

HYDREX ASIA LIMITED

WASTEWATER TREATMENT FOR TEXTILE INDUSTRY INSTALLATION REFERENCE



Business Nature:

- Design and Supply of Water and Wastewater Treatment Plants
- Project Management and Construction of Water and Wastewater Treatment Plants

Main Products:

- Design and Supply of a Complete Range of Water Treatment Systems
- Design and Supply of a Complete Range of Sewage and Wastewater Treatment Systems
- Design and Supply of Wastewater Recovery and Recycle Systems
- Supply of Anaerobic Systems for High Strength Industrial Wastewaters
- Supply of Advanced Wastewater Treatment Systems for Nitrogen and Phosphorous removal

A single source water and wastewater treatment company with total capability to design, supply and construct water and effluent treatment facilities.

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HYDREX – Wastewater Treatment for Textile Industry

Project A

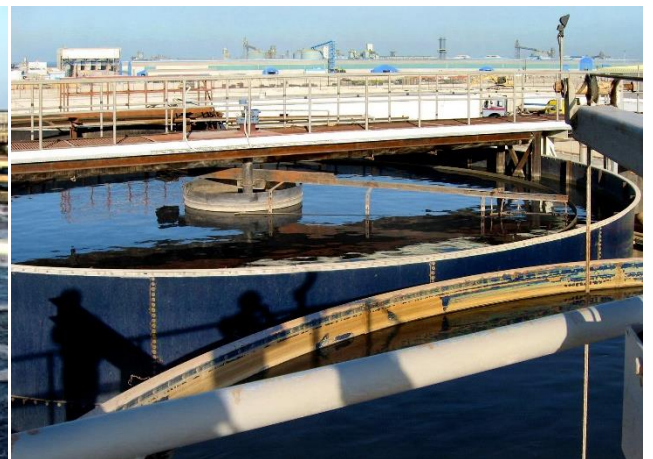
In 2004, there was a big dyeing and finishing mill to be built near a desert in Manama, Bahrain. The land and labor were inexpensive there but the water cost was high. The solution was to recover and reuse the process water at reasonable cost. Hydrex was invited to bid for the design and supply of the Effluent Treatment Plant (ETP) and the recycle system. Hydrex proposed to separate the project into two phases. Phase 1, construct and operate the ETP to meet the local discharge standard and to obtain the operating results on COD and TDS. Phase 2, design a suitable recovery/ recycle system basing production process water requirements. Hydrex won the contract by offering an ETP with a combined chemical + biological treatment (A/O) systems with glass coated steel tanks. Later on, in Phase 2, a recovery/ recycle plant with MBR for polishing of the secondary effluent + Reverse Osmosis for TDS reduction. So, the recycle water was very clean and low in TDS which was very good for the production and boiler use.



**Anoxic Reactor and
Hydrocone Clarifier**



**Oxic Tank with removal
fine bubble diffusers**



Secondary Clarifier

Project B



A long and narrow ETP in Karachi



The end view of the ETP

In 2017, a new Denim factory was constructed in Karachi, Pakistan. Since the factory building was designed and constructed in a rush, only a long underground concrete tank was built below the safety passage along the side of the main building. Due to the zero hazardous chemical discharge would be implemented soon and the Owner also would like to recover the treated effluent for reuse. Hydrex was invited to design the ETP and recycle system. Hydrex was awarded the contract for Phase 1, ETP with MBR to make the plant very compact so that it could fit the exist underground tank and produce clean/ clear effluent for washing purpose. For the future Phase 2, RO shall be installed to reduce TDS so that the RO permeate can be used for boiler and production.



Air Blowers for MBR Air Scrubbing



A membrane Cassette in the MBR tank



Some equipment mounted on top of tanks

Project C

In April 2005, Hydrex cooperate with a local partner in Shanghai to design and install an ETP for a textile Industrial park in Suzhou, China. There were many textile mills and finishing factories in the industrial park which discharge different wastewater to the ETP. Since the combined textile raw wastewater was quite high in COD and color, an anaerobic reactor and A/O activated sludge system as designed and installed. After the ETP was commissioned, the color of the treated effluent meets the local discharge color and COD limits.



