Leading-Edge Biological Treatment: MBBR™
Moving Bed Biofilm Reactor
AnoxKaldnes® MBBR™ Biofilm Technology

An advanced biological treatment process for municipal and industrial wastewaters: 1% plastic, 99% know how.

The Moving Bed Biofilm Reactor (MBBR™) technology is a leading-edge biological solution for wastewater treatment, based on a core understanding of microbiology and treatment processes and intensive Research & Development by AnoxKaldnes®, a Veolia Water Solutions & Technologies company, with over 20 years of experience.

This simple and robust biological treatment process is suitable for specific wastewater treatment processes – nitrogen reduction, high BOD/COD removal, including difficult industrial wastewater requirements.

At the core of the technology, specially designed polyethylene biofilm carriers provide a large surface area for micro-organisms to grow on and perform specific biological treatment functions. Carriers are kept in suspension in the reactor either by the aeration system (aerobic zone) or mixers (anoxic zone). Bacteria from the wastewater attach themselves to the floating carriers.

The very compact configuration helps to achieve a highly active biomass concentration in the reactor and a low settling load in the downstream solids separation process. Biofilm wastewater treatment technologies are very robust, especially when compared to conventional technologies like activated sludge.

Key Characteristics

- High tolerance to load variations (including suspended solids) and toxic shocks
- Easy reuse of existing structures
- Low solids load on clarifier
- Ideal for upgrades
- Very compact configuration, able to fit in very small spaces
- Fast start-up and fast recovery after shut-down
- High removal efficiencies for nitrogen, BOD and COD
- No sludge bulking problems
- Stable process and easy to operate
- Low maintenance
- More than 500 installations in 50 countries
- 20 years of experience
Customers

- Municipal customers and water authorities
  - Sewerage treatment plants with footprint restrictions (sewer mining), requirements for low discharge nitrogen, sludge settlability or bulking problems
  - Recycled water schemes - nitrate reduction and treatment of brine concentrates

- Industrial customers:
  - Food & Beverage, including Dairy and Wineries
  - Mining and minerals, Pulp & Paper processing and industrial processes with difficult wastewaters
  - Oil & Gas for wastewater with organics and nitrogen

- AnoxKaldnes® MBBR™ standalone process, or, as a complete integrated process, can be designed to suit specific customer’s requirements – engineered to suit specific needs, including footprint restriction, use of existing infrastructure, feed fluctuations.

MBBR™ Bench Scale Tests & Pilot Tests

- In order to design the most suitable process for your plant, we can organise bench scale tests – batch or continuous bioreactor operation, under controlled conditions to simulate the full scale process. This will allow us to develop the optimum design, establish the key process parameters and prove the process performance.
- We can also test your wastewater for specific treatment results.

MBBR™ Process Combinations

AnoxKaldnes™ MBBR™ technologies can be used in combination with several sludge separation technologies, e.g. Neosep® Membrane Bioreactor, Actiflo® clarification, Hydrotech® Discfilters, DAF (Dissolved Air Flotation) or conventional clarifier.

MBBR™ & Neosep® MBR Packaged Plant: a unique packaged plant combining leading edge biological and membrane processes for small scale municipal & reuse applications.

- A combination of the biological process of MBBR™ and Neosep® Membrane Bioreactor (MBR) - an immersed membrane filtration for very high removal efficiency of bacteria, suspended solids and high BOD/COD removal
- Available in flow rates from 100 kL/day, this high efficiency compact and robust design can tolerate variations and disturbances

High quality water for reuse (sewer mining)

- This process produces high quality reuse water (class A+), suitable for irrigation, non potable re-use projects and discharge into sensitive environments
- Ideal when combined with Reverse Osmosis to remove TDS for cooling tower make-up water for increased efficiency and reduced chemical and potable water consumption
Bundamba Advanced Water Treatment Plant, Municipal, Bundamba - QLD

- Design & Supply contract for treating Reverse Osmosis Concentrate (ROC) at the Bundamba AWTP (part of the South East Queensland 232 ML/day Western Corridor Recycled Water Scheme)
- Removal of ammonia in ROC by biological nitrification using MBBR™ as post treatment for effluent polishing, to reduce ammonium to 0.9 mg/L
- Capacity: 15.5 ML/day
- Application: environmental discharge to meet stringent EPA environmental requirements

