
ALFA
LAVAL

AlfaCheck

Fouling and condition based maintenance of plate heat exchangers

David Mellby
Product manager
2012-11-02

WHY CLEAN YOUR PLATE HEAT EXCHANGER?

Why clean heat exchangers?

- Maintain heat transfer
- Reduce pressure drop
- Avoid under deposit corrosion
- Secure sealing

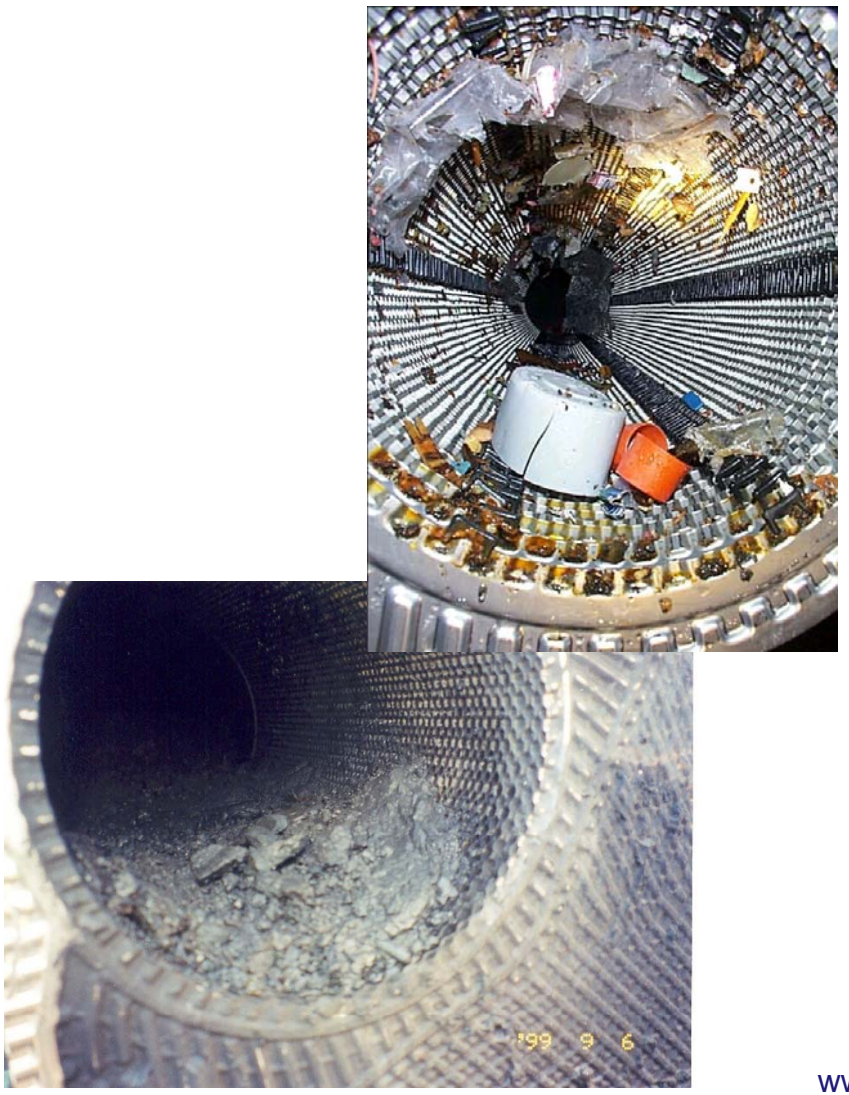
Immediate failure - Major debris clogging / plugging

Results in:

- Increase pressure drop
- Maldistribution → reduced heat transfer

Solution:

