

Case Study

Miskolc Wastewater Treatment Plant

Q=40,000 m³/d



Author: Malatech Water, Ltd.

Title: Municipal Wastewater Treatment Plant Optimization

Layout

Aerobic tanks with primary clarifier.

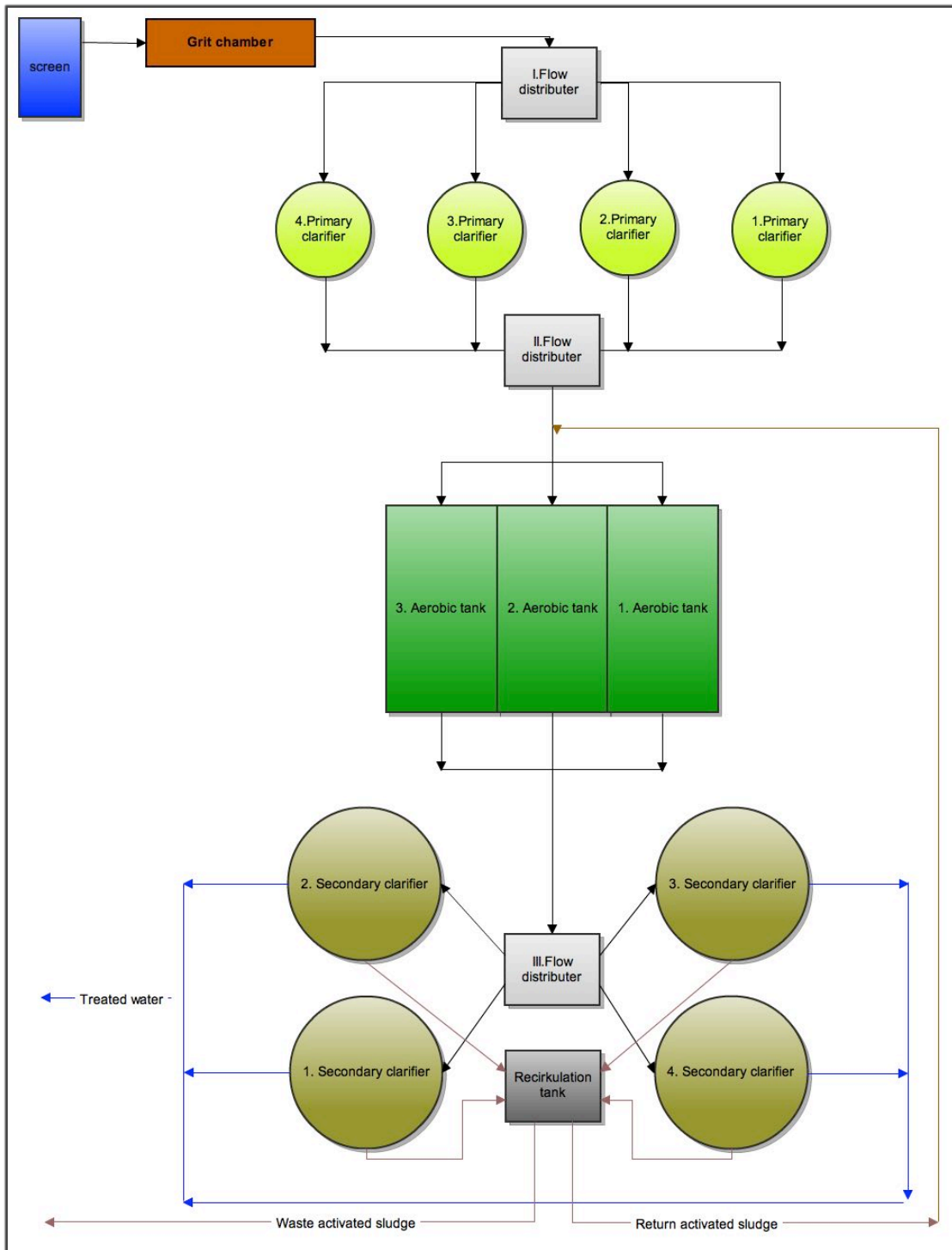


Figure 1 – Layout

Application used:

In order to improve the treatment efficiency **Bioclean**TM has been applied in a shock dose of 50 kg/day in the first week subsequently reduced to 8 kg/day in 3 weeks which has remained the maintenance dosage.

