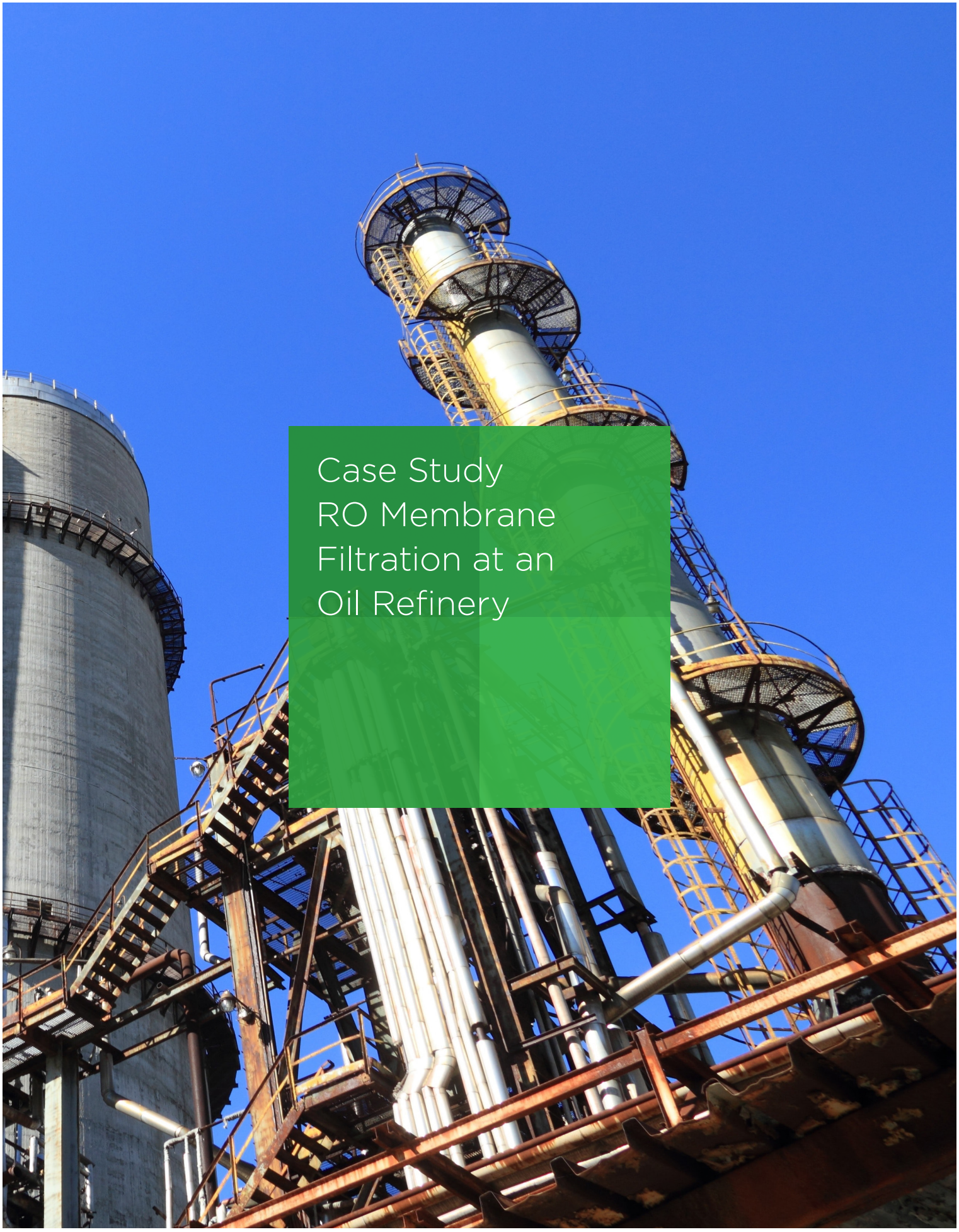

Case Study RO Membrane Filtration at an Oil Refinery

MANN+HUMMEL

Case Study: Oil Refinery Purifying Challenging Industrial Water for Reuse

A leading oil refinery in Southeast Spain chose TRISEP® X-20™ RO membrane elements to treat high-fouling wastewater from boiler water production plant.

PROBLEM
Treating high-fouling refinery wastewater for boiler feed

SITE
Oil refinery in Southeast Spain

OUTCOME
75% recovery in main RO system; 60% recovery in brine RO system

In an effort to increase the processing capacity of crude oil and reduce costs at a major oil refinery in Southeast Spain, the refinery proceeded with an expansion project that included construction of a boiler water production plant. Canal water is mixed with wastewater from the refinery's effluent plant and undergoes clarification, sand filtration, RO, ion exchange, and polishing for use in the refinery's boilers. The brine from the initial reverse osmosis system is fed to a brine recovery RO system for additional water recovery.

The plant conducted an extensive pilot testing phase to select the most effective RO membrane element for use in the RO system in which they compared the salt rejection and permeate flux of multiple manufacturer's membrane elements. X-20 membrane elements were selected for this system because they showed the best combination of high salt rejection and continuous high permeate flow for the duration of the study, with the least decline in permeate flow over time on the high-fouling feed water.

CONCLUSION

The main RO system is fed with effluent from the sand filtration step. This system takes the 3.3 MGD feed with a salinity of 1,120 mg/L and recovers 75% of the water with a permeate salinity of 10 – 30 mg/L. The 5,800 mg/L salinity brine from the main RO system is then fed to a second RO system that can recover an additional 60% of the brine. Both RO systems provide consistent, high-quality permeate to the ion exchange system.

TRISEP X-20 MEMBRANE

X-20 membrane is based on a unique, patented thin-film polyamide-urea membrane chemistry. The considerable operational savings from greater uptime and lower replacement costs due to the remarkable durability of X-20 membrane elements make them an excellent choice for high-fouling applications.

Membrane Element Success In High-Fouling Feedwater

Main RO System

Parameter	Description
Design Recovery	75.0%
RO Permeate Flow	3.3 MGD (12,600 m³/d)
Operating Flux	11.3 GFD (19.2 LMH)
Feed TDS	1,120 mg/L
RO Permeate TDS	10-30 mg/L

Brine Recovery RO System

Parameter	Description
Design Recovery	60.0%
RO Permeate Flow	0.57 MGD (2,160 m³/d)
Operating Flux	10.9 GFD (18.4 LMH)
Feed TDS	5,800 mg/L
RO Permeate TDS	100-130 mg/L

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