> Self Cleaning Evaporator
Industrial Dryer and Spray Cooler
Zero Liquid Discharge Plant

SHACHI
Passion Powered Performance

Self-cleaning Evaporator Technology

Prevents fouling, scaling and frequent cleaning,
saves huge maintenance cost and increases plant uptime

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Advantages of Self-cleaning Evaporator

Better energy performance
As the tubes of the evaporator remain clean and thus provide constant heat transfer.

Environment Friendly
The System does not use chemicals or online additives for cleaning and therefore achieves cleaning with no hazardous waste streams.

Enhanced productivity
Since the equipment does not require to be taken out of production for cleaning, the capacity of the Evaporator remains constant leading to a significantly improved productivity for the entire plant.

Compact Design
Constant heat transfer in self-cleaning evaporators allows tighter allowances in design. By eliminating the need for over dimensioning the systems designed are highly compact.

About Our Technology Partner Klaren International

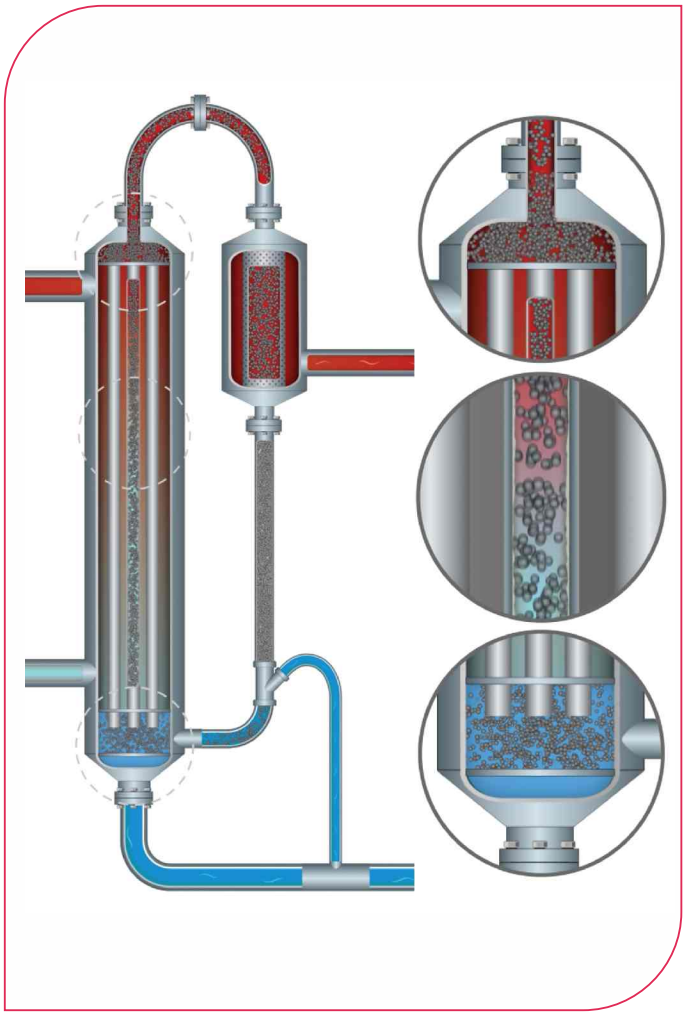
Klaren International's self-cleaning technology increases efficiency and reliability of evaporators by significantly eliminating fouling. Klaren International is a technology and engineering company based in the Netherlands that develops self-cleaning evaporators for operation up to zero-fouling. It employs an international team of engineers and cooperates with a network of specialists. Klaren International is engaged in design, engineer and commission of the self-cleaning evaporators.

How does it work

The operating principle of the self-cleaning evaporator is based on the circulation of solid cleaning particles through the tubes of a vertical shell and tube heat exchanger. The fouling liquid flows upward through the tube bundle of the heat exchanger which incorporates specially designed inlet and outlet channels. Solid particles are fed to the fluid through the inlet channel.

