

# Wastewater Aeration Solutions



# About Mapal



**We are an inspired team of engineers, designers, and innovators who strive to constantly enhance wastewater treatment technologies. We aim to accommodate our client's specific needs, ensuring the right solution for any application and budget.**

Mapal is an Israeli based global patented technology company founded in 2008. Mapal provides Floating & Retrievable Fine Bubble aeration solutions for municipal and industrial wastewater treatment plants of any type, shape and size. Mapal's arsenal includes the unique Floating Fine Bubble Aeration (FFBA™) and Retrievable Fine Bubble Aeration (RFBA™) systems.

Mapal's custom-made systems are suitable for upgrading existing plants, new builds and introducing additional oxygen to current aeration systems, with no need to drain the reactor or stop the process. The removable modular units are easy to add/remove/re-position as the process demands, do not require a levelled floor and can be installed and maintained while the plant is still functioning. Mapal's technology has been proven in wastewater treatment plants (WWTPs) worldwide.

Mapal's engineering expertise offers its clients a complete solution, from pre-sale consultancy services through to post-sale support.

## This includes

- Initial design feasibility study
- System design, supply and assembly
- Commissioning and start-up of installation
- Post-sale operation and maintenance contracts
- Supply of spare parts for diffused aeration systems

## We offer

- Municipal and industrial wastewater treatment solutions
- Aeration and mixing solutions
- Retrofits for wastewater treatment plants
- Rental equipment for supplemental/emergency aeration
- Turnkey aeration projects



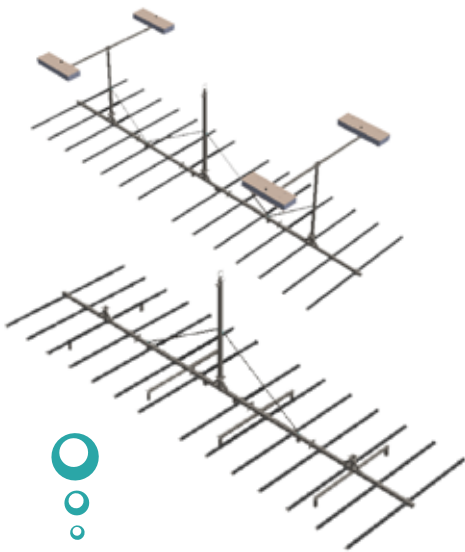
# Our Technology

**Mapal's retrievable fine bubble aerators offer a variety of solutions to meet your aeration demands. Our modular units, floating (FFBA™) and retrievable (RFBA™) allow for bespoke solutions in any wastewater application.**

We have made our equipment simple to install and easy to maintain saving you time and energy. Efficient design and high quality materials make our units a reliable and long lasting solution even in aggressive environments.

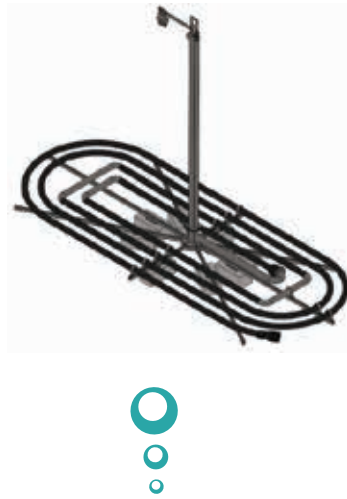
Mapal's patented FFBA™ systems approach the challenge of biological wastewater treatment, both municipal and industrial, by marrying the ease of installation of surface aeration with the efficiency of sub-surface diffusers.

The system incorporates units of robust stainless steel equipped with stainless steel tubular fine bubble diffusers (other materials available on request) and a balancing system of UV resistant Polypropylene floats. We accommodate our clients with a wide range of membrane materials including EPDM, PU, Silicone, and Teflon, to suit the specific wastewater.



## FFBA & RFBA Grid Unit

- Retrievable floating / non-floating
- Mapal SS diffuser
- Air Flow rate- up to 1000 Nm<sup>3</sup>/hr
- Robust structure
- Excellent floor coverage



## FFBA-Oval unit

- Floating and Retrievable
- Mapal Spiral diffuser
- Air Flow rate- up to 500 Nm<sup>3</sup>/hr
- Low cost



## Airlift Purge System

Each aeration unit has its own airlift purge system to remove condensation and liquids that may have entered the piping system

**Our fine bubble diffusers are implemented in Mapal's RFBA™ and FFBA™ units and are designed and manufactured by Mapal.**

The tubular diffusers are comprised of stainless steel fitted with fine bubble membranes providing our clients a robust system with a long life-span.

