TECHNOLOGY OVERVIEW
Floating Brush Aerators

mak water
The Smart Water People

APPLICATIONS

Our Floating Brush Aerators are ideally suited for operation in shallow lagoon applications where vertical shaft-type aerators cannot be employed. These units can operate at minimum water depth of 700mm. By adjusting the float immersion, operation in water as shallow as 500mm deep is possible.

The mixing profile of the Floating Brush Aerator moves the wastewater in a horizontal pattern and creates a circular flow, which prevents short-circuiting from occurring in lagoon treatment applications.

The horizontal mixing circulates highly oxygenated water throughout the lagoon, significantly reducing the BOD and ammonia (under correct climatic conditions) and creating an oxygen cap across the lagoon to reduce odours. This feature is specifically useful in lagoon applications where anaerobic sludge digestion occurs due to breakdown of accumulated or settled sludge in the lagoon.

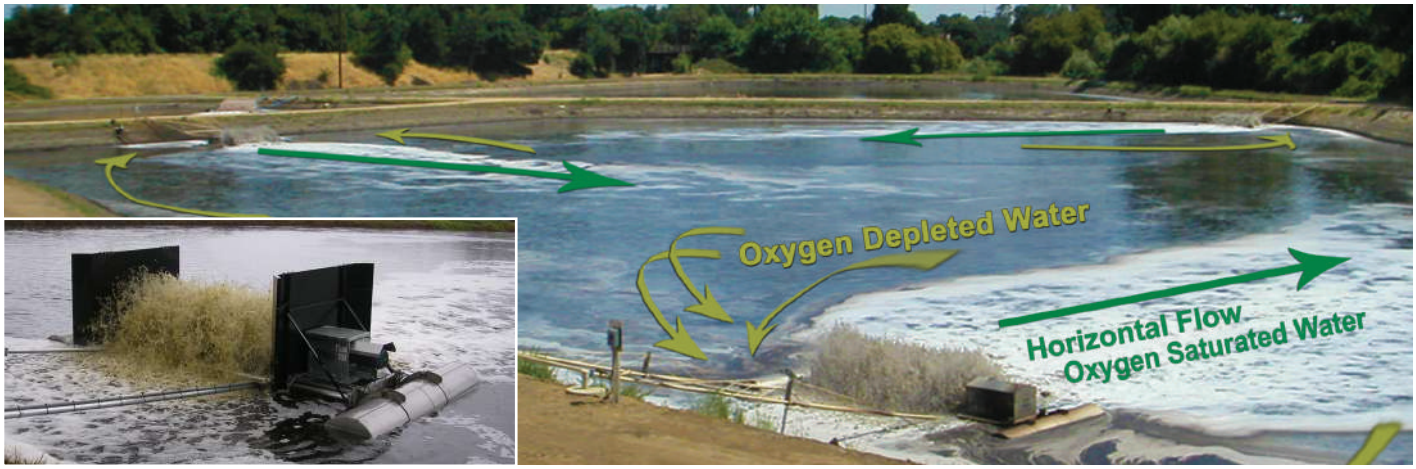

Figure 1. Typical Aeration & Mixing pattern by Floating Brush Aerators
Figure 2 (insert). Floating Brush Aerator with Splash Shields operating in a meat processing facility facultative lagoon

The effective mixing provided by Floating Brush Aerators, is also useful to redistribute accumulated sludge more evenly over the entire surface of the lagoon, thus improving lagoon treatment, and to create mixed conditions to minimise algal growth.

In addition to being ideal for lagoon applications, our Floating Brush Aerators are also suitable for aeration in oxidation ditches (or Pasveer ditches or carousels), SBRs, equalization basins and aerobic digesters of all sizes and configurations.

Figure 3 & 4. Floating Brush Aerators with Splash Shields in a Pasveer ditch

KEY FEATURES

Our Floating Brush Aerators offer the following key features:

- High Standard Aeration Efficiency (SAE) of 1.8 kgO_2/kWh
- High mixing efficiency of 17.8 m^3/min per kW
- Stainless steel grease lubricated drive end and non-drive end bearings with L10 Life of >100,000 hours
- Triple seal protection system to completely seal the gear drive enclosure. This eliminates the risk of wastewater coming into contact with the key drive components thus providing complete corrosion protection.
- Motors as standard: TEFC, 415V, 3-ph, 50 Hz, with IP55 protection (other IP ratings available as option)
- Conservative motor design: at the correct rotor immersion depth each electric motor shall operate at 90% load based on the nameplate data.
- Low maintenance requirements

AERATOR MAINTENANCE

As standard, the Floating Brush Aerators are fixed into position via 5.5m long mooring arms that attach to stakes, which are driven into the embankment (refer figure 11).

