

It won't  
foul up!

High pressure spiral heat exchangers for the refinery industry

# It can solve major problems in your refinery



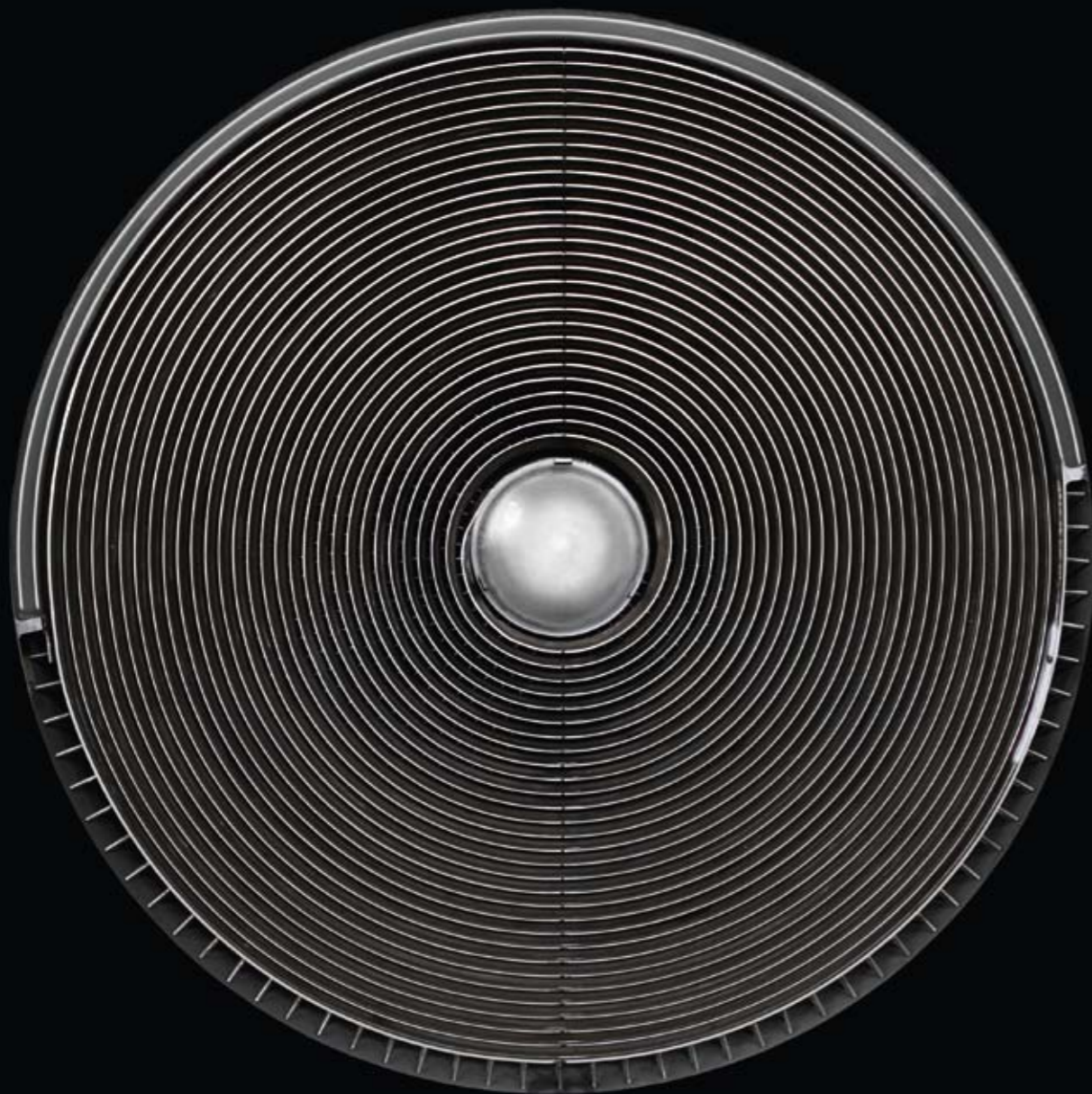
Does fouling of shell-and-tube (S&T) heat exchangers in your plant result in costly downtime and huge maintenance bills? If so, it probably also leads to higher energy costs due to excess fuel consumption in the furnace and increased electricity consumption for pumping power.

