Case study

DUPONT™
Water Solutions

DesaliTec™ 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™ 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

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CCRO vs Legacy RO - Side by Side Performance Summary

		Multi-Stage	Closed Circuit		CCRO Value
Reverse Osmosis 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 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 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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