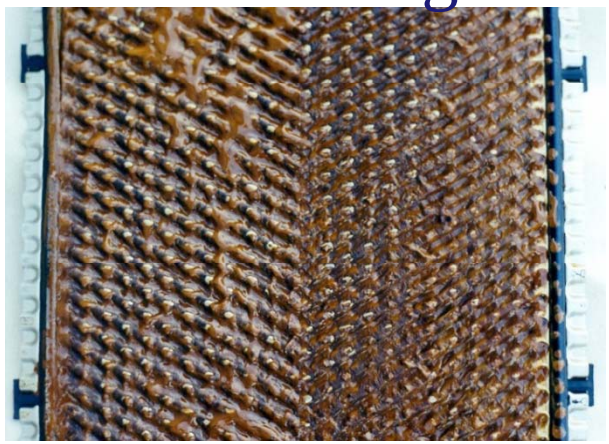
- Filter
- Cleaning

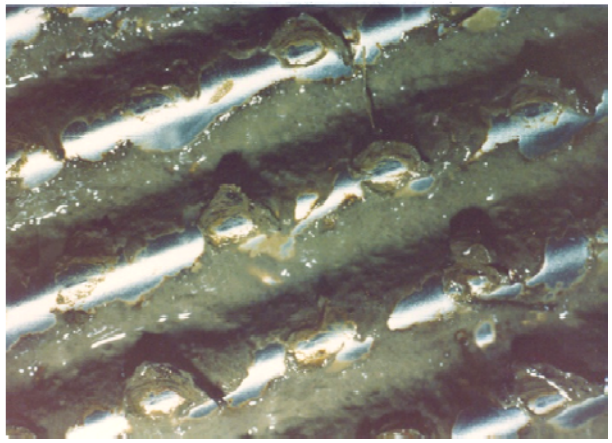


Gradual failure / fouling

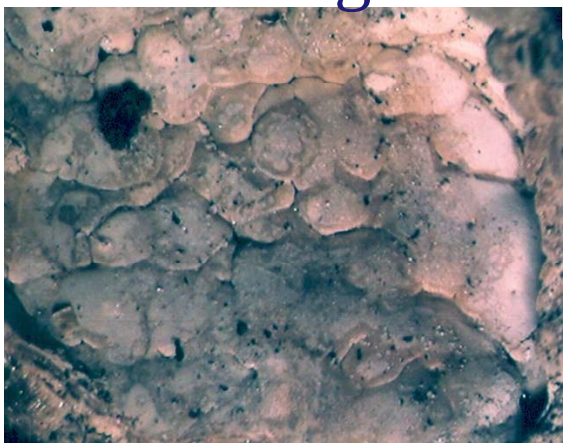
Coarse fouling

Biofouling





Scaling



Cleaning, re-design, condition based monitoring.

WHEN TO CLEAN?

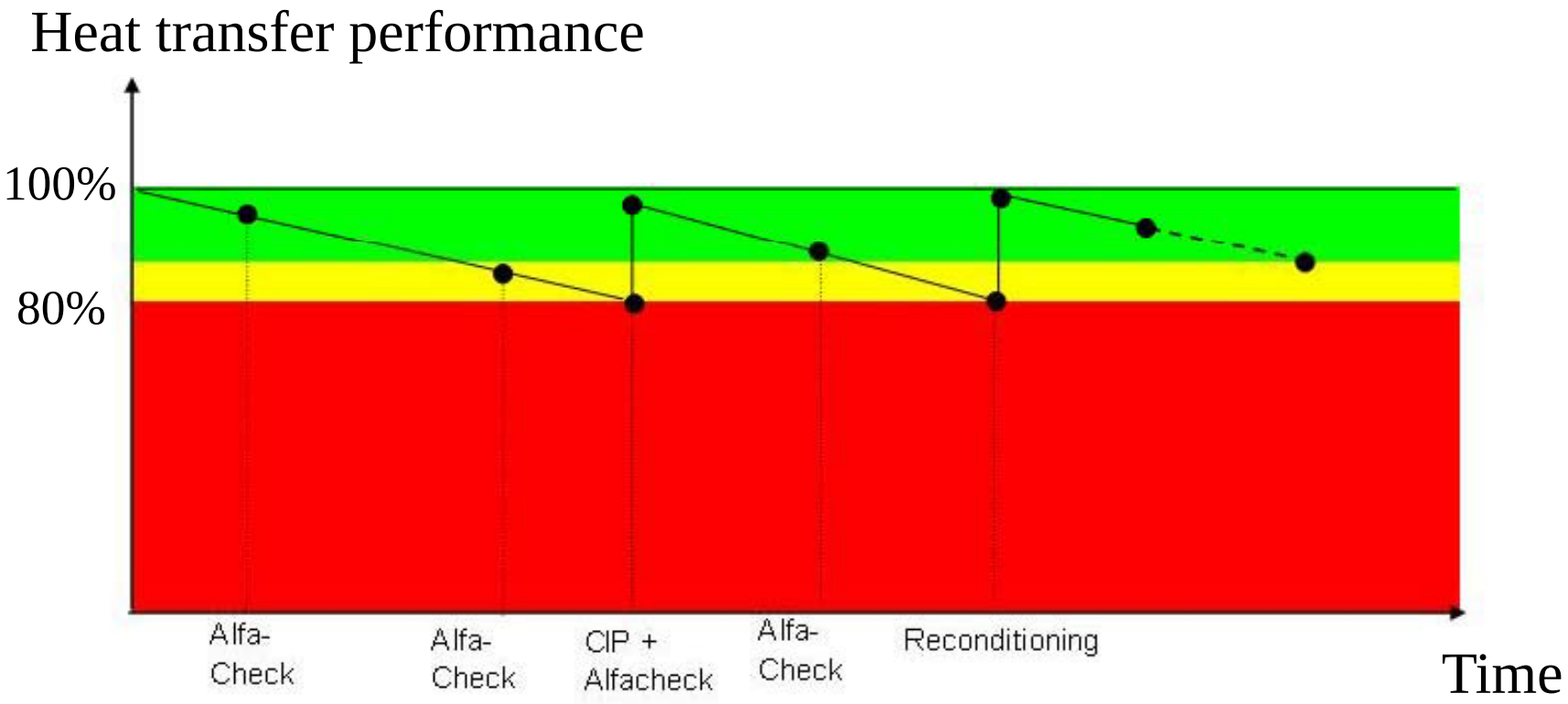
When to clean your plate heat exchanger?

