



Municipal and Industrial Wastewater









Welcome to Landia

It is true that we have been manufacturing pumps since 1933, but we are keener than ever to produce the very best solutions – and match that with unrivalled aftersales support.

We thrive on providing long-term, cost-effective solutions for our customers, focusing on low CO2 impact, better efficiency and performance, whilst making every effort we possibly can to reduce power consumption and improve Health & Safety.

Landia is not part of the throwaway culture. As a Danish company, we are subject to very strict national regulations on energy consumption, waste handling, and wastewater – and rightly so. Throughout our production process and beyond, we work hard to minimize environmental impact.

Serving the global wastewater industry, our goal remains to supply the best technical solution with the lowest life cycle costs in the industry. This includes a constant focus on minimizing energy consumption.

In addition to our headquarters and manufacturing facility in Denmark, we have long-established business units in the UK, the United States, China, and Germany – and solid representation all over the world.





Landia Mixers

- mix almost anything!

A typical wastewater treatment plant consists of numerous tanks containing wastewater in different stages and Landia has a proven range of mixers and flowmakers for almost any municipal or industrial application.

Submersible Flowmaker POPL-I

The POPL-I is a low speed flowmaker for mixing and flow creation of large volumes of water at the lowest possible power consumption.

A unique feature of the POPL-I is the adjustable propeller blades that make it possible to change their angle or setting. This special feature - exclusive to Landia - optimizes power consumption.





Guilin WWTP, China

Guilin, the pearl of China's emerging tourist industry, has chosen Landia's flowmakers, mixers and recirculation pumps for two new wastewater treatment plants that were built in the city famed for its magical land formations.

In 2013 Landia supplied a total of 78 flowmakers, mixers and recirculation pumps to the City of Guilin. The supply was based on the ultra-reliability and performance of 20 Landia flowmakers that have served Guilin since 1995.



Dairy WWTP, Denmark

A Danish Wastewater Treatment Plant was expanded in 2012 as part of a centralisation to include a new aeration tank (known as the N-Tank). The aeration tank, with its diameter of 42.5 m, a water depth of 5.6 m and a volume of 7,750 m³ is equipped with fine bubble diffusers and two Landia POPL-I flowmakers for mixing and flow creation.

The result was a significantly lower power consumption than average – still with a 20% spare mixing capacity in case of increased load of the WWTP.



VCS WWTP, Denmark

Vandcenter Syd (VCS), a member of the Leading Utilities of the World network, is close to seeing a set of Landia mixers complete 30 years of service.

Ib Pedersen, who is a Team Leader for the operation of wastewater treatment plants at VCS, comments:

"In the water/wastewater industry, there is a direct correlation between price and quality, so it is vital to analyze life-time costs. Here in Denmark, pumps and mixers are amortized after twenty years, but in the UK, for example, the typical period can be as low as only five years. This results in inevitable replacements and therefore much higher ongoing costs. It is very bad economy having bought something which appears to be a 'cheaper' product".

"Back in 1989, sixteen mixers from Landia were delivered to us. Fourteen of them are still running fine in our sludge tanks. Ib Pedersen continues: "It is indeed possible to set criteria for service and set requirements for information expected life-time costs when preparing tender documents. I would like to encourage my colleagues in the industry to remember that and think long-term – and in addition to prices, it is also very important to look at service as well.

"We have been offered cheap products from the Far East, and when we asked about service, we were told that there was a man in Germany who could come and visit us if needed. It is simply not good enough. We emphasize the importance of back-up from a company such as Landia, who is committed and able to provide support to their customers.



MBBR Mixing Technology

Over the past two decades, Landia has installed BioMover Mixers in numerous municipal and industrial wastewater treatment plants around the world.

The Landia BioMover is a state-of-the-art slow speed mixer which is remarkable for its great versatility and tremendous robustness. The propeller blade material of construction is stainless steel and the propeller tip-speed is at its lowest hence offering maximum protection of the bio carriers. The biofilm carriers used in MBBR processes in modern wastewater treatment plants are typically made of HDPE with slightly buoyant density and are designed to offer large protected surface area for biofilm growth.

