

EMbaffle 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 the 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 and maintenance costs by reducing fouling losses.

It has been patented and launched by Shell Global Solutions – a dynamic service network that aims to help customers raise their business performance. Combining leading-edge technology with extensive operating experience, Shell Global Solutions provides innovative, yet practical, solutions that are designed to enable clients to achieve their full potential.



Bundle of an EMbaffle heat exchanger

How does it work?

The patented design of EMbaffle employs expanded metal baffles (tube supports) made of plate material that have 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.



Expanded metal – with an open structure for low pressure drop and a heat transfer enhancing shape

What are the benefits?

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

- lower fouling rates
- lower pressure drop at shell-side
- elimination of damaging flow-induced tube vibration
- improved heat transfer capabilities
- lower manufacturing costs
- large operating window
- applicable in combination with segmental baffle
- lower temperature approach
- uniform flow pattern at shell-side
- no friction losses due to cross flow and flow direction change
- an ability to withstand a higher shell-side velocity
- less material waste during production
- possible CO₂ reduction.



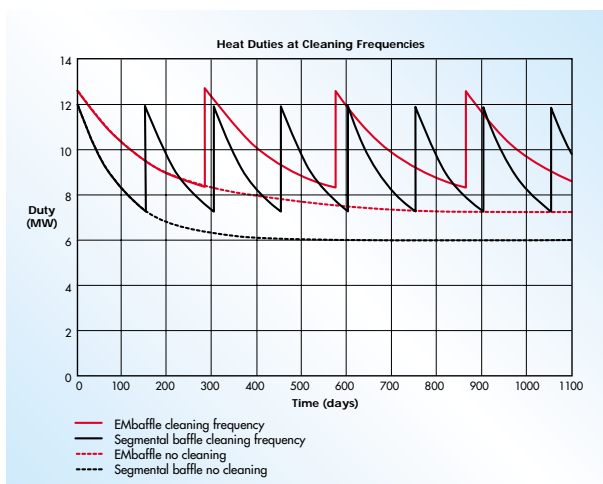
Fouling reduces heat transfer and increases pressure loss

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 reduce 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 analysis of both the conventional and the newly installed type of heat exchanger has demonstrated the performance.

The results show 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 the SGSI developed heat exchanger optimisations tool (Heat for Networks - HEAT4N). They highlighted the potential to maximise the run time of the unit and to reduce energy and maintenance costs – which will help to reduce the CO₂ emissions.



Increased Run Times For The EMbaffle Heat Exchanger

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.

Working with EMbaffle

EMbaffle technology is available, under licence, to heat exchanger manufacturers and expanded metal suppliers. Shell Global Solutions can offer licensees consulting services to design, review and award thermal approval of EMbaffle exchanger designs.

Our team of technical specialists can also advise engineering procurement contractors and end users on design and specification solutions 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 baffle types through HTRI design software – for which EMbaffle is now an option.

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