A proprietary distribution system is employed to ensure a uniform division of particles over all the tubes. The particles are fluidized by the upward flow of liquid, where they create the mild scouring effect on the wall of the heat exchanger tubes, thereby removing any deposit at an early stage of fouling formation. After the tube bundle the particles disengage from the liquid in the separator and are returned to the inlet channel and the cycle is repeated.

To control the amount of particles fed to the inlet, a part of the inlet flow to the heat exchanger is used to push the particles from the down comer into the inlet channel. With the self-cleaning evaporator, many types of fouling deposits can be effectively handled, whether hard or soft, originating from biological, crystallization, chemical or particulate fouling mechanism, or a combination wouldn't affect the evaporation capacity.



Mechanical Vapour Recompression

The benefits of self-cleaning technology do not end here. With the additional use of mechanical vapor recompression, 41% of the primary energy used in self-cleaning process can be saved. In this process, the vapor coming from the evaporator is compressed to increase its pressure and temperature, and can be used in the shell side of the heat exchanger where it condenses. Thus, the energy used in evaporation or the latent heat is recovered and the dependence on primary energy is significantly reduced.

When applying self-cleaning process to a multi-effect evaporator, you must choose the effect which generates the most amount of fouling. When this is done, the fouling in that one effect is eliminated, but it remains in other effects, even though its significance is considerably reduced. Mechanical vapor recompression also eliminates this problem.

Fouling creates several challenges

Fouling means

- Loss of energy
- Production loss or reduced operation capacity
- Over sizing and/or redundancy of equipment
- Higher maintenance costs
- Hazardous waste streams from cleaning

The self-cleaning fluidized bed heat exchanger is a cost-effective alternative to conventional heat exchangers which suffer from severe fouling in a couple of months, weeks, days or even hours. With the self-cleaning heat exchanger any type of fouling deposits can be effectively handled, whether hard or soft, originating from biological, crystallization, chemical or particulate fouling mechanism, or a combination of these. A wide variety of fluids can be handled ranging from aqueous solutions, to oils and slurries.

Zero-fouling when Rate of removal of deposits > Rate of precipitation of deposits

Rate of removal

Influenced by:

- Type of particle (density and hardness)
- Size of the particle
- The volume fraction of the particles in the tubes (porosity of fluidized bed)

Rate of precipitation

Influenced by:

- The solubility characteristics of the precipitate
- Temperature difference between shell and tube
- Wall temperature inside the tube

Different types of particles are used (Size 2-4 mm)

Chopped Metal Wire

Ceramic

Self-cleaning Technology can be applied in many types of industries and applications

- Evaporators for high density and viscous slurries in the mining industry
- Direct seawater coolers for large industrial installations and on offshore platforms
- Evaporators for wastewater treatment like concentration of produced water, Vinasse, or stillage and black-liquor
- Ice Slurry Generator for HVAC systems
- Evaporators for geothermal brines
- Evaporators susceptible to crystallization, polymerization or particulate fouling
- Forced circulation reboilers in the chemical industry
- Evaporators for white-water and black-liquor in the pulp industry
- Evaporators in thermal desalination of brackish water and seawater
- Preheaters for crude oil

