Tantalum heat exchangers bring enduring benefits

PQ Corporation, New Jersey, USA **Case story**

PQ Corporation dramatically reduced maintenance costs and downtime by exchanging an existing graphite block heat exchanger for an Alfa Laval tantalum heat exchanger. The payback time is less than two years.

Specialty chemicals manufacturer PQ Corporation in New Jersey, USA experienced high maintenance costs for a graphite block heat exchanger handling hot sulphuric acid. Once a year, the 3 m (9 ft. 10 in) long heat exchanger had to be hoisted down from its position on the fourth floor, opened and repaired. The process was costly and caused considerable downtime.

Extreme conditions ...
In early 2012, Senior Maintenance Coordinator at PQ Corporation Michael Pingitore and his colleagues started investigating alternative, more cost-efficient solutions that could replace the graphite block.

The options were few since the heat exchanger operates under highly corrosive conditions. The medium is sulphuric acid at a high temperature and concentration.

... call for extreme materials ...
The different solutions typically used in these types of applications all have their drawbacks. Heat exchangers made of zirconium or special alloys would dissolve quickly. A glass heat exchanger would suffer from low heat transfer and be fragile, just like the existing graphite block.

From a chemical point of view, the best material to use under these conditions is tantalum. This metal is extremely resistant to corrosive media at high temperatures, but very expensive. The cost meant a heat exchanger in solid tantalum was out of the question.

... and innovative thinking
When Michael Pingitore and his colleagues came across a new heat exchanger from Alfa Laval they recognized this could be what they were looking for.

Michael Pingitore presented the solution to plant management, and although the investment was significant they made the decision to move ahead quickly.

Compact size
When the Alfa Laval heat exchanger was delivered, Michael Pingitore was so surprised by its small size that he had to go over his calculations once more. The new heat exchanger was only 30 cm (1 ft.) long compared to the existing one measuring 3 m (9 ft. 10 in).

But as soon as the heat exchanger was installed he was convinced. “The unit immediately proved that it met and even exceeded specifications”, Michael Pingitore says.

Alfa Laval sales engineer Michael Baier and Michael Pingitore, Senior Maintenance Coordinator at PQ Corporation. “We are very satisfied with the results. Installing an Alfa Laval tantalum heat exchanger allowed us to save on maintenance costs and increase uptime”, Michael Pingitore says.

Minimal maintenance needs

Plate heat exchangers are characterized by minimal service needs. The only required maintenance for the heat exchanger at PQ Corporation is a weekly, one-hour flushing of hot water to clean out fouling. This is performed in place without the need for any dismantling.

Good results

PQ Corporation is very pleased with the results. Michael Pingitore has been asked to share his experiences with colleagues from other parts of the company, and PQ Corporation is investigating if the same solution can be applied to another site with a similar process.

Alfa Laval tantalum heat exchanger installed at PQ Corporation.

Fast facts

About the company

PQ Corporation is a leading worldwide producer of specialty inorganic performance chemicals and catalysts. PQ traces its beginnings to a family soap and candle business started in Philadelphia by Joseph Elkinton in 1831. Today, PQ is the world’s largest producer of soluble silicates.

Company challenge

One of the products is a filter aid used for clarifying beer in breweries. When producing this filter aid, sulphuric acid is diluted at high temperature. The acid was previously cooled by a graphite block heat exchanger that had to be hoisted down from the fourth floor, opened and repaired once a year. The result was high maintenance costs and frequent downtime.

About the solution

By replacing the graphite block with an Alfa Laval tantalum heat exchanger, PQ Corporation eliminated the need for repairs, cutting maintenance costs and boosting uptime. The only required maintenance is a weekly flushing with hot water, which is performed in place. The new Alfa Laval heat exchanger is significantly smaller than the graphite block. Payback time for the project is less than two years.

Alfa Laval tantalum heat exchanger
– highly corrosion resistant, high-performance plate heat exchanger

- Excellent for handling hot, highly corrosive media
- Minimal maintenance
- Very low lifecycle cost
- High thermal efficiency
- Low investment cost

The Alfa Laval tantalum heat exchanger is a stainless steel heat exchanger that has undergone a unique chemical vapour deposition treatment where a thin tantalum layer is metallurgically bonded to the steel core.

The result is a heat exchanger featuring the same extreme corrosion resistance as a solid-tantalum heat exchanger but with a significantly lower investment cost.

The steel core of an Alfa Laval heat exchanger makes it mechanically strong and gives it much greater resistance to thermal shock than glass, silicon carbide and graphite heat exchangers.

Alfa Laval tantalum heat exchangers use plate technology, resulting in a very compact size. The optimized geometry, highly turbulent flow, good conductivity of the material and high mechanical stability all add up to a heat exchanger with much higher thermal efficiency than a graphite block.

Alfa Laval reserves the right to change specifications without prior notification.

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.