

A Major Advance in Heat Exchanger Technology

Despite increasing demands placed on industry to recover valuable energy, reduce costs and limit environmental emissions, innovation in shell and tube heat exchanger technology, used in processing operations of many industries, has been modest.

The last heat exchanger innovation was some 25 years ago, with the development of Twisted Tube, Helix and Rod baffle heat exchangers – although conventional segmental baffle design still dominates the market.

The EMbaffle® heat exchanger is a major innovation designed to improve performance and simultaneously reduce operating costs by reducing fouling losses.

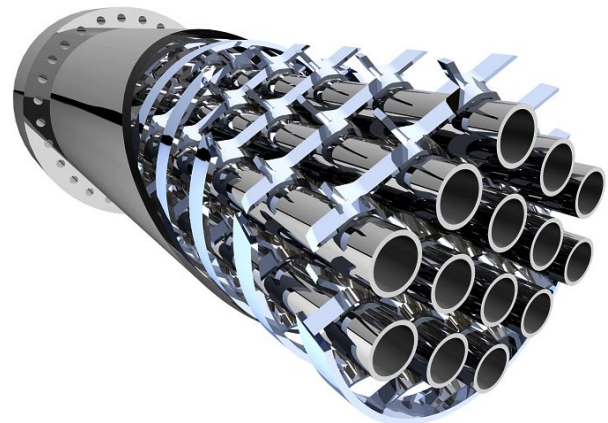
How it works

The patented EMbaffle® design uses expanded metal baffles (tube supports) made of plate material that has been slit and expanded. The open structure results in a low hydraulic resistance and enhanced heat transfer. The EMbaffle® allows a longitudinal flow pattern, so that tube vibration will not occur.

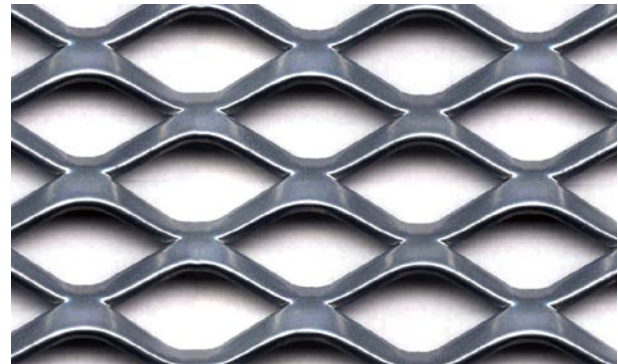
Benefits

The resulting high performance heat exchanger, when compared to conventional shell and tube segmental designs, offers the following potential benefits:

- lower fouling rates
- lower pressure drop on the shell side
- elimination of damaging flow-induced tube vibration
- improved heat transfer capabilities
- competitive manufacturing costs
- large operating window
- applicable in combination with segmental baffle
- lower temperature approach
- uniform flow pattern at shell side
- possible CO₂ reduction
- reduced weight of heat exchanger
- compact heat exchanger design



EMbaffle® Heat exchanger



Expanded metal - with an open structure for lower pressure drop and a heat transfer enhancing shape

The absence of low shell-side velocity 'dead zones' means that operational running times of production units can be increased due to the reduction in fouling. Maintenance, cleaning and refurbishment schedules are optimised, heat recovery improved and firing of furnaces reduced to help lower CO₂ emissions.

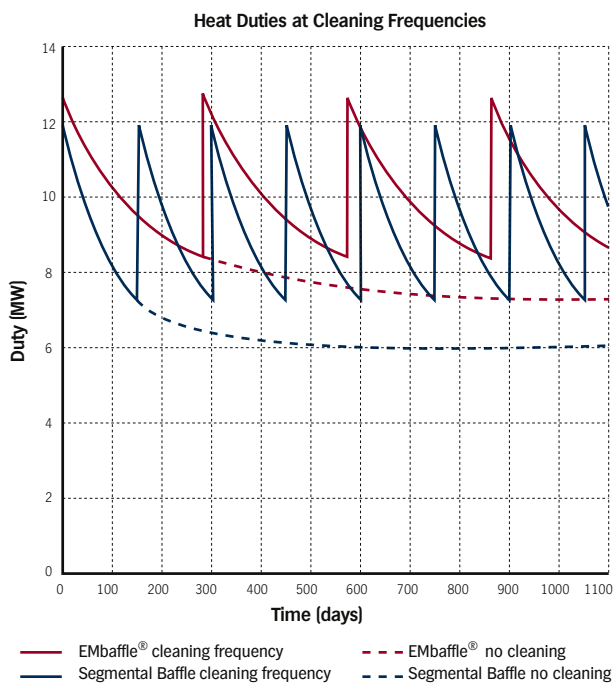
EMbaffle® in action

In early 2004, a conventional heat exchanger bundle at a complex refinery in Western Europe was replaced by an EMbaffle® bundle. Intensive monitoring and comparative analysis of both the conventional and the newly installed type of heat exchanger has demonstrated the enhanced performance from the use of the EMbaffle® design.

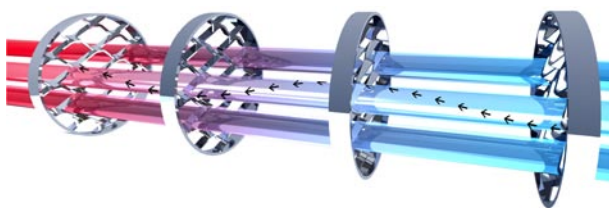
The results showed that the tendency to fouling was almost twice as low for EMbaffle® as with the segmental heat exchanger type. Optimum cleaning frequencies for the various heat exchanger types were determined by heat exchanger optimisation tool (Heat for Networks – HEAT4N) developed by Shell Global Solutions International. This highlighted the potential to maximize the run time of the unit and to reduce energy and maintenance costs – leading to a reduction in CO₂ emissions.

EMbaffle® generated 24% higher thermal performance and a substantially lower pressure drop. In addition, 18% fewer tubes were installed in the EMbaffle® heat exchanger, offering a significant cost saving on equipment.

Energy savings have been shown to be 0.025 – 0.060 PJ/a for a 10MW heat exchanger, leading to an operating cost reduction of 50,000 – 125,000 Euros per year.



Increased run time for the EMbaffle® heat exchanger



Flow Pattern EMbaffle® exchanger



Fouling reduces heat transfer and increases pressure loss



An EMbaffle® test bundle

Working with the EMbaffle®

EMbaffle® technology is available under licence to heat exchanger manufacturers and expanded metal suppliers. EMbaffle B.V. can offer licensees consulting services to design, review and verify thermal performance of EMbaffle® exchanger designs.

Our team of technical specialists can also provide project services and design solutions to engineering procurement contractors and end users for their heat exchanger operations, to ensure optimal heat integration and clean, safe and reliable equipment.

The EMbaffle® team also provides design services for EMbaffle® heat exchangers and a comparison of EMbaffle® solutions to other types through HTRI design software – for which EMbaffle® is now an option.

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