Chemical Industry

Oil and Gas

Mining

Power Plants

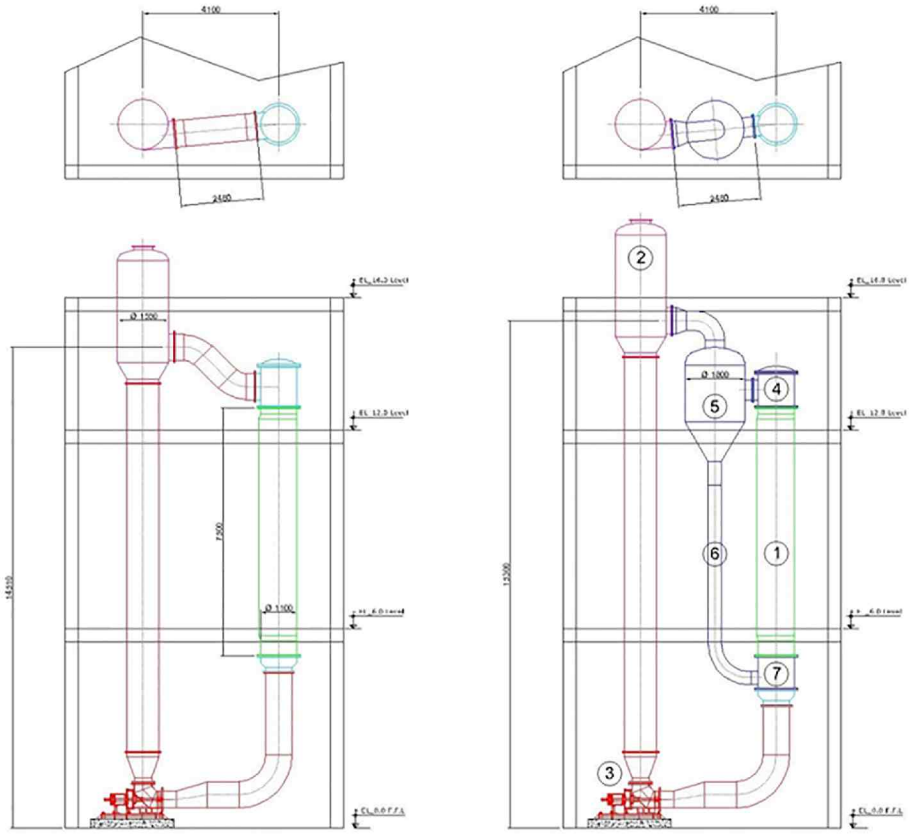
Paper Industry

Revamping your existing installation is also possible

Requirements for the majority of revamps:

- The same process conditions should be maintained as in the original installation
- The connection to the column or evaporator vessel should be maintained
- The installed pumps should be used
- As many components of the existing installation should be used in the revamped configuration
- The revamp must be carried out in the available space

The advantages of revamps are lower maintenance cost, increased production and 'smoother' operation.



Before Revamp

After Revamp

References of Self-cleaning Evaporator

Wastewater treatment for dye producer

- Surat, INDIA, Forced circulation evaporator with 900 m3/h recirculation flow
- 373 tubes of 6 meter length
- Evaporation capacity of plant was kept at 100%

Production of a proprietary chemical

- Texas, USA,
- 160 m3/h process liquid heated with steam
- 73 m2 heat transfer surface
- From 70 to 0 cleanings per year
- 25 years in operation / 160,000 operating hours

