



Belcan

a cognizant company

Developing **Drone Delivery Systems** in Partnership with Belcan

Logistical & Regulatory Support for **Increasingly Sophisticated Technologies**

Drone Delivery

Opportunities & Challenges

Technological Innovation & Demand Progressing in Lockstep

Consumer expectations for package delivery continue to rise as shipping timelines get shorter, delivery options get broader, and competition for consumer dollars gets tighter. Today's consumer wants items delivered quickly and securely to a location of their choosing, on their schedule, at low or no cost. This has generated robust interest in the development of alternate delivery modalities, including small, low-cost precision drones for package delivery.

The idea of a door-to-door autonomous flying craft isn't science fiction—it's been in the public consciousness for years, and advances in technology continue to make drone delivery more feasible and cost-effective. The Coronavirus pandemic has also added increased urgency to the development of truly contactless delivery options. While well-known retailers may have initially considered drone delivery for mundane consumer goods to enhance the instant-gratification factor of the shopping experience, it's also becoming clear that life-sustaining commodities like food and medicine can be delivered by drone in situations where shipping or courier delivery are unavailable, dangerous, or cost-prohibitive.

Autonomous drones unlock the potential for truly contactless delivery of:



Food



Medicine



Machinery
Components



Consumer Goods

Challenges

Keeping Drone Delivery Growth at Bay

The demand is there. The potential upside is enormous. The technology is already available. So why isn't drone delivery "taking off" as a viable replacement for courier services or traditional shipping? There are a few factors in play:

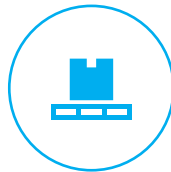


Regulatory Restrictions

In Populated Areas | In Certain Jurisdictions | For Certain Use Cases



Safety



Payload



Range



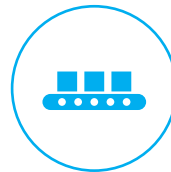
Level of Autonomy



Air Traffic Integration



Cost



Manufacturability

Regulatory requirements notwithstanding, a viable vehicle design would need to be cost effective to manufacture, operate, maintain, and fly autonomously. Its payload would need to meet market demand and stay competitive with other delivery options. The environmental, safety and reliability factors barring the advance from prototype to production and into the aftermarket are also significant and non-intuitive requirements for a flying vehicle.

Navigating an Uncharted Regulatory & Logistical Environment

Despite the complexity of developing and deploying delivery drone technology, the market seems to be primed for robust demand for drone delivery services in the future:

The global drone market will exceed **\$43 billion in 2024** – Delivery applications will be the main factor in the market's growth.¹

The global drone package delivery market should clear **\$6 billion by 2026**, growing at a compound annual growth rate (CAGR) of **42% from 2020 to 2027**.²

A recent Clutch.co survey found that nearly **one-third (31%) of consumers are excited** by the prospect of drone delivery, with 33% believing it may be **faster** than traditional delivery.³

Unfortunately, enthusiasm in the market can't overcome complex regulatory bodies. For that reason, the principal hurdle for organizations looking to deploy drone delivery capabilities remains a regulatory one. Even with a permit to fly drones commercially from the FAA in the United States, for example, there are still requirements that complicate implementation. From getting past the extensive, multi-step certification process to keeping all drones within line of sight of an operator with a pilot's license, regulatory guidelines can be prohibitive to newcomers.

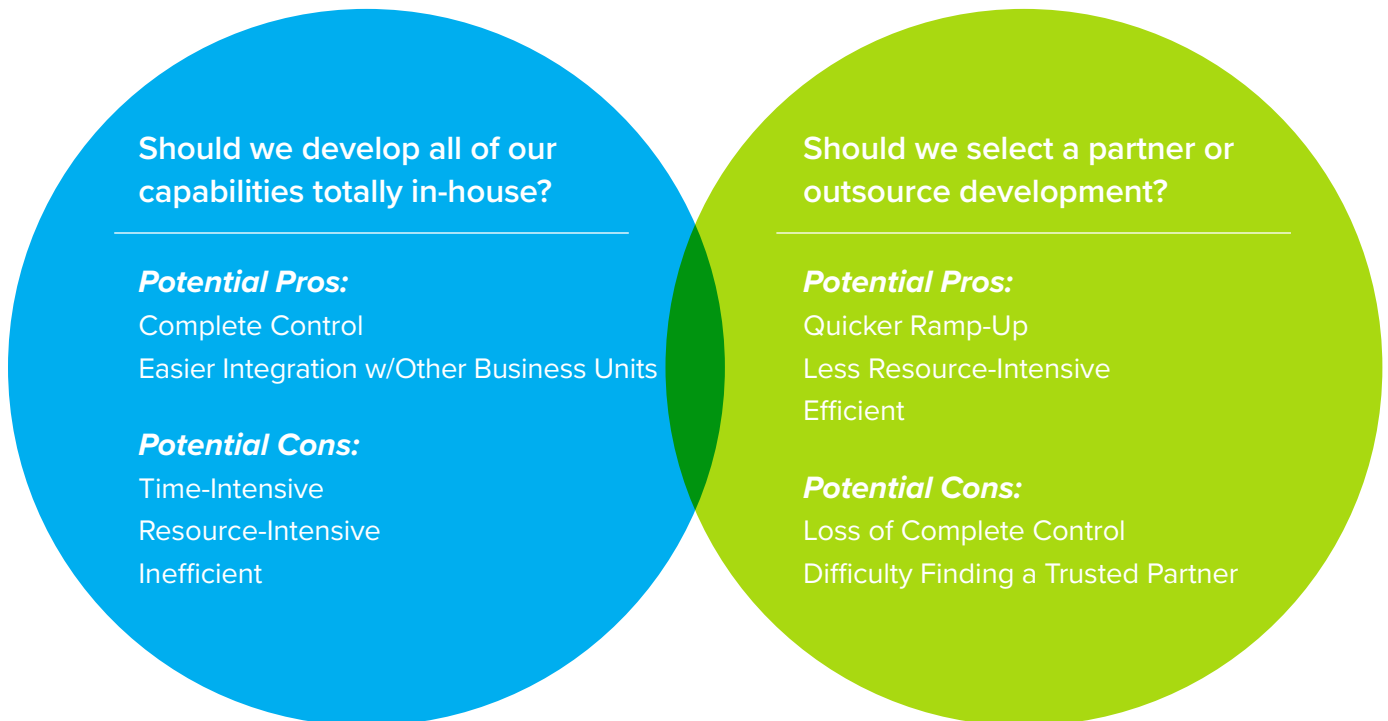
Ultimately, integrating thousands of flying delivery robots into a controlled airspace while maintaining customer experience and safety is a daunting task **even for companies with a proven pedigree in cutting-edge aerospace development**.