Landia BioMover is available with motor sizes from 0.75 kW to 7.5 kW and propeller rpm from 22 to 150. Propeller tip speed from 2 to 8 m/sec.

Landia BioMover Advantages

- Compatible with all types of biofilm carriers from various suppliers.
- The stainless steel propeller, with its wide blades and low speed, ensures gentle and energy efficient mixing of the biofilm carriers.
- Low tip speed prevents damage to the fragile media.
- Guaranteed mixing performance to keep solids and biofilm carriers in suspension.
- Dozens of different motor sizes and individual propeller designs ensures effective mixing of media in all types of tanks.



Sanhe Yanjiao West WWTP, China

Beijing Anguo Water Treatment Automation Engineering Technology Company has awarded an eye-catching order for 88 mixers to Landia.

The POPL-I BioMover mixers, for the Sanhe Yanjiao West WWTP and Sanhe Economic Development Zone WWTP on the eastern outskirts of Beijing, are for the very gentle treatment of biofilm carriers in anaerobic and anoxic tanks.

Designed for a fill ratio of 30% the Landia BioMover mixers, with a propeller tip speed of only 4.2 m/sec., keep the bio media in suspension without damaging the carriers – as well as keeping sieves free from clogging.

Thorkild Maagaard, Landia's Export Sales Director, said:" It is very encouraging to see such a healthy appetite for investing in equipment that is long-lasting, highly efficient and extremely reliable. China is setting a very good example to the world".

He added: "With our dedicated team in China (led by sales manager Danny Zhang), we are also able to offer first-class support and back-up to our customers".

Landia has previously supplied its BioMover mixers to an advanced water treatment plant in Agra, India – home of the Taj Mahal – whilst in China, Landia has earned an enviable reputation for its pumps, mixers and understanding of China's wastewater treatment plants. It has, for example, supplied a plant in Guilin, southern China with flowmakers, mixers and recirculation pumps since 1995.



Mining WWTP, USA

Submersible BioMover mixers for MBBR applications, with their low speed and large surface area propellers, ensure efficient mixing and maximum protection of the bio carriers.

A US mining company purchased the first Landia BioMover in 2006 and has since then installed BioMover in a further four tanks. The mining sites are typically in remote locations and require highly reliable equipment to avoid downtime and unscheduled service calls.

Submersible Flowmaker POP-I 150

The POP-I 150 is a low speed flowmaker for mixing and flow creation at the lowest possible power consumption.

Compared with the POPL-I flowmaker, the POP-I 150 can be used for smaller and odd shape tanks due to its smaller physical size.

The POP-I 150 is also available in solid stainless steel SS316 – typically used in the chemical or food industry.

Applications

- Aeration Tanks
- Oxidation Ditches
- Anoxic and Anaerobic Tanks
- SBR Reactors
- Sludge Tanks
- MBBR Reactors

In Short

Motor sizes from 1.1 - 7.5 kW Propeller diameter: 620 - 1080 mm

Propeller rpm: 150 rpm

Propeller tip speed: 5.2 - 7.6 m/sec.

Available with Ex motor Available with IE3 motor





Submersible Mixer POP-I 300

Landia POP-I 300 is a versatile and efficient heavy duty mixer. The three-blade propeller and the relatively low propeller rpm make it ideal for the mixing of high viscosity liquids such as dewatered sludge.

The POP-I 300 is available also in solid stainless steel SS316 – typically used in the chemical- or food industry.

Applications

- Anoxic- and Anaerobic Tanks
- SBR Reactors
- Sludge Tanks
- Digester Mixing
- Pump Lift Stations

In Short

Motor sizes from 1.1 - 30 kW Propeller diameter: 365 - 880 mm Propeller rpm: 300 rpm Available with Ex motor Available with IE3 motor







Faxe WWTP, Denmark

Slow-speed mixers with low energy consumption have won Landia an important mixer order in Faxe, eastern Denmark.

