Case Study: Rapidly Scaling Residential Drone Delivery

Delivering payloads from altitude mitigates consumer safety concerns and advances residential drone delivery services throughout the US.

Customer: DroneUp

Background

Since its inception in 2016, DroneUp has been one of the most innovative pioneers of drone services in the world. Constantly pushing the envelope, the company has quickly diversified its service offerings to provide drone inspection, security, and construction applications. Yet, some of its most visible advancements have come in the residential drone delivery sector where the company has developed an entire drone delivery ecosystem.

Customer Needs

When DroneUp first began to build its delivery ecosystem, the company was simultaneously developing flight platforms, traffic control systems, ground station outposts, and all of the components which are needed to scale an operation of such magnitude. When it came to the last 50 meters of that delivery process, DroneUp engineers were evaluating several methods of depositing payloads to residential homes.

Even with all the technical and logistical challenges of drone delivery, DroneUp knew consumer safety needed to be at the forefront of its approach to residential deliveries. To ensure maximum scalability for its drone delivery ecosystem, DroneUp also needed to minimize time-on-station for each package delivery.

The company also needed a nimble technology partner that could work hand-in-hand with the flight engineers on the ground.

Solution
A2Z Drone Delivery's RDS1, a lightweight smart winch purpose-built for drone delivery, was the perfect solution for DroneUp's unique delivery needs. By quickly delivering from altitudes up to 45 meters, payloads could be accurately deposited at a customer's door while keeping spinning rotors away from

people and property. The RDS1's one-of-a-kind controlled freefall delivery technique also enabled pilots to reduce time on-site to under 30 seconds per delivery. Shaving seconds from each delivery allowed DroneUp to extend the range of its flight platform and service a greater geographic area around each delivery hub while reducing the safety risk and noise pollution to residents.

"With the innumerable logistics that go into residential drone delivery, it's important to have confidence in every aspect of the hardware from the UAV platform to the delivery mechanism," said John Vernon, the CTO of DroneUp. "The RDS1 allows our pilots to reduce time-on-station to under 30 seconds per delivery. Combined with the ability to make deliveries from cruising altitude, this rapid delivery and the integrated safety features in the tether system itself, help us assuage some of the main public concerns over UAV delivery."

With a premium on redundant safety mechanisms, DroneUp and A2Z Drone Delivery engineers worked hand-in-hand to integrate the RDS1 and its extensive onboard safeguards into the DroneUp flight platform and pilot's software interface. Automating the pre-flight weight check ensured the platform was not accidentally overloaded before liftoff. Redundant command interfaces guaranteed that if the flight platform lost LTE connectivity, payload control and delivery could fall back to traditional ISM radio. RDS1's built-in payload status detection monitored the payload, and manual delivery controls were backed up by intelligent systems to calculate the payload freefall and gently arrested the drop 5 meters above the ground. Should the flight platform encounter an emergency, like entangling the tether in a nearby tree, the RDS1 allowed DroneUp pilots to abandon the payload and tether to keep the UAV platform airborne.

"No matter how many flight hours you have as a UAV pilot, adding the dynamic of delivering packages to the ground is still a new concept, so having the tether controls seamlessly integrated into the pilot software is imperative," said DroneUp pilot Ethan Burnette, who flew delivery missions with the RDS1. "Also, knowing the redundant safety systems are in place gives you the added peace of mind you need as you become accustomed to flying a drone with a payload slung below it."

Given the rapid pace of the early DroneUp trials, A2Z Drone Delivery engineers embedded with the DroneUp flight testing team on the ground. The team evolved the RDS1 to accommodate the growing demands of the project by adapting the tethered system to deliver the existing boxes of DroneUp's retail partners and upgrading the RDS1 to accept heavier payloads. A2Z Drone Delivery's ability to adapt its

hardware to suit these changing needs helped DroneUp keep its project on schedule and provided A2Z Drone Delivery with valuable real-world customer feedback.

"It is a rare and valuable opportunity to be in the action with DroneUp as they expand their drone delivery program," said Aaron Zhang, CEO of A2Z Drone Delivery. "Learning the specific demands our customers are facing in the field allowed us to center our design process around those needs and holistically improved the RDS1 to be a tool that will enable safe and scalable residential retail drone deliveries."

Results

Mounted on the DroneUp flight platform, the RDS1 made its first commercial delivery in a trial flight with Coca-Cola in Coffee Country, Georgia in January 2021. With DroneUp confident it had found a delivery mechanism that not only performed well but also helped mitigate common consumer concerns with drone delivery, the company quickly integrated the RDS1 into its fleet of residential delivery drones.

Throughout DroneUp's continued field trials, the drone service provider has expanded regional retail deliveries, and its delivery of COVID-19 test kits during the pandemic. DroneUp will be expanding its residential drone delivery services to 34 sites, with the potential to serve 4 million U.S. households across six states - Arizona, Arkansas, Florida, Texas, Utah, and Virginia - with safe, efficient, and unintrusive on-demand parcel delivery.