Compabloc reboiler saves steam in aromatics plant

IRPC, Rayong, Thailand **Case story**

Thai refining and petrochemicals company IRPC replaced a shell-and-tube reboiler with an Alfa Laval Compabloc in order to use waste heat as heat source for a sulfolane stripper column instead of steam. This resulted in an annual reduction of 1,300,000 Euro in steam costs.

Ambitious energy saving programme

The IRPC plant in Rayong is a fully integrated petrochemical complex that produces various petroleum and petrochemical products. In 2017 the output from the aromatics section was 367,000 tonnes of toluene, benzene and xylene.

The company runs an ambitious energy saving programme with the goal of being an industry leader in terms of sustainability and energy efficiency. Over the last decade IRPC has reduced its CO_2 emissions significantly and achieved substantial savings on energy costs.

New possibilities to save steam

Finding new ways to save energy is an ongoing activity at IRPC. In cooperation with Professor Dr Arnat Watanasungsuit of Hydrocarbon Solutions Ltd, the company's engineers identified the possibility of recovering waste heat from an overhead condenser and using it as heat source in a reboiler heating a stripper column in the sulfolane extraction process.

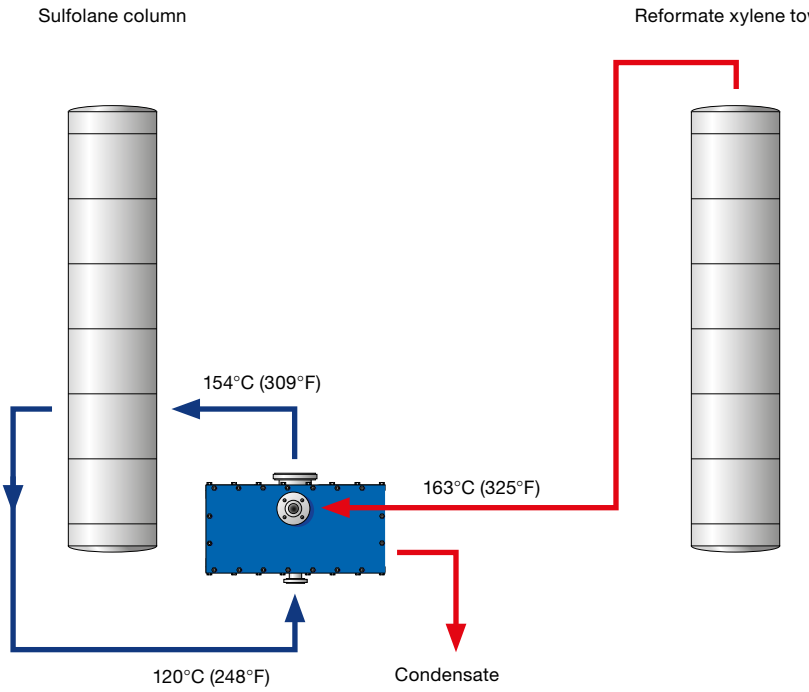
Before the revamp the shell-and-tube reboiler consumed 70,167 tonnes of 17.5 bar steam per year, which means the suggested improvement would reduce energy costs by approximately 1,300,000 Euro.

A switch to a more efficient technology

The company's engineers started designing a shell-and-tube solution that would be able to handle the new duty. The required hot approach temperature (the temperature difference between the hot stream going in and the cold stream coming out) was 10°C (18°F), meaning the new installation would have to be much larger than the existing reboiler and it was evident that the available installation space was far too small.

Dr Arnat Watanasungsuit suggested a solution based on Alfa Laval's Compabloc heat exchanger. Thanks to its exceptional thermal efficiency, the required heat transfer area would be much smaller compared to a shell-and-tube.

PROCESS OVERVIEW



Replacing an existing shell-and-tube reboiler with an Alfa Laval Compabloc, allowed IRPC to run the reboiler on heat from overhead vapours from a reformate xylene tower instead of steam. This saves the company roughly 1,300,000 Euro per year.

The Compabloc solution was so small that the existing shell-and-tube did not even have to be removed and could be kept as a backup.

About the solution

The new reboiler is an Alfa Laval Compabloc CPX120 with 350 plates. The heat source is the overhead vapour stream from a reformate xylene tower. The hot vapour has a temperature of 163°C (325°F) and a pressure of 1.8 bar.

The heat is transferred to the 104,000 kg/hour flow of sulfolane and aromatics, which is heated from 120°C (248°F) to 154°C (309°F) and is partly vaporized. The hot approach temperature is only 9°C (16°F), one degree below the required maximum. The total heat transfer is 4.2 MW. The Compabloc is configured as a once-through reboiler and is controlled by the condensate level in the unit.

Satisfied customer

Khun Worapat Pornpattanapong is manager for the Styrenics & Aromatics Process Technology Division at IRPC. “This revamp saves us substantial amounts of steam and it was made possible thanks to the compact size of our new Compabloc”, he says.

Khun Ekkarat Teera-aulhkorn, Section Manager, Wanchai Jitthavorn, Senior Engineer and Khun Kanda Thumsoontorn, Senior Engineer at IRPC all agree that they are very satisfied with both the performance of the new heat exchanger and the cooperation with Alfa Laval.

Fast facts

The plant
The aromatics section of IRPC’s Rayong petrochemicals plant.

The challenge
To replace steam with overhead vapours as heat source in a reboiler heating a sulfolane stripper column. The heat exchanger had to be small enough to fit into the available installation space, yet be able to handle a low hot approach temperature and high flow rates.

The solution
To install an Alfa Laval Compabloc CPX120 heat exchanger.

The benefits

- Energy savings of roughly 1,300,000 Euro resulting in a payback time of 1.5 years
- Compact size
- High flow rate
- Maximum operating reliability

C-Weld
Excellent corrosion protection.

Xcore
High-performance plate with superior strength.

SmartClean
Efficient removal of fouling.

ALOnsite
Global, onsite service by skilled engineers.

Learn more at www.alfalaval.com/compabloc.

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.