Quality wins – again

Why a Chinese steel manufacturer switched back to Alfa Laval Spirals

Case story

A few years back, the Bao Shan Iron and Steel Co. experimented with the spiral products of a local manufacturer with a lower price than that of the Alfa Laval spirals Bao Shan had been using. But Bao Shan soon found out that what they gained on purchase price, Alfa Laval more than made up for in long-lasting quality, experience and support.

The Bao Shan Iron and Steel Company located in Shang Hai produces more than 20 million tons of steel annually.

What no gasket can withstand

Bao Shan in Shang Hai have three production lines for Coke Oven Gas (COG) refining, each one with a yearly production of 150,000 tons/year. They use Alfa Laval products for a number of processes, including decanters for the coal tar recovery process, and have a total of 53 units installed.

Recently, they switched back to the Alfa Laval brand (from the products of a local manufacturer) for the cooling of lean ammonia in the COG plant. They now use six Alfa Laval spirals instead, each one cooling 110 m3/hour of lean ammonia from 35 to 27 °C.

The amount of ammonia in the COG is reduced for two main reasons. First, the importance of ammonia as a by-product.

Second, ammonia is destructive to the process equipment. In fact, it's so corrosive that no gasket can withstand its harsh environment and tendency to foul. A gasket-free spiral, therefore, is a logical choice.

Not all spirals are created equal

However, when Bao Shan switched to a local manufacturer's low-price product, they found that the quality wasn't up to par. The product didn't have any gaskets that could be corroded, but it was difficult to clean. And that resulted in a number of problems.

"They had a more favourable price, but maintenance and service of those units was very time consuming," says Bao Shan's equipment director, "and the lifetime of the product was much shorter."

Fast Facts

The customer

The Bao Shan Iron and Steel Company located in Shang Hai:

- Produces more than 20 million tons of steel annually, for which the main products are plates, tubes and wires
- One of the largest steel manufacturers in China
- 20000 employees

The challenge

- Wanted to make the ammonia removal process in its Coke Oven Gas plant more cost-efficient

The Benefits

- 4-5 times longer product lifetime
- Less maintenance
- Practical and cost-efficient

The design is what makes them cost-efficient

The Alfa Laval spirals, on the other hand, last 20 years – four or five times longer than the local products. The combination of single-channel technology, the spiral shape, and the hinged door design are what make the Alfa Laval spirals long-lasting and cost-efficient to maintain.

With no internal supports, no sharp bends and no rough edges where solids can clog the channel, the turbulence in the Alfa Laval spiral acts as a constant scrubbing action. The fluid is fully turbulent at a much lower velocity than in straight tube heat exchangers, reducing the likelihood of dead spots and stagnation.

This self-cleaning effect flushes away deposits as they form, resulting in minimal fouling and low maintenance. And when service and cleaning are required, the hinged door and easy-clean hook bolts are easy to open, exposing the entire channel for cleaning.

When leaders come together

It's important for Bao Steel to maintain excellence in all their processes in order to produce high-grade quality products and maintain their position as a leading steel manufacturer. With 50 years' experience, Alfa Laval is helping them meet their goals. Based on their experience with Alfa Laval's products and service engineers, Bao Steel's equipment director says that they feel confident they're on the right track.

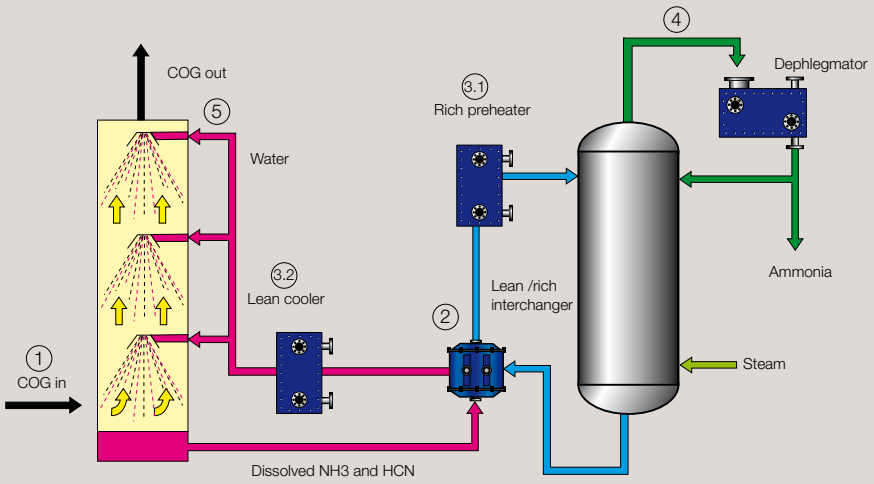
"Working with a company with such a broad range of on-site experience and innovative character, we feel inspired by their pioneering, and it makes us confident that we can continue to lead the way in our area of operation."

The single-channel technology, spiral shape and hinged door make the Alfa Laval spirals long-lasting and easy to maintain.

About the product

Six Alfa Laval spirals are in operation, each one cooling 110 m3/hour of lean ammonia from 35 to 27 °C:

- Ensures continual self-cleaning effect for maximum operating efficiency
- Easy to open hinged door for routine maintenance
- High-quality
- Long lifetime



1. The hot COG enters the absorption tower in which it is flushed with an absorption media, normally water.
2. The ammonia, hydrogen sulfide and hydrogen cyanide dissolve in the water and create a rich ammonia flow. This flow is heat exchanged against the hot, lean ammonia flow coming back from the stripper.
3. The rich and lean ammonia flows need to be (3.1) heated and (3.2) cooled with steam and water respectively before entering the stripping and absorption tower.
4. The rich ammonia flow is treated with steam in the stripper and the ammonia is stripped off at the top.
5. The lean ammonia flow, which is now almost only water, is recycled and used as an absorbent again.

General layout of absorption stripping system for ammonia removal. The type of unit can vary in different process layouts. At Bao Steel, six spirals are installed as lean ammonia coolers.

How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com