

Clean or untreated water? A BPHE works with both.



Industries around the world have to face the challenge of water contamination due to insufficient filtration. The untreated water affects the equipment used in the process plant and is also a major issue for any component where water is used for system processes, for example heat exchangers.

Fouling: a major problem

In most cases, the fluid flowing through a heat exchanger contains traces of dirt, oil, grease, chemicals or organic deposits. This can result in a coating collecting on the heat transfer surface, decreasing the heat transfer coefficient. Mandar Rajwade, Business Engineer at SWEF and based in India with a focus on the South Asian market, is well aware of the problem. "The challenge is to prevent scaling and breakdowns due to fouling issues." The fouling and scaling on equipment cause damage or clogging. This, in turn, raises maintenance costs and reduces the efficiency output. Fouling can reduce the thermal efficiency of the heat exchanger and change the pressure drop characteristics.

Traditionally, the Indian market has preferred plate heat exchangers with rubber gaskets, since they can be taken apart when cleaning is required. "Many people here have equipment with an open cooling tower circuit or they use makeup water in their systems", says Mandar Rajwade. "There is a mindset that brazed plated heat exchangers won't work in our country."

The answer: self-cleaning BPHEs

Unlike traditional heat exchangers, BPHEs cannot be taken apart since the plates are brazed together. How can they be used in an area where untreated water requires regular cleaning? The answer spells self-cleaning. Highly turbulent flows prevent fouling and scaling. The flows keep particles in the



fluid in suspension, i.e. prevents them from sticking on the surface and causing fouling.

An even distribution of fluid through the exchanger is also important. This is strongly related to the plate pattern. SWEF BPHEs have a special pattern in the port areas, designed to ensure a well-distributed flow. Other heat exchangers may have areas sensitive to fouling due to low velocity, for example around gaskets, resulting in laminar flow. Fouling would start here and spread across the heat transfer surface. SWEF BPHEs function perfectly without cleaning, despite poor water quality.

When the going gets tough, there is CIP

In harsh conditions, for example in applications which use water at high temperatures, water with a high

concentration of particles, hard water, or water with high PH levels, there is a risk of fouling or scaling even in a BPHE. Then cleaning might be recommendable, either as a preventive measure or to maintain efficiency. However, there is an easy way to do this which does not require disassembly.

Cleaning in Place (CIP) is an established method of cleaning interior surfaces of closed systems by the circulation of a chemical fluid. The chemicals dissolve or loosen deposits from the equipment, such as pipes, vessels and filters. SWEF BPHEs can be equipped with customized CIP ports for an even easier, faster and more cost-effective procedure. Since a BPHE does not have to be taken apart to be cleaned, the system designers can count on higher energy-efficiency and reduced costs for maintenance and downtime.

Cristopia Energy Systems – always at the forefront

Based in India, Cristopia Energy Systems (I) Pvt. Ltd. is a specialist engineering group which manufactures large and small scale cooling, heating and energy management solutions. The company has earned its reputation of being the nation's leading provider of cost-saving energy systems. Kshama Jain, CEO at Cristopia, knows her market well. "The quality of water varies from installation to installation, even in the same city. Hence we have to be very careful while designing systems with BPHEs, especially when high temperatures are involved."



In its mission to offer solutions of the highest quality, efficiency and reliability, Cristopia Energy Systems has been implementing BPHEs in its heat pumps and chillers for years. "SWEP has collaborated with Cristopia for a long time. It is our first Indian customer to use BPHE in an air conditioning application", says Mandar Rajwade at SWEP. "Cristopia regularly buys SWEP BPHEs for evaporators for chillers in AC systems and for heat pumps for industrial applications. We support their systems with advanced and cost-effective technology."

Reliable cooling

One of Cristopia's chiller models, the Kriscool Mini, is a unique air-conditioning system. Designed with Cristopia's TES technology, which allows the system to store 'cooling energy' when power is available, it provides continuous cooling even during power outages or failures. It even provides a free supply of hot water at no additional energy consumption or cost.

To make the Kriscool Mini a reliable system it has to contain reliable parts. SWEP offers highly efficient evaporators and condensers with dedicated ranges for R410A, R134a, and R407C. "The Kriscool Mini has worry-free design and function. It does not have CIP due to the low temperature of operation of the BPHE evaporators and the incorporated special filtration system. However, the

Kriscool Mini is also available with a hot water option, with an incorporated CIP system to maintain efficiency and prevent fouling", says Kshama Jain. This solution is both reliable and cost-efficient for Cristopia, whose engineers have not experienced any problems with fouling in the one and a half years since the first installation.

Reliable heating

Controlled by a Cristopia-developed microprocessor, the Kriscool heat pump can be used to provide hot water and/or room heating. As it moves thermal energy from low temperature ambient to produce hot water/heating, it saves energy costs of up to 70%, for example for the heating of water in hotels or swimming pools.

In the high temperature operation environment of heat pumps, the cleaning of the BPHE is often required as a preventive measure. The integrated CIP system solves this issue. Through the effective circulation of non-toxic fluid the surfaces are left clean and the performance of the machinery is restored. "We have designed and developed the CIP system. Our system has a semi-automatic cleaning process to maintain efficiency and increase the life expectancy of the BPHEs", says Kshama Jain at Cristopia. "The operation is started manually, but the CIP process is then taken over by the microprocessor." The system is installed as an integral part

of heat pump. "The fact that the equipment does not have to be opened has many advantages", says Kshama Jain. "It means safe cleaning, reduced operating costs, reduced need for spare parts and fewer man-hours required for cleaning, for example. The CIP system pays for itself in a very short period of time".

Looking ahead

Industries around the world will most likely have to face the challenge of untreated water for years to come. Until then the equipment needs to be protected against the use of water of unfavourable quality. "Our CIP design takes care of this problem", says Kshama Jain at Cristopia. "We are still on the experiencing platform and are currently collecting data from all our installations. Our plan is to further simplify the CIP operation by making it fully automatic by the end of this year. So far we have been very pleased with the results. SWEP has been a wonderful partner and has supported us whenever we needed their expertise." ■



SWEP is one of the world's leading suppliers of Brazed Plate Heat Exchangers (BPHEs). World-leading within the field of heat transfer, SWEP constantly advances the front line in order to supply the latest technology to the market. SWEP's goal is to offer its customers excellent performance, economy and service. SWEP was established in 1983 by small group of pioneers in thermal engineering who were among the first to commercialize the BPHE technology. SWEP is close to its customers, with representation in more than 50 countries and its own dedicated sales force in more than 20 countries. Production units in Sweden, Switzerland, USA, Malaysia, Slovakia and China make it possible to serve customers all over the world. The company is part of the global Dover Corporation.