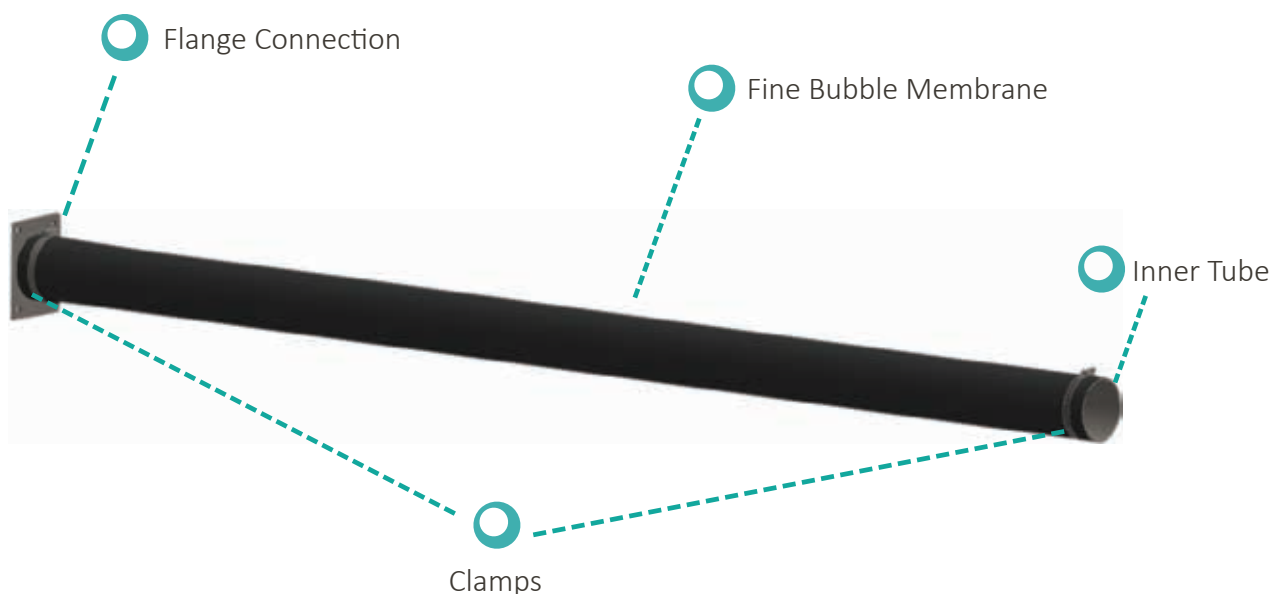
The unique tubular diffuser was originally designed exclusively for special applications but due to its reliability and improved performance it has become Mapal's standard diffuser in the RFBA™ and FFBA™ grid units.

The diffuser has a flanged connection to the main air pipe and is available in lengths of up to 2 meters, providing optimal floor coverage.

Mapal uses standard tubular fine bubble membranes (90mmØ) which are held in place by high quality ss clamps and are available in a variety of materials including EPDM, Silicon, PTFE PU and Teflon.

Our diffusers are significantly more economical compared to plastic diffusers when considering long term use, as only the membrane itself requires replacement for maintenance purposes. The stainless steel inner-tube of the diffuser does not break under the weight of ragging and/or sludge as is common with plastic diffusers.

## The most robust diffuser available in the market



## Why Mapal?

- Installation in any plant with no process interruption; no need to drain the pool.
- Can be installed in addition to any existing aeration system with no need to modify the plant's infrastructure.
- Modular system: possible to add, remove or relocate units with no downtime.
- Simple and quick installation; units are placed in the water with a crane.
- Units are levelled above the floor or above fixed-to-the-floor diffusers.
- Adjustable air flow rates can be supplied to individual units.
- Excellent floor coverage.
- No wall or floor guide rails for installation.
- Custom-made for any type of reactor or lagoon at every scale of operation.
- Full pre-sale and post-sale support.
- Treatment of contaminated natural water sources where oxygen is urgently required to rejuvenate the environment.

