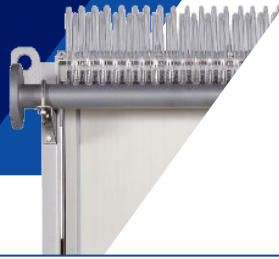


CASE STUDY

RO | NF | UF | MBR

Municipal Wastewater Treatment
Mirassol, Brazil



TORAY

Innovation by Chemistry

Treated Municipal Sewage Achieves High-Quality Discharge Values with Toray MBR Technology

INTRODUCTION

Mirassol is a small city located in the countryside of the São Paulo state in Brazil, with a population of approximately 60,000 people. The city produces around 175 L/s of municipal sewage and has treated the wastewater through conventional WWTP. Due to population growth in recent years, Sanessol, the concessionaire responsible for the water supply and sewage treatment of Mirassol and part of Igua Saneamento Group, decided to use a state of the art technology for their new WWTP, Fartura. The plant has the capacity to treat 45 l/s.

One of the plant's challenges was treating the sewage to a high-quality level to discharge it to a nearby river. The regulatory agency required the outgoing BOD to be less than 5 ppm due to the river's low flow and minimize ecological impact.

Toray MBR technology guarantees the complete removal of turbidity (< 1 NTU) and pathogenic bacteria. The membrane pores have a nominal size of 0.08 μm densely and uniformly distributed along the surface. Combined with effective biological treatment, Toray MBR can produce high-quality effluent and was selected as the new plant's technology.



Table 1 – MBR System	
Toray MBR model	TMR140-400DW
Membrane type	Flat Plate MBR
No. of trains	1
No. of modules	10
No. of membrane elements	4000
Capacity	144m ³ /h
Filtration Method (Gravity or Permeate Pumps)	Gravity
Average Flux	25.7 l/mh
Commissioned	2019
Filtrate Turbidity	< 1 NTU

Figure 1(top): one train MBR tank containing 10 Toray MBR modules

Figure 2(bottom): before and after operation of MBR tank

PROJECT DETAILS

The complete treatment scheme consists of a 3 mm primary screen, followed by the aerobic reactor and MBR tank. The MBR system is comprised of one train with ten TMR140-400DW modules in parallel, capable of treating 144 cubic meters per hour (m³/h).

One module consists of four-element blocks in a double-deck arrangement for 560 m² of total membrane area per module. The double-deck configuration optimizes the system footprint, requiring only 12 meters of length and 4 meters of width for the membrane tank. The air consumption for aeration cleaning is also equivalent to two-element blocks, further saving energy costs. The MBR plant operates with an average flux of 25.7 l/mh.

RESULTS

Commissioned in 2019, the Mirassol plant has an average influent Biological Oxygen Demand and Chemical Oxygen Demand of 178 ppm and 407 ppm, respectively, a typical municipal sewage makeup in Brazil. After the commissioning phase, the MLSS has been stable at 10 g/L, with casual fluctuations. Please refer to Figure 3 for the treated BOD and COD.

Toray flat-sheet technology helped the customer meet very restricted legislation with simple construction and easy operation. Toray MBR configuration does not require a backwash system or permeate pump. The clean-in-place procedure without total chemical immersion also brings easier maintenance and cost savings compared to other MBR technologies. Today, Mirassol city collects and treats 100% of the produced municipal sewage.

Figure 3: Filtrate BOD and COD

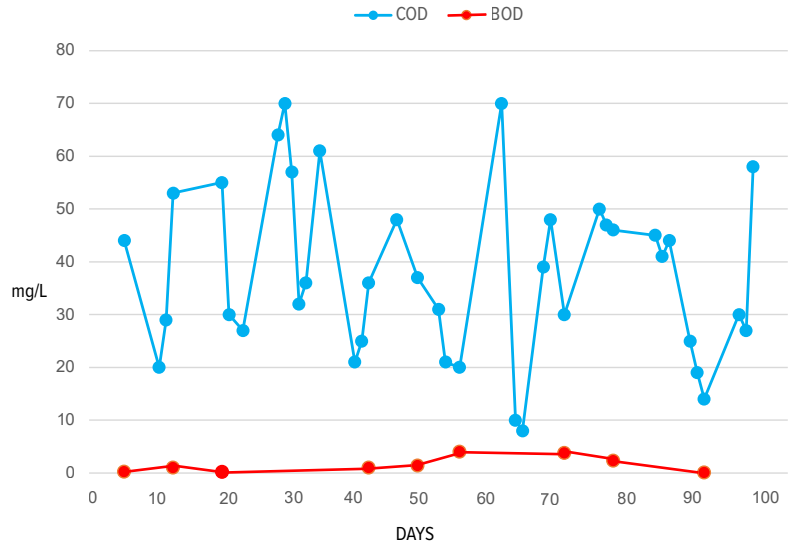


Figure 4: TMR140-400DW MBR module by Toray featuring four element blocks in a double-deck arrangement

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