

Digital compression boosts outdoor condensing unit performance

Result

- Significant reduction in water usage
- Annual energy efficiency improvements
- Condensing unit cycles only once per hour on average
- Fewer refrigeration condensing units to maintain
- Highly flexible load matching, from 20-100%
- Precise setting and tight control over case and box temps
- Copeland™ compressor electronics technology

Application

Foodservice establishments and convenience stores typically have multiple, separate individual pieces of refrigeration equipment. This restaurant replaced several water-cooled refrigeration condensing units with one air-cooled outdoor modulating condensing unit.

Customer

A premier steakhouse in New York City. The work was performed by a leading local residential and commercial HVACR service company.

Challenge

According to the New York City Department of Environmental Protection, 'once-through' water-cooled refrigeration equipment presents several challenges. New York City restaurants, groceries, food stores and other similar establishments that store and prepare food may have cold boxes, ice-makers, beer and soda cases, freezers and other equipment that is cooled by City water. This type of machinery consumes large volumes of water that flows 'once-through', and is then disposed of into the sewer, resulting in higher than necessary water and sewer bills for food-related businesses. When the equipment is properly maintained, it can use between 100 and 1,000 gallons of water daily. Unfortunately, once-through water-cooled equipment is often not well-maintained and consumes more water and electricity than required for the cooling process.

New York City's Administrative Code prohibits new installations of once-through water-cooled equipment except in ice-making



machines producing less than 500 pounds of ice per day. Existing equipment can remain in place but for many years has been limited to six (6) tons of refrigeration or two (2) tons of air conditioning.

While the refrigeration equipment at this steakhouse was properly maintained, all of the water-cooled refrigeration condensing units together consumed the equivalent amount of water as an Olympic-size swimming pool every day. Indoor air-cooled condensing units were not an option because of the amount of heat that would be added to the conditioned space of the restaurant. Individual outdoor condensing units were not an option either because space on the roof was at a premium. In order to run multiple refrigeration loads from one condensing unit, the compressor must be able to modulate capacity in order to maintain a consistent suction pressure and temperatures in the refrigerated cases and walk-in coolers.

Solution

The contractor connected the digital X-Line unit to multiple evaporators, each with loads from 2,000 Btuh to 25,000 Btuh, with no downtime for the restaurant. Emerson Site Supervisor was added for control and remote monitoring. Dixell controllers were used to control temperature and humidity. The digital unit resulted in tight suction pressure control and fewer pump-downs. The compact digital X-Line unit takes up less roof space and cut down on the amount of refrigerant piping required.

Digital modulation enables owners to maintain much more precise setting and tight control of case temperatures. This helps operators minimize temperature deviations in refrigeration fixtures so that food is kept safe and at maximum quality. The digital X-Line series combines compression technology with variable-speed fan motor control, large-capacity condenser coils, and smart protection and diagnostics to meet today's challenging refrigeration requirements.

Ideal for walk-in coolers, display cases, and food preparation, digital X-Line units deliver more precise, reliable refrigeration, longer lasting equipment, and lower energy bills in medium temperature applications. The contractor paired the digital unit with low-temperature X-Line units to cover all the restaurant refrigeration loads.

Built-in compressor electronics technology and protection allow operators to take action to minimize product loss from equipment downtime. Errors can be quickly communicated

to service technicians, and the system can make changes to protect against faults that might otherwise cause a compressor failure. Operators can expect improved reliability, an extended compressor lifespan and greatly reduced lifecycle costs.

The digital X-Line series' slim profile, lightweight design and wall-mount option give operators the flexibility to install the units, even in locations with significant space constraints. In fact, digital X-Line units are so unobtrusive they're often mistaken for an AC mini-split unit. This helps operators lower installation costs and avoid expensive system design work-arounds and/or relocation issues. Digital X-Line units can even be applied to systems featuring multiple evaporators.

Operators located near residential areas or noise-restricted zones benefit from using the quietest standard unit available. Under most expected operating conditions, the units produce less sound than a normal conversation. In most applications, noise from the digital X-Line series is practically undetectable. The units are unobtrusive and allow more mounting options where the sound produced by traditional units might prevent their use, such as customer-facing locations near entryways, patios or even indoors.



Resources

Learn more about the Copeland™ digital outdoor refrigeration unit at: Climate.Emerson.com/DigitalXLine