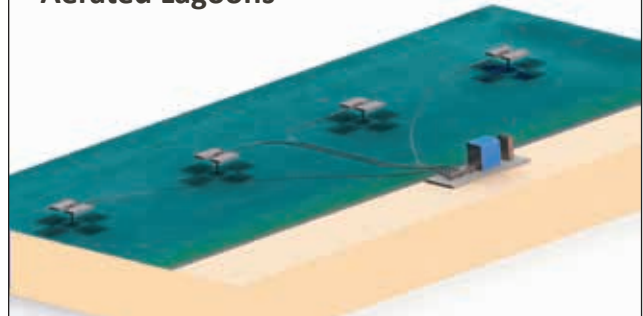
## Main Applications

### Above existing fixed to the floor diffusers



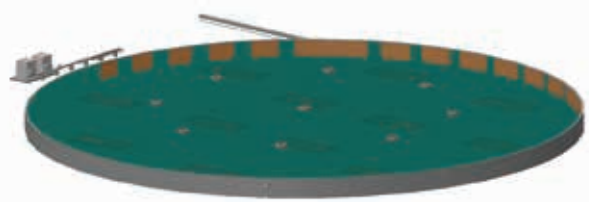
Due to malfunctioning existing aeration equipment, Mapal floating units were installed without removing the existing diffusers, providing supplemental oxygen to the reactor.

### Aerated Lagoons



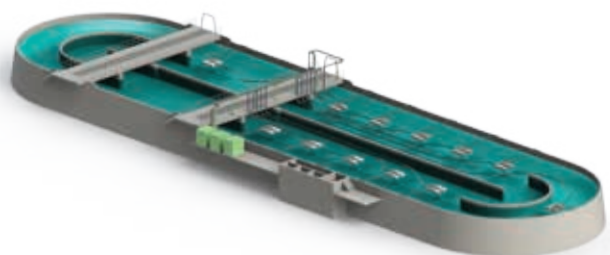
Mapal floating units were installed in a lagoon providing fine bubble diffuser aeration without requiring a levelled floor.

### Upgrade from surface aerators



Mapal floating units replaced the existing surface aerators.

### Supplemental aeration



Mapal floating units were installed in parallel to existing surface aerators to provide supplemental oxygen to the reactor.

## Need more oxygen?

Mapal's emergency aeration system is a fast, simple and cost-effective solution



Quick &  
Simple



Odour  
Treatment



Extra Air



Energy  
Efficient

Renting our aeration systems on a temporary basis can assist you with:

- Equipment failure
- Flow increase in peak seasons
- Odour problems
- Oxygen supplement during maintenance work

We are here to help whenever your aeration system breaks down, is unreliable, or requires upgrade. Our system is easy to install and maintain, without stopping the treatment process or draining your reactor.

Our aerators can be installed above existing fixed-to-the-floor diffusers or alongside surface aerators.

We can provide our customers with a complete system, including a blower, manifold, air supply pipes and aeration units. We can also provide a control system including a control panel, PLC, and DO sensors for optimal operation which can conjoin to any existing control system on site.

**Rental contracts are available on a weekly or monthly basis  
with no minimum period required.**

**Contact us for details:  
office@mapal-ge.com or 972-4- 8200231  
www.mapal-ge.com**

# Municipal SBR Process

## Upgrade from surface aeration



**Electra Greentech, a large service provider of wastewater treatment solutions in the Israeli market, operates the WWTP of Arad city in the south of Israel.**

The plant treats more than 2.5 million m<sup>3</sup> of municipal wastewater annually with an average daily flow rate of 7,000m<sup>3</sup>/day in an SBR process. The existing aeration systems in the SBR lagoons comprised of 6 floating aspirator units, combining mechanical mixers with coarse bubble diffusers, designed to deliver oxygen of 420 kg/hr under standard conditions. Each unit included a mixer with the capacity of 7.5 kW and a regenerative blower of 22 kW, but the system did not achieve the expected results according to the design specifications.

**Challenge** To improve the dissolved oxygen concentration in the SBR, to improve the nitrogen removal and the settling characteristics of the MLSS and to reduce the O&M complications and costs.

**Solution** 6 of Mapal's FFBA™ units were installed in each of the two reactors, replacing the original aeration system. Mapal's units connected to the existing blowers on site reducing the customer's capital expenditure.

The units were designed to suit the fluctuating water level so that the diffusers remain above the lagoon floor eliminating any possibility of damaging the lining.

