

**FOCUS: STORAGE & CONTAINERS****Building the sweet spot of apple storage is part science, part art**

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By the numbers, apple grower Chris Hedges spent five years of research on two continents to pull a trigger on a \$3.5 million investment in controlled atmosphere storage. Not only is he at peace with the decision, but so are his banker and accountant.

“It was painful at the time with a projected payback of 15 years,” says Hedges. “But I wanted on-farm storage so that I could deliver a better product and pull more margin out of an industry that is experiencing declining margins.”

By industry standards, Hedges is a young grower with 20 years under his belt. His 250 acres of high-density apples at Vanessa, Ontario are planted to consumer favourites: Gala, Honeycrisp and Ambrosia varieties. In 2011, he acquired another farm contiguous to his own. Only then, did he start musing about the possibilities of building his own controlled atmosphere (CA) storage with enough apple volumes to justify the space.

The science of CA storage – regulating oxygen, carbon dioxide and nitrogen levels as well as the temperature and humidity -- is well understood in preserving apples for months at a time. The art of CA storage is how the building is constructed to most efficiently control the interior environment. Air leakage is the enemy.

To that end, Hedges narrowed the contenders to a handful of vendors specializing in the field. Besseling Group, based in the Okanagan Valley of British Columbia, won the contract for the CA technology, the panels and the doors.

“They are a Canadian supplier with a long history in Holland,” explains Hedges. “They are not gimmicky, but put forward proven technologies.”

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**Chris Hedges manages 250 acres of high-density apples at Vanessa, Ontario. He spent five years researching the best controlled atmosphere storage for his farm. Photos by Glenn Lawson.**

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The Dutch expertise of Besseling CA Systems was contracted for the installation of controlled atmosphere rooms, panels and doors.



Buffer lungs regulate the atmosphere in the room partially before starting machinery.

Buchanan and Hall, Stratford, Ontario won the bid for refrigeration, with a reputation built in the agricultural sector since 1950. A local general contractor, Reid and Deleye, Tillsonburg, Ontario was hired to manage all the trades.

With these key suppliers in place, the starting time was February 2018 with clear deadlines. The structure was ready to receive that season's

harvest by September 2018.

"It's important to remember that you're a farmer," says Hedges. "I saved a ton of time and aggravation by hiring a general contractor who understood time lines in agriculture."

As it turned out, the 17,000-bin storage facilities of Hedges' buyer – Martin's Family Fruit Farms -- burned to the ground in a nearby village in March

2018. It was fortuitous to be able to rent some of the new 10,000-bin space last fall with room to stack nine bins high.

"We were jammed to the rafters," says Hedges. A true test of the quality of construction of a CA storage is the level of air tightness in the rooms. With the big crop last year, the Besseling equipment and panel installation were put to the test. Experienced CA storage panel installers were used. They also installed "fleece filler" on all the panel seams in the rooms. This additional measure ensures that the rooms can be kept at low oxygen and ultra-low oxygen regimes from the start.

Building costs are one consideration, but another is ongoing energy costs. According to the Besseling website, a frequency-controlled ventilator reduces energy consumption to a minimum – an important benefit because an adsorber runs for the majority of the day. Every fruit and vegetable variety has its own CO<sub>2</sub> production and maximum permitted CO<sub>2</sub> value. For this reason, Besseling produces different capacities of adsorbers.

The refrigeration is rack-style using variable horsepower units to minimize power use particularly after the building has been "pulled down" to maintenance temperatures. The entire building – from lighting to refrigeration to atmosphere control – has been designed and built to keep operating costs to a minimum for the long term.

"It's sticker shock to build these buildings," says Hedges, "but it's either pay now or later."

In the early going, Hedges has made an astute decision to invest in cold storage rather than more apple acreage. His rationale is to build his business vertically rather than horizontally. There are growers and then grower-shippers and marketers. He is relying on his expertise in the growing and management of his apples through the entire year.

When the Ontario government signaled the rapid rise of minimum wage rates in 2017, Hedges didn't risk planting more apple acreage, hiring more labour at ever-rising costs and building more bunkhouses. He figured there

was more certainty in building on-farm storage facilities that required only himself and one other person to manage.

In retrospect, after just one season of apple storage, Hedges has a new appreciation for the steep learning curve. With nearly all apple varieties, they don't get any better in storage. Knowing the qualities of the apples at harvest time and how fast they have been cooled to proper temperatures are important factors in evaluating apple quality coming out of storage.

"If apples go into storage a little soft and overripe, they will never improve in the cold," says

Hedges. "It's been a large learning curve by apple variety. Some varieties such as Honeycrisp aren't kept at typical refrigeration regimes, requiring extensive management such as individual controls room by room."

On July 22, Hedges shared his venture with those on the summer tour of the International Fruit Tree Association. His orchard and storage were a timely stop to punctuate his career in apples. The association has not visited Ontario since February 1999 – virtually when Hedges got into the business.

## Setting the new standard in CA storage

### Unrivalled quality, from fruit growers roots



- Superior quality equipment
- Unbeaten energy performance
- Extreme reliability
- Small footprint
- Global operating company
- Local support and service

### NITROGEN GENERATOR

- High purity output
- Most efficient energy to production ratio
- Low total cost of ownership



### CARBON DIOXIDE ADSORBER

- Large range of capacities available
- Low energy consumption
- Patented low oxygen operation

### ETHYLENE CONVERTER

- Decomposes to PPM and PPB levels
- No consumables
- Proven technology



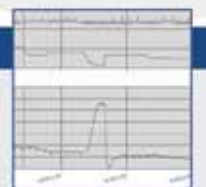
### ATMOSPHERE CONTROL SYSTEM

- Control of O<sub>2</sub>, CO<sub>2</sub>, C<sub>2</sub>H<sub>4</sub>, temperature and humidity
- Centralized controls via easy to use software
- High accuracy sensors



### DCA - FRUIT OBSERVER

- Based on chlorophyll fluorescence measurement
- Safe detection of lowest oxygen level
- Significant reduction of scald



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