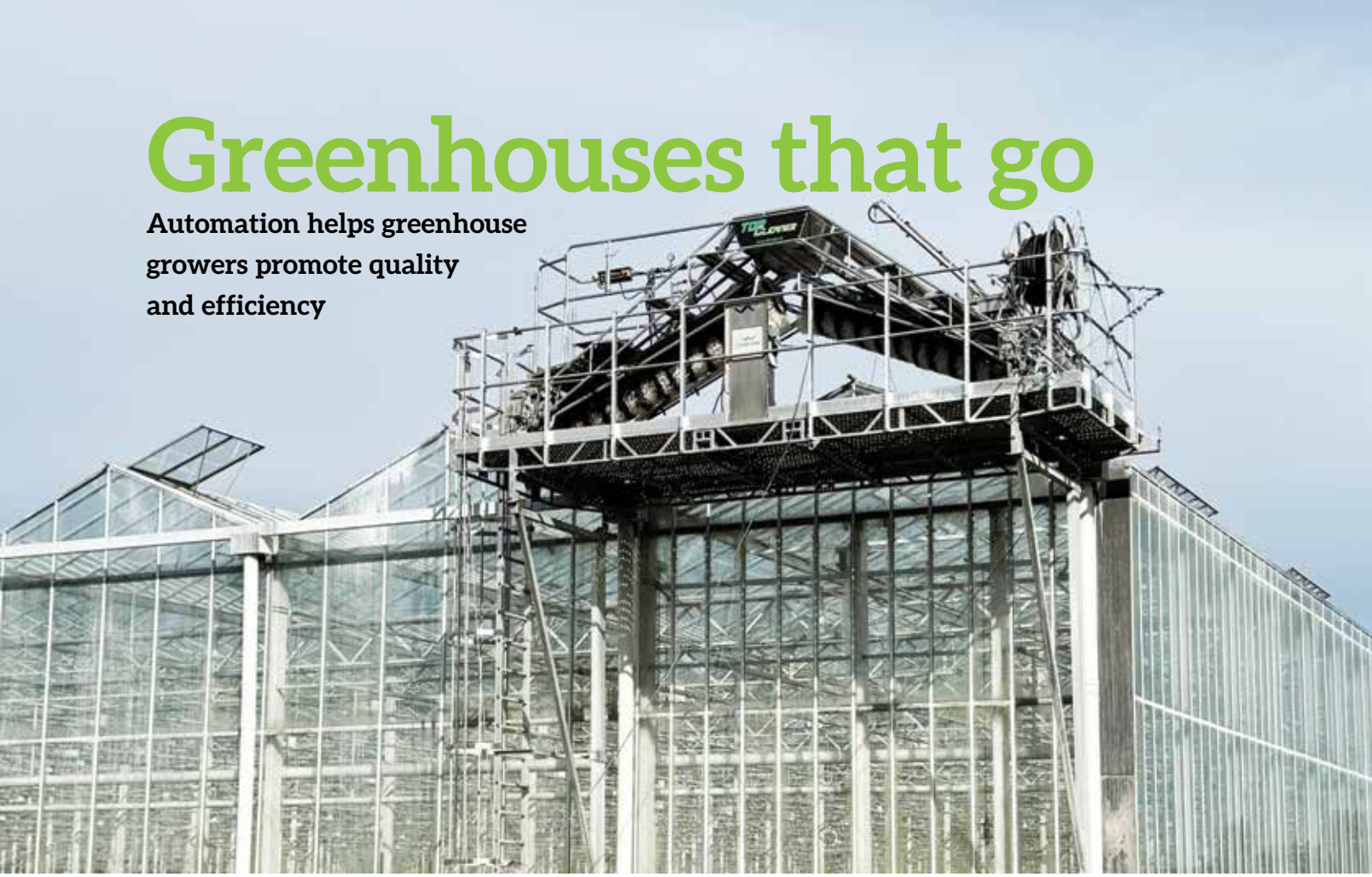
Greenhouses that go

Automation helps greenhouse growers promote quality and efficiency



Above: An automatic roof washer known as a Top Cleaner from the Dutch company Van Der Waay runs laps back and forth atop Oregon Flowers' greenhouses to keep them clean. Below: A "top trimmer" machine from GK Machine uniformly trims any stems left in soil crates after the mature flowers are cut. PHOTOS COURTESY OF OREGON FLOWERS