When maintenance is required, the aerator is simply floated/pulled to the embankment using the mooring arms. This is achieved by removing the mooring arm anchor caps that are attached to the stakes, which then allows free-floating movement of the aerator. The aerator is supplied with non-slip service platforms to stand on to carry out any maintenance.

For some projects, it may be preferable to remove the aerator completely out of the water for maintenance. One method is to lift the aerator from the water onto the embankment using a franna or similar lifting equipment.

MAK Water can also implement custom solutions to retrieve the aerator from the water. For the Corryong WWTP Floating Brush Aerator installation in VIC, the custom design included a special tow hitch attachment to the mooring arms, and castor wheels fitted to the floats of the unit. This allows a vehicle to pull the entire unit out of the water via a concrete ramp, as illustrated in figure 5.

Figure 5. Corryong WWTP Floating Brush Aerator with special rolling assembly

The standard maintenance for our Floating Brush Aerators include:

- Every 3-6 months (depending on running hours) – inspect & top up grease in automatic Lubesite Lubricators for drive end and non-drive end bearings & shaft (refer figure 6)
- Every 6 months or 25,000 run-hours - Oil change for gear reducer (refer figure 7)
- As required - Remove any debris from rotor and rotor blades

Figure 6. Typical automatic Lubesite lubricator on non-drive end bearing & shaft (housing cover removed for clarity)

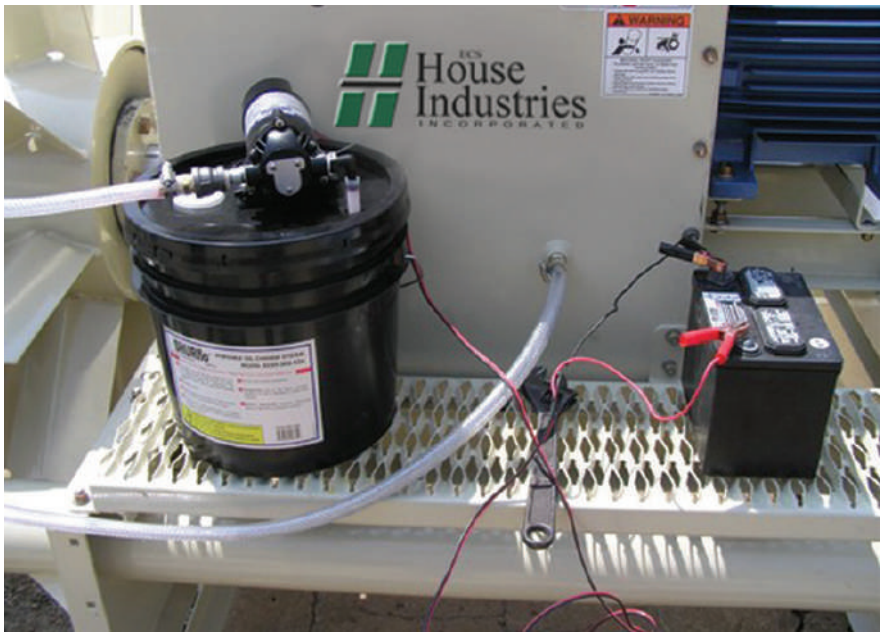

Figure 7. Gear Reducer oil change being completed using oil change kit supplied with Floating Brush Aerators

NOISE

In operation mechanical noise from the aerator motor and gearbox, is typically drowned out by the water splashing noise. This low-level mechanical noise is unlikely to be noticeable beyond the site boundaries of wastewater treatment plants.

The manufacturer completed noise level testing on a standard 7.5 kW Floating Brush Aerator without splash shields at their 10m x 20m factory test tank. Sound levels were measured at several locations around the aerator. Results are given below.

- Non-drive end at 3m = 78 dB / Non-drive end at 7.6m = 71 dB
- Drive end at 7.6m = 72 dB / Drive end at 12m = 71 dB

If noise must be reduced, an optional rotor cover can be fitted over the entire unit (refer figure 8). Note that the rotor cover will also lower the aeration efficiency by around 7.5%.

