

## Secrets to Success

*Jeff Johnson*

### Sensible refrigeration investments that matter

Purchasing, operating and properly maintaining commercial refrigeration systems in a food service facility can be challenging, and can become an overwhelming experience. But it doesn't have to be.

Often, decisions on refrigeration equipment technology take a back seat to other, more customer-facing facility design needs. However, investing a bit more time in researching refrigeration decisions can lead to lower costs, fewer headaches and better refrigeration system performance.

The following are just a few examples of tried-and-true commercial refrigeration technologies that are often overlooked but have typical payback periods of less than two years.\*

#### Scroll Compressors

Scroll compressors have been around for years; you would be hard pressed to find a rooftop HVAC unit that does not use them. Scroll compressors are also available to the refrigeration sector and offer some great benefits, including energy savings.

A scroll compressor uses 10 to 20 percent less energy on average than a traditional reciprocating compressor, which is predominantly found in most refrigeration equipment today. Scrolls are more reliable, largely due to fact they contain fewer moving parts than reciprocating compressors. Additionally, scrolls tend to perform better over time as they "wear in," which leads to increased energy efficiency the longer they operate. Finally, scrolls are tolerant, or compliant, to liquid refrigerant that may find its way back to the compressor. This is significant because liquid flood back has the potential to severely damage reciprocating compressors, causing immediate system failure and requiring replacement.

#### Floating-Head Pressure Controls

There are many factors that can go into the proper sizing of refrigeration, as well as HVAC equipment. One of the most critical pieces of sizing criteria is determining the hottest day of the year for your geographic region where the equipment will be used. The goal is to size equipment for the maximum ambient temperature, so that there is never a shortage of refrigeration capacity when it gets hot outside.

Most refrigeration equipment is oversized by an incremental amount to provide satisfactory performance on those days when conditions are at their most unfavorable. However, conditions are usually far less demanding and the system requires less capacity than the design provides. Floating-head pressure, using variable speed condenser fans, allows the system capacity to float with, or self-regulate, based on ambient conditions. It is equivalent to having a system large enough to handle the most extreme days but only paying for the capacity you need on average days.

#### Intelligent Defrost

Intelligent defrost means only defrosting a freezer or cooler set at or below 35 degrees Fahrenheit when it needs it. The overwhelming majority of commercial refrigeration systems in operation today are set to defrost four to six times per day, whether the systems needs it or not. The smarter, more cost effective approach is to only initiate a defrost when sufficient frost is built up on the evaporator coil and the cooling performance of the system has degraded to a level that it makes sense to stop the system and defrost the coil. By skipping these unnecessary defrosts, you achieve an immediate energy savings. But that's not the only benefit. You also reduce the number of temperature fluctuations in your walk-in freezers that occur during defrost, leading to a reduction in food spoilage and waste.

It is also important to know that some level of frost forming on an evaporator coil is not necessarily a bad thing and can actually help to increase a system's cooling performance.

Typically, there is less of a need to defrost a system during cooler, less humid fall and winter months, allowing further opportunities to skip defrosts, save energy and better preserve stored food.

#### Electronic Expansion Valves

Last, and certainly not least, on our list of underutilized refrigeration technologies are electronic expansion valves. The job of the

expansion valve in a refrigeration or HVAC system is to properly control and regulate the flow of liquid refrigerant into the evaporator. It is a critical component of the system and, if it is not set or adjusted correctly, it can lead to system performance issues, unnecessary energy consumption and even premature equipment failure.

Expansion valves for commercial refrigeration come in two types: mechanical and electronic. Mechanical expansion valves are most commonly in use today. However, mechanical valves are similar to carburetors on older cars: They function just fine when proper care has been taken to set them for the desired application, and they have a relatively narrow window in which they operate effectively. Electronic valves, on the other hand, function well in a much wider operating range or envelope and are able to accommodate drastic changes in load or conditions, much like the fuel injection systems on modern vehicles.

When temperatures rise dramatically above the set point—typically the result of opening the door frequently over a short period of time or leaving it open for extended periods during box loading or after a defrost cycle—an increased amount of refrigerant flow is required to quickly pull the temperature back down to the set point. While a mechanical valve will hunt and surge, much like the carburetor of yesterday, the electronic valves will rapidly hone in on the desired parameters and bring the box back to temperature as quickly as possible, just like modern fuel injection.

A rapid response to temperature spikes results in more consistent overall walk-in box operating temperatures and fresher food for longer periods of time. Extending the freshness of product means your kitchen staff can put better tasting and looking food on customers' plates, while cutting costs at the same time by reducing food spoilage.

This article is meant to give you a few things to consider when reviewing and updating your refrigeration equipment specifications. While refrigeration may not always be top of mind when thinking about opportunities to save energy and serve fresher, better-tasting food, it offers some proven technologies that can deliver attractive payback periods while helping your company stand out in the crowded, competitive foodservice industry.

Energy savings results can vary dramatically and payback periods are highly dependent on varying energy costs throughout North America.

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