BY JON BELL

For Tyler Meskers, owner of **Oregon Flowers**, greenhouses are key to growing the colorful lilies, tulips and other cut flowers that the company has become known for since his parents founded it in Aurora, Oregon, in 1985. And it's not just because their 10 acres of greenhouses create optimal growing conditions; it's also because they provide something that Mother Nature can't — multiple growing seasons each year.

That means Oregon Flowers can meet the high points of demand throughout the entire year with fresh flowers no matter the season, from Thanksgiving and Christmas to the rushes at Valentine's and Easter, on into Mother's Day and then the relatively calm weddings and celebrations of early summer.

"In a greenhouse, we can mimic the late spring season with grow lights and heating, so we can force our plants over a three-month period," Meskers said. "Out in the fields, you only have one chance throughout a 12-month period. We pretty much have four cycles a year in our greenhouses, sometimes five, so it's like you can run five seasons instead of just one being outside. That's really how we get the numbers to work."

Of course, greenhouses are nothing new. The first attempts at growing indoors likely date back to ancient Rome if not earlier; later advances happened in Korea during the 15th century. The first practical modern greenhouse was built in Holland in the 1800s, and similar structures developed throughout the remainder of the 19th and 20th centuries in Europe, North America and beyond.

And while greenhouse designs continue to evolve to improve efficiency and growing conditions, growers in more recent times have turned to another factor to help their glass (or plastic) houses grow the best they can: automation.

From automated climate controls, lighting and irrigation to autonomous vehicles and robots that can cut flowers, stack crates and mix soil, automation is helping nursery growers improve quality, efficiency and consistency. It's been happening — and helping — for years. And even though there is concern that automation might be displacing workers, many nursery owners say automating tasks frees up their employees for much more »

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Canopii takes a leap towards autonomous greenhouse production.
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meaningful and important work.

"We are always looking at automation," Meskers said, "but that's not to necessarily remove employees, but to expand our production and improve our quality while we keep our labor force the same."

The basics

Automating and mechanizing greenhouses — and the work that goes on inside them — has been happening for years. These days, it's not uncommon for greenhouses to have sidewalls that automatically raise and lower depending on the weather and other conditions. Many also have programmable fans that create the horizontal airflow that's key to creating an ideal growing environment.

It's no longer cutting edge, but rather best practice, to have temperature, irrigation, fertilization and other factors programmed and controlled digitally, making it easier to create the kind of consistent conditions that result in higher-quality crops.

"Greenhouse automation systems enhance plant quality, uniformity and operational efficiency by providing precise control over the cultivation environment," said Derrick Bratton, head of greenhouse sales for **GK Machine**, a manufacturer of agricultural equipment and greenhouses that is based in Donald, Oregon. "These systems regulate key variables such as temperature, humidity, irrigation and fertilization, creating stable conditions for consistent crop development."

Future focus

And then there are other innovations that have made their way into greenhouses to help growers in different ways.

Pablo Costa is the director of operations for Van Belle Finished Plants, part of the **Van Belle Nursery** in Abbotsford, British Columbia, Canada. They grow a broad range of plants, from tropicals and succulents to perennials and grasses, for sale to retail shops and high-volume garden centers.

Costa said the company has been investing in automation for its greenhouse operations annually. "My starting point is always looking at automation equipment that is replacing repetitive or tedious work," he said. "Equipment that has a good ROI (return on investment) and saves time in terms of hours of labor or unvalued labor activity."

Workers at Van Belle receive a briefing on an autonomous Burro, which can be used to move racks and plants. PHOTO COURTESY OF VAN BELLE NURSERY

For Van Belle Finished Plants, that's meant investing in automated wrapping machines, which automatically wrap containers in plastic to secure them for shipping. Van Belle has also purchased an automatic soil machine that fills hoppers with soil, a job that used to be handled by an employee in a Bobcat.