- Too long maintenance intervals?
- Too short maintenance intervals?

With **AlfaCheck** you can now **clean at the right time**

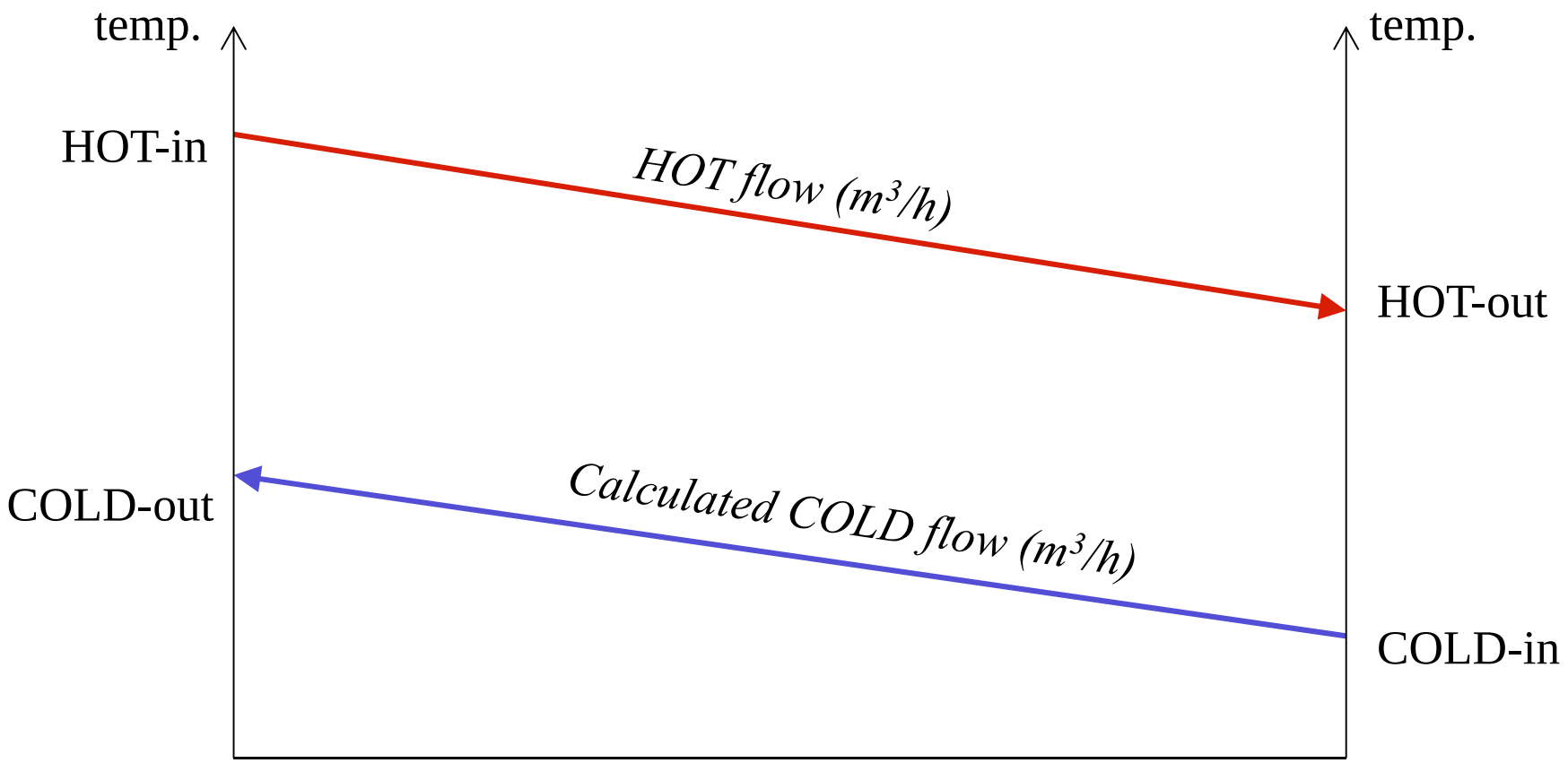
