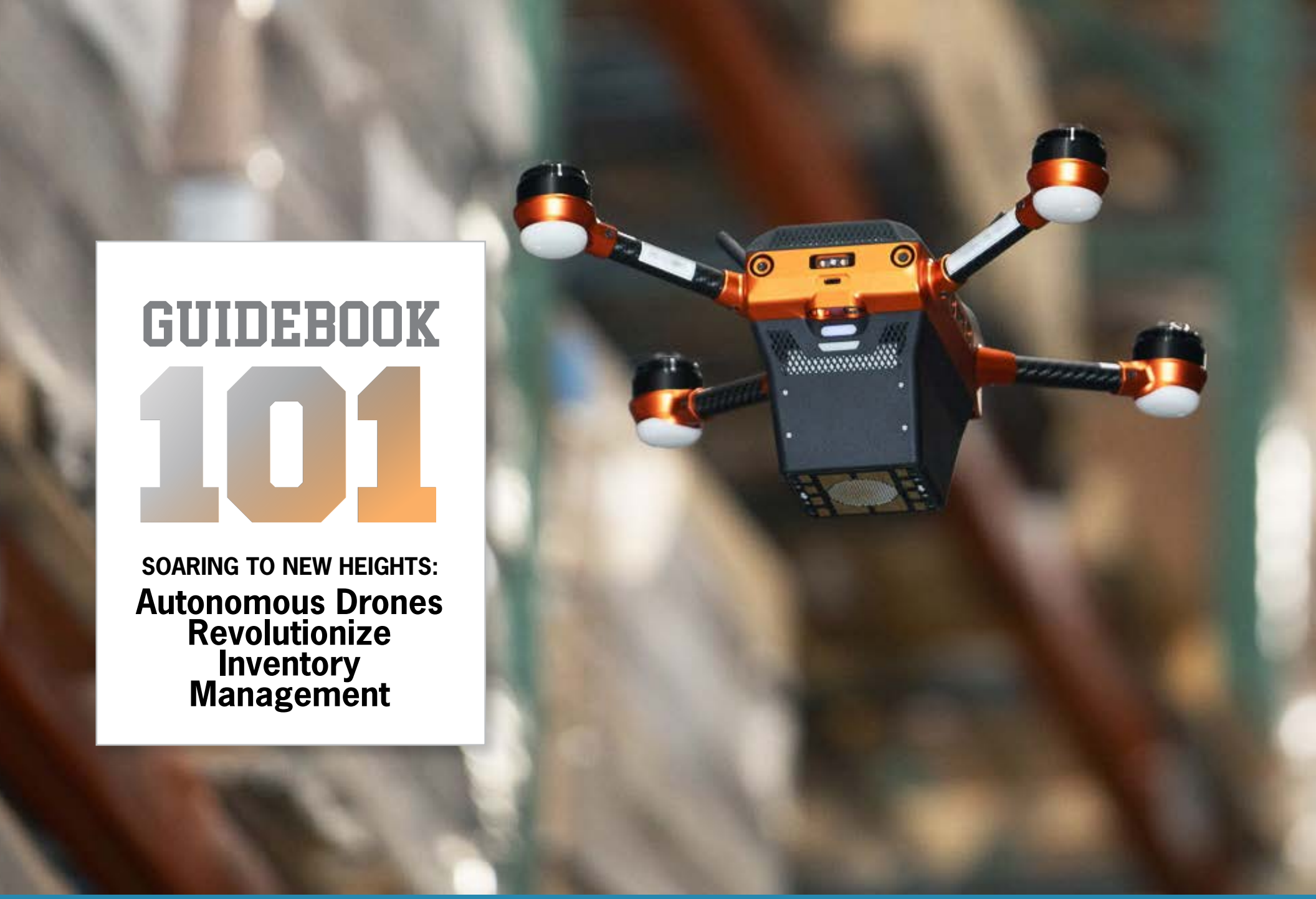

GUIDEBOOK 101

SOARING TO NEW HEIGHTS:
Autonomous Drones Revolutionize Inventory Management

CORVUS ROBOTICS

Logistics MANAGEMENT

INTRODUCTION

Corvus Robotics' self-flying inventory drones provide a game-changing solution for warehouses and distribution centers.

