

AdaptaPak Puts Grocers on the Path to Increased Profitability

Anyone in the food retail business knows that making money today is more challenging than ever. From razor-thin margins to rising energy costs to ever tightening regulatory pressures and changing shopper preferences, the obstacles to profitability have never been greater.

An Alternate Approach to Refrigerate Your store



Given that a store's refrigeration is one of the single largest ongoing costs a retailer faces, (along with lighting and HVAC) these areas of power consumption together typically add up to two thirds of a store's energy use, the need to find savings in this critical area is essential. In fact, for many retailers it could practically be their mantra: lower energy and operating costs, increase efficiency and avoid compliance burdens, while at the same time maximizing any revenue generating resources possible. It's the only way to stay in business.

There are different approaches with current refrigeration technology to achieving these goals but one of them—highly-efficient distributed refrigeration systems, may be the most effective of all depending on a store's specific requirements. The AdaptaPak system from Hillphoenix brings these advances to retailers.

Up until a few decades ago, most supermarkets and food retailers relied on traditional direct expansion (DX) refrigeration using Freon (HCFC) refrigerant. But with the advent of the Montreal Protocol in 1987, and subsequent international agreements since then, the industry has moved towards low global warming potential (GWP) HFCs and HFC/HFO blends. It has also led to the adoption of secondary systems and natural refrigerants. In fact, these two go approaches often go together as in systems that use a natural refrigerant as a secondary coolant and a small amount of

an HFC/HFO as a primary DX refrigerant. Still other types of systems rely entirely on natural refrigerants like CO₂.

Centralized parallel rack systems, the kind in use in most supermarkets today, typically have a couple of parallel racks in a single location to cover all of the refrigeration requirements for the store. Usually, one of the two racks is connected to all the medium-temperature loads and the other rack is connected to all of the low-temperature loads. Circuited or loop piping systems connected to manifolds (or headers) on each rack circulate refrigerant to their portion of the store's loads.

But at the same time that these newer systems were being developed, commercial refrigeration was also progressing along another path – distributed systems.

With their ever-tightening margins, food retailers' concerns can often come down to even the last square foot of physical space in their buildings. A dedicated machine room containing one or more parallel racks for instance, can take up a considerable amount of space; space that could more effectively (and profitably) be used for storage or additional sales space. Eliminating the mechanical room can also add to construction savings to the project.

The Distributed Option

The distributed refrigeration approach solves this problem by locating the equipment away from valuable store space and placing it in a weather-tight enclosure outside. Besides freeing up considerable space for more revenue-generating activities, AdaptaPak distributed systems offer other savings that can make a critical difference.

Installation costs, for instance, are one place where distributed systems can offer retailers savings by shortening the distance of piping runs. Centralized parallel rack systems can require long extensive pipe runs from the racks to the cases and walk-ins throughout the store. The same is true with the electrical wiring that controls and connects the racks to those cases and walk-ins. But, with distributed systems, those piping and wiring runs are usually shortened since the individual refrigeration units are located much closer to their refrigeration loads. (Of course with multiple distributed units as would be required for supermarkets and warehouse clubs, more piping

and wiring is needed.) Often the units are situated directly overhead on the roof above the sections of the store they serve. In other cases they're placed outside behind the exterior walls of stores (usually along the back or sides of the building) immediately opposite their lineups and walk-ins. A single-point penetration is all that is required for each unit. And for C-stores and other smaller format retailers, often a single AdaptaPak unit is all that is needed.

Another benefit that comes from shorter pipe runs is that the number of brazed joints in the piping that is required to negotiate the twists and turns between the refrigeration machinery and its loads is greatly reduced. This matters since each joint is potentially a point from which refrigerant circulating through the piping can leak. In fact, poorly maintained brazed piping systems on average loose as much as 25% of their refrigerant annually. The resulting replacement and compliance costs add up.

When compared to traditional centralized systems, distributed systems typically require less piping, with less brazed joints, carrying less refrigerant, ultimately resulting in less loss of refrigerant.

AdaptaPak units only need a steel frame on the roof or a poured concrete pad on the ground to support them. The low-profile configuration of AdaptaPak units in particular make them an appealing choice since in most roof-mounted installations they essentially become invisible from the ground due to their compact design.