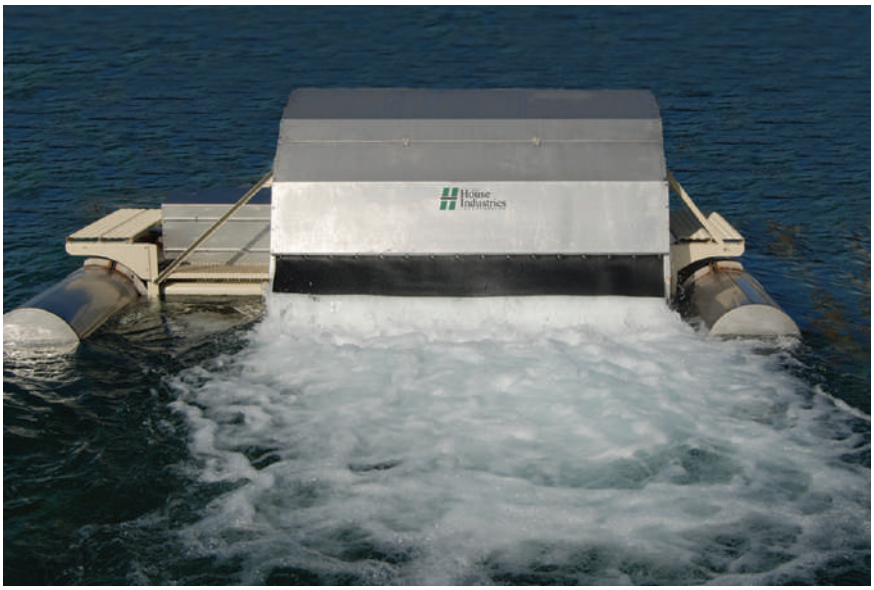

Figure 8. A Floating Brush Aerator in operation fitted with (optional) Rotor Cover

MATERIALS OF CONSTRUCTION

Our Floating Brush Aerators are available in different materials of construction options as per the table below.

Floating Brush Aerator Components	Materials of Construction Options			
	A	B	C	D
Drive end shaft / Non-drive end shaft	316L SS			
Foam-filled Floats / Floatation Band Attachments / Non-Drive End Bearing Cover / Motor Cover / Splash Shields (2x) / Rotor Cover (option)	304L SS			
Rotor and Rotor Blades / Frame / Drive Enclosure / Service Platforms (2x) / Mooring Arm assembly	MS Powder Coated	MS HDG	304L SS	316L SS

MECHANICAL INSTALLATION

Each Floating Brush Aerator is factory-supplied in sub-assembled components. Assembly is required for a complete unit as following:

- Attach 2x floatation tanks to main aerator frame
- Assemble 2x splash shields, and attached to main aerator frame
- Assemble mooring arms and attached to main aerator frame

The optional rotor cover, consisting of 3x sections, must be pre-assembled, before it is fixed to the aerator.

Following mechanical assembly, the floats are checked/adjusted for correct rotor water depth or immersion. Gearbox oil and grease levels must be checked before the aerators are lifted into the water.

Once mechanical and electrical installation are completed, the aerator can be lifted into the water with a franna or similar lifting plant. To complete installation for lagoon projects, the mooring arms will be attached to the mooring stakes that are driven into the embankment at the preferred mooring location. (refer figures 10 & 11)

Mechanical assembly is straight forward. It will take two (2) persons about 2-3 hours to complete assembly of an aerator. The optional rotor cover will take two (2) persons about 2-3 hours to assemble. A franna or similar lifting plant is required for assembly.

Figure 9. A fully assembled Floating Brush Aerator (without Splash Shields) being lifted/installed into a lagoon

ELECTRICAL INSTALLATION

The power cable for each aerator is typically fitted with a 3-phase plug, to be plugged into an electrical 3-phase socket with local isolator mounted on a post, located on the embankment (refer figures 10 & 11). Supply of the power cable with 3-phase plug, 3-phase socket, and post, are typically by others.

Electrical installation at the aerator involves terminating the power cable at the aerator motor junction box, and fixing the power cable to the mooring arms (refer figures 10 & 11). The supply of aerator power cable with 3-phase plug is typically by others.

All electrical installation and testing of rotor rotation must be completed before aerators are lifted into the water.

Figure 10. 3-phase electrical socket with local isolator mounted on post.

Figure 11. Completed installation of a Floating Brush Aerator (without Splash Shields) at a municipal lagoon plant in QLD