Imagine for a moment a lights-out warehouse where autonomous, self-flying drones launch themselves into the air and begin flying around recording data on inventory levels at scheduled times. Then, those drones fly back to their home bases, lock into a landing pad, sync up with the warehouse management system (WMS), and then charge up while waiting to be called on again to handle cycle counting. The best part is that this all happens with a high level of precision, and without the need for human intervention, devices, spreadsheets or clipboards.

If you think this scenario sounds like a far-off dream come true, think again. Flying autonomous inventory drones are making their way into warehouses and DCs nationwide as organizations seek out ways to balance growing demand with ongoing labor constraints and the need for more accurate, reliable inventory management processes.

Achieving these goals isn't easy in a business setting where barcode scanning technology is 70+ years old and warehouse management systems (WMS) haven't changed much aside from occasional user interface (UI) updates.

In spite of these realities, every warehouse, DC and fulfillment center has to be able to track its inventory accurately, consistently and reliably. The e-commerce surge, for example, has put extreme pressure on companies that need to get the right product to the right place and at the right time—and very often within a day or two (or less). Both B2B and B2C customers know your nearest competitor is always just one screen tap or mouse click away, and dissatisfied ones may just go elsewhere next time around. These are just some of the factors driving companies to tighten up their inventory

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management strategies and infuse advanced technology solutions into those processes. With autonomous inventory management systems, organizations are automatically collecting and tracking all of the inventory in their facilities right down to the individual item level.

As the first company to develop fully-autonomous inventory drones, meaning they navigate without localization infrastructure or human operators, Corvus Robotics takes the burden off of employees who would otherwise have to navigate the warehouse, scanning, checking and counting inventory.

"The Corvus One™ drone doesn't require thousands of stickers, hundreds of reflectors, beacons or even a strong Wi-Fi signal—the latter of which isn't always available in the typical warehouse facility," says Jackie Wu, founder and CEO at Corvus Robotics. "It just flies around automatically, capturing inventory data and case counts; recording barcodes; and determining the location of every SKU." The drone then syncs up with the company's WMS and goes back to its resting place until the next scheduled inventory count begins.

With approximately 80% of U.S. warehouses yet to adopt automation, self-flying inventory drones help companies take a giant leap into the world of autonomous inventory management without any disruption to their existing operations. This is an important win in a fulfillment environment where having accurate inventory counts has become table stakes for a wide swath of product-centric companies, and where clipboards and spreadsheets simply don't cut it anymore.

"By deploying fully autonomous self-flying drones, companies can streamline the cycle counting process, either during off-hours or alongside human workers," Wu says. "This significantly enhances operational efficiency and accuracy by freeing up labor hours, allowing staff to focus on higher-value tasks within the warehouse."

CHAPTER ONE:
The First of its Kind

The world's first fully unmanned warehouse inventory drone, Corvus One, is equipped with embodied Generative AI to understand what inventory to look for, where it is located, and how to interact with its environment.

The system comes with the hardware, software, service and consumables needed to operate the system, which is available via a "Robot as a Service" (RaaS) package. The package includes one or more flying drones or landing pads, depending on the company's specific needs. In some cases, organizations will extend the coverage area by installing multiple landing pads for a single drone.

Corvus updates the drone hardware or software at no charge to the customer, with the latter being handled over the air, in the background and with no service disruption. "We want to make it as simple as possible for companies to buy, adopt and start using the drones," says Wu. "Customers always have the latest hardware and software iterations and never wind up stuck with obsolete technology; this gives our customers peace of mind."

Once in place, the autonomous flying drones start producing significant benefits, including monetary savings on labor, material handling equipment (MHE) and other expenses associated with manual or semi-automated cycle counting.

For the company that does twice-yearly physical inventory counts—and that needs temporary workers and has to shut down to get that monumental task completed every six months—a drone-directed cycle count program can be scheduled at any frequency throughout the year, significantly reducing the time spent checking discrepancies.

Customers can also count on positive sustainability impacts, including less material handling equipment maintenance, lower emissions and a lights-out environment as the drones move about the warehouse taking care of business. Other returns on investment (ROI) that Corvus One customers report include more reliable, accurate pick, put-away and replenishment processes. These are big advantages for U.S. warehouse operations that average about 70% inventory accuracy rates.

"When audited, year-end accuracies may 'true up' to over 99%," says Wu, "the reality is that those rates really hover around 70-80% for the other 360 days of the year."

