



CORD HEAT EXCHANGER, THE PERFECT SOLUTION FOR CHALLENGING APPLICATIONS AT BOLIDEN, RONNSKÄR

Our improved CORD gas/gas heat exchanger design greatly enhanced reliability and performance at one of the world's most efficient copper smelters at New Boliden, Rönnskär.

Swedish mining and smelting company New Boliden focuses on the production of copper, zinc, lead, gold and silver. Rönnskär, a site some 800 kilometers north of Stockholm, Sweden, one of the world's most efficient copper smelters processes ore from the nearby Boliden mine and electronic scrap.

The Rönnskär plant has a capacity of 2625 tons per day and produces sulfuric acid as a byproduct. Outotec has supported the operations at Rönnskär with a long-term service agreement since 2003.

CHALLENGES

- SO₂-rich gas and acid mist increasing plant emissions
- High corrosion levels
- Short equipment life
- High maintenance costs
- Tube breaches
- Decreased heat flow
- Iron sulfate blockages

SOLUTION

- Design, installation and delivery of new CORD heat exchanger
- Meticulous project planning

BENEFITS

- Reduced lifecycle costs
- Corrosion resistant
- Improved reliability
- Reduced investment costs
- Easy cold end maintenance
- Cold bypass temperature remains above dew point
- Installation within shut down period

As has been the case at numerous other sulfuric acid plants, the cold reheat gas-to-gas heat exchanger at Rönnskär became increasingly challenging since installation in 2000. In 2010, a major overhaul was conducted to secure performance for the next years. Initially the heat exchanger had been oversized to compensate for potential expansions of the sulfuric acid plant. This reserve was consumed by damaged tubes that had to be blocked in order to keep the heat exchangers functional.

By 2012 it became evident that a replacement of the unit was necessary and could not be postponed. Our new CORD heat exchanger solution was selected to replace the unit to eliminate continuous and intensive maintenance work.

RELIABLE, NON-CORROSIVE CORD HEAT EXCHANGER

The patented CORD heat exchanger design is based on a two-section concept. This concept was originally introduced by Outotec in the late 1950s and has undergone numerous developments since.

The new CORD design consists of a vertical and a horizontal heat exchanger section, both of which are operated under non-corrosive conditions. The small horizontal cold end is manufactured in stainless steel, whereas the main vertical section can be manufactured from standard steel grades.

The horizontal section is designed to provide a gas temperature increase of approximately 20°C. This means the horizontal section needs to operate at temperatures where the stainless steel is corrosion resistant and the acid condensation does not cause any accumulation of deposits or tube leakages due to corrosion. The vertical section also operates completely above the acid dew point, preventing corrosion.

FEATURES

- Vertical tube sheets at the cold end prevent the tube or tube sheet joint areas from being continuously exposed to sulfuric acid condensates, enabling easy drainage of the horizontal section.
- Optimization of gas flow at the cold-end entry due to a new inlet cross section design and eccentric tube bundle positioning, supporting homogeneous gas flow through the bundle for efficient heat exchange and separation of acid condensates as well as carryover from the absorption tower

The order was placed in November 2012 and the installation was scheduled for the planned shutdown in May 2013. A precise project schedule was established to accomplish the short delivery time of just six months. The delivery scope also included the installation design work, while an Outotec representative acted as design manager for all CORD-related work in close cooperation with the project manager from New Boliden. Additional services in other areas of the acid and smelter plant were also performed by Outotec, including the delivery and installation of an SX acid cooler.

We also recommended that New Boliden install a droplet separator upstream, to minimize the acid condensate carryover from the duct walls into the heat exchanger and prevent droplets entering the heat exchangers' inlet from the gas flow.

The total weight of the new CORD heat exchanger for New Boliden, Rönnskär is 258,000 kilos, of which less than 9 percent is stainless steel. This minimizes the investment costs for a reliable, long-lasting solution as the CORD acronym suggests "Cost Optimized Reliable Design".

The equipment was fabricated at a European supplier and was transported within 7 days to site. The replacement of the new heat exchanger and connection to the existing plant was performed within 10 days, which was well within the available shutdown time.

The new heat exchanger was erected on a new foundation, enabling the existing heat exchanger to be demolished independently from the shutdown schedule, saving erection time and minimizing any risk of interfering with the planned shutdown schedule.

“The CORD heat exchange performs perfectly. The first scheduled inspection after one year of operation revealed no corrosion and even manufacturing markings on the internals are still visible. Outotec supplied the perfect solution for this challenging application.”