The Power of a Trusted Engineering Partner

We've discussed the challenges that can complicate delivery drone deployment, even for companies with existing aerospace expertise. But what if you don't have a pedigree of aerospace development?

Managing the complexity of the process takes people, time, and money—but it also takes strategic choices:

Weighing Your Options for Delivery Drone Development



The risks and difficulties inherent in the development process, regardless of which option is chosen, may lead companies who don't have extensive aerospace expertise to assume that the way forward is barred to them.

Belcan rejects that hypothesis. We have the technical resources and aerospace industry experience to assist in every phase of the development of autonomous drones for consumer package delivery. We can work as a seamless extension of your team, so you retain a high level of control over the process while benefitting from the expertise of a trusted partner.

Unlock Drone Delivery Potential Across Use Cases with a **Trusted Partner**

Belcan's Strategic Business Units (SBUs) Support the Entire Project Lifecycle:



Belcan is well positioned to assist, and if needed take the lead, in solving the numerous engineering, manufacturing, and operational challenges fundamental in the drone delivery development effort.

Put Belcan's Diverse Experience to Work for Your Drone Delivery Project

Belcan has a comprehensive background designing air vehicles and mission systems on both large (manned) and small (unmanned) aircraft. We have worked in varying capacities on several autonomous and optionally piloted vehicle (OPV) projects comprising both fixed wing and vertical lift aircraft. Additionally, Belcan has assisted in the design and approval of numerous new aircraft design and mission systems integration projects.

Why Choose Belcan?

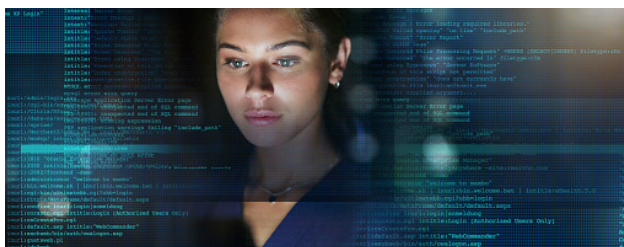
- Extensive aerospace design acumen
- Direct experience with autonomous vehicles
- Proven scalability for projects of any size
- Expertise designing metallic, composite, and other types of aircraft and aircraft components
- Decades of experience offering creative solutions to troubleshoot emergent challenges
- Ability to integrate with your team at any stage of the design process, at any level of responsibility

A Track Record of Excellence in Autonomous & Optionally Piloted Vehicle (OPV) Flight

Case Study: How Belcan Engineers Successfully Modified a Legacy Aircraft for Autonomous Flight

In 2019 Belcan successfully supported a commercial air vehicle program that entailed modification of an existing aircraft to provide optional manned and unmanned flight functionality.

This project included considerable **software and mechanical engineering expertise:**



On the software side, our team helped establish formal processes for software validation, including ensuring all tested modules had 100% decision coverage, zero model advisor error, generated code, passed design verifiers, and had traceability to the requirements in DOORS.

Where requirements were missing or inadequate, updates were proposed. Belcan also built new software modules from the ground up and made updates to the software to resolve existing model advisor issues. Once finished with the main portion of their work, they put all of their software through VectorCAST. Where modules had lingering model advisor warnings or false design verifier failures, Belcan helped establish a method to provide rationale for why these issues should be tolerated to reduce work for future designers.



On the mechanical side, the team employed designers and stress analysts to support the replacement of the pilot's seat with a modular assembly encompassing a wide array of equipment and sensors to enable remote control of the aircraft. This assembly was divided into four main "LRU" (line-replaceable units) components stacked together, with the intention of using in various combinations depending on what the particular mission required.

Belcan's engineers seamlessly integrated this modular assembly with the systems and software of an existing airframe – an extremely challenging task – working within installation requirements and restrictive space constraints. Belcan was also able to assist with the design and analysis of machined and sheet metal components to mount all of the equipment according to the LRU groupings. Thanks to the quality of our initial work, Belcan was asked to perform additional tasks for the customer, including creating models to help 3D print the LRU components with long lead times to mockup the entire assembly, incorporating redlines as needed, and designing fixtures for testing other components.

Ready to partner with Belcan and achieve lift off for your delivery drone project?

Contact us to get started or visit belcan.com for more information.

For more information, please visit www.belcan.com. |   



References:

1. [“The Drone Delivery Market, Forecast to 2024 - Drone Deliveries Will Be the Fastest Growing Application Within the \\$43+ Billion Global Drone Market.”](#)
2. [Global Drone Package Delivery Market Size Will Reach USD 6,051 Million by 2026: Facts & Factors](#)
3. [Drone Delivery: Benefits and Challenges](#)