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– Jackie Wu, founder and CEO, Corvus Robotics

CHAPTER TWO:
Easy to Adopt, Use and Adapt

In the modern business environment, warehouse operators need flexible technology solutions that fit into their existing operations and provide advanced capabilities without disrupting workflows, throughput and processes.

Knowing this, Corvus Robotics designs modular hardware and software that is easy to install and that can be up and flying in less than a week. The solutions can then be moved, changed and/or upgraded, and are designed for use in both greenfield and brownfield locations.

The Corvus One RaaS package can also be integrated into any WMS, including SAP, JDA, Oracle, NetSuite and proprietary applications. "We can even connect right into smaller niche or homegrown/custom-built applications—plus older software like AS/400," Wu explains. These connection points are critical because they allow companies to install the drone and then immediately start capturing more accurate inventory data in their existing software systems.

"There are no changes to the existing infrastructure, both from a racking and barcode standpoint, and we don't require special barcodes. We just adopt Corvus One to most existing setups," Wu says. "This makes implementation much easier and simpler compared to some other systems out there and not just from a drone perspective, but also from an automation perspective."

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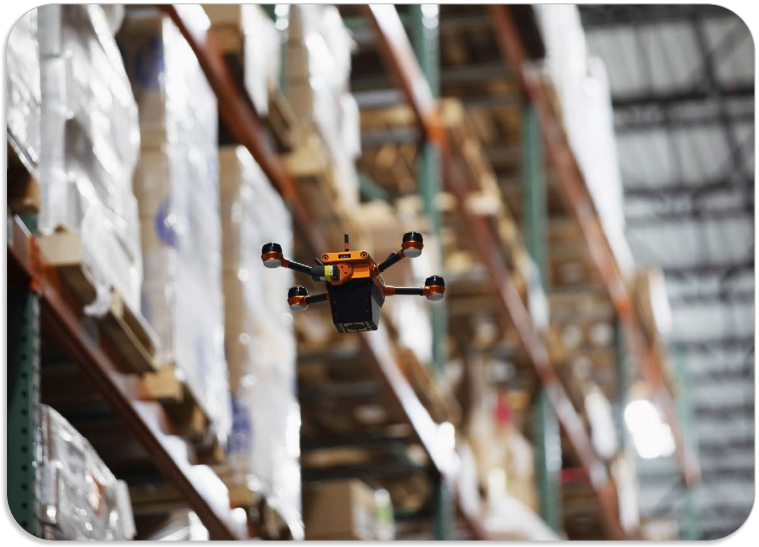
CHAPTER THREE:
The Drones Come Out at Night

It's one thing to talk about how self-flying drones help companies save money, operate more efficiently and control their inventory levels, but it's something else to actually see the vehicles in action in a real-life setting. Austin Feagins, senior director of customer solutions, gets to witness the drones in action at Staci Americas' warehouses every day.

Headquartered in Atlanta, Staci Americas is a third-party logistics (3PL) provider whose services include warehousing, order fulfillment, transportation and returns management. The company is part of Staci Group, a European omnichannel fulfillment provider with 78 facilities and a footprint that extends across the U.S., seven European countries and Asia.

The organization, which was acquired by bpostgroup in August of 2024, provides integrated fulfillment solutions (direct-to-customer, retail and wholesale customers), kitting, complex packaging, logistics and warehousing to a growing B2C and B2B customer base. Many of Staci's facilities run either one or two shifts, so the locations sit "dark" for about 6 to 8 hours per day. After employees exit the building for the day and the motion sensor lights switch off, it's the Corvus One autonomous drones' chance to shine.

The vehicles leave their landing pads and start the process of counting all of the inventory in the warehouse. The data is uploaded to the company's proprietary, integration WMS, and then waits patiently for employees to filter back into work the following day.



Even before the picking and packing workers make their way onto the warehouse floor, shift managers are already proactively comparing inventory levels, making adjustments and fixing issues.

