

This issue spotlights our oily waste water treatment system supplied to General Motors India for their new power train project in Maharashtra; with a 75 m³/day capacity, it is one of the largest membrane systems in the country, for this application. It also features some of our membrane bio-reactor installations for recycle of waste water/sewage.

Oily Waste Removal for General Motors

General Motors is installing a new power train facility at Talegaon near Pune to cater to the needs of the cars being produced in India and other locations.

This power train facility will use a lot of metal working fluids and lubricants which will form a significant portion of the waste generated. While the high oil content, to the extent of 5% (50,000 ppm), in the waste would create an environmental hazard, the oil can also be reused for low end purposes, if recovered properly. Similarly, after oil removal, the water can also be reused. Considering site and environmental requirements, it was decided to use ultra filtration membranes over options which involve physico-chemical separation as these other processes need constant operator attention and also generate solid waste.

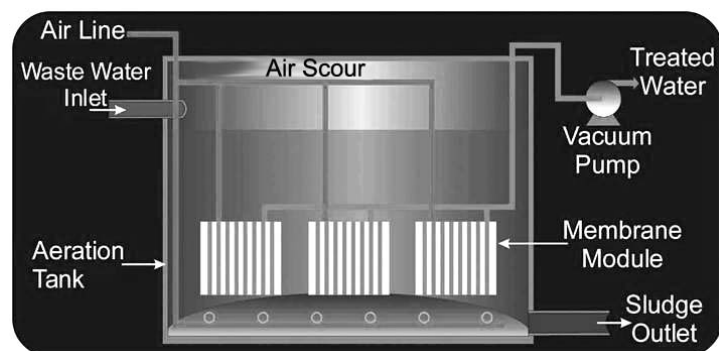
The ultra filtration system will use special multi-core tubular membranes that will ensure the oil is concentrated and removed in the retentate. The permeate water which will have traces of oil is further treated through an activated carbon bed to remove the trace oil and make it suitable for discharge/reuse. The concentrated oil is drawn off separately into a tank from where it can be suitably disposed.

A magnetic paper band filter and oil skimmer are provided upstream of the ultra filtration skid to prevent the metal fines and free oils from reaching the ultra filtration unit. The emulsified oil will then be treated effectively by the ultra filtration unit.

The system is completely compact and fully automatic. Apart from being a completely clean process that does not generate any additional waste, it requires very little operator assistance.

Membrane Bio-Reactor – Preferred Technology for Recycle

Whereas earlier, technologies to treat waste water for reuse were mainly biological, current technologies integrate physico-chemical, biological and membrane separation processes for optimum water recovery. They include micro, ultra and nano filtration & reverse osmosis systems, membrane bio-reactors and advanced photo-chemical oxidation. Among these, the membrane bio-reactor is fast becoming the technology of choice; it produces a very high treated water quality and effectively combines biological and membrane separation processes, eliminating the need for secondary clarification after aeration as well as for tertiary treatment.



Ion Exchange has supplied a large number of membrane bio-reactors (MBRs) in industrial, residential, commercial and institutional sectors for the treatment and recycle of both industrial effluent and domestic/municipal sewage. Showcased here are some of our installations.

INDION® MBR for Effluent Recycle at Ion Exchange Resin Plant

Ion Exchange's plant, one of the largest ion exchange resin producing units in India, is located in Ankleshwar, a well developed industrial area in Gujarat. The fully automated facility produces various grades of resin - anion cation and gel, macroporous & isoporous, for water treatment as well as non-water and speciality applications. ISO 9001:2000 and 14001 certified for quality and environmental compliance, ours was, in fact, the first ion exchange resin manufacturing facility in India, to receive such certification. It also has an FDA approved facility for producing resins for applications in the pharmaceutical industry.



Our ISO 9001:2000 and 14001 certified resin facility at Ankleshwar, Gujarat.

Because of the cluster of industries, primarily chemical, in Ankleshwar and inadequate treatment of complex chemical waste generated by them, the water table and the natural water resource around this industrial area have been heavily polluted. While our own plant had a fully operational effluent treatment system treating the waste streams to acceptable levels for discharge, our commitment to recover water from the effluent and reduce the load on the environment led us to initiate a first-of-its-kind project to extend the treatment of effluents by a series of state-of-art and sophisticated membrane systems.

Manufacture of ion exchange resins generates waste streams with a lot of complex bio-degradable and non bio-degradable chemicals. So it was critical to choose a combination of robust processes and technologies that could withstand the complex chemicals, convert them into harmless compounds suitable for treatment in membrane systems and meet requirements of operating costs, sustainability etc. Evaluation of technologies was also important to ensure lower life cycle costs without hindering plant performance and uptime.

