CASE STUDY

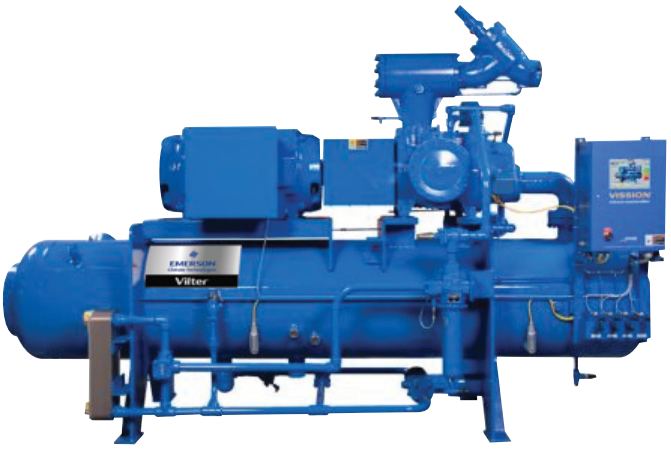
VILTER SINGLE SCREW COMPRESSORS

Nestlé cutting costs with efficient waste heat recovery

Innovative ammonia heat pump plant utilizing waste heat for energy saving heating and cooling system.

Result

- Process utility costs cut by $394,000 per year
- Waste heat recovery of 1130 kW
- High coefficient of performance heat pump
- Non-ozone depleting refrigerant with zero global warming impact
- CO_2 reduction of 1.1 million pounds per year
- Vilter single screw compressor with ammonia refrigerant achieves increased performance
- 15% higher efficiency than comparable technologies
- Design for 20 years service without costly maintenance



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Application

Innovative ammonia heat pump plant utilizing waste heat for energy saving heating and cooling system.

Customer

Nestlé's confectionary production facility in Halifax, West Yorkshire, UK.

Challenge

Nestlé started looking at its heating and cooling systems as a way to reduce the environmental footprint of its operations. Installing heat pumps to capture waste heat from industrial processes is increasingly popular in Europe, largely because the heat they deliver far exceeds the energy they consume, greatly reducing the reliance on fossil fuels and the need for additional renewable energy sources..

Nestlé relies on large refrigeration systems for both chocolate manufacturing and storage and distribution. Refrigeration is needed to cool chocolate, while heat is needed to separate the chocolate from the shaping molds. Nestlé was using one central coal fired steam generation plant, but wanted to find a way to capture waste heat to replace the need for gas fired equipment.

Nestlé wanted the highest coefficient of performance (COP) possible, and a technology solution with low annual operating and maintenance costs. The system needed to use a non-ozone depleting refrigerant with zero global warming impact.

One of the few refrigerants that could meet all of Nestlé's efficiency and environmental requirements was ammonia, an efficient refrigerant (designated as R-717) most commonly used by the food and beverage industry for process cooling and refrigeration. Ammonia does not contribute to ozone depletion or global warming, but has not been commonly used in high temperature industrial heat pump applications. In fact, not long ago the application was deemed impossible by the International Energy Agency's (IEA) Heat Pump Centre, which said there were no suitable high-pressure compressors available to make using ammonia a reality for high-temperature industrial heat pumps. When Copeland and project partner Star Refrigeration got involved, a solution had to be found that would reduce total energy demand at the Halifax site, using only natural refrigerants to reduce the environmental impact of its manufacturing operations.

Solution

The dual-purpose ammonia heat pump system delivers chilled glycol at 32°F and hot water at 140°F using waste heat, and features Vilter single screw compressors. With the new system, heat can be taken from the 32°F process glycol and lifted to 140°F in one stage for heating. Since commissioning in May 2010, Nestlé Halifax is heating around 14,000 gallons of water each day to 140°F. And this hot water is delivered far more efficiently than from their previous coal-fired steam generator.

The ammonia heat pump solution has cut process utility costs at the Halifax site by over $394,000 per year. In addition, the reduction of gas combustion has reduced CO_2 emissions by over 1.1 million pounds per year. The Nestlé system recently won the Industrial and Commercial Project of the Year title at the 2010 RAC awards. By using ammonia, Copeland's compressor technologysolution offered Star Refrigeration a refrigerant that has a good environmental profile (non-ozone depleting and zero global warming impact), delivers higher temperatures and provides superior performance benefits from its consumed resources than competing technologies.

In addition, the balanced radial and axial force design of the single screw compressor reduces stress on the unit's bearings, resulting in very low operating and maintenance costs while delivering a performance unachievable with any other type of compressor.

Learn more about the Vilter single screw compressors at: **copeland.com/vilter**

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