Main goals:

- 1) Reduction of dewatered excess sludge quantity
- 2) Reduction of energy consumption of the biology
- 3) Effluent quality improvement because of continuous discharge limit violations (COD, TN, TP)

Sludge production

The average quantity of dewatered sludge was **2234 m³/month** before the biotechnological optimization. After the startup phase the average amount has been reduced significantly to **1851 m³/month** which was due to the significant reduction of excess sludge removal rate since our treatment has had no influence on the raw sludge removed from the primary clarifiers.

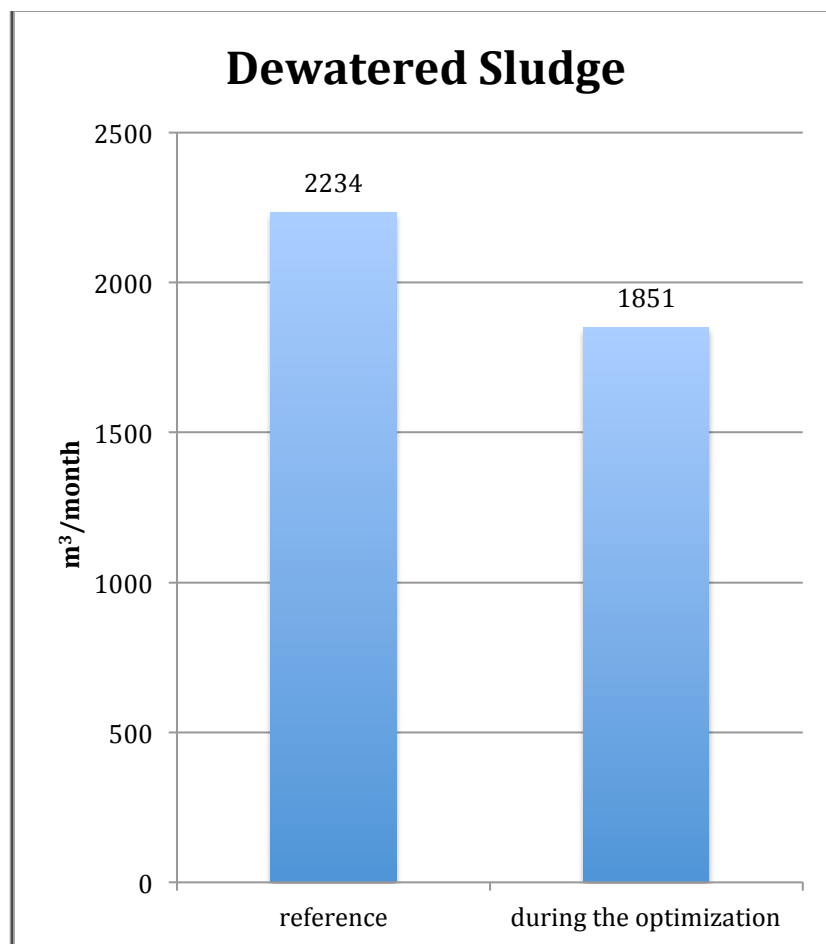


Figure 2 – Monthly quantity of the dewatered sludge

Energy consumption

Due to the **Bioclean™** optimization we were able to **decrease the dissolved oxygen concentration from 1.8 mg/l to 1.2 mg/l in the aerobic tank** because of the the better oxygen utilization of the modified activated sludge, and anoxic periods have been applied. They resulted in a **decreased energy uptake of the blowers** and the energy consumption of the whole plant **has been decreased by 18% while the COD breakdown and nitrification has been greatly improved.**