Alfa Laval has the solution. Already installed in refineries worldwide for liquid-to-liquid and condensing duties, Alfa Laval spiral heat exchangers are now available with design pressures of 100 bar. These high pressure units, designated HPSHEs, are robust process heat exchangers with an ultra-efficient, self-cleaning effect.

Occupying relatively little space, HPSHEs will continuously recover maximum heat energy from bottom residues. They do not suffer from fouling, they only require servicing every four to five years and they are very easy to clean.

Install our problem solvers and forget heat exchanger fouling problems in your refinery.

Visit [www.alfalaval.com/refinery](http://www.alfalaval.com/refinery) and read more about our time, money and energy saving products for Crude Oil Refineries. You'll find information on sensitive refinery processes, customer stories, FAQs, and much more.



# It doesn't suffer from fouling



Designed for service intervals of up to five years, HPSHEs can normally be serviced during a refinery's general shutdown, every three to four years.

## Single-channel self-cleaning effect

HPSHEs are "self-cleaning" due to their single channel geometry. If fouling starts to occur in the heat transfer channel, the cross-section of this part of the channel is decreased. Yet, since the entire flow rate must still pass through it, the local velocity here increases, causing a scrubbing effect that removes the fouling.

Another important anti-fouling factor is the scouring action. This is caused by both the spiral flow and the continuously curving passages, which create turbulence in the flow. Other factors are the uniform velocity profile, the design without dead zones and efficient heat transfer.

## Long service intervals

HPSHEs can be serviced during a refinery's general shutdown, every three to four years. They can be cleaned quickly and simply by backflushing, hydroblasting or in-line chemical cleaning. There is an Alfa Laval Cleaning-in-Place system designed for this duty.



A shell-and-tube heat exchanger (S&T) after three months' operation in a fouling process.

## Easy to open

Highly service-friendly, the interiors of HPSHEs are accessed by means of an easily opened front cover. Unlike S&Ts, where space must be allowed for long tube bundles to be withdrawn and cleaned manually, HPSHEs have a small service footprint.

## Process stability means peace of mind

The fact that HPSHEs do not suffer from fouling eliminates unplanned downtime due to fouled heat exchangers. It provides a high level of stability for your process and greater peace of mind.

# It's compact and highly energy efficient



## **Energy efficient, design pressure 100 bar**

The turbulence created in the spiralling channels of an HPSHE ensures two to three times higher heat transfer efficiency than is provided by an S&T.

An HPSHE is ideal for recovering maximum heat energy from bottom residues, due to the almost 100% counter-current flow in the unit.

## **Save fuel, reduce CO<sub>2</sub> emissions, use less energy**

Since the heat recovery performance of an HPSHE will not be reduced by fouling you will not require extra heat from the furnace. This

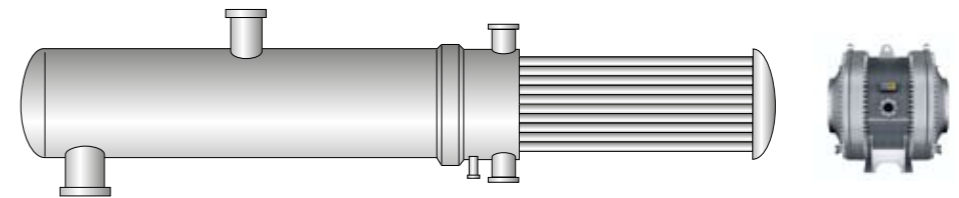
will cut fuel costs and reduce CO<sub>2</sub> emissions from your plant.

