



Worth its Salt

Milind Kothari, Sanghi Industries Limited, India, talks about how the company has faced the challenges presented by local water shortages.

Introduction

Worldwide, the cement industry has seen very few innovations that could be considered a quantum leap. Some processes have been in existence for more than 30 years and are very energy-intensive. For example, despite various studies being conducted across the world, the industry is yet to find a way to reduce the energy demands of the clinker production process. Some companies though, have found various ways to ensure that efficiency is maintained during clinker production.

Sanghi Industries Limited's 2.6 million tpa cement plant uses some of the most modern technology available to cement producers. Being based in the village of Motiber, in the Kutch District of Gujarat, comes with some unique challenges. Water shortages are a major problem in the region. Indeed, the region's industrial development has been detrimentally affected due to a lack of this fundamental raw material. The need for abundant water in cement manufacture in particular meant that alternative solutions needed to be investigated.

Since Kutch has a large coastal area, desalination presented a logical solution. Advancements in the technology and system design, as well as a greater depth of operating experience and the associated reductions in power consumption, have seen desalination costs continuously decreasing over the years.

Multistage flash desalination (MSF), multiple-effect evaporation, both with thermal vapour compression (MEE-TVC) and without (MEE), and mechanical vapour compression (MVC) are the most widely used thermal separation desalination processes.

Of the three, the multiple-effect desalination technique is regarded as the most energy efficient and sophisticated. However, the technique has suffered some operational problems and its maximum unit capacity is limited compared to MSF.

Multi-effect desalination plant

The desalination process involves boiling seawater and collecting the cooled vapours. This generates distilled water, which

becomes potable after the addition of the desired chemicals. This process of one time boiling and one time cooling is called single-effect desalination, whereas if it is repeated a number of times, it is known as multi-effect distillation. Seawater normally boils at 100 °C, but boiling at such a high temperature leaves salts in the residue that are chemically corrosive to the containers. Creating a vacuum can lower the boiling point, thus lessening the impact of corrosion. This system, in essence, is low-temperature, vacuum multi-effect distillation. Using this principle, Sanghi Industries Ltd has established a desalination plant at Sanghipuram in Kutch District, which desalinates 5500 m³ of seawater each day. The principle is low temperature, vacuum distillation. The advantages of this process include:

- Less/no corrosion due to seawater.
- Less heat input required.
- Maximum purity.
- No disturbance to the underground water table due to drill boreholes.

This technology also caters for the water requirements of the plant/colony as well as those of 83 surrounding villages (supplied to the government by the company) using seawater rather than boreholes.



Other modifications

At the same time as installing the desalination plant, the company also made some other modifications to the cement plant.

Three string preheater

The company increased pyroprocessing capacity with the addition of one more preheater string of six cyclones and a calciner. This resulted in improved product quality and a lower pressure differential at the preheater outlet at the same production level. There were also noticeable benefits in energy consumption due to the pressure-drop.

Cooler refractory

Cooler bull nose refractory failure was a chronic problem at the plant. However, after modifying the bull nose refractory and converting it to arch shape, refractory life improved.

Main baghouse

The efficiency of the baghouse was enhanced and problems relating to high differential pressure were resolved by increasing the air-to-cloth ratio of the baghouse bag fabric by replacing glass fibre bags with high permeable membrane bags.

Water spray system in top stage cyclones of preheater

The company has installed a water spray system in the top stage cyclones of the preheater. This system controls the preheater exit gas temperature and maintains the required temperature at the baghouse inlet to ensure smooth operation and safety. It also helps in controlling the ID fan inlet temperature during plant startup. Issues such as high baghouse inlet temperature, high preheater fan inlet temperature during plant startup, or operation at lower capacity have been eliminated.

Conclusion

By constructing a desalination plant, Sanghi Industries Ltd has achieved the twin goals of reducing power consumption and providing a solution to the local unavailability of water. Though the water situation has improved in the region in recent years due to the extension of the Sardar Sarovar Canal Network, desalination technology has proved to be a boon to the companies in this region. The future of desalination technology will depend largely on reducing energy costs by optimising power generation. 🌱