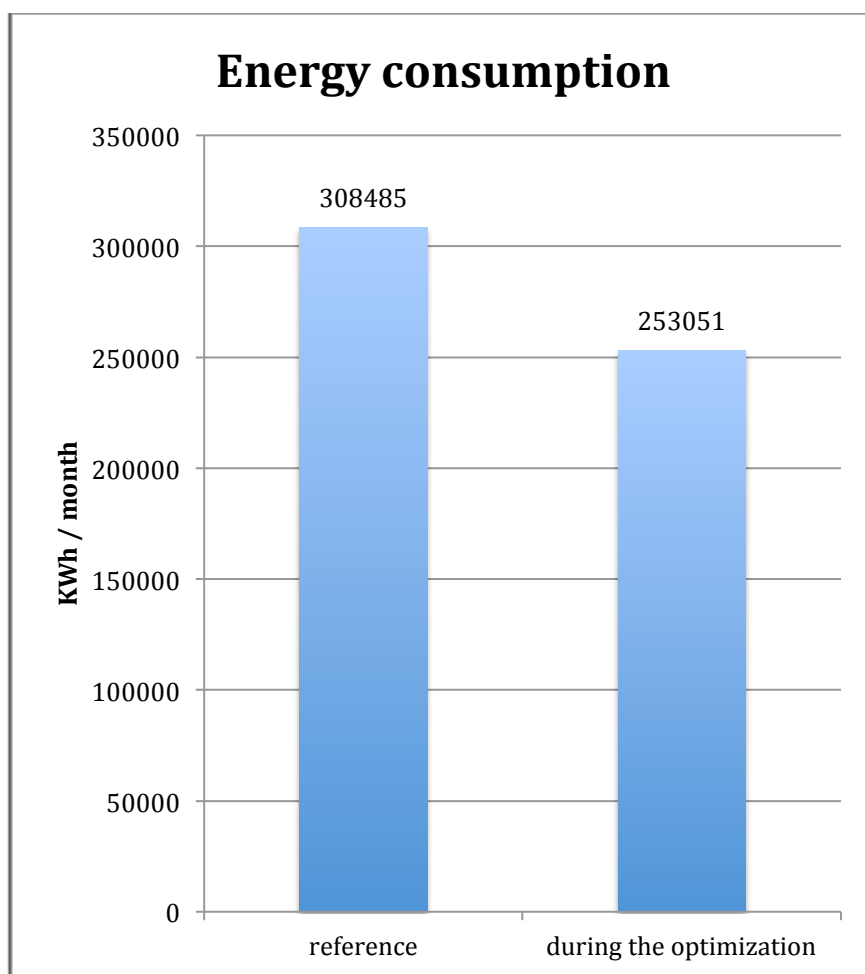


Figure 3 – Average monthly energy consumption

Effluent Parameters

The plant has only aerobic reactors, the biological nitrogen removal step is not installed. In order to improve the nitrogen removal interfloc denitrification and an sequential aeration operation was aimed. By dosing the **Bioclean™** the size of flocs has been improved for the interfloc denitrification, besides the biological treatment capacity has been increased and we were allowed to apply sequential operation. Both, **the sequential aeration and the interfloc denitrification increased the nitrogen removal rate.**

