Turning pharmaceutical wastewater into clean effluent through custom-designed MBBR Technology at JSC Grindeks, Riga

CASE STUDY I MBBR | Pharma

| The client's needs

Grindeks is the leading pharmaceutical company in the Baltic states. The wastewater from the production is highly polluted and contains difficult-to-degrade and toxic organic compounds (including phenols). High organically bound nitrogen concentration is typical for Grindeks wastewater.

Grindeks office in Riga, Latvia.

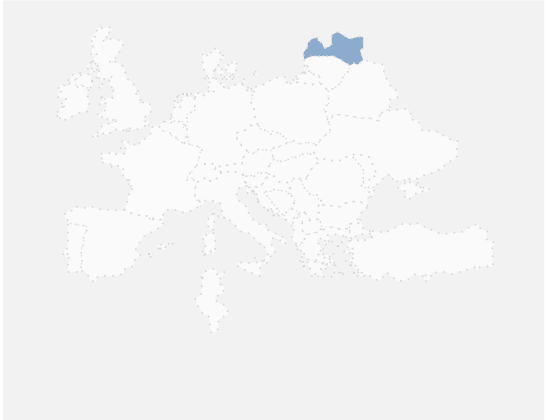
The challenge was to build a new, compact, effective-working wastewater treatment plant and meet Authority determined effluent demands in COD, total nitrogen, total phosphorus and Suspended Solids (SS).

| The solution

Veolia decided together with the Client to start a laboratory campaign for feasibility studies and for optimization of the process design.

The laboratory trials were conducted for several months before we could present an optimized process solution to the Client based on MBBR™ technology. The laboratory trials helped identifying the maximum concentration of toxic compounds that could be fed to the biology without interfering with the treatment processes. A "toxic" tank for storage of the effluents rich in toxic compounds was proposed as part of the solution. The effluent stored in the toxic tank was designed to be slowly fed to the biology without exceeding a maximum allowed concentration.

Covered MBBR reactors.



Riga, Latvia

| The client

JSC Grindeks is a pharmaceutical industry located in Riga, Latvia. Its product portfolio is composed of original products, generics, and active pharmaceutical ingredients, marjory focused on medications that treat cardiovascular, central nervous system, oncological, diabetic and skin diseases.

Key figures

Challenge

To meet effluent demands in COD, total nitrogen, total phosphorus and SS

Solution

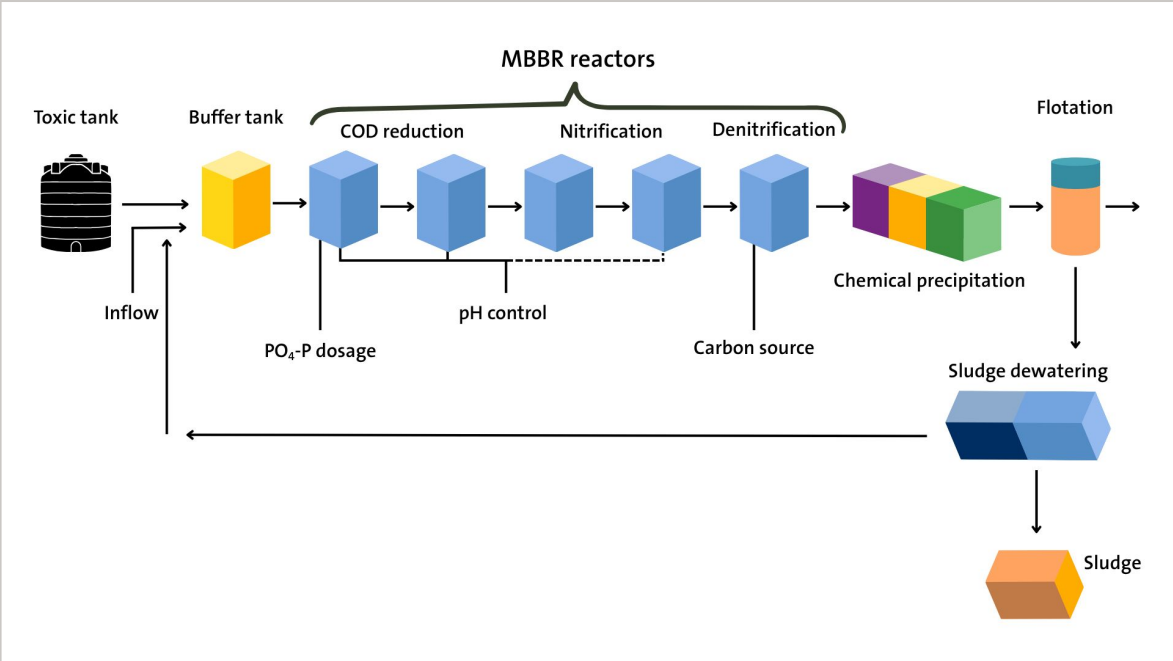
Five-stage MBBR process including COD removal, nitrification and denitrification

Results

COD removal: 89-95%
BOD removal: > 99%
Total nitrogen removal: 45-87%
Total phosphorus, effluent: 0,1-11mg/l (average 2 mg/l)

| Process description

The wastewater treatment process consists of the following main components: buffer tank, five MBBR reactors with biofilm carriers type K3, a tank for toxic phenol-containing wastewater, pH control, phosphorus addition and finally a flocculation and dissolved air flotation unit with possibility to precipitate COD and excess phosphorus not reduced in the biological stages.
Also a sludge dewatering unit - decanter-centrifuge and a compost filter for treatment of the ventilation air, are included in the plant.



| Results

The first MBBR reactor is primarily for the reduction of COD. About 60-70% of the COD is removed in this reactor with the final effluent COD removal typically over 90%. The second MBBR reactor is used for reduction of large molecules that are a waste unique to the production of certain pharmaceuticals. Reactor three continues the removal of hard to reduce organic compounds. The three upstream reactors act as a buffer ahead of reactor 4 where nitrification takes place. The final reactor is a post-denitrification reactor where solvents from the production process are utilized as effective carbon source.

Total nitrogen treatment efficiency varies between 45-88%. Nitrification is the most sensitive step of the process treatment and it is periodically upset during production stops and when disinfectants are used for cleaning. The average phosphorus concentration in effluent normally is 2 mg/l. Wastewater containing phenols are pumped to a buffer tank with controlled flow rate so that phenol concentration in the buffer tank is 20-30 mg/l and in effluent phenol concentration do not exceed 0,8 mg/l.

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