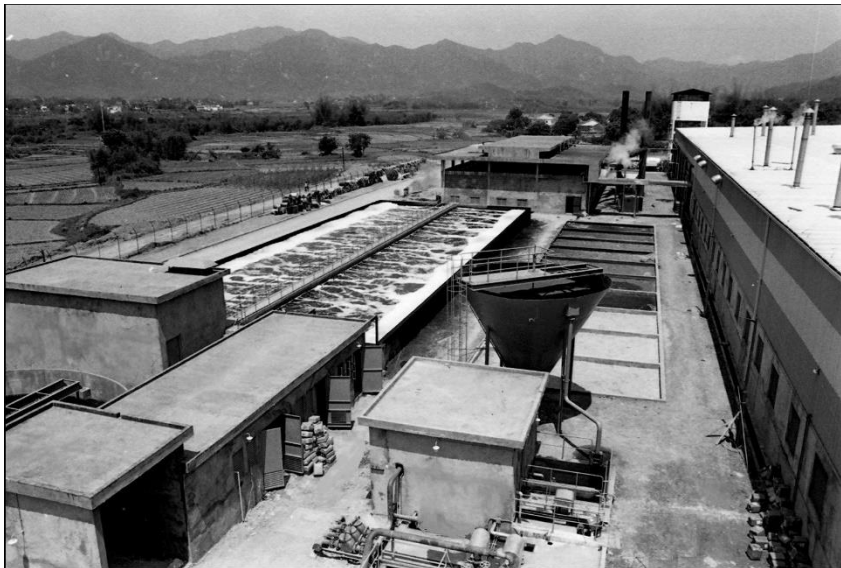
Equalization Tank and Anaerobic Reactor



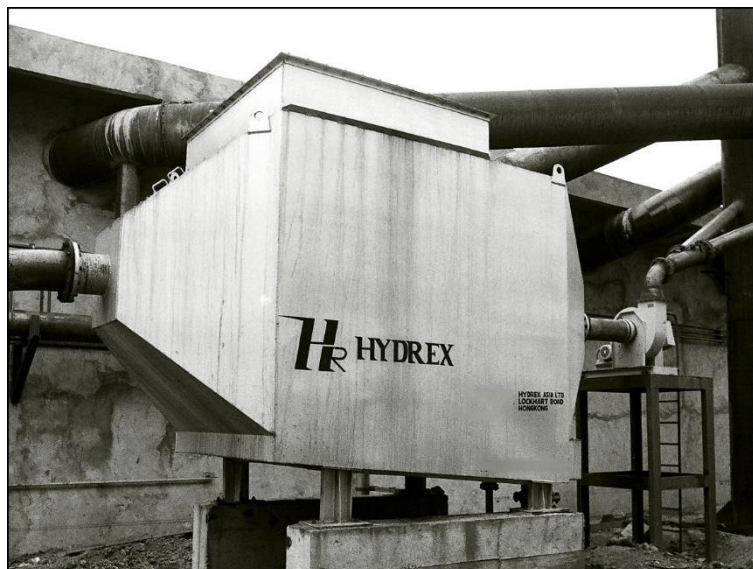
Aeration Tanks and Clarifier

Project D

In 1979~1980, Hydrex had successfully designed and commissioned an ETP for Pollux Bleaching and Dyeing Work, a leader of this industry in Hong Kong. In 1980, Pollux introduced Hydrex to another investor LMK who was planning to set up a large bleaching and finishing mill in Shenzhen, China. Hydrex, being the one of most experienced designers of Industrial/ textile ETP in Hong Kong, was invited to design and supply the ETP. The plant was commissioned in early 1982. Flue gas from boiler was utilized to neutralize the alkaline bleaching wastewater. For chemical coagulation and flocculation of colored wastewater, Hydrex's proprietary Hydrocone reactor/ clarifier was applied in this system. For technical details, please refer to the Technical Feature of Textile Wastewater Treatment that Hydrex contributed to Textile Asia (The Asian monthly magazine of Textile and Apparel).