In Phase 1 the FFBA™ units were installed in only one reactor in order to allow an accurate comparison between Mapal's units and the existing system, in equal conditions.

**Results** Mapal's aeration system was installed within 4 days and without stopping the treatment process or draining the reactor. Thereafter, began a comparative experiment between both systems. Samples were taken at the entrance and exit of each SBR lagoon, and the incoming flow rate and daily energy consumption of each lagoon were measured.

Mapal's technology improved the effluent quality and decreased the energy consumption. In light of the substantial improvement in performance where Mapal's system was installed, the customer decided to complete the upgrade and replace the old system in the second reactor with Mapal's units.





**The client, a large pulp and paper mill in South Africa, produces fine paper from bagasse. The mill uses an aeration lagoon to treat the wastewater before discharging into the local river. Before Mapal's installation, the plant was using a combination of surface aerators, aspirators, and liquid O<sub>2</sub> in order to reduce the COD as required.**

## Challenge

To reduce the high operation and maintenance expenditure by providing a more efficient aeration solution.

## Solution

Mapal's engineers calculated that replacing the liquid oxygen injectors would be the most economical solution as the operation and maintenance costs of the system were extremely high and provided the most room for savings.

An FFBA™ system was installed comprising of 4 floating aerators, 1 blower, air feeding pipes and manifold.

In order to provide the fine bubble membranes most suited to the mill's aggressive wastewater, Mapal undertook preliminary tests on a selection of materials. Four types of membranes were tested (EPDM, Polyurethane, Silicone and PTFE) over a period of 3 months. Upon completion of the tests and based on laboratory results, the decision was made to use Polyurethane membranes for the project.

## Results

Having installed the Mapal aerators the mill operators were able to inject less liquid oxygen into the wastewater and therefore reduced their operational costs.

Mapal's floating aeration system was installed within 3 days without draining the lagoon or disabling the existing aeration equipment. Mapal achieved a Standard Aeration Efficiency (SAE) of more than 3kg oxygen/kW.



**The Blackmans Bay WWTP, an Acciona / BMD Joint Venture in Tasmania, was designed with the IDEA (Intermittently Decanted Extended Aeration) process in order to enable wastewater treatment capacity beyond the year 2040, at the daily flow rate of 8,500m<sup>3</sup>/d.**

## Challenge

To increase the daily flow rate of the WWTP and improve the effluent quality including nitrogen removal in order to abide by EPA regulations.

## Solution

The solution was to provide 36 retrievable fine bubble aeration units. 28 units were installed in the bio-reactor. Each unit was equipped with tubular diffusers with a stainless-steel inner tube and EPDM membranes, all designed, manufactured and supplied by Mapal. The additional eight aeration units, manufactured from 316 SS with EPDM fine bubble membranes were installed in the aerobic digester. Each aeration unit was equipped with a purge system that uses the positive air pressure to continually remove any condensate or water penetrating the unit.

## Results

The aeration units in both the bioreactor and the aerobic digester, were designed for the maximum airflow rate for 2040, with the number of diffusers required up to 2025. This was done to accommodate the future possibility of attaching additional diffusers for increase in the oxygen demand, providing future cost savings to the client.

# Industrial Semiconductor Plant

## Aeration Rental



**A cutting-edge WWTP treating the effluent from a semiconductor factory with pre-treatment processes of separation, metal recycling and MBR for removing organic materials.**

The plant's aerobic reactor used fixed-to-the-floor disc diffusers which began to breakdown causing problems with the biological process and the efficiency of the nitrogen removal. In order to repair the disc diffusers, the reactor had to be drained, a process which requires synchronization with the production plant to reduce the factory's wastewater during the maintenance period. This time consuming process called for a temporary solution.

## Challenge

To urgently supply additional oxygen to the aerobic reactor without interfering with the existing treatment process.

## Solution

The client hired two FFBA™ units. The floating units were installed just above the existing fixed-to-the-floor diffusers. Mapal also provided a specialized manifold that connected to the existing air feeding pipe, eliminating the need to supply a new blower.

## Results

Mapal's rental aeration system was supplied to the client within seven days, and was installed and operating within two days. Following the installation, the wastewater process performance improved and the nitrogen removal returned to its expected values. Installation was completed without draining the reactor, providing the factory with consistent production. Following the project's success, the client purchased two additional floating aeration units in case of further problems with their fixed-to-the-floor diffusers.

