

CASE STUDY

RO/NF | UF | MBR | CHEMICALS

Wastewater Treatment
Gujarat, India



TORAY

Toray NF-RO Integrated Membrane System (IMS) provides sustainable solution that meets stringent wastewater treatment regulations for dye production

CLIENT OVERVIEW

JAY CHEMICAL is a dye manufacturer based in India, handling highly colored wastewater with an extremely high COD concentration. Due to the stringent local discharge regulations, failure to comply could result in a forced shutdown of operations. Therefore, it was imperative to promptly evaluate an effective wastewater treatment process. At the same time, from a "Water Positive" perspective, the client was also aiming to minimize wastewater volume through reuse and recycling.

OUR PROPOSAL AND TRIAL IMPLEMENTATION

In 2010, we proposed an Integrated Membrane System (IMS), two-stage nanofiltration (NF) membrane process for COD removal (NE8040-70 and NE8040-90) followed by a one-stage reverse osmosis (RO) membrane process (TM720-D400) to further treat the NF permeate for potential reuse. A pilot test was subsequently conducted.

CHALLENGES

The client's wastewater had an exceptionally high COD concentration of 4,800 mg/L, which was primarily composed of refractory substances. This rendered conventional biological and chemical treatment methods ineffective, necessitating the development of a new and advanced treatment approach. It was also necessary to consider a total process that utilized the client's existing wastewater treatment facilities.



Figure 1: Water quality comparison
(Wastewater on the left and RO effluent on the right)

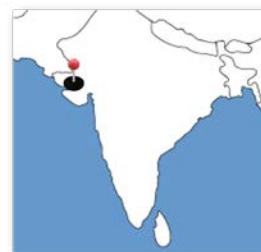


Figure 2: Gujarat, India

Table 1 — Quick Facts

Client	Jay Chemical
Location	Gujarat, India
Operation start	2010
Production capacity (Permeate)	1,680 m ³ /d
Toray Product model	NE8040-70 (NF 1st Pass), NE8040-90 (NF 2nd Pass), TM720D-400 (RO)
Recovery rate	80% (NF 1st Pass), 85% (NF 2in second Pass), 90% (RO)
Operating temperature	28 - 39 °C
pH	7 - 8

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Table 2 — Target Characteristics

	Feed Water	NF 1st Pass Permeate	NF 2nd Pass Permeate	RO Permeate
TDS (mg/L)	20,000	13,000	4,000	200
COD (mg/L)	4,800	1,800	600	250
System Recovery (%)	-	80	85	90
CIP Frequency	-	Daily	Once in a week	Once in 2 - 3 months
Membrane Life	-	1 Year	2 - 3 Years	3 Years +

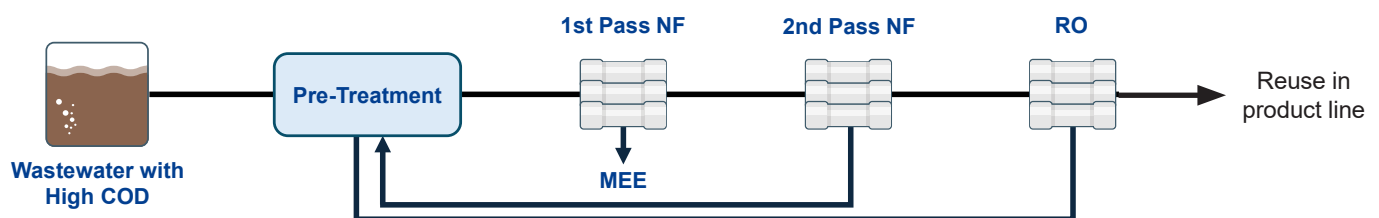


Figure 3: Process Flow

RESULTS

NF 1st Pass was able to remove 37% of the refractory COD and NF 2nd Pass 87% of the refractory COD, giving a total COD removal rate of 95% including the RO process. Membrane life was sufficient, and chemical cleaning was less frequent, reducing capital and operating costs.

The integration of NF and RO membranes for COD reduction and wastewater reuse is an important innovation in industrial water treatment. This case study highlights the transformative potential of this technology, which is particularly important for industries with high COD, BOD, TDS and TSS in their wastewater. These membranes provide answers to the challenges of modern industry by addressing operational costs, environmental compliance and water management issues.

CUSTOMER VOICE

The customer was so happy after using these membranes that he offered us the performance certificate of Toray NF membranes. Toray has been supplying the NF and RO membranes for 12 years, and the customer has remained loyal to us.



Figure 4: NF and RO membranes

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