



Service corrects non-compliant repairs in paper mill



Foul condensate spiral cooler receives ASME repairs to return 28-year-old unit to operation

In the midst of the COVID-19 pandemic in the US, a northeast paper production customer saw increased production rates which taxed numerous older spiral heat exchangers in various states of aging and corrosion. With new metal coils in shorter supply and long lead times due to supply chain issues, the best option to maintain uptime was to repair the older units. The craft paper and containerboard customer had one unit needing service. It had obvious non-code repairs performed by other service vendors.

The unit was sent into the Alfa Laval spiral repair facility in Broken Arrow, Oklahoma. Inspection revealed both corrosion and over-pressurization damage. The various repairs over the heat exchanger's 28-year-old lifetime were not American Society of Mechanical Engineers (ASME) code compliant.

The prior repairs were cut back layer by layer to reveal the most recent underlying problem, a large crack in the base metal material, five layers down from the outer shell layer. This was the result of over-pressurization from the process. The primary material crack was weld repaired with new, studded materials. Each layer thereafter was

welded under backing gas and dye pen inspected until they reached the outer shell. The outer nozzle manifolds were welded back into place. The final repairs and final hydrotest were witnessed by an authorized ASME code inspector and the R-stamp was approved.

The revitalized spiral heat exchanger was shipped back to the customer and installed. The ASME-compliant unit was now safe and ready for increased production.



Spiral window repair cutting down to root of problem.



Benefits of the spiral heat exchanger:

- A deep temperature cross is possible due to the long thermal length and the fully counter-current flow pattern.
- The single channel design maximizes fluid velocity and turbulence, which, in turn, minimizes fouling. It also prevents fluid bypassing eliminating the possible loss of heat transfer area.
- The hot and cold channel spacing can be varied independently to suit the concentration and size of fibers/particles in the fluid.
- The “self-scrubbing effect” occurs as a result of any accumulation of solids in the channel, which reduces cross-sectional area and thereby increases fluid velocity. This localized increase in velocity creates a scrubbing effect.
- Cleaning-in-place (CIP) can be effective since the single channel design ensures that the active chemical agent reaches any fouled surface. Experience has shown that CIP can even replace mechanical cleaning, depending on the severity and type of the fouling.
- The compact but open channel design simplifies mechanical cleaning, should chemical cleaning prove ineffective. Unbolting and removing the cover provides full access to the hot or cold channel, which can be efficiently cleaned by a high-pressure water jet.

Fast facts

The customer

A paper and pulp manufacturer at a northeastern United States location with 530 employees and 635,000 tons of product produced.

The challenge

Correct non-ASME compliant repairs to provide increased capacity due to demand for paper packaging during COVID-19.

The solution

Cut back all prior repair welds to correctly fix in the base metal material which contributed to corrosion and over-pressurization damage. Correct all prior welds in the various layers in order to be ASME compliant.

Benefits

Alfa Laval has been a leader in heat exchange technology since 1933. The customer was impressed with Alfa Laval’s troubleshooting expertise and repair prowess. In the end, the customer benefitted from genuine spare parts and ASME inspection.

Compared to other heat exchangers commonly used in similar applications, Alfa Laval’s spiral designs offer a compact footprint and increased thermal efficiency. Built with unique features that prevent fouling, they can handle the toughest heat transfer challenges while ensuring the most reliable performance. The perfect solution for liquid-to-liquid and two-phase duties, they work consistently, with extremely low installation and maintenance costs.