By limiting the sections of the store that individual units handle to different suction groups or departments, another potential advantage of distributed systems come into play especially in larger stores. The two major load groupings in most stores, medium temperature and low temperature, almost always contain narrower temperature bands within them. Medium-temperature applications, for instance, usually range from seafood and meat (27 to 29°), to dairy (30 to 34°), and produce (31 to 34°). Low-temperature applications also usually include different product types such as ice cream (-25 to -12°), frozen foods (-15 to -2°), and walk-in freezers (-25°).ⁱ Even though the difference between these bands may seem insignificant, the energy that is needed to meet a temperature

requirement of just one degree (the difference between dairy and produce, for instance) adds up. In order for a traditional centralized system to perform adequately, it must run its compressors for a given suction group enough to satisfy the lowest temperature requirement. In the example of the medium-temperature group described above, that is 27° even though the other requirements in the group range upward to 34°. The result of this type of arrangement is that at times unneeded capacity results in wasted energy consumption.



AdaptaPak systems are designed with a number of innovations built-in that ensure their efficient installation and operation. These innovations begin to pay off right from the start. Among these is a whole high-side mechanical package that fully integrates a condenser into the rest of the unit. Each unit with its built-in condenser is shipped complete from the factory ready for installation.

Even with their built-in condensers, the units are compact. Standard two-fan configurations weigh approximately 3,800 pounds and three-fan versions about 4,500 pounds. An available four-fan version comes in at 5,200 pounds. All versions are 51 inches tall, with another 3 inches height for the fan guards, by 51 inches wide. The two-fan version is 140 inches long, the three-fan version 180 inches long, and the four-fan version is 220 inches long.

The entire unit can easily be lifted into position on the roof with a crane attached to built-in lifting lugs on each side, or even with a forklift through the lift pockets in the unit's base. Piping and electrical connections, each through a single penetration, can then be connected to the nearby loads the unit is serving. In the case of c-stores and other small format retailers, that is all that is

needed for setting and connecting single AdaptaPak units. Of course, stores with two or more units will need penetrations for each additional unit's piping and wiring.

For larger-scale operations, supermarkets, warehouse clubs, etc., multiple units will be necessary. But here again, the benefits of distributed systems being located closer to their loads means potentially less piping and wiring than would otherwise be required for comparable centralized systems. With less refrigerant and installation materials needed, lower installation costs can result.

The advantages of AdaptaPak often extend beyond installation to the cost of their operation. Each unit with its end-mounted weatherproofed electrical control panel, IEC contactors, phase loss monitor and MultiMax system controller is designed to deliver the most efficient operation. Depending on the application, different configurations of the units are equipped with from two to six compressors can be chosen. All versions use highly efficient multiple-staged scroll compressors, including one digital scroll per suction group. The scroll compressors are compatible with widely available low-GWP R-407A & F, R-448A and R-449A HFC refrigerants.

The layout of the units divides them into two compartments, one for the compressors and the other for the condenser, receiver and major oil system components. Each of these sections can be accessed directly from opposite sides through removable panels over the condenser/receiver and oil system sections and hinged (French) doors on to the compressor and electrical panel sections. The arrangement isolates the compressor compartment from the condenser section allowing for service and maintenance to be performed on the compressors without interrupting airflow to the condenser.

The condenser section of the units comes standard with two to four low-noise AC fan motors. Energy-efficient EC motors are also available to even further increase the operational savings even more. An oversized receiver with digital liquid level alarm is also included in the condenser section.

As already pointed out, AdaptaPak is flexible enough to accommodate the requirements of stores ranging from small format to large format. Units can be configured with one or two suction groups depending on temperature requirements.

One of the biggest concerns in the industry today is that of sustainability. As the regulatory structure and consumer attitudes change, customers have moved increasingly toward so-called “greener” operations that save energy and reduce their carbon footprint. On top of that, the food retail industry has become an easy target for regulators due to its high leak rate and the high global warming numbers of its legacy refrigerants. Retailers increasingly are looking for alternatives to traditional approaches and the AdaptaPak system offers one of the most effective paths to greater sustainability and profitability.

Customer experience suggests that another benefit of narrower suction groups is potential energy savings. Some customers have observed three to five percent reductions in energy use. Combined with lower refrigerant charges and fewer leaks, these energy savings contribute to a reduced carbon footprints and greater sustainability. Changing consumer attitudes increasingly lead shoppers to stores that can make these claims. In the case of Adaptapak systems, lower costs and greener operations go hand and hand.

ⁱ Investigation of Energy-Efficient Supermarket Display Cases, U.S. Department of Energy, Office of Scientific and Technical Information December, 2004