

## Case Study

# Ultrafiltration Reduces Boiler Blowdown at India's Largest Paperboard Mill



### Project Details

Location: Bhadrachalam, India

Application: High Purity Water  
(Boiler Water)

Engineering: Driplex Water  
Engineering

Commissioned: 2004

### Overview

The Paperboards & 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 polycoated 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 percent power self-sufficient through cogeneration, and it recently commissioned India's only elemental chlorine-free pulp mill.

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 feed water.

### The Challenge

To develop an energy-efficient system to effectively remove the colloidal silica in feed water, reducing blowdown operations and conserving water.

### The Solution

"We determined that membrane ultrafiltration (UF) was the best method for solving our problem," said Mr. V. Srinivasan, the General Manager of PSPD-Bhadrachalam. "We visited several operating plants in India where UF has effectively removed the colloidal silica in feed water used for similar boiler applications. In addition, we also found that ultrafiltration will filter the organic matter in the water to protect the ion exchange resins from organic fouling."

As a result, in 2004, PSPD-Bhadrachalam commissioned a UF system employing 44 TARGA®-10 hollow fiber membrane cartridges supplied by Koch Membrane Systems (KMS). The UF system was designed and constructed by Driplex Water Engineering of New Delhi.

"We analyzed membranes from three vendors and we selected the KMS membranes because our analysis determined that their UF membranes

were especially effective at handling the colloidal silica in boiler feed water," Mr. Srinivasan said.

"The KMS UF membranes have successfully addressed our problem," said Mr. Srinivasan. "The blowdown from the boiler has been reduced to less than one percent, from the previous level of three percent, and the total silica level in the boiler feed water has dropped from 35 to 15 parts per billion."

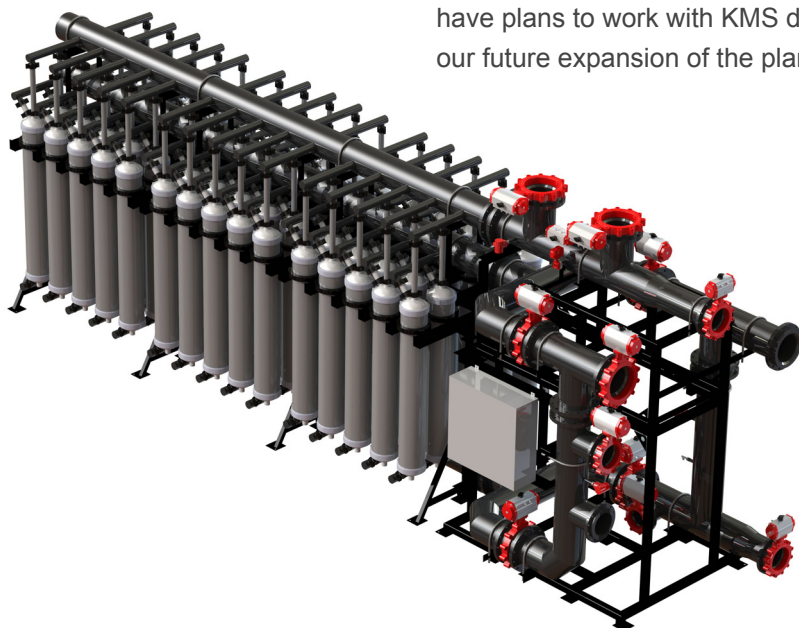
The improved water quality results in significantly increased heat transfer efficiency and lower fuel consumption, less carbon emission and a more than two-thirds reduction in the volume of treated boiler water that is wasted during the blowdown process. Moreover, the improved water quality produced by the UF membranes has also reduced resin fouling in the demineralization system.

### The Treatment Plant

Prior to installing 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 demineralization process and the entire boiler operation.

The installation of the ultrafiltration process upstream of the demineralization system has dramatically reduced resin fouling, which 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.

"Ultrafiltration of our boiler feed water is a sensible solution, with economic and environmental benefits," commented Mr. Srinivasan. "And the membranes have proven durable and easy to clean. We operate the system according to the manufacturer's guidelines, and we expect that membrane life will be as high as eight years. It has been a good investment, and we have plans to work with KMS during our future expansion of the plant."



### Product Overview

In 2011, KMS launched the TARGA® II HF system, which offers cost effective, safe, high quality water for a variety of treated water applications, from drinking water to seawater RO pretreatment, industrial water treatment, and tertiary wastewater treatment. TARGA II HF systems are an ideal solution for industries requiring consistent, high quality water as a part of the overall water treatment system in the facility. The TARGA II HF system features several significant advantages:

#### Optimal System Design

- Smaller footprint
- Easily expandable
- Reduced capital costs

#### Proven 4-log Virus Removal

- Fiber ideally suited to meet stringent regulations
- Prevents contaminant breakthrough
- Cost-effective compliance for drinking water treatment

#### Intelligent Controls

- Reduced chemical usage
- Reduced energy cost
- Minimized operator involvement
- Efficient handling of feed water quality upsets

#### Robust Fiber

- Robust PES fibers
- Reduced fiber breakage
- Wide range of pH cleaning—1.5 to 13

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