



Dow Membranes Enable South Korea's First Seawater Desalination Plant

Fast Facts

Project

Gwangyang East Revetment Desalination Water Supply Project

Location

Gwangyang, South Korea

End User

POSCO Steel Gwangyang

OEM

POSCO E&C / Kyungil Water Engineering

Capacity

67,000 m³/day (UF)

30,000 m³/day (RO)

Start Up

August 1, 2014



The Challenges

- Enable POSCO's Gwangyang Mill to secure its resource and supply an additional 15% more water to feed its steelworks.
- Develop the first commercial seawater desalination project in the country, which presented the EPC (what does EPC stand for?) with many unknowns.
- Support POSCO's vision of becoming a world leading green company.

The Solution

Following successful piloting, full scale plant development began on January 7, 2013.

Seawater from a canal circulating the mill feeds a direct coupled UF/RO system consisting of DOW™ Ultrafiltration pretreatment and DOW™ FILMTEC™ RO membranes in an Internally Staged Design. Provision exists for treatment of the raw water by DAF when feed water quality is poor; however this process is bypassed under normal operating conditions.

The UF system consists of 658 DOW™ SFP-2880 modules to produce 67,000 m³/d of filtered water with turbidity < 0.05 NTU and SDI of ≤ 2.5.

The high pressure rating of the DOW™ Ultrafiltration modules allows filtrate to flow directly to the inlet of the high pressure pumps of the downstream RO system, eliminating the need for a break tank and intermediate chlorination and dechlorination – a solution which saves valuable footprint and capital.

The desalination plant uses a direct coupled configuration to combine the two separate IMS elements: the low pressure UF system and the downstream RO. This practice is also known as a close-coupled, inline UF or direct feed. Under this approach, the filtrate from the low pressure membranes flows directly to the inlet of the RO high pressure pumps.

The Solution

This is different from typical UF-RO systems which generally include a break tank and other equipment between the two processes – a solution which saves valuable footprint and capital.

The operating point of the UF system is defined by the downstream RO flow setpoint, resulting in a demand-led control. For this direct coupled system, the RO feed pressure is controlled using the UF feed pumps. The Gwangyang plant has been designed to operate with a closed-loop control system and its design allows the UF system to respond quickly to large or small changes in the RO feed pressure. This is accomplished automatically and without the need for operator intervention or dumping of UF filtrate under normal operation.

Results

- The plant delivers 13% of the overall water needs of the Gwangyang Mill.
- UF system design delivers recovery ranging from 94-96%, low CAPEX and OPEX and excellent stability and reliability.
- The success of the project as well as lessons learned will enable POSCO to expand their business and construct further advanced water treatment plants both locally and overseas.

You can find more details and follow developments on this project and its first year in operation at IDA 2015 in San Diego, California. Papers co-authored by Dow technical experts along with engineers from POSCO E&C and Kyungil Water Engineering will be presented at the conference.