A funding.

4. The Future

From reference 1:

But there's real possibility for disruption, in two ways, Riedel says.³ If the new electric aircraft turn out to be as cheap to operate as promised, they could enable more cargo flights a day between small communities and hub airports. And their ability to land in places where current airplanes can't, such as the parking lots of warehouses and factories, could lead to a reshaping of delivery networks.

One of the biggest factors in whether Pyka and other drone cargo delivery aspirants can lower costs is how many people will be required to look after their aircraft. Currently regulators are expecting one safety monitor to oversee one drone at a time. To cut labor costs, Pyka and others have to convince regulators that one person can safely oversee multiple aircraft simultaneously. (McKinsey has modeled out how much that means for the operating costs of small, single-package delivery drones.)

³ Robin Riedel, an aviation consultant with McKinsey

Norcia says what separates Pyka from all the other electric aviation contenders is simple: It's the only company commercially operating a large autonomous electric aircraft.

Pyka currently has five crop sprayers flying in Central America. Since July 2021, it's been conducting trial services for an unnamed company Norcia describes as "one of the largest banana producers on Earth" and recently started working with another. He says both are interested in scaling up to about 100 aircraft each. Pyka plans to expand to other Central American countries where its customers have plantations, as well as Brazil.

U.S. regulatory approval has been slow in coming. In 2020, Pyka was hoping the Federal Aviation Administration would grant it an exemption by year-end from rules for piloted aircraft operations to conduct crop spraying under the oversight of a safety monitor. It's still waiting. Norcia says the FAA hasn't asked for any additional documentation or testing. He says the holdup is a by-product of the FAA's slow pace in drafting new regulations covering drone operations, which has left Pyka and other drone operators waiting for multiple FAA offices to consider whether to sign off on whether to exempt them from existing rules for conventional planes. "It's an issue pretty much every commercial drone [maker] here in the States has faced," Norcia says.

While Pyka has been able to gain experience by flying in other countries, other companies like Elroy and Beta are looking to start flying sooner through the Air Force's Agility Prime program, which is testing out military uses for commercial electric aircraft.

Electric aircraft developers may be frustrated by the FAA's slowness in drafting new regulations, but Riedel says the agency shouldn't be faulted for taking its time weighing the risks. "In the interest of all of us on the ground, it's good," he says. Plus, given the newness of the technology, rapid rulemaking could result in ill-fitting requirements that hold the industry back, he points out. "By putting out regulation too quickly you might actually stifle innovation."

Final author's comment and reference: I mentioned "pilotless air taxis" in the Introduction. There are a large number of piloted air taxis under development. Also some of these are attempting to transition from "piloted" to "monitored" (as the subject of this paper intends), the FAA does not appear to be encouraging this. Also these craft are several times larger than the Pelican, and appear to be moving to larger designs during development. See the paper from last year described and linked below for more details.

Air Taxis, Starting to Takeoff? *A bit over three years ago, I wrote a post on flying EVs. Although there are some flying EVs (as there were then), these have hardly become mainstream, but the title version of these appear to (very slowly) taking off, and the amount of funds being pumped into them by major firms are taking off, big-time.*

This post will review how air taxis from the earlier post have developed and review the current crop of air taxis most likely to quickly (and perhaps inexpensively) whisk you over the traffic in the next few years.

<https://energycentral.com/c/ec/air-taxis-starting-takeoff>