HPSHEs use a quarter of the pumping energy required by S&Ts. Also, as there will be no fouling to increase the pressure drop over the heat exchangers, you will not require extra pumping energy either. It all adds up to substantial energy savings for your refinery.

## **Compact design, lower installation costs**

Based on a popular, well-proven design, the HPSHE takes up one sixth of the space required by an S&T, yet is much more efficient. Installation costs are lower since less pipework and steel structures are needed.

HPSHEs help you optimize energy consumption in your refinery. In addition, their compact design enables you to free up valuable floorspace by replacing long S&T "trains" with a few HPSHEs.



Compared to an S&T, an HPSHE takes up one sixth of the space, uses a quarter of the pumping energy, and offers two to three times higher heat transfer efficiency.

# Still not convinced?



Install an Alfa Laval HPSHE and get two problem-solvers for the price of one!

## Design pressures of up to 100 bar

Able to withstand pressures of up to 100 bar and higher temperatures, Alfa Laval HPSHEs are reliable process heat exchangers for:

- Visbreaking
- H-oil
- Fluid Catalytic Cracking (FCC)
- LC Fining
- Coking
- Desalting

They offer higher mechanical quality and are more robust than competing products. HPSHEs comply with main codes and regulations worldwide, including the coming API standard relating to Spiral Heat Exchangers.

## A reliable partner with application know-how

When you invest in an Alfa Laval HPSHE you don't just get one problem solver, you get two! You enter a partnership with a global heat transfer specialist with extensive experience of process optimization in Crude Oil Refineries.

We can help you make the conversion to HPSHEs in your sensitive processes. With our help, refinery industry customers in several



A spiral heat exchanger is circular with two concentric spiral channels, one for each fluid. The curving channels provide extremely efficient heat transfer.

countries have achieved this smoothly – and with excellent results for their bottom lines.

## Alfa Laval Parts & Service

Install an Alfa Laval spiral heat exchanger and you gain access to a world-class parts and service organization that will help you get the most out of your installation. We are just a phone call away, 24 hours a day, 365 days a year, and our mission is to help keep your equipment up and running.

# More than 50 fouling problems solved already!

Although high pressure versions of Alfa Laval's popular Spiral Heat Exchangers have only recently been introduced to the market, they have already solved fouling problems for more than 50 refinery customers around the world. HPSHEs simply won't foul up! Below are some examples...



Germany:  
Slurry oil cooling

Two double-pipe S&Ts cooling slurry oil in the FCC process were replaced with two Alfa Laval HPSHEs. These have required no service at all during eight years of non-stop operation, and are now included in the plant's standard five-year maintenance programme.

Savings in maintenance-related costs alone were approximately € 500,000 over a period of 15 months.



Spain:  
Feed preheating at vacuum distillation and cooling of fuel oil after Visbreaker

In 2009 the company replaced clogged S&Ts (the first heat exchangers of the train) with two Alfa Laval HPSHEs in parallel. No cleaning has been required so far.

The results were lower maintenance costs and higher heat recovery.



Ukraine:  
Spiral heat exchangers for Visbreaking unit

A refinery replaced 24 S&Ts with four Alfa Laval HPSHEs for Visbreaking bottom cooling duties. Installed in 2008, when first opened one year later they showed no signs of fouling. There has been an increase in the conversion rate from 54% to 80% and the process is very stable.



Bulgaria:  
Spiral heat exchangers replace S&Ts for Visbreaking bottom cooling duties

Due to major fouling problems, a new refinery replaced twelve S&T heat exchangers with eight HPSHEs. Fouling is now insignificant and the units provide higher heat transfer efficiency and more stable and profitable production.

Savings in maintenance-related costs amount to €1,650,000 per year.

[www.alfalaval.com/refinery](http://www.alfalaval.com/refinery)