Each of the eight 5.5 kW, 150 rpm Landia mixers had to be installed with no interruption to the process at the Faxe Wastewater Treatment Plant, because the tanks (79.5 m in length, with a width of 22 m and volume 2,720 m³), could not be emptied. So, using mobile cranes, including distances of up to 50 m between the assembly point and the road, each mixer was installed on its own platform.

Outdated surface brush aerators were previously being used for the 'race-track' design at the plant, but from both a process and energy point of view, were not longer viable. A switch to diffusor aeration in combination with the low speed Landia mixers resulted in an up-to date configuration of the process.



Agaba WWTP, Jordan

Landia Flowmakers, with a Lifetime Propeller Guarantee, have been supplied for a wastewater project in North Aqaba - a city in the kingdom of Jordan that is experiencing a rapid growth due to extensive construction of new hotels and resorts on its way to becoming an important tourist destination.

Working in close conjunction with its local partner, Modern Industrial Services, Landia has provided a total of 23 mixers and recirculation pumps - actually decreasing the number of mixers in the plant's anoxic tanks from sixteen to eight - thus significantly reducing installation and ongoing operational costs for many years to come. This saving was a direct result of Landia's detailed discussions with engineers in Jordan, who wanted to optimize the entire mixing operation and see a proven history of longevity and reliability in the equipment supplied.

Side Entry Mixer POPTR-I

Landia's POPTR-I is a versatile and efficient side-entry mixer. The three-blade propeller and the low propeller rpm makes it ideal for mixing of high viscosity liquids such as dewatered sludge or digested sludge.

Being a side-entry mixer the POPTR-I has the motor outside the tank which significantly eases service and maintenance. Optimum cooling conditions for the motor makes it the ideal choice for high temperature liquids.

The POPTR-I is suitable for most types of tanks – concrete and steel.

Applications

- Sludge Tanks
- Digester Mixing
- Hot liquids

In Short

Motor sizes from 5.5 – 18.5 kW Propeller diameter: 575 - 770 mm

Propeller rpm: 300 rpm Available with Ex motor Available with IE3 motor



Submersible Mixer POD-I

The POD-I is a compact and flexible submersible mixer for applications in smaller tanks and liquids with relatively low solids concentration.

Landia POD-I is available both in cast iron and stainless steel SS316.

Applications

- Selector Tanks
- Anoxic and Anaerobic Tanks
- SBR Reactors
- Pump Stations
- Equalization Tanks

In Short

Motor sizes from 1.1 – 18.5 kW Propeller diameter: 170 - 375 mm Propeller rpm: 1000 and 1500 rpm

Available with Ex motor Available with IE3 motor



Recirculation Pumps / Wall Pumps

Axial pumps designed to pump large volumes of water with low back pressure. The pump is mostly used in wastewater treatment plants for the recirculation of sludge, but may also be used in e.g. drainage, and for recirculating in fish farming facilities.

Landia recirculation pumps are available in three sizes: 300, 500 or 800 mm. Capacity up to 5,000 m³/h. Also available in stainless steel SS316 upon request.

The AXP-I/AXD-I is typically mounted directly onto the outside of a tank wall, but it can also be fitted in-line in a pipe system.

Suitable for frequency drive operation. Available with Ex motor Available with IE3 motor





The Chopper Pump

Landia developed the first chopper pump in 1950. A chopper pump is a pump equipped with a knife system at the pump inlet. The knife system prevents the pump from clogging when the pumped liquid contains solids.

Originally, the Landia chopper pump was designed to chop the straw that was always present in liquid manure and often caused clogging of the pump.

The Landia pump design has proven so efficient, that the pump system has been refined even further into a pump that is ideal for municipal and industrial applications.

The applications are municipal and industrial wastewater, pumping of sludge, liquid biomass, by-products in the food industry, different kinds of abrasive liquids and any other type of challenging pump application.

Below please find advice with regards to selecting the correct pump for the application:

Dry mounted or submersible?

In most cases the choice is obvious. However applications can be found where a shift from submersible to dry mounted pump is a good idea.

> Material of Construction?

For the majority of applications the standard cast iron model is just perfect for the job. Landia pumps are available also in AISI 316 and hardened cast iron.