Nam Sang Textile Wastewater Treatment Plant



**Flue Gas Scrubber for
neutralization of alkaline wastewater**

Zero Discharge of Hazardous Chemicals (ZDHC) Program Calls for Membrane Bio Reactor (MBR) application in Wastewater Treatment/ Recycle

ZDHC is a group of apparel and footwear brands and retailers working together to lead the industry towards zero discharge of hazardous chemicals by 2020. This program also affects wastewater treatment since some hazardous chemical are in the wastewater. They will benchmark existing standards and existing data at facilities, develop a guidance document and promote the inclusion of functioning wastewater treatment plants at manufacturing facilities.

Application of Membrane Bio Reactor (MBR) becomes popular in textile wastewater biological treatment/ recovery/ recycle. The membrane of MBR can effectively remove almost 100% of the color particles/ suspended solids in the treated effluent after colored wastewater is treated by chemical and/ or biological methods. There are two options for recovery/ reuse of MBR treated effluent in the production process:

1. If the required Total Dissolved Solids (TDS) of process water is below 500~1000 mg/l, the MBR permeate may blend with some city water to reduce its consumption.
2. If the required TDS limit of process water is quite low, the MBR permeate may be further treated with Reverse Osmosis to reduce TDS by 95~98% for direct reuse or blending with city water to reduce its consumption.



MBR in operation & drained down



A Packaged MBR Plant

Recent Development of the modern MBR elements and Cassettes

When MBR was initially introduced to the market about two decades ago, the slot insertion type membrane elements were quite popular due to easy element replacement and off-line cleaning. The frame of such element is normally made from plastic. In the recent decade, MBR applications increase and flow capacities are getting higher, membrane elements have to be longer and longer. When such long membrane elements were introduced to tropical regions, The high ambient temperature and warm wastewater may cause the plastic frames of the elements to be out of shape and difficult to be inserted back into the slots of the cassettes; the threaded connections of plastic fittings on element/ manifolds are easily damaged under high ambient temperature/ torque and thus causes leakage after maintenance. For high capacity and large membrane cassette, it is recommended to lift out the whole cassette for off-line cleaning in a regeneration tank. Due to these problems, a new generation of MBR cassettes was developed in 2014~2016.



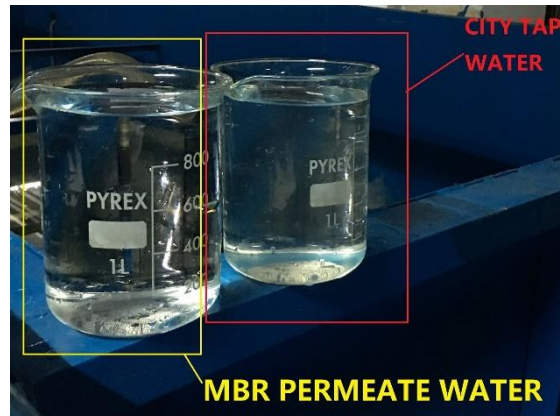
MBR Element, Hanging Type and Cassette

Considering the fact that reinforced PVDF hollow membranes has long service life and air scrubbing, backwash, online chemical cleaning and etc. which extend the off-line cleaning to 1~2 times a year, it is more practical to lift the whole MBR cassette out in another regeneration tank. So, it is important to make the cassette sturdier for handling and to reduce plastic threaded fittings.

So, the modified MBR cassette was developed with the whole cassette frame and threaded connections in SS304. One MBR element has only the top and bottom high temp resistant molded plastic manifold which is only opened at one outlet end with a SS304 union connection. So, to assemble / disassemble one element is only by tighten/ loosen two SS304 union nuts at top and bottom manifolds. The new design is more durable than the slot insertion type and SS304 construction is much more suitable for tropical climate and warm wastewater.



MBR Double Cassettes top view



MBR Permeate VS. City Water