



Textile Effluent Treatment, India

Model: Q-SEP 6008

Flow Rate: 12 m³/hr

Total Q-SEP Membranes: 4

Feed Water: Tertiary treated textile effluent

Project Overview

Jayshree Textiles is a cotton yarn dyeing unit that also bleaches fabrics. They are located in Erode, Tamil Nadu. Jayshree's dyeing and bleaching unit produces about 250 kilo liters per day (KLD) of wastewaters. This textile effluent is severely contaminated and contains considerable amounts of hazardous pollutants - recalcitrant organic, colored, toxicant, surfactant and chlorinated compounds and salts - and even heavy metals are common.

Environmental regulations have made mandatory the treatment of textile effluent before allowing it to flow into the natural ecological system. The scarcity of fresh water availability has also necessitated that wastewater be treated for recycle and reuse.

Jayshree started with a conventional pretreatment wherein they used coagulants and flocculants to take care of the suspended solids. Subsequently, the biological process took over to take care of BOD & COD. The final treated effluent after clarification was taken through filtration followed by a UF RO system. The RO treated water was recycled back to the process.

The feed water to the UF plant was tertiary treated textile effluent. The client had installed the UF RO system about 3 years back. The UF plant was configured with another manufacturer's membranes and was designed for an output capacity of 12m³/hr. Four membranes were installed with a membrane area of 70 sqm each. A crossflow of 5m³/hr was being carried out to reduce the impact on the membrane due to the challenging water which was prone to fouling. The UF permeate was the feed to the RO system.

The Challenge

The client encountered issues with the other ultrafiltration membranes right from the beginning.

Textile wastewaters are characterized by extreme fluctuations in many parameters such as chemical oxygen demand (COD), biochemical oxygen demand (BOD), pH, color and salinity. At Jayshree textiles, the UF feed water - secondary treated effluent - had higher than expected BOD and COD, BOD in the ranges of 50-150 ppm and COD in the range of 400-700 ppm.

Project Profile

The UF membranes were just not able to perform under the load of such harsh waters. They began fouling quickly and the SDI started rising beyond 5ppm from the third month onwards and there were frequent cleaning required of the UF and RO systems, resulting in increased downtimes. The membranes were unable to adequately pretreat the water and meet the expected performance criteria.

The situation deteriorated to such an extent that CIP was being done every other day resulting in a drop in permeate flow to as low as 6-7 m³/hr and a rise in turbidity at the outlet. Further, SDI levels severely rose and touched infinity in the preceding 6 months. Jayshree was extremely dissatisfied with the performance of the membranes and the support they were getting from the supplier, so they decided to explore other UF options to solve the problem.

The Solution

The client found Q-SEP[®] hollow fiber UF membranes to be the most suitable and robust solution for their polluted effluent. Q-SEP membranes, with its Cloud Point Precipitation technology, ensure a high pore density along the length of the fiber and a uniform narrow pore size distribution in the membrane, and have proven to be extremely effective with challenging effluents and achieving the desired SDI.

Thus Jayshree replaced the other manufacturer's membranes with 4 Q SEP 6008, at a flux rate of 50 LMH with cross flow design.

Q-SEP[®] hollow fiber ultrafiltration modules contain membranes manufactured with QUA's innovative patented "Cloud Point Precipitation" method. This process ensures a high pore density along the length of the fiber and uniform narrow pore size distribution in the membrane. Q-SEP modules deliver superior performance characteristics and product water quality that surpass the quality from conventional UF modules. The narrow pore size distribution allows the membrane to produce water with a low silt density index (SDI). The lower product SDI leads to less frequent and easier cleaning of downstream RO membranes. In addition, the Q-SEP membranes provide an excellent rejection of bacteria and viruses.

Q-SEP UF membranes are made of modified hydrophilic polyether sulfone (PES) material that offers high fiber strength and excellent low fouling characteristics, resulting in higher membrane productivity. These hollow fiber membranes operate under a low transmembrane pressure in an inside-out flow configuration for superior performance. Applications of Q-SEP UF include pretreatment to RO systems (brackish and seawater applications), purification of surface and well water for potable applications, filtration of industrial water, and wastewater recycle and reuse.

Q-SEP Performance

The performance of the Q SEP[®] membrane on tertiary treated textile waste recycle application has been very encouraging.

The Q-SEP ultrafiltration system was installed for pretreatment to the RO system, to safeguard the RO membranes from fouling due to fine colloidal impurities, and the system has been running successfully for the last two years.

The Q-SEP feed water COD has been constantly high over the 2 years, in the range of 400 ppm to 770 ppm. Despite this, the permeate flow of the UF system has been consistently maintained at 12 m³/hr on a day to day basis without any loss in gross output, and the cross flow has been maintained at 5 m³/hr. The feed pressure has been maintained between 0.4 bar to 2.0 bar, with the CEB being done whenever the pressure reaches 2.0 bar which usually happens once in the day. CEB is being carried out once every day with sodium hypo chlorite + NaoH and HCL. The turbidity and COD is being tested almost every alternate day by the client. The product water turbidity has been consistently less than 0.1 NTU on all days and SDI less than 3 for the entire 2 years since Q-Sep has been in operation. This effectively meets the RO membrane inlet requirement.

The above results make it quite evident that Q-SEP[®] is very effectively treating the textile waste producing superior product water quality at low operating cost.