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HYDRANAUTICS
Nitto Group Company

HIGH PURITY WATERS FOR PETROCHEMICAL PLANTS

Case study

Treating extremely difficult waters and reducing the operational costs with CPA7-LD RO membranes.

The PROBLEM

The Texas Gulf area is a major industrial zone with several petrochemical industries. Many of these industries require high purity waters for high pressure boilers and other processes. Surface water through marshy zones is the only available source of natural water. Water quality varies greatly in salinity, turbidity and is often laden with heavy amounts of suspended solids, silts, and organic substances like tannins and humic acid. Treating water with these characteristics has two major problems:

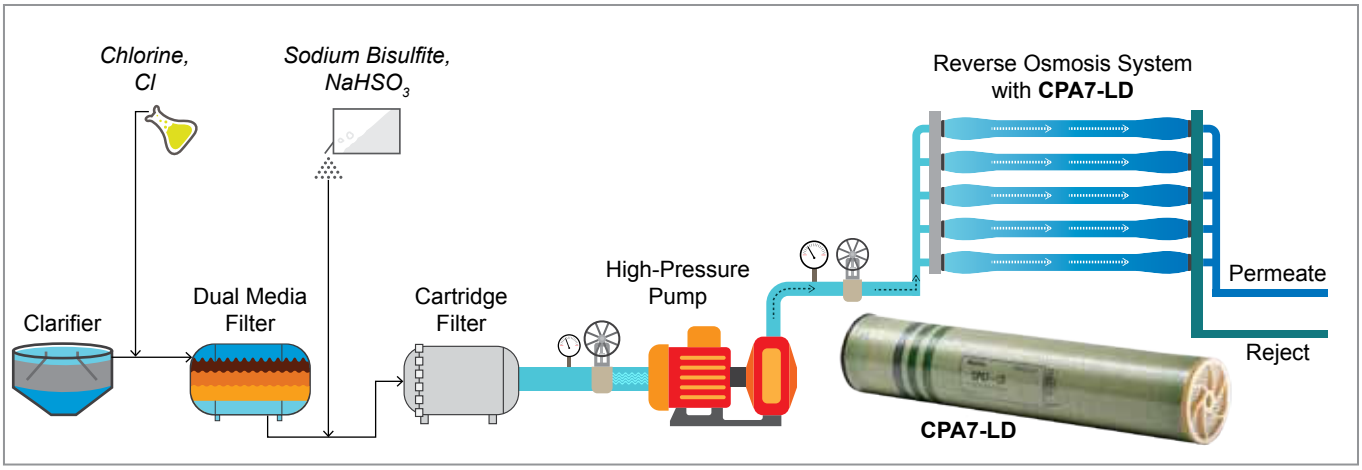
1. Reverse Osmosis (RO) systems become heavily fouled with silt and/or natural organic matter (NOM). These substances coat or even react with membrane surfaces causing frequent cleanings, increased feed pressures and reduced membrane life
2. Where an ion-exchange system is required for final polishing, it demands frequent regeneration which is costly and adds to salt loading to the environment

Location	Texas, USA
Feed water source	River surface water
Application	Purification of surface water for industrial use
Capacity	341 m^3/hr (at 75% recovery)
Start-up date	June 2016
Pretreatment	Clarification, chlorination, multimedia filtration, de-chlorination with SBS
RO Design	6 trains, 8:4 array of 6M vessels

The SOLUTION

To reduce RO membrane fouling possibilities, Hydranautics recommended their sixth generation CPA7-LD RO membrane in the plant. The CPA7-LD employs a 34 mil feed spacer (LD Technology®) which has a proven record of decreasing fouling possibilities. The membrane uses an improved chemistry, which has a more neutral surface charge that also decreases membrane fouling and reduces cleaning.

Thus, CPA7-LD was re-engineered to run more efficiently at lower pressures treating sustained high organic and silt containing waters.



The IMPACT

Using CPA7-LD membranes has significantly improved the performance of the treatment plant.

Figure 1 shows the pressure drop variation of CPA7-LD against standard RO membranes that were used earlier. Pressure drop is an important parameter to measure feed spacer fouling – lower the better. *Figure 2* shows specific flux variation of CPA7-LD against standard RO membranes. Specific flux is a measure of membrane surface fouling – higher the better. Reduced fouling meant reduced cleaning frequency, reduced downtime and hence, reduced operating costs.

CPA7-LD showed other benefits like reduced silica concentrations in the RO permeate. CPA7-LD membranes produced RO permeate with 0.09 ppm silica compared to 0.49 ppm by standard RO membranes. This resulted in significant reduction in downtime and ion-exchange regeneration costs.

