Compabloc Condenser Solved Fouling Problem

Queensland Alumina, Australia **Case story**

Queensland Alumina replaced a shell-and-tube unit with a fully welded Alfa Laval Compabloc condenser unit in order to decrease maintenance costs. Utilising only a quarter of the space of the old shell-and-tube installation, the Compabloc solved severe corrosion and fouling problems resulting in a significant service cost reduction. 18 months after the installation, the Compabloc is in successful operation without having been cleaned once.

Process Plant

The Queensland Alumina plant at Gladstone produces 3.7 million tonnes of alumina annually using the Bayer process, the thermal process based on the solubility of alumina in caustic liquor. Heat exchangers are required for a broad spectrum of duties in the process of heating and cooling the circulating liquor stream. The Compabloc replaced the original carbon steel shell-and-tube heat exchanger in the precipitation area, where it is heating incoming process water with final flash vapour at 29 kPa abs.

Problems with Original shell-and-tube Unit

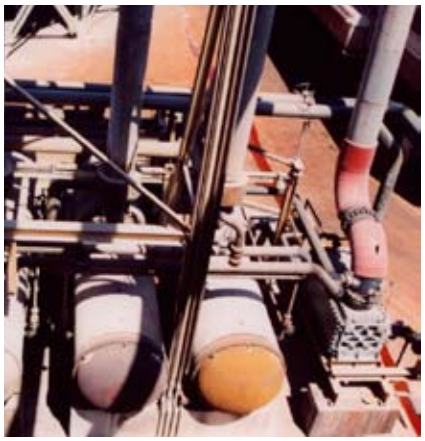
The excessive levels of fouling in the original shell-and tube exchangers lead to regular cleaning every 6 months. The cleaning procedure took a week from start to finish. In addition to the fouling, the shell-and-tube heat exchanger also suffered from interleakage due to extensive corrosion. In 2001 the plant and process engineers began looking for a new solution in order to solve the extreme fouling and corrosion.

Looking For a New Solution

As for many process industries using heat exchangers, the most important requirements for Queensland Alumina are:

- High thermal efficiency
- Low fouling and scaling
- Minimal space requirements
- Design flexibility
- Ease of installation
- Minimal maintenance

The Compabloc replaced a shell and tube unit on a quarter of the footprint.



In discussions with Alfa Laval Australia it became clear that the Compabloc would satisfy all those requests.

Operation of the Compabloc Condenser

To date the Compabloc has been in operation without any problems whatso ever. Besides the ease of installation and minimal space requirement, the low maintenance frequency is a benefit highly appreciated by Queensland Alumina.

Customer Comments

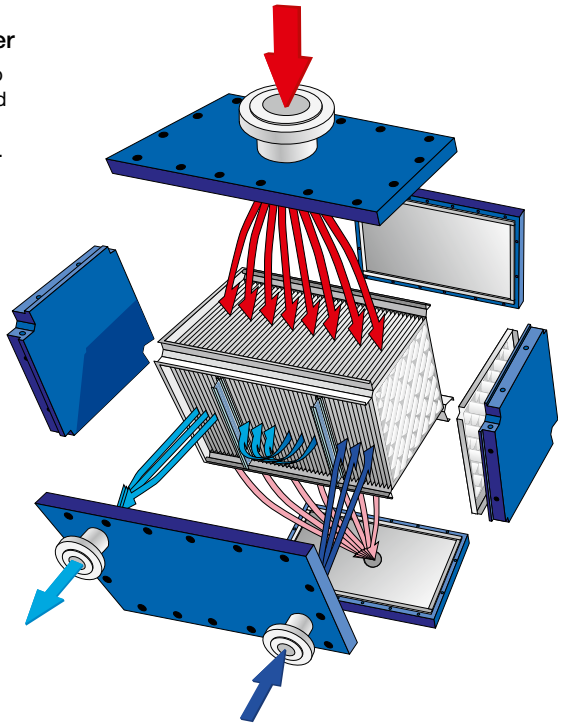
After 12 months of operation, the Compabloc was inspected and found to be clean. Brian Aikenhead, Area Supervisor, who was present at the inspection says: “There was no fouling whatsoever. It was clean as a whistle”. Phil Wheatley, Asset Owner Rep at Queensland Alumina, says: “The best thing about the Compabloc is that we haven’t had to worry about maintenance. Fouling or scaling problems just don’t exist”.

Low Fouling

The low fouling tendency of the Compabloc can partly be explained by the high turbulence, which minimize fouling and makes longer operating periods possible. The low levels of fouling can also be attributed to finer material; decreasing corrosion and promoting high shear stress rates along the heat transfer wall.

Compabloc condenser

Vapour enters from the top and condenses on the cold plates. The condensate is extracted from the bottom. Even though fully welded the Compabloc is easy accessible for inspection and cleaning on both the cold and the hot side by undoing the panels



Key facts about Compabloc

Compabloc is a high-efficiency, all-welded compact heat exchanger designed for aggressive or hazardous process services. It is available in six sizes, with heat transfer areas in the range 0.7–320 m² (7–3450 sq ft).

The heat transfer area is made up of a pack of corrugated plates welded alternately to form the media channels. The plate pack is supported by an upper and lower head and four side panels, which accommodate the connections. The fully welded plate pack extends design limits and provides improved reliability. Because there are no inter-plate gaskets, compatibility concerns are eliminated, and maintenance and operating costs are reduced.

Access for inspection and cleaning is fast and easy.

PLATE MATERIALS

- 316L, 304L, 317L, 904L, 254 SMO and AL6XN stainless steel
- Titanium, Pd-stabilized titanium
- C-2000, C-276, C-22 and B3 alloy

SPECIFICATIONS

Design pressure:
min. vacuum/max. 37 barg (520 psig)

Design temperature:
min. -50°C/max. 350°C (-20/660°F)

Pressure vessel code:
PED and ASME
(with or without U-stamp)

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.