Characteristics of the liquid to be pumped?

This is essential and in most cases the liquid is very different from water. It can have a high solids content, high viscosity, containing rags or being abrasive. The pH will also influence the lifetime of the pump.

Liquid Temperature?

High liquid temperature, up to 80-90°, is normally not a problem for a dry mounted pump. A submersible pump has a max. liquid temperature of 50°C, since the pump motor relies on the surrounding liquid for cooling.

> Pump Capacity?

The required capacity of the pump is usually determined by the flow and the head, derived from water-based pump curves. A Landia pump normally pumps higher viscosity liquids, and so compensation must be applied.



A Complete Pump Range

In Short

Motor sizes from 0.75 - 37 kW

Pump sizes: 50 mm, 65 mm, 80 mm, 105 mm or 150 mm

Capacity: up to 475 m³/h Head: up to 50 m

Standard: hardened steel knife system at pump inlet

MOC: cast iron EN-GJL-250

Option: hardened cast iron EN-GJS-700 – for abrasive applications

Option: AISI 316 - for acidic applications Horizontal or vertical installation

Available with Ex motor Available with IE3 motor



Model DG-I

In addition to the complete submersible pump installation with coupling flange in vertical installation, we are also able to supply pumps for horizontal installation or with an adapter for existing installations.

Chopper Pump for Dry Installation

Model MPTK-I

Heavy duty pump with a compact design that can be used for new or existing applications. Horizontal or vertical installation.

The Gator Series

The EradiGator is a highly efficient chopper pump, which is designed for pumping, mixing and chopping heavily contaminated wastewater.

All EradiGator pumps are equipped with a knife system at the inlet to the pump, which ensures non-clog operation under conditions in which many other pumps have to give up.

The EradiGator is typically used in lift stations where existing wastewater pumps face clogging problems due to wet wipes, oil, fats and grease. The EradiGator mixes by means of recirculation and breaks up the solids in the lift station to ensure hassle-free operation of existing lift station pumps.

An AeriGator solution is also available for simultaneous mixing and aeration – perfect for lift stations with odour issues.









Food, Fat and Wet Wipes

People put all sorts of things beside human waste and toilet paper down the drains. This creates problems for the sewage pumps in terms of blockages with time consuming and costly maintenance as a result. Food fat and wet wipes are the primary sewer abuse offenders.

Several clients in England and Germany had problems with existing sewage pumps. After every rainfall, textile toilet articles such as wet wipes clogged the pumps, resulting in unexpected maintenance and increased costs.

Landia chopper pumps have - whether submersible or dry installed - solved the problems with significantly reduced costs as a result.



Severn Trent's Minworth STW, UK

With a £60M investment aimed at producing 30% more green energy from its largest sewage treatment works, Severn Trent's upgrade of its twelve anaerobic digesters has put people and equipment to the ultimate test – including the Landia Chopper Pump.

In seeking to reach a target by 2020 of 50% for all the energy it uses as a business from renewables, Severn Trent brought in the trusted services of framework partners MWH Treatment to design and construct a 3-stream thermal hydrolysis plant (THP) using Cambi technology.

For many years at Minworth, sludge was moved from holding tanks to digesters (for around 15 days retention time), then to secondary digesters, before going on to be dewatered. As Richard Thomson, Project Director at MWH Treatment explains, upgrading to Cambi's advanced digestion process also meant sourcing pumps that were capable of such a demanding duty point.

"We knew that especially for the first few months, taking legacy sludge directly (from the 12 digesters, all the way back through to the hydrolysis plant, would see the pumps face an arduous duty. Landia was the only chopper pump-that could achieve what we needed".

He added: "Since going on-line – four pumps at a time – one on each digester, they've been very good operationally, especially having to work under such duress for those first 3 months".