Darling Quarter Recycled Water Plant, Commercial, Sydney - NSW

- Design, Build & Support for a Recycled Water Plant, to treat 245 kl/day of sewage (sewer mining project) for a low rise sustainable development in Darling Harbour in Sydney
- Process: MBBR™, Membrane Bioreactor (MBR), Reverse Osmosis
- Capacity: the RWP will produce 166 kl/day (60 ML/year) of high quality treated recycled water for reuse on site for toilet flushing, irrigation and cooling tower make up water
- The project is registered for a Green Star Office Design rating and targeting a 6-star rating
- Veolia Water Solutions & Technologies was awarded a WICA (Water Industry Competition Act) License for this project

Carlton and United Breweries, Food & Beverage, Yatala - QLD

- Australian beer and spirits division of Foster’s Group, decided to expand their plant with additional water requirements attracting significant overhead charges, which encouraged CUB to recycle their wastewater
- Process: two-stage MBBR™ used for polishing BOD after anaerobic treatment, prior to DAF and Microfiltration/Reverse Osmosis
- Capacity: 140 m³/hour
- Application: the reuse water is used for Clean In Place, boilers and general washing

Norco Pauls, Food & Beverage - Dairy, Raleigh - NSW

- The customer wanted to treat the dairy wastewater, and meet new discharge permit conditions before discharging to the river
- Process: two-stage MBBR™ plant, treating 230 m³ per day of wastewater, influent COD 3,500 mg/L, reduced to COD below 100 mg/L
- The treated effluent exceeded objectives with BOD below 100 mg/L, typically effluent BOD < 50 mg/L

Norske Skog Boyer Mill, Pulp & Paper, Hobart - TAS

- Norske Skog wanted to upgrade their existing primary wastewater treatment plant to secondary, using the BAS™ process (combination of MBBR™ and Activated Sludge)
- The new secondary process uses MBBR™ for pre-treatment, 2,000 m³ volume, and is followed by activated sludge
- Efficient and high performance BAS™ combination process in a unique configuration
- The plant is currently achieving > 90% BOD removal
The MBBR™ can be used in combination with other processes to achieve the appropriate treatment objectives: after anaerobic treatment for polishing BOD load; before activated sludge for high BOD/COD treatment, or multiple stages of MBBR™. MBBR™ is also ideal for upgrades or as post treatment to existing activated sludge for nitrogen removal.

> The MBBR™ process is suitable for: organic removal, nitrification, denitrification or detoxification. MBBR™ processes are suitable either for new plants, upgrade or expansion of existing plants.
> Specially designed carriers (K1, K3, BiofilmChip™ M, BiofilmChip™ P, F3, Matrix™ Sol) will meet different applications. The carriers are designed to give a large surface area for micro-organisms to grow on.
> The reactor can be filled with up to 70% volume of carriers, which are kept in the tank by sieves at the reactor outlet.
> Several reactors in series may be used to develop specialised bacteria in each stage.

**Two-stage MBBR™ - Specialised, high performance treatment**

**BAS™ MBBR™ pre-treatment followed by Activated Sludge - High BOD/COD load**

**MBBR™ post-treatment (polishing), e.g. for Post-Denitrification**

**Hybas™ MBBR™ in activated sludge - ideal for upgrades, e.g. for nitrogen removal**
Veolia Water Solutions & Technologies is a world leader in Design & Build of water and wastewater treatment plants, focusing on reuse & desalination. We provide Design & Build capabilities, custom & standard skid systems and packaged plants, Equipment Supply, Mobile Plants, Hydrex® Specialty Water Chemicals, as well as Maintenance & Service agreements.

We offer advanced technologies and processes, including Membrane Filtration, Reverse Osmosis, Actiflo® Clarification, Discfilters, Neosep® Membrane Bioreactors, and Moving Bed Biofilm Reactors. We create water solutions for drinking water, industrial process water and wastewater aimed at municipal, commercial & industrial customers.