The waste streams from the cation and anion plants, and the utility waste like boiler blowdown and demineralisation (DM) regeneration effluent, are segregated based on their constituent impurities and treated separately. The acidic water, wash water, boiler blowdown and DM plant waste from both the plants are treated through a process which incorporates the INDION high rate solids contact clarifier (HRSCC), hollow fibre ultra filtration and reverse osmosis. The water recovered from these streams is taken back for process uses.



Pretreatment of effluent

The stream comprising complex organics and the other bio-degradable waste from the toilets are combined and treated by a process involving chemical treatment, HRSCC, advanced oxidation and MBR to recover water for reuse.

The complete treatment philosophy was determined after extensive studies and piloting to arrive at the most suitable technology for implementation. The plants have all been commissioned and are performing at expected levels thereby reducing fresh water consumption in the plant as well as reducing the discharge of waste to the environment.



Ultra filtration section



MBR section

At HCC' s 247 Park, our 400 m³/day MBR

The HCC Real Estate (wholly owned subsidiary of Hindustan Construction Company) 2 million-square foot composite IT park complex will house offices, banks, ATMs, retail shops, food courts, high-end restaurants, a business centre, and a gymnasium.

Ion Exchange was awarded the contract for the design, supply and installation of the 400 m³/day membrane bio-reactor plant for sewage treatment and recycle for the zero discharge, LEED-certified Green Building which will house around 6000 professionals. The outlet water will be used for toilet flushing and cooling tower makeup.

INDION® MBR for 10 MLD Zero Discharge System at Angeripalayam CETP

Around 80 bleaching and dyeing units form part of the Angeripalayam common effluent treatment plant (ACETP) project at Tirupur, the hosiery and export centre in Tamil Nadu. These dyeing units consume large volumes of water which they were purchasing at around Rs.50 to 60 per cu.m through tankers. During the dyeing process, 10 MLD (million litres per day) of waste water with high total dissolved solids (TDS), organics and colour is generated by the individual units of the ACETP.

The ACETP had been set up to treat the effluent discharged from these units.

The partially treated effluent, without reduction of TDS, was being discharged by the Tirupur units into the Noyyal River, polluting the water and making it unfit for agriculture and domestic use. Discharge of the high TDS effluent into the river and its subsequent percolation into the ground water system had also affected the ground water quality. In view of this, all textile units were directed by the Chennai High Court to implement zero liquid discharge.

Ion Exchange carried out extensive piloting to identify the right solution to overcome the problem faced by the units in Tirupur. Various combinations of technologies including biological, chemical, resin and membrane based systems were tried out. Based on this, a 0.5 MLD plant was built to gather further operating data after which the scheme for the 10 MLD zero discharge system was developed and constructed.

The main treatment scheme comprises the flat sheet MBR and two stage reverse osmosis for effluent recycle, followed by silica removal, sand filtration and nano filtration for zero discharge.

The RO permeate has TDS of <200 ppm, COD of <5, with nil BOD, suspended solids and colour.



MBR section of 10 MLD zero discharge plant

Benefits of the Zero Discharge System

Apart from satisfying the High Court mandate of zero liquid discharge, the ACETP/individual units derive a host of benefits.

- More than 82% of the feed water (10 MLD capacity) is obtained as RO permeate of much better quality than available raw water. This improves the quality of dyeing.
- 11% of the feed water, obtained as pure brine solution from nano filtration, will be used effectively for dyeing. This means around 93% of effluent is recycled and reused by the dyeing industries.
- The operating cost of the project is around Rs.40 – 45 per cu.m., much less than the fresh water cost of about Rs.50 – 60 per cu.m., a huge saving on costs of purchasing water.

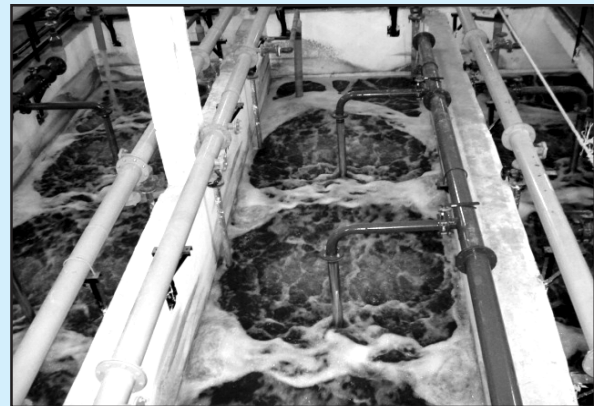


Reverse osmosis section

- A much smaller footprint, as it uses MBR instead of a conventional biological system.
- Sludge production is vastly minimised as the physico-chemical process is avoided.

INDION® MBR for Vikas Telecom, Bangalore

We have supplied a 900 m³/day MBR for the 112 acre Vrindavan Tech Village & SEZ, Surjapur Main Road, Bangalore. The treated water is being used for gardening, toilet flushing etc. The project is developed by Vikas Telecom.



INDION is a registered trademark of Ion Exchange (India) Ltd.