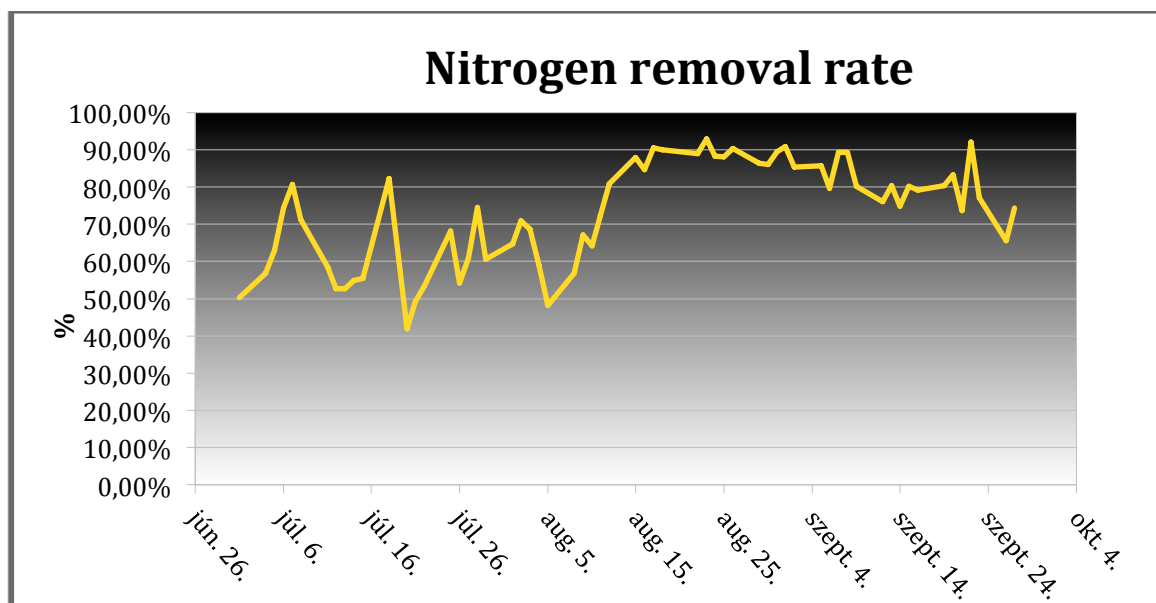
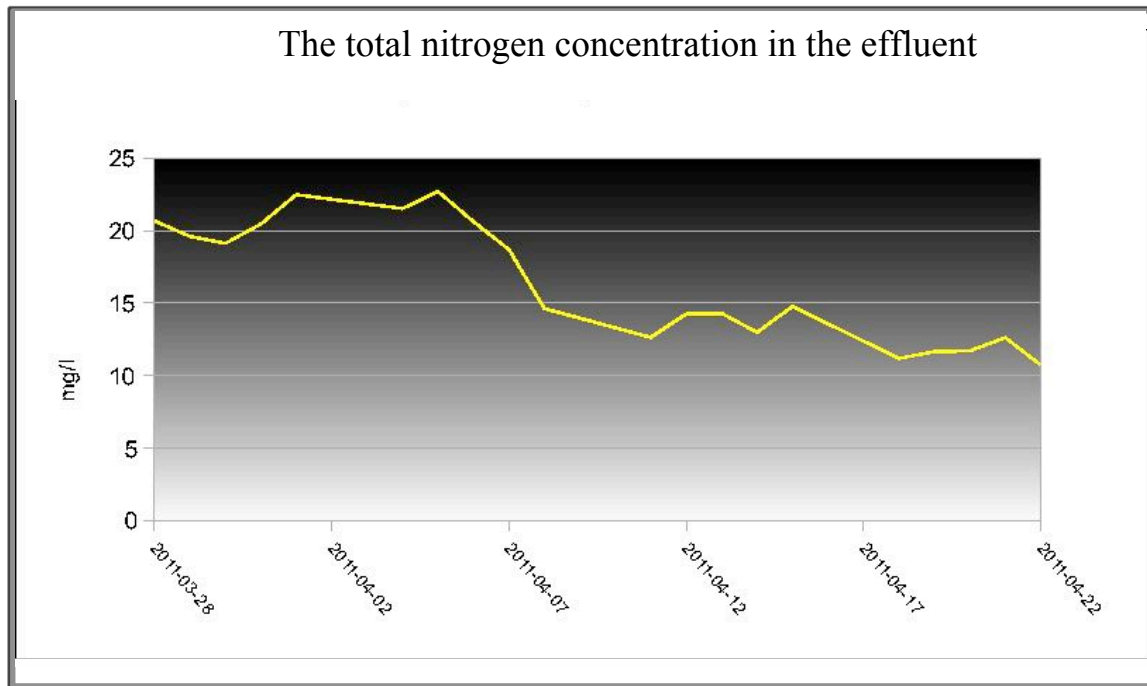
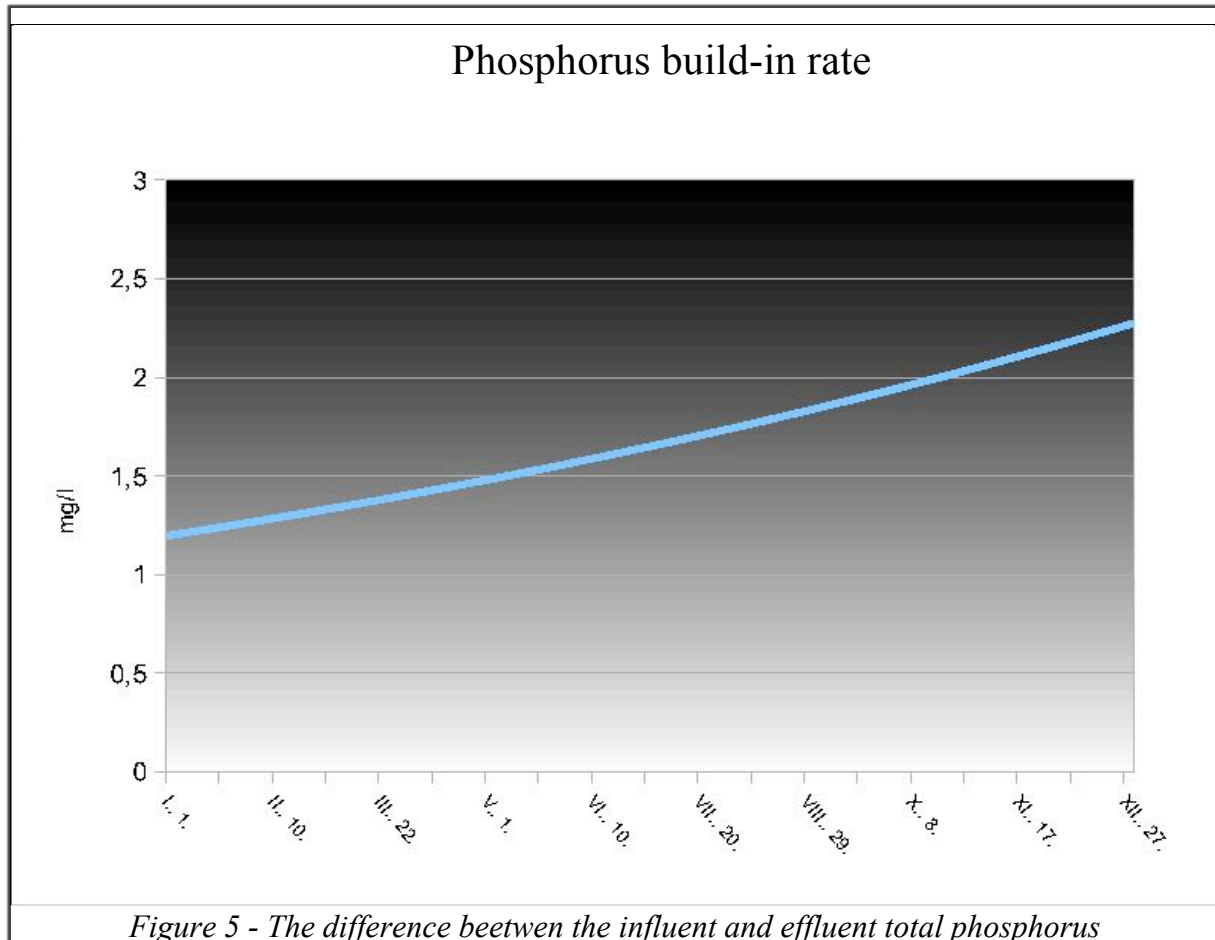


Figure 4 – The improvement of nitrogen removal

The plant is not equipped with anaerobic reactors and chemical phosphorus removal is also not applied. The **Bioclean™** has enhanced the utilization rate of phosphorus. After the dosing, the phosphorus build-in rate within the bacteria has significantly improved as well as the effluent TP levels.



The quality of the effluent water has improved due to a more efficient organic matter removal and more stable nitrification, the fluctuation of the parameters has been reduced as well. The operation of the secondary clarifiers got stable by the floc structure's improvement, which also reduced the suspended solids content of the effluent water. **The effect of Bioclean™ is the most visible on organic breakdown (COD removal), Nitrogen and Phosphorus removal enhancement (effluent TP concentration reduction).**