# Industrial Pulp and Paper Mill

## Supplemental Aeration



**One of the world's leading pulp and paper manufacturers required extra air in one of their paper mill WWTPs in Asia. Equipped with surface aerators and jet mixers, the plant treats approximately 20,000 m<sup>3</sup>/day in two activated sludge reactors.**

## Challenge

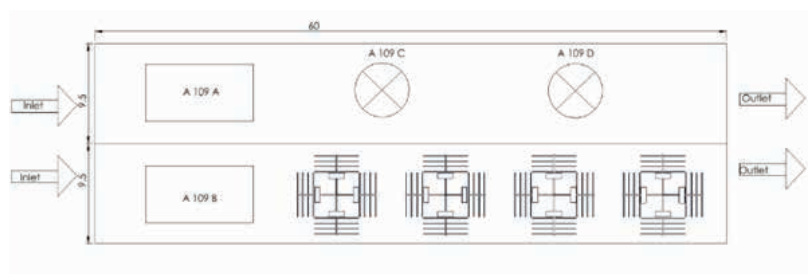
The client needed to increase the plant's oxygen supply to comply with regulations and maintain consistent production. They were seeking an aeration system that could withstand the harsh industrial wastewater and could increase the dissolved oxygen in the reactor.

## Solution

To replace the existing jet aerators with Mapal's floating aeration units. Mapal's aeration system was connected to the existing blower. Due to the system's efficiency the oxygen flow rate increased which resulted in a higher dissolved oxygen concentration in the reactor.

## Results

Installation alongside the surface aerators was safe, simple, and carried out without stopping the treatment process. Once Mapal's floating aeration system began to operate there was an immediate improvement in the reactor's oxygen level. One week later the client reported oxygen increase to the required level and that the color of the wastewater transformed from grey to brown, indicating improvement of the treatment process. Following the project's success, the client purchased an additional Mapal aeration system with nine floating units in order to upgrade the entire wastewater treatment process of the production plant.



# Municipal Aerated Lagoon Odor Treatment



**Nisgav WWTP located in the south of Israel, is operated by the local municipality and treats wastewater at an average of 10,000 m<sup>3</sup>/day for reuse in irrigation. Due to the malfunctioning existing aeration equipment, odors began emanating from the aerated lagoon and the municipality received numerous complaints from the neighboring residents.**

## Challenge

To solve the odor problem and improve the effluent quality.

## Solution

Replace the existing floating lateral diffusers with Mapal's FFBA™ system. The system was designed to operate with the existing blower while improving the oxygen transfer efficiency. Mapal's system comprised of six floating aerators, which were installed without stopping the process.

## Results

Several days after the installation of Mapal's aeration system the odor problem disappeared. A few months later the regional council received a thank you letter from its residents stating that solving the problem significantly improved their quality of life.

“*Having immediately noticed the improvement in the odor problem, days and weeks went by and we realised that the problem had been solved permanently improving the quality of life for all of us! We want to express our gratitude to the local council for making its residents a top priority.*”  
A quote from the letter written by the neighboring residents.



**AFGRI, a leading agricultural services and food processing company in South Africa required a new wastewater treatment plant to treat the effluent from one of their chicken abattoirs.**

A lagoon was excavated to treat a flow of 2,500 m<sup>3</sup>/day using an activated sludge process.

Design parameters:

- Lagoon dimensions: 57m x 30m x 4.5m with a slope of 1:2.5
- Inlet BOD: 150 mg/l
- Inlet Ammonia: 120 mg/l
- Site elevation: 1,560m above sea level

## Challenge

To supply an aeration system suited to the lagoon, with a standard aeration efficiency of more than 2.5 kgO<sub>2</sub>/kWh and to meet the required effluent quality of BOD<40mg/l and ammonia <5mg/l.

## Solution

Four of Mapal's floating aeration units were installed in the aerated lagoon to supply an oxygen transfer rate of 160 kgO<sub>2</sub>/hr (SOTR). Each unit included 40 meters of Mapal's fine bubble diffusers. The floating units received an air flow rate of 2,800m<sup>3</sup>/hr from a positive displacement blower located next to the lagoon.

## Results

The system operates at a power consumption of 60 kWh and continues to deliver high quality effluent and efficient aeration complying with the local regulations. The client ordered another Mapal system for a second site based on the success of the first installation.



[www.mapal-ge.com](http://www.mapal-ge.com)

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