Condition Based Maintenance

Clean at the right time



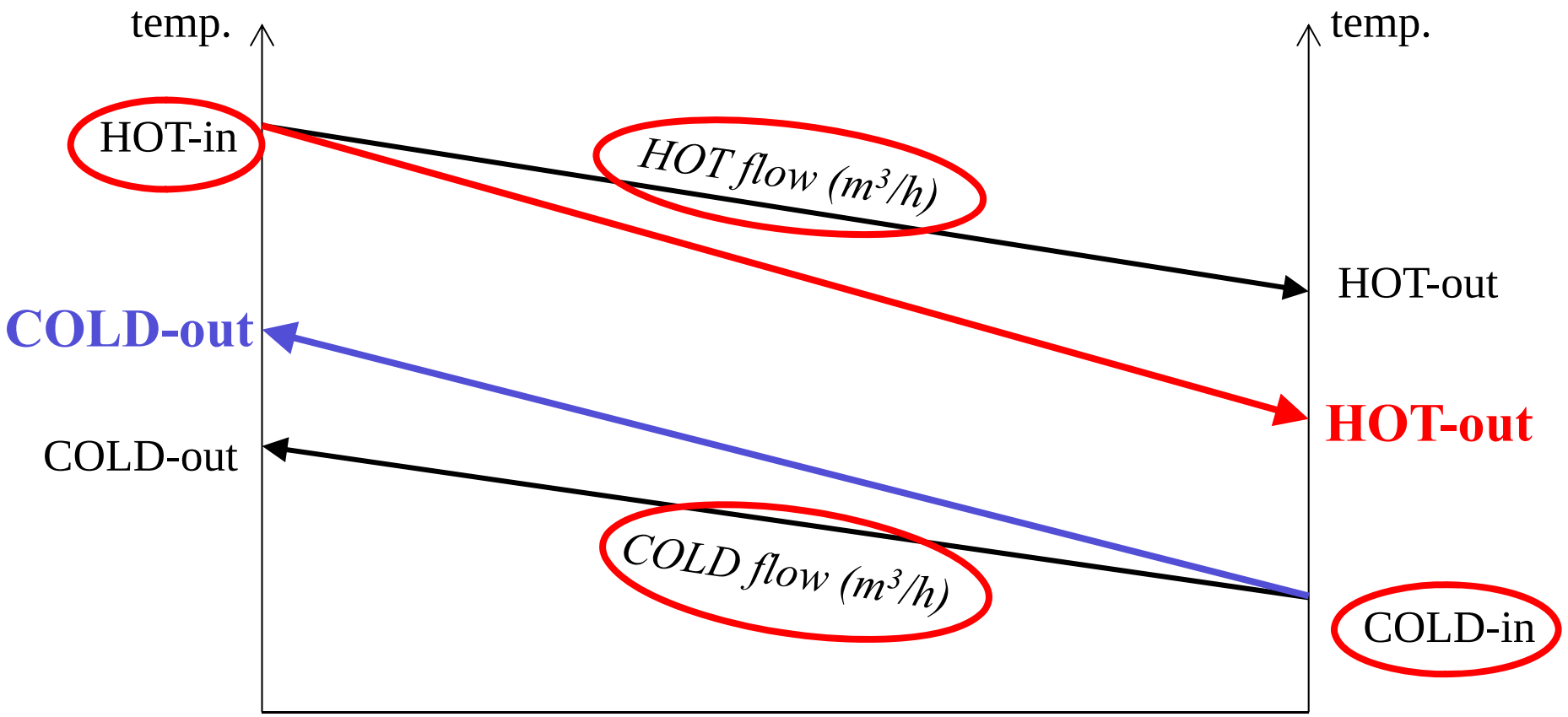
Color	Action
Green	Status OK
Yellow	Plan for CIP/cleaning
Red	Clean asap (manual cleaning)