Figure 1: **Differential Pressure** per Vessel, Standard RO *vs* CPA7-LD Normalized

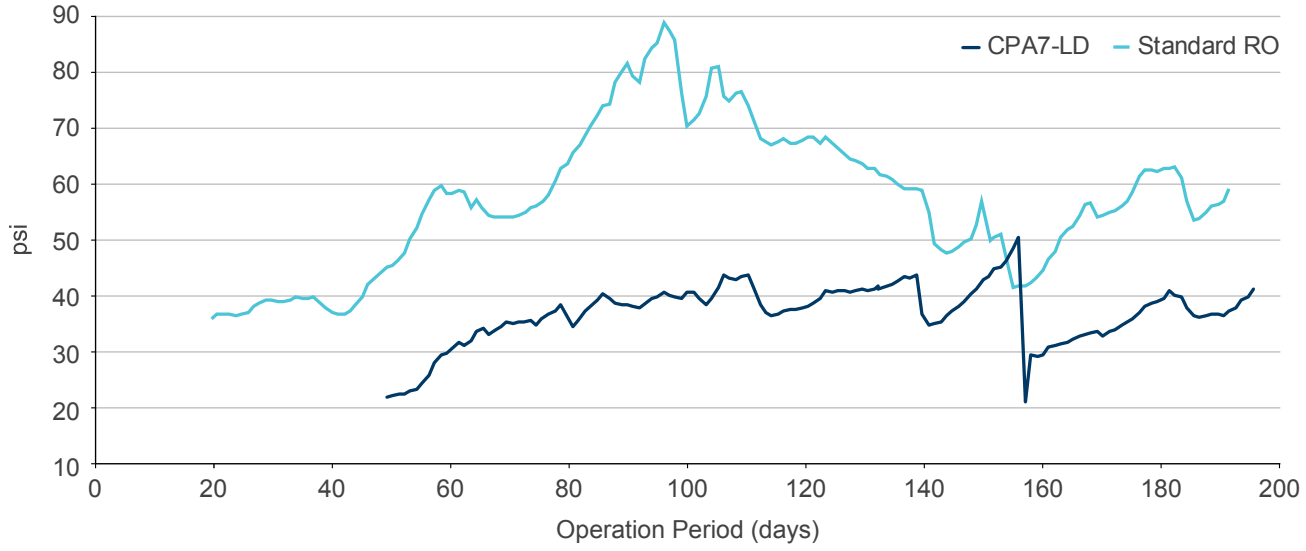
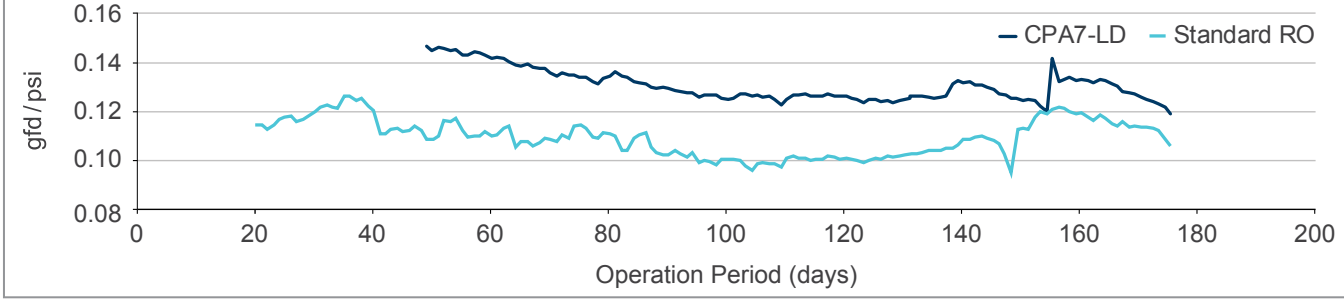


Figure 2: **Specific Flux** per Train for Standard RO *vs* CPA7-LD Normalized



About the author

MR. JOSHUA DE LA CRUZ

Joshua De La Cruz *is a Product Development Engineer for Hydranautics – A Nitto Group Company. He has over 25 years' experience in membrane, application and product development. His focus has been on wastewater, food-dairy, petro-chemical, automotive and other industrial membrane applications usually introducing new specialized products including forward osmosis and pressure retarded osmosis membranes.*

For more information about Hydranautics case studies, contact us at **hy-info@nitto.com** or visit our website at **membranes.com**

About Hydranautics

Since our founding in 1963, Hydranautics has been committed to the highest standards of technology research, product excellence and customer fulfillment. Hydranautics entered the Reverse Osmosis (RO) water treatment field in 1970 and is one of the most respected and experienced firms in the membrane separations industry. We joined the Osaka, Japan based Nitto Denko corporation in 1987 which was founded in 1918 and now has 117 companies in more than 20 countries, with over 30,000 employees worldwide. Our alliance with this global film industry giant boosts Hydranautics to a superior level of technological sophistication, product performance and customer response.

We are not simply product manufacturers; we are your membrane technology partners. As leaders of high quality membrane solutions, we believe our obligations extend beyond manufacturing and selling our products. Our skilled staff of technicians, engineers and service professionals assist in designing, operating and maintaining a robust, reliable and efficient membrane system to meet your requirements and exceed your expectations. Our support is offered from early stage conceptual design and engineering to start-up and maintenance, no matter the location globally whether it is on land or off-shore.

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