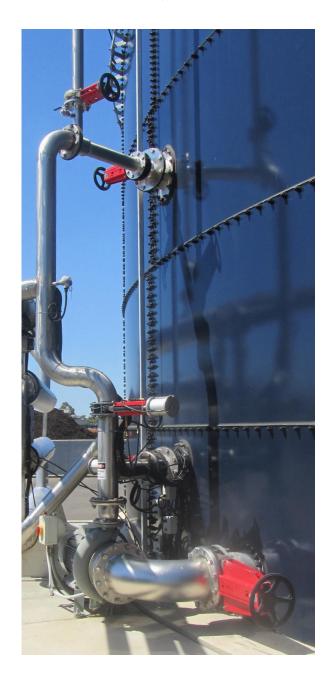
"We've been able to see the trending data on the pumps' performance, including current, flows, head - demonstrating just how hard the duty was in those first three months. As the sludge has gradually improved, so has the efficiency of the pumps, with less rags meaning far less energy required".

Landia GasMix Digester Mixing System

- a unique mixing system for anaerobic digesters

Landia GasMix is the ideal mixing solution for anaerobic digesters. Most importantly it is all externally mounted with no rotating equipment inside the digester. The entire system, including the nozzles, is mounted on the outside of the digester. Landia GasMix is hence the only digester mixing system where the digester never has to be opened for service or repair of the mixing system. This advantage also leads to significantly improved Health and Safety conditions.

Landia GasMix is applicable for most types of digesters and is suitable for a wide variety of slugdes with a TS concentration of up to 12%.





Landia GasMix

- how it works

When the GasMix Chopper Pump is operating, sludge from the bottom of the digester is drawn into the pump where solids are chopped before being discharged and pumped back into the digester. This accelerates the digestion process and prevents clogging of pipes and nozzles.

In the first stage of the mixing process, the sludge is injected into the upper half of the tank while biogas is aspirated from the top of the tank and mixed into the sludge.

In the second stage of the mixing process, the sludge is injected into the lower half of the tank causing powerful mixing of the tank contents.

Depending on the type and size of the digester there might be a third stage where the sludge is injected into the very upper part of the digester preventing solids from building up a layer of crust on the surface.

Unique Advantages

- Improved sludge reduction
- Sludge concentrations up to 12%
- No crust on liquid surface
- Genuine external mixing system

Process benefits

More biogas – University Research* proves up to 11% higher biogas production compared to traditional mixing due to enhanced cell destruction and viscosity reduction.

Cost benefits

No need for hatches, platforms, ladders and structural support for mixers. No downtime – no loss of biogas production during servicing.

Health & Safety benefits

No working at height – no restrictive breathing apparatus required.



Cost benefits

No need for hatches, platforms, ladders and structural support for mixers.

No downtime – no loss of biogas production during servicing.

A Complete System - guaranteed

A key part of each Landia GasMix system is the pipework that connects all the components in accordance with the designer's specification.

Landia is responsible for the pipe design - this is one less thing for the busy project manager to consider, saving time and money!

- Ocustomized for each individual project
- Optional modular, no-weld pipe system available
- Flow-optimized design
- Extra thickness for increased lifetime
- Available in both stainless and mild steel
- Omplete delivery and assembly including start-up





Process benefits

Improved sludge reduction – University research* proves higher biogas production due to enhanced cell destruction and viscosity reduction. This in the end results in improved sludge reduction compared to traditional mixing.



^{*}For a copy of The University Report, please contact Landia

Recommended

- by satisfied customers



Bellozanne STW, Jersey

Design Parameters

Digester diameter: 12.75 m
Digester height (total): 13.8 m
Volume: 1,700 m³
Substrate characteristics: sludge from

wastewater

TS, design: 6%
TS, nominally: 3%
No. of digesters: 3
Year: 2014

Three cast-in-situ concrete digesters each equipped with one Landia GasMix 22 kW.

"We didn't want any breaks that would interfere with our gas production. Lowest possible price wasn't our objective, not for one second. We were making decisions on what was most appropriate – for the long-term. A mixing system that could produce the most gas yet be the lowest on maintenance made perfect sense." Bob King, Senior Engineer, Jersey's Department for Infrastructure

"It is interesting that many digesters in the industry run on 2 to 2.5 % solids, when with a simple retrofit to a superior mixing system, they could increase to 4 % and see an immediate pay off."