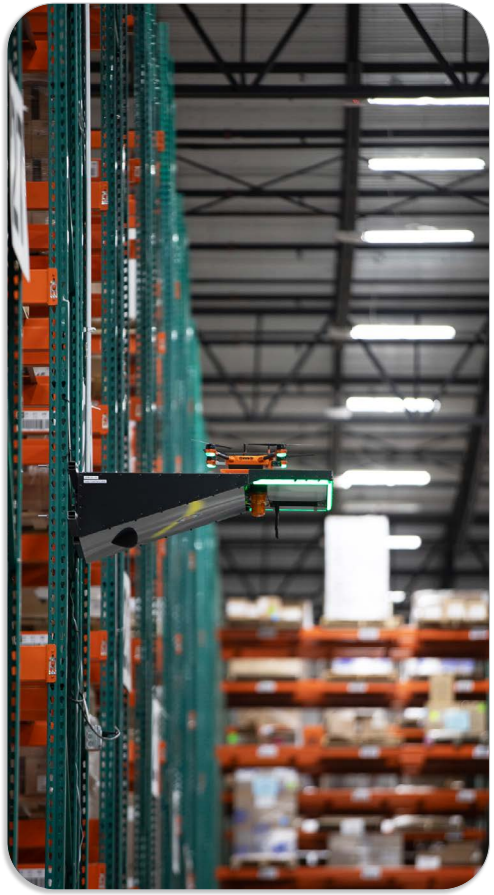
"Our inventory teams come in during the early-morning hours, after the drones have finished making four or five flights, and have the reports right at their fingertips," says Feagins. "They can get in there and correct any discrepancies during the first 60 to 90 minutes of the day and before inbound and production come in. That's been a real game-changer for us."

CHAPTER FOUR:
Tackling Inventory Management Challenges

Before it started using the Corvus One drones in its warehouses, Staci faced many of the same inventory issues that companies typically deal with. It was doing cycle counts manually and encountering challenges on the production floor (e.g., pickers unable to locate goods, replenishments weren't on time and outbound orders were delayed).

If a B2B pallet needed to be pulled and shipped, and if that pallet wasn't in the right place, locating it was taking anywhere from 6 to 8 extra hours.

"We get penalized by clients and providers for not shipping and delivering orders on time. That's fairly common practice in our industry," Feagins explains. Of course, many of those challenges were multiplied across 50+ different customers, since the company serves such a wide range of different clients with its omnichannel operations.



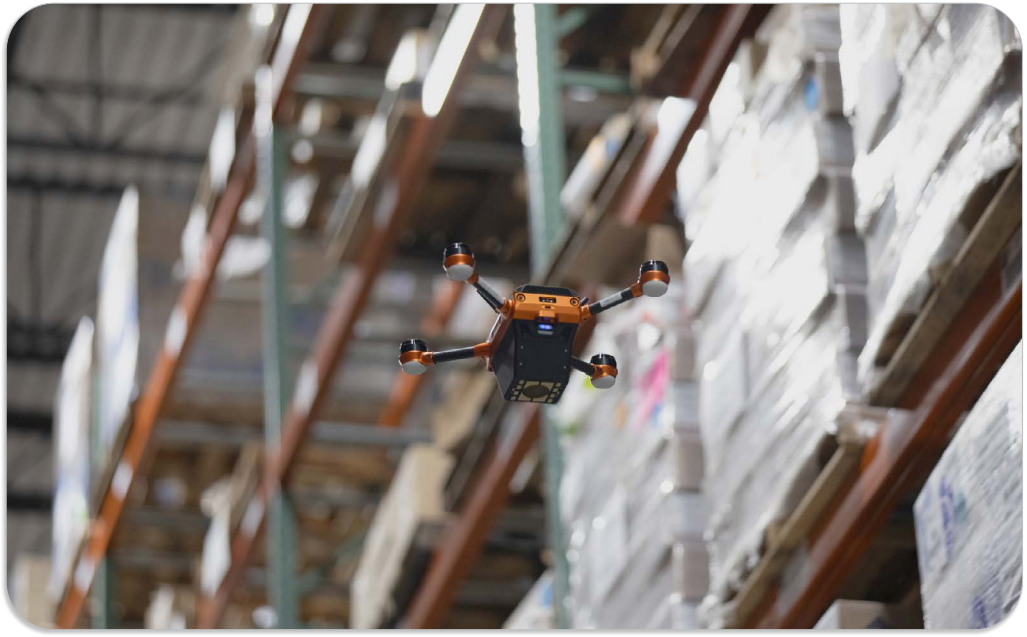
The company knew the right inventory management solution would also save the many wasted hours its employees spent searching for products in the warehouse—not to mention the customer penalties it was incurring for any shipment delays. Having an efficient and productive warehouse operation from a timeliness perspective would ultimately lead to lower operational and contractual costs.

