

# Maximizing energy savings through maintenance

International studies show that 2.5% of all global CO<sub>2</sub> emissions are related to fouled heat exchangers. As fouling causes heat exchangers to perform sub-optimally, it also leads to increased costs for additional fuel, over-design and plant downtime. The traditional practice is to operate the heat exchangers with excessively long intervals between cleanings. This leads to large energy losses and unnecessary environmental impact. Thankfully, there are methods to monitor the condition of the heat exchangers, ensuring appropriate maintenance at optimal service intervals.

By implementing an optimized maintenance plan, you ensure that the heat exchangers operate at a peak performance through its life cycle. The different service interventions ensure the performance of the heat exchanger improving the efficiency of the process and enabling savings in operational expenses and significant reduction in carbon emissions.

## Setting up a new service strategy

There are two efficient methods for cleaning a plate heat exchanger; by reconditioning and by Cleaning-In-Place.

- Reconditioning involves sending the plates or units to a service centre where they are cleaned with high-pressure water jet or chemicals and come out as good as new. In the reconditioning process, the gaskets are replaced as well.
- Cleaning-In-Place, or CIP, is performed on-site and without disassembling the unit. The method involves circulating selected cleaning agents through the plate heat exchanger to swiftly remove the fouling. CIP is a cost-effective solution that extends the lifespan of both the gasket and the plates. However, it is important to use approved and tested cleaning agents for this process. Manual cleaning or cleaning with high-pressure water jet on-site effectively removes fouling and blockages, restoring the heat exchanger to high performance levels. It is particularly beneficial when other cleaning methods aren't feasible, or when the unit or the plates can't be removed from the site.



## How to optimize heat exchanger performance through predictive services

### Keep your heat exchanger clean

A heat exchanger is a critical piece of equipment in industrial processes, especially when it comes to saving energy and reducing CO<sub>2</sub> emissions. The key to achieving the energy efficiency benefits is to keep it clean.

### Condition-based assessment services

By using condition-based assessment services, you can establish a maintenance plan that tells you when and how to clean. These services are performed while the plate heat exchanger is in operation. Alfa Laval offers a 24/7 condition-based assessment service called SmartHEX, where machine learning provides methods to monitor the condition of the heat exchangers, ensuring appropriate maintenance at optimal service intervals. It is also possible to perform an instant thermal health check during operation, called Visual condition assessment (VCA). With the help of thermal imaging, the VCA reveals potential fouling, clogging and maldistribution, indicating energy loss and a need for service. Additionally, a Performance Assessment gives a detailed and fact-based thermal performance verification of the heat exchanger. The service involves using process data to compare the actual performance with expected clean performance. This will indicate when to clean and which cleaning method to use.

### Optimized performance through redesign

Many heat exchangers are designed to handle peak conditions, but do not operate under them at all. The ability to add or remove plates and thereby redesigning a plate heat exchanger provides flexibility to the heat exchanger. It allows adjustment of the plate pack to match the actual operating conditions, optimizing its performance in terms of energy transfer and resistance to fouling.

Plate heat exchanger heat transfer efficiency

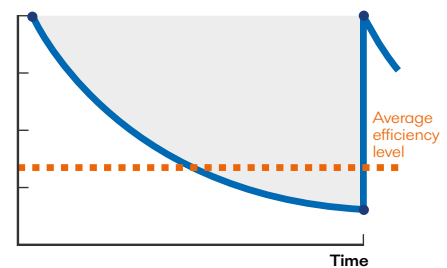
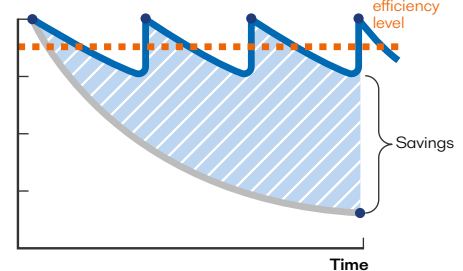


Plate heat exchanger heat transfer efficiency



## Benefits of regular maintenance strategies

- If all petrochemical plants regularly serviced their plate heat exchangers to optimize heat transfer efficiency, energy consumption could be reduced by 154 TWh per year – the same as 32 million tonnes of CO<sub>2</sub> annually. Equivalent to the entire Denmark.
- If all refineries regularly serviced their plate heat exchangers to optimize heat transfer efficiency, energy consumption could be reduced by 60 TWh every year, saving 13.6 million tonnes of CO<sub>2</sub> emissions annually – the same as 44,000 flights between London and Shanghai.

