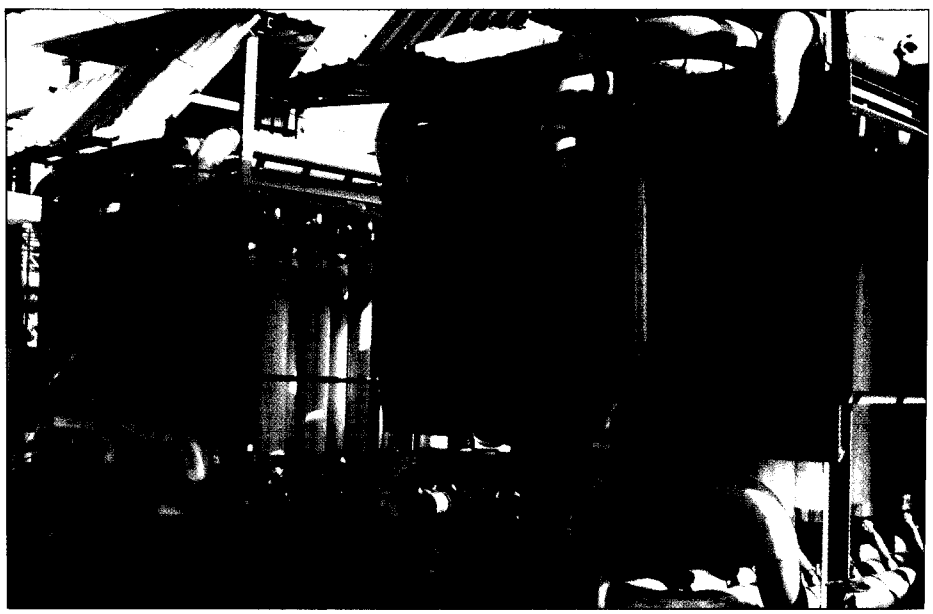
Reducing Boiler

Blowdown at India's Largest Paperboard Mill

By Koch Membrane Systems

ITC Paper Mills utilises UF for the removal of silica in the boiler feed water reducing the boiler blowdowns which consume heavy volumes of water and heat energy.



The Paperboards and Specialty Papers Division commissioned a UF system employing 44 TARGA®-10 hollow fibre cartridges from KMS

Modern technology and revered tradition coexist in the small city of Bhadrachalam, which has a population of 45,000 in India's southern state of Andhra Pradesh. The rural city is home to one of the country's most important Hindu pilgrimage shrines, the abode of Lord Rama, situated at the bank of the holy Godavari River.

Not far away, the Paperboards and Specialty Papers Division(PSPD) of ITC Ltd operates India's largest paperboard manufacturing plant. The plant produces packaging and graphic paperboards, specialty boards including boards with poly-coated barriers and paper for cigarette tissue, fine printing and decoration. The facility has earned a reputation for technological innovation and environmental stewardship. The ISO-14001 certified mill is 98% power self-sufficient through cogeneration and it has recently commissioned India's only elemental chlorine-free pulp mill.

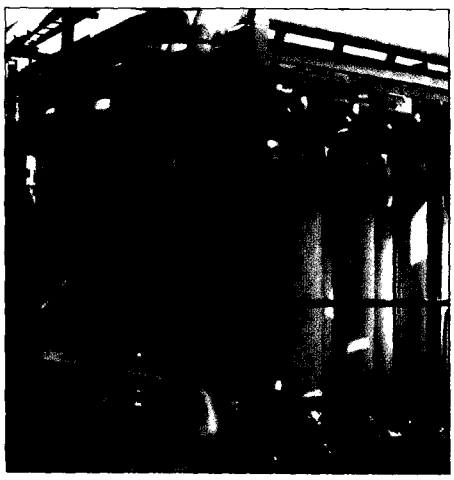
The Bhadrachalam business unit is 100% carbon positive through CO_2 sequestration of plant emissions and extensive farm forestry programs. This forestry program has rejuvenated wastelands in the area and has alleviated poverty for tens of thousands of local farm families. With a capacity to produce 300,000 tonnes per year of standard paperboard, PSPD-Bhadrachalam holds a 30% domestic market share, growing to 40% in 2007-2008 and a full 90% market share in value-added paperboard products.

The problem

The plant generates 250 tonnes per hour of high-pressure steam at 62 bars to satisfy the mill's power and process requirements. Engineers at the plant found that the silica impurities in the boiler water were high, necessitating frequent blowdown operations that consumed large volumes of water and wasted heat energy. Further investigation determined that the source of the problem was colloidal silica in the form of fine mud in the boiler feedwater.

The solution: UF

According to V Srinivasan, the General Manager of PSPD-Bhadrachalam, it was determined that membrane UF was the best method for solving this problem. He says, "We visited several operating plants in



Mr. Srinivasan, General Manager of Paperboards and Specialty Papers–Bhadrachalam says that UF membranes are especially effective at handling the colloidal silica in boiler feed water.

India where UF has effectively removed the colloidal silica in feed water used for similar boiler applications. In addition, we also found that UF filters the organic matter in the water to protect the ion exchange resins from organic fouling."

As a result PSPD-Bhadrachalam commissioned a UF system employing 44 TARGA®-10 hollow fibre membrane cartridges from the US-based Koch Membrane Systems Inc(KMS). The TARGA-10 cartridges are 10.75in (273mm) in diameter and 72in (1,829mm) in length. The UF system was designed and constructed by Driplex Water Engineering of New Delhi.

Membranes from three vendors and were analysed and the KMS membranes were slected based on the analysis determining that their UF membranes were especially effective at handling the colloidal silica in boiler feed water.

The TARGA cartridges are composed of thousands of hollow fibres made from a proprietary polymer, with a pore size of 10,000 Daltons. The membranes are pH tolerant and chlorine resistant up to 200ppm at 10.5pH. The internal diameter of the hollow fibres is 0.035in (0.9mm). The membranes operate from the inside to the outside during filtration. The feed water (retentate) flows through the center of the hollow fibre, while the filtered water (permeate) passes through the fibre wall to the outside of the membrane fibre. The tangential flow of the retentate continually acts to limit membrane fouling.

Economic and environmental benefits

"The KMS UF membranes have successfully addressed our problem," says Mr. Srinivasan. "The blowdown from the boiler has been reduced to less than 1%, from the previous level of 3% and the total silica level in the boiler feed water has dropped from 35–15 parts per billion." The improved water quality results in significantly increased heat transfer efficiency and lower fuel consumption, less carbon emission and more than two-thirds reduction in the volume of treated boiler water that is wasted during the blowdown process.

Moreover, the improved water quality produced by the membranes has also reduced resin fouling in the demineralisation system. Prior to the installation of the UF system, fouling of the cation and anion exchange resin beds continually diminished performance and necessitated monthly cleanings, which resulted in the costly shutdown of the demineralisation process and the entire boiler operation.

The installation of the UF process upstream of the demineralisation system has dramatically reduced resin fouling. This has improved resin performance and completely eliminated the need for resin cleaning and the associated downtime. The reduced fouling will also significantly extend resin life.

"UF for the boiler feed water is a sensible solution, with economic and environmental benefits." Mr. Srinivasan commented. "The membranes have proven durable and easy to clean." He also stated that the expected life span for the installation will be eight years.

About the Contributor

Koch Membrane Systems Inc has been a global leader in separation and filtration products for more than 30 years. A designer and manufacturer of state-of-the-art membrane cartridges and elements, as well as complete membrane systems, KMS products are specified for the most demanding applications.

For further information on the contributor, write to us at content@eawater.com