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# PIONEERING CANADA'S FIRST INDUSTRIAL AMMONIA/CO<sub>2</sub> BRINE SYSTEM

## Ammonia/CO<sub>2</sub> Brine System

- Provides 200 tons of refrigeration affordably and efficiently.
- Offers the efficiency of an ammonia-based system with the safety of pumping cooled CO<sub>2</sub>.
- Features four 100 HP, 575-volt variable frequency drives.
- Designed with a multi-port valve station with a high-design working pressure of 754 psig.

Expansion brings with it opportunities and challenges — opportunities to grow and provide better customer service, and the challenge to do so affordably and in a way that does not significantly impact the environment.

The people at Flanagan Foodservice, Inc. should know. The broad line foodservice distributor recently completed a 65,000-square-foot expansion of its Kitchener, Ont., facility, increasing the size of the structure by 50 per cent. Most of the 65,000 square foot expansion is a state-of-the-art freezer that uses technology developed and implemented in Japan, but never before built in Canada. Flanagan Foodservice caters primarily to restaurants, including quick-serve restaurants, fine-dining establishments and everything in between. Its list of more than 5,000 customers also includes bakeries, doughnut shops and healthcare and institutional facilities.

Flanagan's 32-year history is matched by 32 consecutive years of growth.

"With a track record like that, it's natural to anticipate continued



## Varying the speed

Danfoss supplied the system's ICF valve stations, and variable frequency drives and pressure transmitters for the NH<sub>3</sub> screw compressors and CO<sub>2</sub> pumps.

"When you vary the speed, you can achieve significant energy savings," said Jim Hower, national sales manager for Danfoss, who installed a number of system components. "Additionally, the variable frequency drives are easy to program and interface with the local programmable logic controller."

Quinn Vo, corporate engineer at Japanese parent of Mycom Canada, Mayekawa, agrees, "The programming is very user-friendly. The keypads are transferrable from drive to drive, so once you program one, you can move the keypad to another drive and download the settings, saving time in the process."



growth," said Rick Flanagan, executive vice-president at the company. "However, we were at capacity in our old facility and unable to add new customers and new product lines in our building footprint. In order to continue to grow and invest in our future, we needed additional warehouse space."

The expanded warehouse opened in April and brings the facility to 200,000 square feet. Because much of the company's business is in the frozen food area, the addition was used to double the size of the facility's freezer space to 50,000 square feet, including 45,000 square feet of regular freezer space and 5,000 square feet of ice cream freezer space. An additional 10,000 square feet of cool dock and 5,000 square feet of refrigerated storage completed the expansion.

The original facility relied on an R-22 system to provide 163 tons of refrigeration and maintain temperatures as low as four degrees Fahrenheit in the regular freezer, and minus-20 degrees Fahrenheit in the ice cream freezer.

So, the search was on for an alternative refrigeration system that could provide as much as 200 tons of refrigeration—and do so efficiently, affordably and in an environmentally responsible way. An ammonia-based system offered the efficiency the company sought but Flanagan was concerned with the risk of a leak or an accident.

When considering refrigeration options to serve the new, larger facility, Flanagan admits the low initial first cost of an R-22 system – a viable



## Reducing ammonia charge

The refrigeration solution at Flanagan Foodservice uses ammonia in two large, insulated compressors that are isolated in an enclosed space. The compressors cool CO<sub>2</sub>, which is then pumped into those areas of the building that require refrigeration, significantly reducing the ammonia charge the warehouse holds.

"As a result, Flanagan enjoys the cost benefit derived from the efficiency of ammonia and feels comfortable knowing they are pumping CO<sub>2</sub>, and not ammonia, into their building," explained Len Puhacz, manager of green technology projects for Mycom Canada, the company that supplied the equipment.

## Under pressure

Before the Canadian B52 code was amended (even prior to the system design and commissioning), it allowed CO<sub>2</sub> — as long as the system was designed to ambient condensing pressures of 1,100 psig, which is not practical in industrial refrigeration. The system in use at Flanagan Foodservice was designed to safely operate at a maximum of 600 psig, which satisfied Canadian authorities.

option at the time of the RFP – held some appeal, but it would not have been the most environmentally-friendly option, and with the future cost of refrigerant to consider, ongoing maintenance costs became another factor to consider in the overall cost of the new system.

Instead, the company turned to what Flanagan described as "an exciting new technology that represents the best of both worlds" – a dual-temperature ammonia/CO<sub>2</sub> brine refrigeration packaged system.

"We're looking at a payback for this system of about 6.6 years thanks to the energy savings it offers," reports Flanagan. "And it's an environmentally-friendly system that will reduce our carbon footprint and eliminate safety risks to our employees and the products we warehouse. When you put all of that together, it's definitely clear that the ammonia/CO<sub>2</sub> system is a win for us."



## Factory-built components

The single, one-piece valve station in the system provides ports for up to six-function-device modules that are configured specifically for a customer's application and shipped to a jobsite as a complete subassembly, ready for installation into the jobsite piping or into the OEM's products.

"It's really quite simple to install, requiring just two welds," explains Jim Hower of Danfoss. "Without the valve station, you would need to use individual components, requiring multiple welds and additional installation time. And because the valve is a factory-ready block, it reduces the potential for leaks that occur as the result of flanges or welds, and improves system reliability."