



# Long-term reliability

## Unipetrol, Refinery Litvínov, Czech Republic

Unipetrol RPA has been operating a Packinox combined feed/effluent heat exchanger in its refinery in Litvínov, Czech Republic, since 2002. This heat exchanger recovers heat in the refinery's catalytic reforming unit and has delivered reliable performance and large energy savings for many years.

### Stable performance

The Packinox heat exchanger was designed for a hot approach temperature, i.e. the temperature difference between the incoming hot reactor effluent and the exiting cold feed, of 48°C (118.4°F). The actual hot approach temperature has constantly been below the design temperature, see diagram 1. This means the energy savings have been even larger than expected.

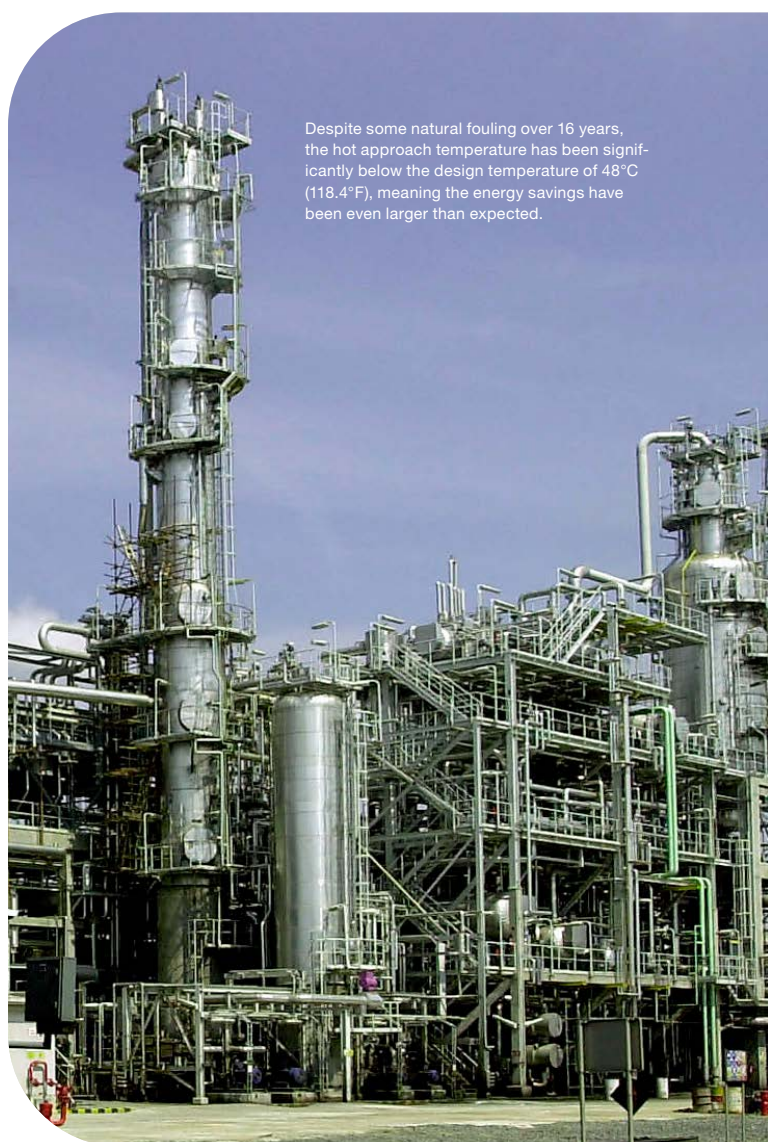
### Major energy savings

As can be seen in diagram 1, the average hot approach temperature has been below 40°C (104°F) over the 16 years of operation covered by the diagram. As a rough comparison, an equivalent setup with shell-and-tube heat exchangers would have a hot approach temperature of around 65°C (149°F) and recover 1.25 MW less heat.

The extra fuel cost due to the inferior heat recovery would be 0.25–0.30 million euros per year. This means the Packinox heat exchanger has saved Unipetrol somewhere between 4 and 5 million euros over the years (not taking the gradually decreasing thermal performance of a shell-and-tube or the fluctuating energy prices into account).

### Low, stable pressure drop

The pressure drop in the heat exchanger has also been very stable since it was commissioned. On the feed side it is 0.3 kg/cm<sup>2</sup> (29.4 kpa) and on the effluent side it is 0.4–0.5 kg/cm<sup>2</sup> (39.2–49.0 kpa).



Despite some natural fouling over 16 years, the hot approach temperature has been significantly below the design temperature of 48°C (118.4°F), meaning the energy savings have been even larger than expected.

An average shell-and-tube setup has a pressure drop that is 2–3 times higher, leading to higher costs for the compressor (CAPEX and OPEX) and in some cases lower yield in the process.

### Continuous follow-up

Operating data are continuously collected and analysed by the Alfa Laval Packinox team. The results are presented to the customer in regular condition reports together with recommendations on how to improve performance and when to plan for service.

Petr Městka, Head of Technology and Research at Unipetrol says: "This has resulted in maximum operating reliability and has allowed the company's engineers to optimize the operation of the Packinox heat exchanger."

### Minimal maintenance

The only maintenance that has been required to this date (August 2018) is a chemical cleaning that was performed during a plant turnaround in 2016 – 14 years after the unit was commissioned. An endoscopic inspection confirmed the cleaning had been effective.

Mr. Městka concludes: "Over the years we have been very satisfied with the performance of our Packinox heat exchanger and the support we have received from Alfa Laval."



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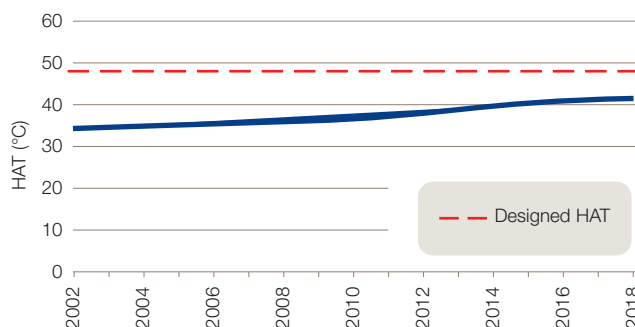
Effective mixing of the liquid feed and the recycle gas



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### Hot approach temperature (HAT)



Despite some natural fouling over 16 years, the hot approach temperature has been significantly below the design temperature of 48°C (118.4°F), meaning the energy savings have been even larger than expected.

## Fast facts

#### The plant

Unipetrol's refinery in Litvínov, Czech Republic.

#### The challenge

To cut fuel costs in the refinery's catalytic reforming unit by recovering as much heat as possible.

#### The solution

A Packinox combined feed/effluent heat exchanger.

#### The benefits

- Maximum heat recovery
- Reliable operation
- High yield

Learn more about Alfa Laval Packinox heat exchangers at: [www.alfalaval.com/packinox](http://www.alfalaval.com/packinox).

#### 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](http://www.alfalaval.com)

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