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Water Solutions

# **DesaliTec**<sup>™</sup> SOAR CCRO

# Turning the Page on Water Treatment at Doubletree Paper Mill

## The challenge

A U.S.-based pulp and paper manufacturer required high purity process and boiler feed water. It was using water from a local well and treating it with a 150 gpm conventional RO system operating at 75% recovery, but this was creating 50 gpm of wastewater – over 26 million gallons per year. The facility wanted to double paper production by adding a second paper machine, but the wastewater flow rate was already at the discharge limit set by the municipal water treatment facility.

### The solution

To minimize water footprint and concentrate volumes, the paper mill upgraded its traditional multi-stage RO system to two (2) DesaliTec<sup>™</sup> SOAR CCRO systems. Not only did the solution double the required permeate capacity, but the units did so while reducing the volume of concentrate produced over the single traditional system with half the capacity that the mill operated at before. This was achieved while extending the CIP frequency and significantly reducing the energy and chemical consumption. The results are presented in the table.

#### Results

- Increased Water Resources
  - High recovery means better utilization of water supplies and less waste to dispose of.
  - The facility was able to significantly increase paper production while complying with historic discharge limitations.
- Cost Reduction
  - Reduced volume of wastewater generated by 26%, while doubling production capacity.
  - Increased reliability by reduced fouling and scaling, resulting in 6X less CIPs than the traditional multi-stage RO it replaced.
- Environmental Responsibility
  - The new RO systems help the plant achieve its sustainability goals by reducing water and carbon footprints.

### Fast Facts

**Industry:** Pulp & Paper

Application: Process Water & Boiler Feed Water

**Products Used:** DesaliTec™ SOAR CCRO systems

Year Completed: 2014

#### Client:

U.S. Pulp and Paper Manufacturer

#### Project Size:

400 gallons per minute permeate









#### CCRO vs Legacy RO - Side by Side Performance Summary

|                           |                                       | Multi-Stage        | Closed Circuit    |      | CCRO Value                           |
|---------------------------|---------------------------------------|--------------------|-------------------|------|--------------------------------------|
| Reverse Osmosis<br>Design | # of Trains                           | 1 x 100%           | 2 x 100%          |      |                                      |
|                           | # of Stages                           | 2                  | 1                 |      |                                      |
|                           | Array (per train)                     | 3:1 (28 Membranes) | 10 (40 Membranes) |      |                                      |
|                           | Process                               | Steady-State       | Dynamic           |      |                                      |
|                           | Recovery                              | 73%                | 88%               |      |                                      |
|                           | Utilization Rate                      | 90%                | 63%               |      |                                      |
|                           | Permeate Flux (gfd)                   | 15.4               | 15.5              |      |                                      |
| System<br>Performance     | Daily Process Water (gallons)         | 155,520            | 311,040           | 200% | Increase in Permeate Production      |
|                           | Daily Wastewater (gallons)            | 57,521             | 42,414            | 26%  | Reduction in Wastewater Generated    |
|                           | Specific Power Consumption (kWh/kgal) | 1.75               | 1.67              | 5%   | Reduction in Energy Required         |
|                           | Antiscalant Consumption (ppm)         | 8                  | 3                 | 63%  | Reduction in Antiscalant Consumption |
|                           | Biocide Frequency                     | 3 x / Week         | 1 x / Week        | 300% | Extension in Biocide Frequency       |
|                           | CIP Frequency                         | 24 x / Year        | 4 x / Year        | 600% | Extension in CIP Frequency           |
| Membrane<br>Performance   | Lead Element Flux (gfd, avg)          | 20.5               | 18.0              | 12%  | Reduction in Lead Element Flux       |
|                           | Flux Distribution (gfd, avg)          | (6.5 – 20.5)       | (13.9 – 18.0)     |      | Tighter Flux Distribution            |
|                           | Max Beta Value                        | 1.14               | 1.09              | 4%   | Reduction in Max Beta Value          |
|                           | Beta Range                            | 1.03 - 1.14        | 1.04 - 1.09       |      | Tighter Beta Range                   |



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