In addition, the nursery now has two autonomous vehicles called Burros, which can be used to move racks, plants and other goods around the property — work that used to take a driver and a vehicle.

At Oregon Flowers, crews use a "top trimmer" machine from GK Machine, which uniformly trims any stems left in soil crates after the mature flowers are cut. That way, the crates can be stacked evenly by a robotic machine. Before, workers would tend to this task with knives, something that didn't always result in uniform cuts. It was also work that would often provide overtime hours for employees — a perk that's gotten more challenging for nurseries to offer as rules have changed and made overtime pay more costly.

They also employ an automatic roof washer known as a Top Cleaner from the Dutch company Van Der Waay, which runs laps back and forth atop Oregon Flowers' greenhouses to keep them clean. In addition, Oregon Flowers has a robotic mobile stacking unit built by Terra International that collects crates from the greenhouse and places them onto pallets, which can then be transported by forklift. There's also a mobile stacking unit from Dutch company Potveer that takes out old crates and brings in freshly planted ones, work that used to require manual labor.

Other innovations making their way into greenhouses include systems for pest and disease management which, according to Bratton, can apply treatments automatically in precise, pre-calculated amounts, helping to mitigate crop loss and reduce the need for widespread chemical applications. Advanced sensors and software utilizing AI can also monitor environmental variables like temperature, humidity and lighting and make real-time adjustments to maintain ideal conditions.

"By implementing these automations, greenhouse growers can achieve greater operational efficiency, reduce manual labor and produce a more consistent, high-quality product," Bratton said. Other benefits of automation include more efficient use of resources — i.e. saving electricity, not over-watering, etc ... — optimizing available workers, shifting to year-round production and being able to operate more sustainably.

Meskers said the biggest difference he notices with automation is an increase in quality and consistency.

"Our quality is much more consistent," he said. "If you have people doing something by hand, each person is doing it slightly different. If you have a piece of equipment doing it, your product is much more consistent. I think there's a big advantage to that."

Reality check

Despite all its benefits, automation in greenhouses doesn't come without chal-

lenges. For starters, there's the up-front cost, which can be substantial. Individual pieces of equipment come with their own costs, but a fully automated facility — including structure, systems for climate control, lighting and irrigation, automated sensors and software — can range between $100 to $150 per square foot, according to Bratton.

Cost examples for such a facility might include $75,000–150,000 for climate control systems, $60,000–120,000 for sensors and controls and $30,000–50,000 for irrigation and fertigation systems.

While the initial cost can be steep, Bratton said many growers see a return on their investment within three to five years.

There's also training that comes with new technology, not to mention maintenance and upkeep. However, even maintenance has taken a leap forward these days when it comes to automation. Meskers said if there's ever an issue with some of the Dutch equipment Oregon Flowers uses, technicians from Europe can patch in and troubleshoot or conduct maintenance from afar at night when in-person employees aren't working.

"It's definitely a different way of farming," he said. "You used to be able to go fix something with a screwdriver and a hammer. Now you go to your laptop to figure out the issue."

Automating a facility that's already up and running can be a trickier too. At Van Belle, Costa said they've had to spend time mapping the greenhouses and identifying doors and obstacles so that the autonomous vehicles can be programmed to move smoothly about the property. In some instances, that's meant making changes to the layout.

"I think you kind of wish you could start (automating) from scratch, but instead you have to modify your structure or make other changes to accommodate it," he said. "That can be a challenge."

There's also the idea that automating greenhouses means there's less of a need for real-life workers. But Costa and others say that's not how it works. When a mundane task can be automated, that worker can be reallocated to a different, more meaningful position — and more can be done with the same amount of people.

"As the company grows and we produce more plants, we're not hiring more people," he said. "We're using the same number of people but producing more — and the work's more satisfying too."

Jon Bell is an Oregon freelance journalist who writes about everything from Mt. Hood and craft beer to real estate and the great outdoors. His website is **JBellInk.com.**