(intel®)

Nature Fresh Productivity Grows on Intel®

Based in Leamington, Ontario, Nature Fresh Farms operates a 130-acre greenhouse operation that grows tomatoes, bell peppers, hot peppers, cucumbers and tomatoes. The company is expanding to a new facility in Delta, Ohio, that will start growing produce on 16 acres this year and will expand to 202 acres within the next seven years. The company also produces certified organic products.

Bringing produce to market is a manual process with high labour costs.

"In the US and Canada, we don't have cheap labour and labour is by far my number one cost at Nature Fresh," says owner Peter Quiring. "The second biggest cost is probably heating and it is not even remotely close to our labour cost."

Quiring explains that Nature Fresh Farms has more than 400 people working in its farming operations and at any given time those people can be spread out over a couple hundred acres of greenhouses in five different locations.

"Managing that number of people gets pretty difficult and we found the honor system just didn't work. We are now able to reward good performance and pay those employees who perform very well without rewarding poor performance," says Quiring, noting the tight monitoring has saved an estimated around 25% in labour costs.

 "Without investing in some of the better, modern technology we would not be able to manage labour like we do and it would be an even higher cost than it is," says Quiring.

The transformation has yielded positive results for the Canadian grower.

"Our labour costs are far lower than the other North American competitors because of the amount of data we are tracking and have analyzed over the years. We have been able to refine our processes very precisely, and even analyze the efficiency and effectiveness of one picker over another to know which ones consistently pick good produce and which ones leave good produce behind on the plants. All that data is collected and can be analyzed," says IT manager Keith Bradley, noting staff who are consistently effective are a valued commodity in this business. By rewarding performance, Nature Fresh staff retention rates are approximately 75%, which is higher than average for the industry.

The move to better monitoring and control over labour led to a new system for product traceability, which became increasingly important after a few competitors experienced product recalls. All Nature Fresh produce currently come with a 32 number bar code that identifies where the item was grown, who picked it, when, and which customer it was shipped to. All the data about each vegetable is transmitted and tracked by Nature Fresh's main Dell server powered

Nature Fresh estimates that leveraging the technology allows the company to realize higher yields while using just 5% of the water and 30% of the space that would be required to grow the same amount on a traditional farm.

by the Intel® Xeon® processor E5-2420 for big data analysis on picker efficiency, plant volume and growing conditions.

"With that (bar code) number we can track back into our labour system to know what bin it came out of and when we know what bin it came out, we know how many times that bin was filled, on which day, and by whom," explains Bradley.

"When we did it originally, it was all about labour management, but food safety is a really big deal in food supply these days," adds Quiring, whose company launched traceability in 2008.

Implementing a produce traceability program means if there is ever an issue detected with Nature Fresh produce, they can quickly identify the source without having to lock down their entire 130 acres of greenhouses.

To implement these labour control and traceability programs, Nature Fresh had to transform its network infrastructure with a significant investment in new technology to track, monitor, and report back on key data points in the operation including staff effectiveness and growing conditions. Bradley built a new network infrastructure from the ground up on Dell* hardware that's all powered by Intel®.

Initiating Cost Controls

Once the pickers fill a bin, it is weighed and that data is captured for analysis on a range of key measures including greenhouse growing conditions, picker efficiency, labour payments and which customer received that order.

"If the bin didn't weigh properly in the past, it would just error out and we wouldn't know until the end of the day. We would have to figure out whose bin was missed, and estimate the weight

based on total end of day volumes," says Bradley.

Today, each bin's weight is captured on scales connected to a Dell laptop with Intel® Core™ i7 processors and alerts are sent immediately if the weight is not correctly captured so it can be instantly re-weighed.

"The bin's weight information is processed on the local computer and our new system stops the process immediately if the bin doesn't weigh correctly so someone can correct the error right away," he adds, noting that this is saving Nature Fresh up to six hours of nightly reconciliation of bin weights and the rates Nature Fresh needed to pay the pickers from that day's work. "They are not spending hours and hours back-tracking data and filling in the gaps."

Nature Fresh has also added new technology that pre-weighs all bins and advises sales how much of each variety and what grade based on colour is being packaged that day. This helps Nature Fresh sales adjust orders in real time to respond to produce volumes.

Lining up Consistency

After produce is picked, it is placed on a packing line with up to eight lanes for produce sorting. A digital camera takes up to 30 pictures of each of the produce picked by Nature Fresh staff. The plant sorting technology running on a Dell PC with an Intel® Core™ i7-3610 processor directs the produce to the right lane according to size and colour.

"When it gets to the person putting it into the package, they don't have to think. They know the produce they are receiving is all the same size and colour," explains Bradley.

The new packing line has improved the speed of packaging up Nature Fresh

product to around eight seconds, down from the 35 to 45 seconds it used to take before the produce was pre-sorted. Packing efficiency saves Nature Fresh labour costs, while automation is increasing the consistency of their product which customers appreciate.

Powering building Automation

Nature Fresh Farms is leveraging Priva* greenhouse automation software to control conditions in their greenhouses. It runs on Dell servers powered by the Intel® Xeon® processor E5-2420 for dependable, scalable access to critical data about growing conditions. A series of sensors monitor internal and external temperatures, track weather conditions like rain, and also control the water and fertilizers delivered to each plant in every corner of the greenhouse.