Dave Garnett, Technical Specialist (wastewater) at Doosan Enpure.



Istanbul Organized Industrial Zone for Tanneries, Turkey

Design Parameters

Digester diameter: 22 m
Digester height (total): 19 m
Digester height (vertical): 14.5 m
Volume: 5,000 m³

Substrate characteristics: sludge from WWTP

Average TS, input: 4-6% No. of digesters: 2 Year: 2015

The digesters are glass fused to steel tanks built on top of existing concrete foundation. The vertical height of the tank is 10 m. The digester is equipped with double membrane gas holder.

Landia supplied two GasMix 30 kW for each digester with an estimated power consumption of only 15 - 20 kW/hour.

Specific benefits of GasMix compared to traditional, mechanical mixing:

- Quicker and cheaper installation, as all components are placed on the outside of the tank.
- More efficient anaerobic process and thus a quicker gas production.
- Low maintenance costs, as all mechanical and electrical components can be serviced from the outside without emptying the tank.
- No prolonged downtime, because the tank will never have to be emptied in order to inspect or service the mixing equipment.



Yeongcheon City, South Korea

Design Parameters

Digester diameter: 20 m
Digester height: 18 m
Volume: 5,000 m³
Substrate characteristics: Food waste,

agricultural waste and

municipal sludge

Dry matter content: 6-7% No. of digesters: 2

Type of tank: Glass Fused to Steel Tanks

Steel Tani

Year: 2016

For the Yeongcheon project Landia supplied two mixing systems for each digester.

Each mixer is 30 kW however designed for on/ off operation. After fine tuning the system, the mixing system now runs 24/7 due to increased biogas production.

The two digesters produce approximately 30% more biogas than expected.



Kawana STW, Australia

Design Parameters

Digester diameter: 10 m Digester height: 11.5 m Volume: 800 m³

Substrate characteristics: Waste activated

sludge

Dry matter content: 3-4%

Type of tank: Concrete tank

Year: 2010

Digester is mixed by means of one GasMix 18.5 kW designed for on/off operation. Power consumption approximately 7-8 kW/h.

Process Benefits

More biogas – improved sludge reduction Cost Benefits External installation Health & Safety benefits No working at height – no restrictive breathing apparatus required.



Health & Safety benefits

No working at height

– no restrictive breathing
apparatus required.

AirJet systems

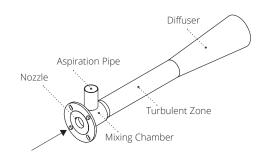
- ideal for both industrial and municipal applications

Landia AirJet provides an economical and effective approach to the aeration and mixing of wastewater. AirJet is ideal for highly polluted wastewater due to the non-clogging construction including a Landia chopper pump.

How it works

The liquid is pumped through the nozzle into the mixing chamber. Passing the nozzle, liquid velocity is increased remarkably. This creates a stable negative pressure resulting in the air being drawn through the aspiration pipe.

In the mixing chamber air and liquid are mixed thoroughly. The mixing is enhanced in the ejector's high turbulent zone after which the liquid/air mix is flushed out through the diffuser by means of the high pressure created by the pump.



