One of the major paraxylene producers in Asia replaced an existing air-cooled heat exchanger on top of a distillation column with an Alfa Laval Compabloc. The new Compabloc heat exchanger recovers 9 MW of heat. Over a year it saves the company energy valued at approximately 1.25 million euros annually. Payback time, including the installation cost, was less than 6 months.

Paraxylene production involves a series of distillation steps which use large amounts of energy. A standard 650,000 tpa plant produces approximately 170 MW of heat that is often treated as waste and cooled off. Recovering 40% of this heat leads to a 12% cut in the plant’s total energy consumption.

There are typically 19 distillation columns in a paraxylene plant. Five of these produce 50% of the waste heat, making them prime candidates for an energy-recovery revamp.

New tools
The overhead vapours from these five columns are usually cooled and condensed in air-cooled heat exchangers. Due to low temperatures and engineering difficulties, heat is seldom recovered. This is too costly and technically impractical using traditional shell-and-tube technology.

Highly efficient compact heat exchangers such as the Alfa Laval Compabloc open up a range of new possibilities. The exceptionally high thermal efficiency of compact heat exchangers makes it possible to recover waste heat, even when temperatures are low and space is scarce.

Short payback time
A leading paraxylene producer in Asia operating under license from UOP exchanged two large air cooled heat exchangers for an Alfa Laval Compabloc on top of the plant’s o-xylene separation column. The new heat exchanger recovers 9 MW of energy which is used for preheating boiler feedwater.

The energy recovered over a year has a value of 1.25 million euros and the revamp, including the installation cost, had a payback time of less than six months.

The compact size of the installed Compabloc made it easy to fit it into existing structures on top of the column. The unit is 0.7 by 0.7 by 1.5 metres wide and needed no extra foundation.

Perfect for heat recovery
The temperature approach in a Compabloc can be as small as 3°C (5.4°F) meaning it is very suitable for heat recovery duties.

Other possible uses of the recovered heat include heat tracing of process equipment, district heating or using the heat to run a refrigeration system.

The Compabloc was installed in 2013 and one year later, at the time of publishing this story, it is confirmed to work according to specifications.
Process overview

Distillation column

Overhead vapours

Water

65°C (149°F)

Compabloc condenser

177°C (351°F)

95°C (203°F)

105°C (221°F)

Compabloc condenser

Reboiler

Heavy aromatics

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.

Replacing an existing air-cooled heat exchanger on top of a distillation column with an Alfa Laval Compabloc let the company save energy valued at approximately 1.25 million euros annually. Payback time, including the installation cost, was less than 6 months.

Design temperature
400°C (752°F), down to -100 °C (-148°F)

Design pressure
From full vacuum to 42 barg (600 psig)

Maximum heat transfer area
840 m² (8,985 ft²)

Material of construction
316L, SMO254, 904L (UB6), Titanium, C-276/C-22/C-2000

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Duties
Heat recovery, cooling, heating, condensation, partial condensation, reboiling, evaporation and gas cooling.

Unique features
Compabloc is the champion of heat exchange thanks to unique Alfa Laval innovations that enable reliable, efficient performance, letting you save energy and improve sustainability.

SmartClean
Fast and efficient flushing of fouling material

C-Weld
Superior cleaning and extended performance

XCore
Advanced design for higher pressures

ALOnsite
Qualified support at your facility

Fast facts:

Alfa Laval Compabloc – perfect for condensing duties
The all-welded Alfa Laval Compabloc compact heat exchanger has a solid reputation for reliability and high performance.

Superior performance
Its high turbulence and counter-current flow give Compabloc unrivalled thermal efficiency. It performs condensing duties 2-4 times more efficiently than traditional solutions. This means Compabloc condensers are compact and can be installed at the top of columns without problems.

This high efficiency minimizes cooling water consumption. Alternatively it lets you use warmer cooling water or subcool the condensate.

Low pressure drop
The short flow path and the large cross section give Compabloc a low pressure drop, making it an excellent condenser.

Minimal maintenance
Fouling is minimal in a Compabloc thanks to a highly turbulent flow. When it needs cleaning, service personnel can either use cleaning-in-place equipment or remove the panels and clean the plates with a water jet. All channels are accessible for mechanical cleaning, meaning a Compabloc is back up to 100% performance after cleaning.

Designed and built for rough conditions
Compablocs are specially developed for operating with aggressive media and are available in a wide range of corrosion resistant materials.

Gas/liquid separation
If the vapour contains non-condensable gases, a Compabloc condenser can be configured with two passes, permitting gas/liquid separation in the condenser without the need for a separator unit.

Learn more at www.alfalaval.com/compabloc