

Power industry brings about a step change in water quality

DOUBLE WALLED PLATE HEAT EXCHANGERS OFFER A SUSTAINABLE SOLUTION TO INVASIVE MUSSELS IN THE GREAT LAKES REGION, PROTECTING THE LOCAL WATER SUPPLY FROM CROSS-CONTAMINATION CAUSED BY MUSSEL RELATED EQUIPMENT FAILURE WHILE USING 50% LESS COOLING WATER

A greater awareness of the importance of protecting the environment is leading many companies to review the sustainability of their processes.

A leading power utility company in upstate New York relied on the local river water supply to support the cooling of its turbine oil cooler. When the utility discovered that corrosion related equipment failures - caused by chemical oxidation of the water stream to eliminate the presence of zebra mussels - were in turn leading to cross contamination of the local water supply, it immediately took action to resolve the issue.

As part of a broader sustainability initiative the company took steps to prevent further cross contamination and protect the water quality for the wider community.

Challenge

A high-quality water supply is central to the overall health of the agricultural economy, the viability of cities and rural communities, and the environmental well-being of the landscape. Zebra mussels pose a significant threat to the Great Lakes area, negatively impacting the aquatic biodiversity of the area and causing serious problems for power plants and industries who rely on the local water supply by rapidly coating water intake pipes with colonies as large as 700,000 mussels per square meter.

Mussel infestations have been estimated to cost the power sector in the Great Lakes region several million dollars annually. The most common methods of managing invasions include chemical treatment, such as chlorination and non-chemical treatment such as ultraviolet light treatment. However, these treatments are not without their own issues. There are concerns that extensive chlorine use in rivers and lakes could be harmful to non-target organisms.

The oxidizing properties of chlorine can also corrode metal surfaces, damaging water cooling equipment. For a cogeneration power plant operating in the New York region this treatment has caused a corrosive attack on the copper tubing of its heat exchanger, which utilized river water to cool oil for a turbine. The corrosive degradation resulted in the leaking of lubricating oil into their water-cooling stream which subsequently discharged back into the local waterway.



PROJECT HIGHLIGHTS:

- **Optimizes performance** - higher rate of heat transfer as a result of flow of water through corrugated plates
- **Minimizes downtime** - stainless-steel design is more corrosion resistant than brass or copper helping prevent equipment failure
- **Prevents cross-contamination** - double wall protection and dedicated leak ports enable quick leak detection preventing cross-contamination of cooling liquids
- **Reduced water consumption** - provides the same cooling load but using up to 50 percent less cooling water
- **Easy to maintain** - double wall plate and frame design is easy to open and inspect and/or clean

SOLUTIONS:

- Standard Xchange P14DW gasketed double wall plate and frame heat exchanger

The leaking oil was having a resulting effect on the whole ecosystem, endangering native species, threatening supplies of clean drinking water and polluting irrigation efforts. The region is known for its bountiful and diverse agricultural production, occupying over a third of the land area of the Basin, and supporting 7 percent of American and nearly 25 percent of Canadian farm production. When polluted water is used to irrigate agricultural lands there is a risk of polluting the food chain that serves so many.

The plant still needed to use the river water but had to ensure it wouldn't damage its equipment in the process. It needed a water-cooling system that could withstand the corrosive, chlorine treated river water to guarantee continuity of service, avoid costly downtime and protect the local water supply.

Solution

Power plants, city treatment plants, irrigation facilities and manufacturing plants in the Great Lakes region are all too familiar with the degradation, reductions in pumping capacity and occasional shutdowns caused as a result of managing the zebra mussel invasion, with many having to replace their heat exchangers or other affected equipment every few years. Furthermore, the downtime and maintenance associated with changing such equipment is considerable.

Seeking a more sustainable solution, the power plant turned to Standard Xchange. Armed with a wealth of knowledge and broad portfolio of heat exchanger products including gasketed plate and frame, brazed plate, pre-engineered or custom TEMA shell & tube and air-cooled heat exchangers, Xylem's Standard Xchange engineers can evaluate, select, and install the optimal solution needed for even the most complex heat transfer needs.

The team of Xylem engineers used their depth of application expertise and solutions-focused approach to determine a solution to the plant's equipment failure and subsequent cross-contamination challenges.

The power plant installed a Standard Xchange P14DW gasketed double wall plate and frame heat exchanger, which would greatly reduce the possibility of future contamination of the water basin and its subsequent impact on marine life and the region's agricultural sector.

Results

The Standard Xchange gasketed double wall plate and frame heat exchanger provides double wall protection with the highest level of leak protection, safety, thermal efficiency and durability in a compact unit. No other technology is more compact, efficient or flexible. The double wall protection and dedicated leak ports provide quick and easy leak detection meaning leaks can be detected and addressed to avoid any cross-contamination of the river cooling water supply. This feature provides dependable protection of freshwater streams and water supplies for cooling of oils, glycols, and other fluids.



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With one of the broadest ranges of gasketed plate and frame models in the industry, Standard Xchange draws on true heat transfer application expertise based on more than 100 years of experience utilizing a broad range of solutions to provide the optimal design.

The 316 stainless-steel design of the P14DW offers superior corrosion resistance than materials such as brass and copper which are commonly used in heat exchangers.

This increased resistance to corrosion, combined with the double wall design, provides a twofold approach to avoiding cross contamination and ensuring improved water quality.

In addition to the double-wall construction, the unit allows for easy inspection and cleaning, together with the capability for future expansion. The number of plates can be increased or decreased if the system is redesigned or outside changes occur. If, for example, the river water temperature was to increase the heat exchanger could still maintain cooling of lubricating oil by adding more plates to deliver the required amount of cooling.

The flow of water through the corrugated plates of its gasketed plate design also results in a higher rate of turbulence, resulting in a much higher rate of heat transfer. This provides a dual benefit of providing the same cooling load but using up to 50 percent less cooling water.