Solves a layout problem and cuts costs in a Swiss refinery

Tamoil's refinery at Collombey in Switzerland **Case story**

Four Compabloc exchangers have been successfully operating since 1997 in Tamoil's refinery at Collombey in Switzerland. The most important criteria for the selection were reliability, compactness, and its availability in titanium at an economic cost.

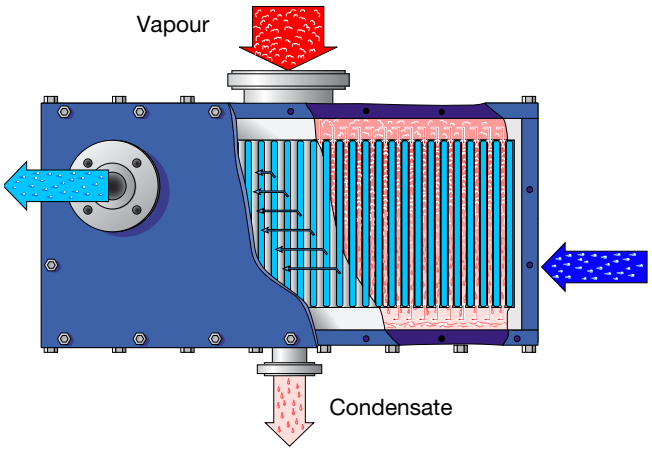
In 1995, Tamoil SA, raffinerie de Collombey embarked on a revamp and modernisation program for their Collombey refinery. Foster-Wheeler Italiana handled the engineering, procurement and construction for the project. One of the major issues was heat recovery from the atmospheric distillation column. Substantial savings could be made if heat from the top fraction, the so-called virgin naphtha, could be used to pre-heat crude oil feed to the desalter and also to generate hot utility water for the refinery. This heat had until then been wasted.

Initially the heat recovery study was limited to the conventional shell & tube type exchanger only. Very soon, however, this restriction created a number of major problems for the project engineers. One was the sheer size and weight of the shell & tubes. The foundation and structural work became very costly as the in-stallation site was at a high elevation. Another problem was the possibility of chlorides occurring in the naphtha. Chlorides that have not been removed in the desalter will accumulate at the top of the atmospheric column and exit with the top fraction. This meant that the virgin naphtha condenser/coolers had to be manufactured in a corrosion resistant material, preferably in titanium, which made the shell & tube exchangers very expensive.

Compabloc offered the optimal solution

At this point in the exchanger study, Tamoil refinery technical staff proposed that the evaluation should be extended to also include compact heat exchangers. The final result, after meeting all the stringent process requirements, was the selection of the all-welded Compabloc heat exchanger for the virgin naphtha condensing and cooling service.

Many of the features and benefits on which this selection was based are derived from the high shear rates created by the corrugated heat transfer surface of the Compabloc. These high shear rates generate extremely good heat transfer coefficients as well as making the channels less susceptible to fouling. The result is a lower required heat transfer area, which in turn means a lighter and more compact exchanger. More efficient use of the material also means that noble materials such as titanium can be used economically.



Horizontal installation for condensing applications.

The four Compabloc exchangers are installed two in parallel and two in series. In the first step, the virgin naphtha stream, composed of C1 to C9 fractions with an inlet temperature of 125 °C is partially condensed and cooled, by means of the de-mineralised water used for heating purposes in the refinery. In the following step the stream is further condensed and cooled to 77 °C by means of pre-heating the crude feed to the desalter from 20 to 70 °C, thus recovering a substantial amount of heat from the overhead stream.

Great savings and benefits

The installation of the Compablocs has meant great benefits and savings to Tamoil. The capital cost for the exchangers was reduced to half and for the structures and installation to less than half the cost compared to shell & tube heat exchangers. The Compablocs have now been in continuous operation for more than four years since commissioning in 1997. According to Mr. Ammar, the Senior Process Engineer of the refinery there has been no sign of decreased heat transfer or increase of pressure drops during this period and consequently there has been no requirement for service and maintenance of the Compablocs.

Two out of totally four horizontally mounted Compabloc in titanium used for vapour condensing in the atmospheric distillation tower.

Key facts about Compabloc

The 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 ranging between 0.7 to 320 m2 (7 to 3 450 sqft). The heat transfer area is made up of a pack of corrugated plates alternatively welded 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 100% welded plate pack extends design limits and offers 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

Stainless steel 316L, 304L, 317L, 904L
Avesta 254 SMO, AL6XN
Titanium, Pd-stabilized titanium
Alloy C276, C22, B2

Specifications

Design pressure min/max:	Vacuum/32 barg (460 psig)
Design temperature min/max:	-30/350°C (-20/660°F)
Connections:	ANSI or DIN flange
Codes of construction:	ASME (with or without U-stamp), AD-Merkblatter, Stoomwezen

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