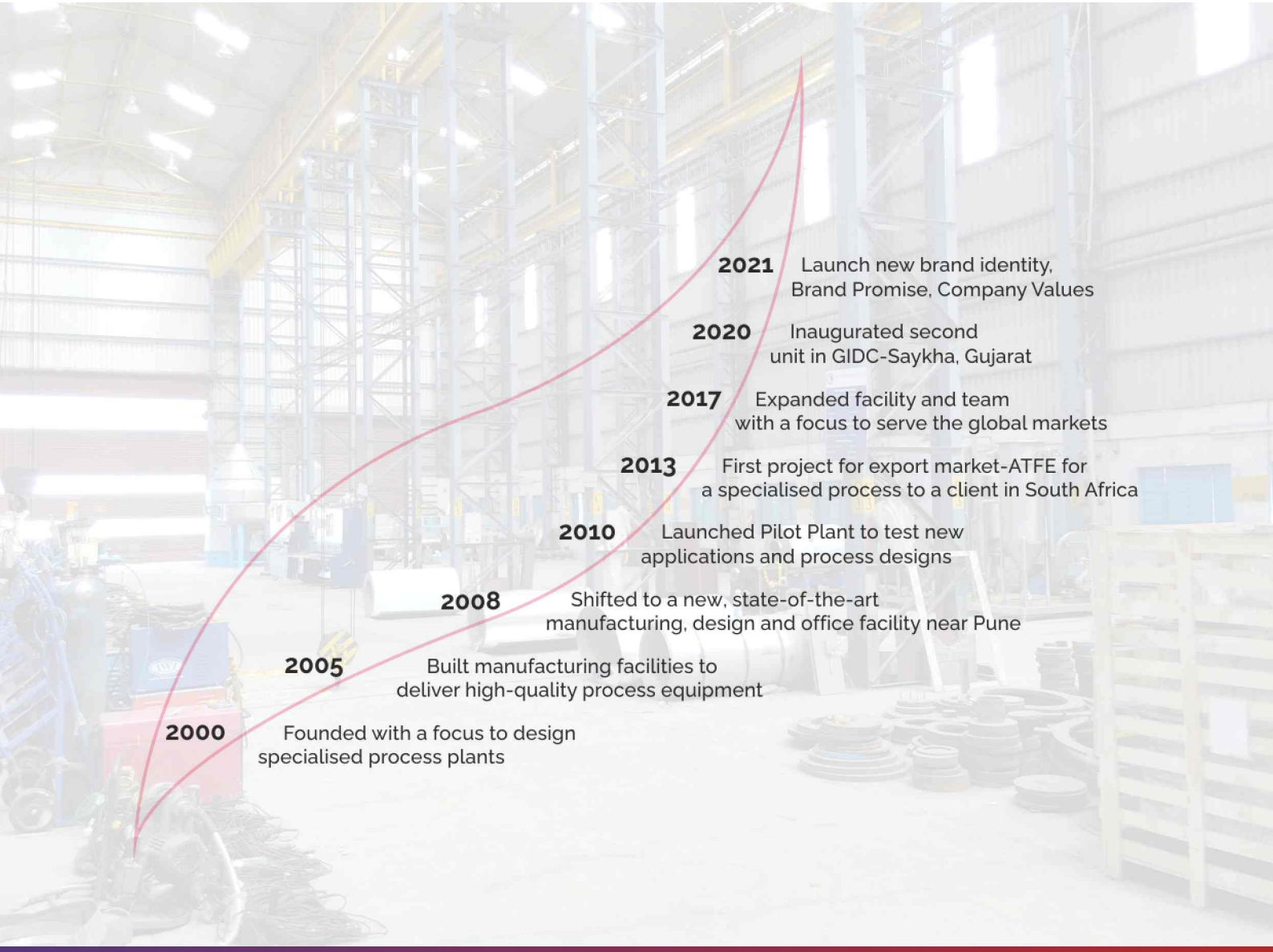
Cooling of quench water

- Louisiana, USA
- 4 x 700 m3/h quench water cooled
- From heat transfer surface of 24 x 1,000 m2 to 4 x 1,150 m2
- From 12 to 0 cleanings per year
- From 2000 kW to 850 kW pumping power requirement

Waste water treatment plant

- Fukuoka, Japan
- 30 ton/day feed, Evaporator
- Concentration of Vinasse up to 40% solids from Shochu plant
- Tube length 6 m
- 19 years of operation
- Cleaning every 5 years

Our Journey



- Established in the year 2000
- Promoted by Technocrats with Hands on experience
- Over 350+ Process Plants operational in 5 Countries
- Total 1,60,000 square feet of covered full fledge manufacturing facility
- In-house R&D team to develop and design innovative products.
- Team of 120+ Professionals
- Pilot Plant facility to prove the process and develop new products
- Dedicated team for erection, Commissioning and After Sales Service.

SHACHI
Passion Powered Performance

Global Installations

Connect

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