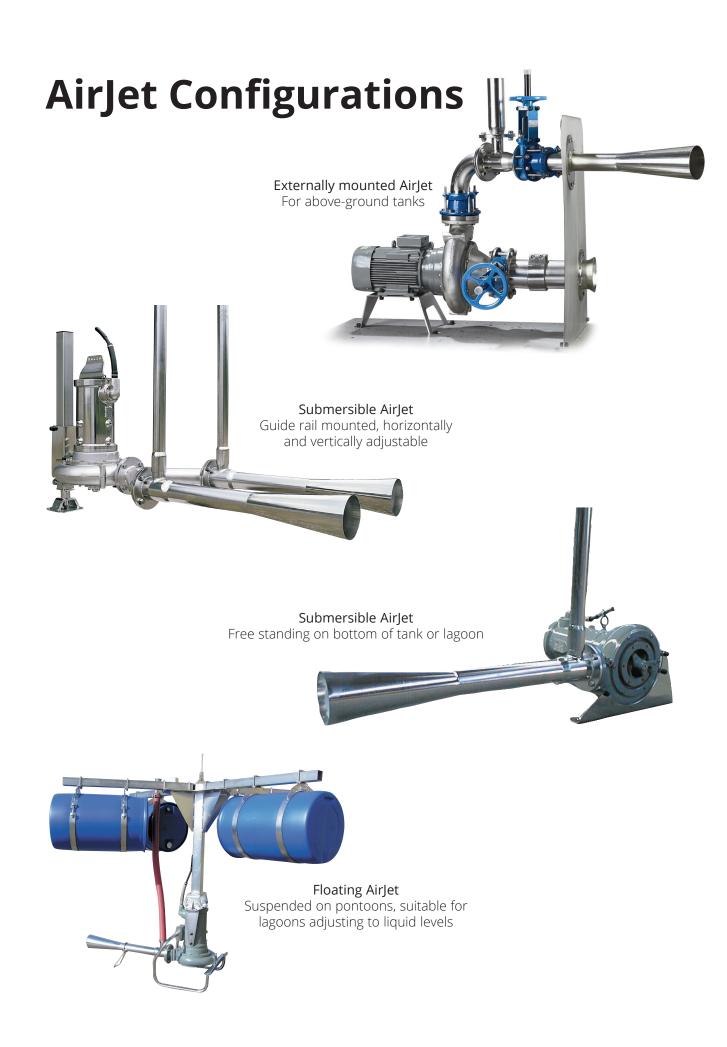


"A bonus from replacing the existing diffusor system with Landia AirJet was a 30% lowering of the energy costs" Rob Decker, Roquette America.

Photo: Roquette

Unique advantages

- Self-aspirating no need for compressed air supply
- Description Easy installation even in a full tank
- Combined aeration and mixing
- Non-clogging aeration system no cleaning of system is required
- The integrated chopper pump available in stainless steel for aggressive wastewater
- Very low maintenance costs only the pump needs to be serviced





Dairy Crest, United Kingdom

Dairy Crest, makers of some of the UK's bestloved food brands, has upgraded its wastewater treatment process by investing in a new mixing system from Landia.

Four new stainless steel AirJets, which incorporate the chopper pump that Landia invented back in 1950, have been installed in balance tanks that require thorough mixing.

Dai Williams, Project Manager at Dairy Crest, said: "As demand for our products has increased, so has the need to increase our production capacity, so it is important that we invest in top quality equipment with a long lifespan and low maintenance.

Landia's AirJet very much meets these requirements – and removes the cost of adding chemicals or using energy-intensive blowers".









Lor Halus Wetland, Singapore

Leachate Aeration and Mixing

Lagoon length: 80 m Lagoon width: 30 m Volume: 6,300 m³ Design: Inclined sides

Substrate characteristics: Leachate Liquid temperature: 25-30° C No. of lagoons: 2 / Year: 2009

A total number of 8 floating aerators and 4 floating mixers were supplied for the Lor Halus Leachate Project. Due to the aggressive characteristics of the leachate all aerators and mixers were made from AISI 316 stainless steel. The pontoon solution is ideal for lagoons where it is impossible to fasten guide rails to the tank floor.

Laita, Landernau, France

Tank diameter: 22.6 m Volume: 2,000 m³

Substrate characteristics: Storage tank for

wastewater from dairy factory Dry matter content: 2-3% Type of tank: Concrete

Year: 2015

Landia was selected as the supplier for this project due to our stainless steel pumps and the capability to supply a customized solution.

Landia was founded in 1933 and is today a modern, successful manufacturer of a comprehensive range of chopper pumps, propeller mixers and aerators, offering customised solutions and systems for difficult to handle liquids with high dry matter content, liquid biomass and other organic waste.

Our customers are involved in the conception and construction of biogas plants, municipal and industrial wastewater treatment, processing of by-products and waste from the food industry, agricultural slurry handling and much more.

We support our customers through our subsidiaries and offices in the UK, Germany, Norway, the US and China – plus a worldwide network of professional distributors.

