

# Leather Manufacturing

## MBR Effluent Treatment



### PROJECT DETAILS

Location: India  
Product: External MBR System  
Capacity: 2,500 m<sup>3</sup>/day  
COD feed: 2,000 – 3,000 ppm  
Membrane: 8 mm PVDF, non-backwashable

### PROJECT OVERVIEW

A company in India services the wastewater treatment needs of its 130+ member tanneries via a **common effluent treatment plant (CETP)**. Due to the volume of wastewater generated from the tannery industry and the need to reduce discharge levels, the company needed a more effective MBR system to replace the existing low energy aerated MBR.

### THE CHALLENGE

The volume of wastewater effluent generated by the 130+ member tanneries made it necessary to install an energy-efficient system to enable wastewater reuse and lower discharge. Due to the high fouling and poor cleaning efficiency of the external aerated UF system, the overall recovery was far below the original design specifications, producing a permeate flux of only 28–30LMH and requiring backwashing of the system every seven minutes.

Membrane plugging was also a recurring problem that required weekly shutdowns to clean the UF trains. Plant operators needed a robust MBR system to **increase the recovery of the reverse osmosis (RO) unit** at the end of the process which then fed treated permeate back into the tanneries for reuse. As in many wastewater/effluent treatment plants, MBR systems are typically employed as a pre-treatment step for RO units to provide better feed quality, thereby increasing RO system recovery and reducing the scaling potential within the RO unit.



Image 1: The 4-loop external MBR design from Berghof Membranes

### THE BERGHOF MEMBRANES SOLUTION

Given the heavy volume of hairs and fibers in the feed stream, clogging was a serious ongoing problem for plant operators. To resolve this, Berghof Membranes engineers designed the **external MBR system** so that plant operators can easily reverse the direction of the system's flow: top-to-bottom or bottom-to-top. This helps to prevent the accumulation hairs and fibers that would otherwise settle in the membrane tubes.

The external MBR system was designed to be a **vital part of a robust zero liquid discharge (ZLD) process** that minimizes the footprint of an otherwise discharge-heavy industry.

#### System Performance

COD Effluent	< 300 ppm (90 % COD removal)
Velocity	3.5 m/s
System Flux	90LMH
Membrane Surface	1282 m <sup>2</sup>
System Configuration	4 loops, 24 total modules (doubled in 2019)

A basic process flow diagram (PFD) of the plant is shown in Figure 1 (see below). In this process, the raw effluent from the tanneries is directed through a **rotoscreen** to remove solids larger than 1 mm. The feed is then sent to a **homogenization tank** outfitted with a mixing system that homogenizes all the **various streams from the 130+ tanneries**.

The wastewater is then pumped to **flocculation and coagulation chambers** before it flows to a circular **clarifier** that precipitates metals and colloidal solids. To remove the bulk of the hairs and fibers present in the wastewater stream, the feed passes through a **250 – 350 micron filtration system** before it is pumped into the **MBR tank** equipped with a jet aeration system.

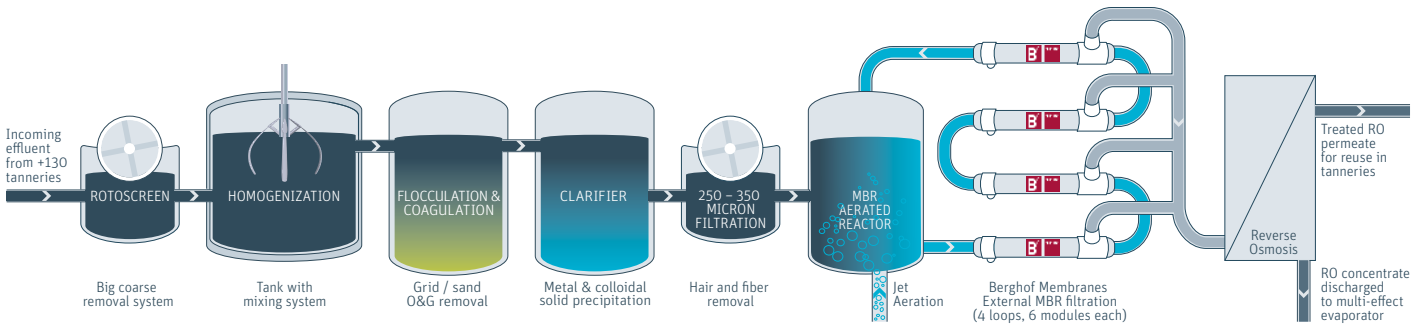


Figure 1: Basic process flow of the plant

The **external MBR system** from Berghof Membranes was designed to consist of 4 loops with 6 modules each. The modules contain **8 mm diameter membrane tubes** perfectly suited for high solid concentrations. The ability to **reverse the direction of the flow** within the system (top-to-bottom or bottom-to-top) ensures that the **accumulation of hairs and fibers within the tubes is minimized**.

This MBR system design provides a **high quality permeate stream that is then sent to a reverse osmosis (RO)** unit for further treatment and the RO permeate is reused back into the tanneries. The RO concentrate, on the other hand, is sent to a multiple-effect evaporator (MEE).



## Customer Benefits

Plant operators are not only pleased with the system's performance, but they now spend much less time on maintenance as **clean-in-place (CIP) procedures are carried out only once per month**. They have since ordered an **expansion of the project** to include an additional 4 loops with 24 modules from Berghof Membranes.



### ABOUT BERGHOF MEMBRANES

Berghof Membrane Technology GmbH, part of the Berghof Group, is your leading manufacturer of tubular UF membrane solutions for the filtration and separation of process streams and wastewater in a variety of industries including dairy, landfills, food & beverage, chemical, pharmaceutical and oil & gas.

We at Berghof Membranes continuously “think outside the box” by not only offering tubular UF membrane modules, but we also deliver engineered filtration systems and support services to our OEM partners. From lab-scale testing, to piloting, to engineering design, to commissioning, to remote monitoring and analysis, to replace parts – we’re more than just a membrane supplier.

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