

ENERSAVE 'Integrated Treatment Plant' For Petrochemical Industry

A leading Malaysian petrochemical company diversified their operations from gas exploration and processing to build a state of art *Centralized Utility Facility (CUF)* located at two sites on the East Coast of Malaysia. The CUF is situated in the midst of a large integrated petrochemical complex (IPC) providing all the major utilities such as steam, power, demineralised water, nitrogen and oxygen gas as well as waste water treatment to various petrochemical companies in the IPC. The main objective of CUF is to provide the above utilities at the most effective and efficient level.

One of the challenges of this plant was to meet unhindered production during monsoon periods when there is an excessive amount of seawater ingress into the raw feed water source, a local reservoir. Normally the feed TDS varies from 40 - 50 ppm and can deteriorate up to 500 - 800 ppm TDS during the monsoon periods of seawater ingress. This has been a major challenge to most of the existing demineralisers in the vicinity of the CUF. As result of this, this project was designed with RO instead of Ion Exchange process as a pretreatment.

For this challenging project, which is the largest of its type in the region, *Enersave Engineering Systems* was chosen as the contractor for the design, installation, commissioning and operation of the demineralised water plants and effluent treatment plants. The plant was built to the most stringent API and other petrochemical specifications.

Demineralised Water Plants

The first stage in the operation is the Demineralised Water Plants, which differ only on capacity. These Multi Train Plants design consists of Multi Media Filters, Main Reverse Osmosis, Mixed Bed Deionisers, Brined Recovery RO, Regeneration and Neutralisation System. The RO system comprises of TFC membranes and the Mixed Bed Deioniser comprises uniform particle size resins.

The capacity of RO system is 2,100 m³/hr and 700 m³/hr; while Demineralisation system is 1,100 m³/hr and 500 m³/hr respectively for the two CUF plants.

Each train is capable of producing 110 m³/h of demineralised water with quality of conductivity less than 0.06 uS/cm and silica less than 5 ppb.

Both water treatment plants are fully automated with the most advanced SCADA and DCS for unmanned plant operation and to ensure that the systems are operated at the optimal condition. The DCS controls Multi Train Operation based on demand with First In First Out (FIFO) concept.

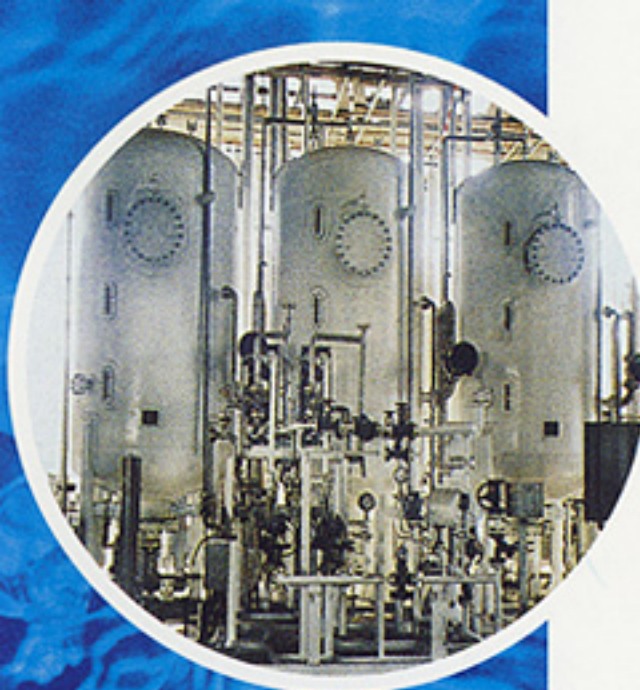
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Condensate Polishing Plants

These Multi Train Condensate Polishing Plants are designed to recycle steam condensate and consist of Activated Carbon Filters and Condensate Polishers. The condensate polishers have a capacity of 900 m³/hr and 400 m³/hr respectively for the two CUF plants.

Each train is capable of recycling 150 m³/h of steam condensate to Demineralised Water Plants with quality of conductivity less than 0.06 uS/cm and silica less than 5 ppb.



Effluent Treatment Plants

This plant is designed to treat effluent wastewater received from various IPC customers prior to discharge into public sewer.

The plant consists of Equalisation Sump, Aeration Basin with activated sludge, Clarifier, Outfall Chamber, Sludge Digester, Sludge Thickener, Centrifuge and Dryer.

It is able to treat up to 400 m³/h of wastewater and the final sludge produced is more than 90% solids content of dryness.

Performance & Benefits

The selection of RO/DI process over the standard DI/DI process has given CUF plants :

- ◆ Consistent finished water quality regardless of feed water quality especially during monsoon periods when there is an excessive amount of seawater ingress into the raw feed water source.
- ◆ Reduction in the usage of regeneration chemicals of about 90%.
- ◆ Reduction in the space required. The sizes of neutralization plant, bulk chemical storage tanks and containment area required are much smaller.
- ◆ Costs saving with minimum number of operators are required.

The plants success is a testament to the design and engineering capabilities of *Enersave*



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