Garlock Sealing Technologies

Rochester, NY

Background

Many facilities within New York State rely solely on mechanical cooling for process and comfort cooling needs. For some of these facilities, natural cooling sources, such as lake water, may be available to supplement or replace cooling performed using electricity. Due to the potentially high first cost of lake-water cooling, it tends to be used primarily in large campus or city applications where financing is available for the infrastructure required. In cases where the initial cost can be minimized, these systems can be beneficial long-term solutions.

Process Improvements

This project is located at the Garlock Sealing Technologies manufacturing plant in Palmyra, NY. The system, installed in 2007, is designed to use lake water to provide both process and comfort cooling to the plant. An existing 30-mile long pipeline between Canandaigua Lake and Palmyra was installed in the 1930s. This water source provided a relatively inexpensive natural cooling source. Modifications included minor repairs and rerouting the water line through the building.

Process cooling is needed throughout the entire year at this facility. The process load has been estimated at 20 tons, and two 10-ton chillers have been installed in a primary-secondary schematic. In addition, lake-water cooling has been implemented to minimize the amount of time that the chillers actually operate. This has been accomplished by installing a plate and frame heat exchanger in the return water line of the process cooling loop to precool the return water. As a result, the chillers can remain offline during most of the year.

Incoming lake-water temperature varies seasonally from a low of 37 °F to a high of approximately 65 °F. Chilled water at 60 °F is required for the production processes, so the operation of the chillers is periodically required during the late summer months, when the lake-water temperature is the warmest.

In the original design, lake water was used to provide comfort cooling to the facility, as well as process cooling. However, seasonal temperature increases in the lake-water temperature resulted in high humidity levels during the summer months. When corrosion was experienced on manufacturing materials due to high humidity, the lake-water heat exchangers were replaced with a chiller, in order to maintain humidity levels below 60 percent. It is expected that the chiller will continue to be used in the summer months for humidity control.

Energy Savings

Energy savings are achieved because the process chillers are not required to operate for most of the year. Data obtained from the site during 2008 demonstrated an energy savings of 63,500 kWh, when compared to the mechanical cooling only model. This indicates that a simple payback should be achieved in approximately 14 years. This is based on the incremental cost of the lake-water cooling system when compared to a strictly mechanical cooling system.

The application of lake-water cooling, often not considered due to high first costs, can prove to be a cost-effective alternative to a strictly mechanical cooling system, provided that a natural cooling source is readily available.