"When it starts to rain or if the winds pick up, the windows will close automatically. If it gets too hot or too sunny, curtains will close," Bradley says, noting that in the past, workers would have to drop what they were doing and start to manually close windows or curtains. "It was not unusual to see Nature Fresh staff leaving church on a Sunday to close windows if it started raining."

"There is very little human intervention once the system is set up," says Bradley, noting the manpower savings is significant. Prior to automation, Bradley estimates they needed about six growers to manage 32 acres of greenhouses. Today, that same section can be managed by one person.

It has also saved time monitoring plant conditions. In the past, the head grower would spend his days walking through the greenhouse monitoring conditions. He can now see the entire facility from his Dell laptop with Intel®

Core™ i7 vPro™ processor technology and make changes on the fly, from anywhere.

"Without Priva, you'd have trouble keeping up. We can monitor everything in real time," Bradley says, noting the time savings also means growers can spend more time analysing performance, or identifying changes to the feeding routines that are needed. Where it used to take growers an hour to log all the changes they wanted to make in each section of greenhouse, it now takes around five minutes. Priva allows NatureFresh to be pro-active not reactive to conditions in the greenhouse.

"Precision monitoring lets us also keep a close eye on the volumes produced in every sector of the greenhouse," he adds. "We found out that there was an air leak in one of the north facing walls of one of our greenhouses. The leak was only detected because we were not getting as much production out of that section of greenhouse. When they started digging into why is this one section not doing well as other areas and we discovered the air leak that was causing the plants to get cold."

Nature Fresh estimates that leveraging the technology allows the company to realize higher yields while using just 5% of the water and 30% of the space that would be required to grow the same amount on a traditional farm.

Automation is also helping Nature Fresh with its plans to raise bees for pollination. A climate controlled facility will change temperatures at specific times to encourage the bees to leave the hive. Maintaining their own hives eliminates the need for someone to manually pollinate the flowers, saving time and labour.

Monitoring Plant Health

With the investment in technology and a solid infrastructure on which to

Challenge:

Picking produce is a manual process and with employees working across 130 acres of greenhouses, monitoring performance is challenging. With growing global competition from low-cost labour countries, Nature Fresh Farms needed to boost efficiency, monitoring and productivity to compete.

Solution:

Transforming a Growing Business. A new network infrastructure was built from the ground up leveraging Dell servers featuring the Intel® Xeon® processor E5-2420 and desktop solutions powered by the Intel® Core™ processor family to deliver real-time monitoring of plants, greenhouses, produce and labour.

Impact:

- Real-time plant monitoring software means one grower equipped with a Dell laptop, featuring the Intel® Core™ i7-4600U vPro™ processor, can monitor production across 32 acres, eliminating the need for up to six additional staff, and increasing yield by up to 10-15%.

- Greenhouse building automation, controlled by Dell servers with Intel® Xeon® processor E5 technology, lets Nature Fresh realize higher yields using approximately 5% of the water and 30% of the space needed by traditional approaches.

- Analysis of produce colour and size on a Dell laptop powered by Intel® Core™ i7 processor technology pre-sorts vegetables and cuts packing time from 45 seconds to around eight seconds per box.

- Produce traceability and detailed labour monitoring provides Nature Fresh with real-time data about picker performance, productivity and efficiency resulting in approximately 25% labour cost savings.

build, Nature Fresh is constantly looking at new areas of growth or improved efficiency. They have moved into the organic pepper market and are the first greenhouse in Canada to test grow lights for producing peppers.

In addition, they have implemented a new plant monitoring system that Quiring describes as an EKG for plants. "It measures the plant temperature. It weighs the water going into the plant and leaving the plant, and is able to translate this information into a harvest and yield forecast," he says, noting the software can also show with time lapse photography how changes in temperature or increasing water at set times can change the projected yields.

"The new plant measurement technology is pretty exciting and we are the only ones in North America using it," says Quiring. "We are constantly implementing new things, like using photo optics for grading fruit size. Some of the new camera systems are pretty amazing."

Big Data Produce Analysis

With the vast amount of data being collected, Nature Fresh Farms is translating that information into useable business information such as sales forecasts so their reps can promote produce they have in abundance or predict peaks so that they can increase the orders to coincide with the flush.

The information is being used to identify which areas of a greenhouse have the best yields for specific produce so they can maximize productivity across a limited space.

This kind of data analysis has allowed Nature Fresh Farms increase yields by approximately 15%.

Refreshing the Fleet

When Bradley came into Nature Fresh four years ago, the average age of computers was five years old. He modified the refresh schedule to replace mission critical machines every three years to eliminate computer crashes that were the norm before he joined the company.

"Downtime translates into huge costs," he says, noting with their operations tied into new technology, people need to be able to function reliably and efficiency. He standardizes on a minimum of the Intel® Core™ i5 vPro™ processor family for laptop and desktop PCs, and the latest generation of Intel® Xeon® processors in his servers.

"We are constantly upgrading our software systems to deliver even more fine control over greenhouse conditions. We need flexibility to respond to new requirements that come up," he says, adding virtualization gives him that capacity to make rapid changes in response to new requirements.

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