Staci's ultimate goal is always to get its clients' products to the right place at the right time, and when each building manages 5,000 to 10,000 SKUs and 10,000 to 30,000 pallet positions, "That's a lot of product, which equates to a lot of chance for things to be misplaced," says Feagins. "These challenges drove us to take a look and see what's out there in the market that might be able to help us and give us a leg up on our competitors."

CHAPTER FIVE:
Finding the Perfect Solution

After learning about Corvus One at an industry trade show, Staci signed up for a 6-month paid pilot program. It adopted a single self-flying drone, used it for a large number of "missions," and then checked its error rates.

From that exercise, the logistics provider learned that the ROI on a single drone would be six months or less.



"I want them in every single building that we have…We probably have four or five buildings where an urgent deployment makes sense, and our plan is to have them in every one of our U.S. markets in 2025."

– Austin Feagins, senior director of customer solutions, Staci Americas

And with that, Staci decided to implement four drones and four landing pads in its corporate headquarters location in Atlanta, which manages about 17,000 pallet positions weekly.

Staci then began using the drones in its New Jersey innovation center, where two drones and two landing pads handle all of the cycle counting work. The company is planning to implement more of the drones—both nationally and internationally—in the coming months.

If Feagins has his way, the Corvus One solution will be the blueprint for all of Staci's locations. "I want them in every single building that we have," he says. "We probably have four or five buildings where an urgent deployment makes sense, and our plan is to have them in every one of our U.S. markets in 2025."

CHAPTER SIX:
The Cool Factor

Staci's inventory management drones have produced numerous benefits for the busy third-party logistics provider. Staci is saving money and time, including time of management, while reducing usage and wear-and-tear on material handling equipment. The improvement also extends to better space utilization in its facilities and happier customers who know all of their B2B and B2C shipments are being tracked in a timely, accurate manner.

"We want to utilize as little space as possible so that we can help clients either expand or add new clients to our buildings," says Feagins. "We also now have very extensive reporting and a clear picture of where the opportunities lie." He says the inventory drones were easy to set up, feature a modular design that can be adapted as needed and support the company's sustainability goals (e.g., lowering emissions and reducing equipment maintenance).

There's also a "cool factor" that no software program, spreadsheet or clipboard can even come close to. Feagins says everything he envisioned about drones—joysticks, human operators and tons of batteries—went out the window when Staci adopted the Corvus One solution. Instead, the solution is as simple as installing one data (Ethernet) line and one power line.

"You don't even need Wi-Fi throughout the entire facility," Feagins points out. "As long as you have power and data, you get a drone and a landing pad and you're all set." The landing pad also acts as a data center. After coming back from its daily runs, the drone immediately begins recharging and transferring data to the WMS.

Thanks to its Corvus One drones, Staci has been able to reallocate employees who used to spend their days conducting inventory audits. "We took those highly-trained and skilled people and shifted them to a department that really needs them," says Feagins. The logistics provider has also reduced the number of misplaced pallets and maintains an inventory accuracy rate of 99.8-99.9%—up from a prior 98-99.4% range.

Those high accuracy levels are critical for an operation that, according to Feagins, could wind up with 20 production employees unable to work because the items in question can't be found. Multiplied across Staci's expansive workflows, these non-productive hours can take a significant chunk out of the 3PL's bottom line.

"Instead of misplacing pallets of goods, we're now down to one or two units missing, and that's probably because they just got stuck in the conveyor belt," says Feagins. "I can't stress this enough, the accuracy improvement for us may mean a percent or even half a percent, but we're playing a game of percentages, and in that game of percentages the small decimals translate to thousands and thousands of dollars, especially for us and for our clients."

IT'S TIME FOR A CHANGE

Meeting customer demands in an environment with labor and resources challenges is difficult. Organizations that rely on manual inventory management processes and daily inventory audit rituals may soon find themselves at a disadvantage as more of their competitors automate and digitize.

By deploying self-flying inventory drones, companies like Staci Americas can replace slow, inaccurate, manual inventory counting processes with a self-contained RaaS offering that's easy to implement and even easier to use—even with the lights out.

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