Heat transfer, actual conditions



$$Q_{actual} = m_{hot} \times Cp_{hot} \times (\Delta T_{hot}) = m_{cold} \times Cp_{cold} \times (\Delta t_{cold})$$

Heat transfer, clean PHE



$$Q_{clean} = k \times A \times LMTD$$

Result – Heat transfer performance

How to calculate heat transfer performance?

- By comparing actual heat transfer with theoretical heat transfer if PHE was clean

$$\frac{Q_{actual}}{Q_{clean}} = XX\ \%$$

AlfaCheck - For all units?

All Alfa Laval PHE

- 1-Phase (liquid/liquid)
- Inlet dim. ≥ 60 mm
  - Gasketed PHE
  - Welded PHE
  - CompaBloc

FUNKE

invensys APV

Most major PHE suppliers

GEA

HISAKA

TRANTER

AlfaCheck benefits

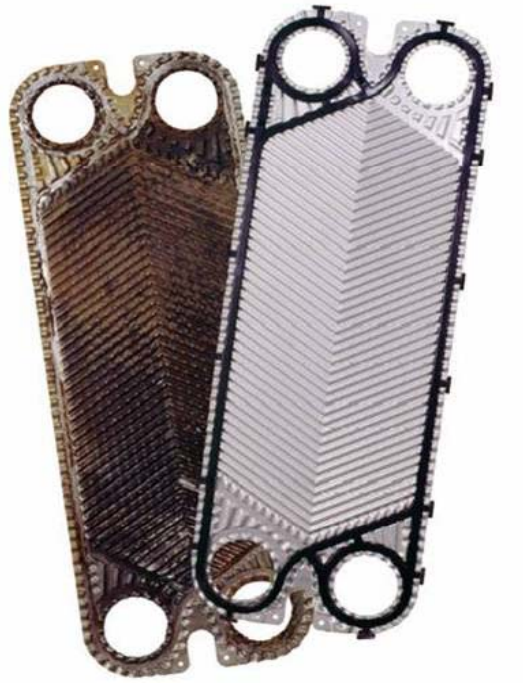
- Optimized service intervals: Cleaning at the right time - not too early not too late
- Save money on energy bill
  - Secure efficient heat transfer
  - Reduced pressure drop
- Increase production uptime since you are in charge of the operation stops
- Minimize opening of PHE ⇨ prolonged PHE life-time

Clean for greater energy savings

Cooling application using sea water. Five large plate heat exchanger operated in parallel.

- With AlfaCheck we optimized cleaning intervals
  - Clean when heat load dropped to 90% instead of 80%
  - Fouling leads to increased flow and pressure drop

- Annual electricity savings: EUR 26 000 (440 000 kWh)
- Annual decrease in CO2 release: 240 000 kg



Based on 8,000 operating hours per year, heat transfer of 63 000 kW and energy costs €0.06 per kWh

AlfaCheck

Clean only if and when needed