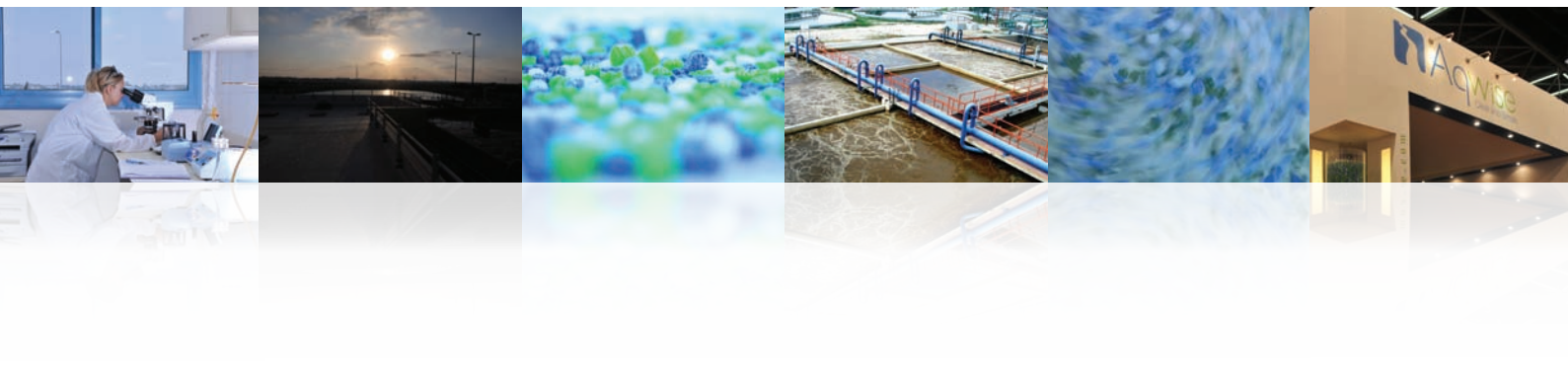


Integrated Water & Wastewater Treatment Solutions

Extending Nature's Capacity



OVERVIEW

Aqwise is a world leader in the development and implementation of innovative water and wastewater treatment solutions for diverse industrial and municipal markets. Aqwise's comprehensive solutions' portfolio is designed to increase BOD and nutrient removal capacity in wastewater treatment facilities and offer enhanced utilization of existing plants as well as unique efficiencies in the implementation of new ones.

Leveraging its significant investment in R&D and extensive field expertise, Aqwise provides its worldwide customer base with integrated tailor-made solutions.

Aqwise utilizes the AGAR® (Attached Growth Airlift Reactor) technology in various configurations, such as MBBR (Moving Bed Bio Reactor) and IFAS (Integrated Fixed Film Activated Sludge), as well as offering custom-made integrated solutions for solids separation, sludge dewatering, package plants and more.

ADDRESSING GLOBAL NEEDS

Aqwise's technology lends itself to providing operational and cost benefits for various client needs.

By using Aqwise's innovative solutions, municipalities can cope with evolving regulation, aging infrastructure and growing population. Industrial plants can meet the strictest regulatory requirements for wastewater discharge to the

environment or to municipal collection systems, and address typical challenges such as variable inflow, seasonal peaks and high organic loads. Aqwise's solutions may also facilitate additional in-plant reuse of treated effluent with up to Zero Liquid Discharge (ZLD) and efficient energy recovery opportunities.

THE AGAR® TECHNOLOGY

Aqwise's proprietary AGAR® technology is the result of more than a decade of intensive multidisciplinary research & development. Integrating Fixed Film and Suspended Growth processes, the unique AGAR® technology is considered as the 'next generation' biological wastewater treatment methodology. The AGAR® technology combines fully open and protected biomass carriers with highly efficient aeration and mixing techniques. Applying the AGAR® technology presents customers with superior effective surface area for biomass growth and optimal oxygen transfer efficiencies.

MUNICIPAL

UPGRADES

INDUSTRIAL

GREENFIELD

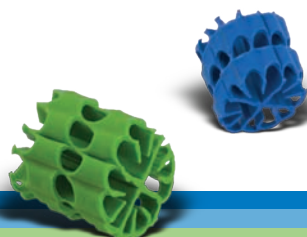


PULP & PAPER

OIL & GAS

FOOD & BEVERAGE

PHARMACEUTICALS



Wastewater Treatment

VERSATILE AGAR® CONFIGURATIONS

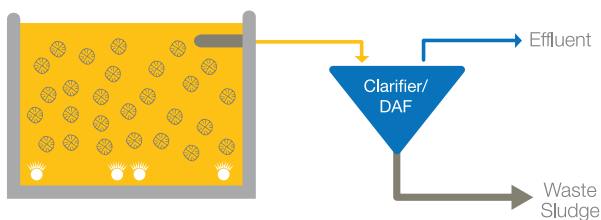
Biofilm processes utilize biofilm grown on carrier media in order to aerobically degrade soluble organic pollutants in the wastewater. These applications typically include a biological reactor filled with floating biomass carriers, a screen to prevent downstream migration of the carriers and an aeration grid. Different configurations may apply to address various scenarios.

AGAR® – MBBR

The main characteristic of Moving Bed Biological Reactor (MBBR) configurations is that there is no sludge recycle from a secondary clarifier. MBBR is essentially a simple, once-through process, where all of the biological activity takes place on the biomass carriers. MBBR is usually followed by a solids separation system such as a secondary clarifier or DAF, in order to separate bio-solids produced in the process from the final effluent.

The main advantage of MBBR is robust and simple reduction of soluble pollutants (soluble BOD or COD, NH_4^+ , etc.), with minimal process complexity, utilizing a significantly smaller footprint when compared to conventional aerobic treatment methods.

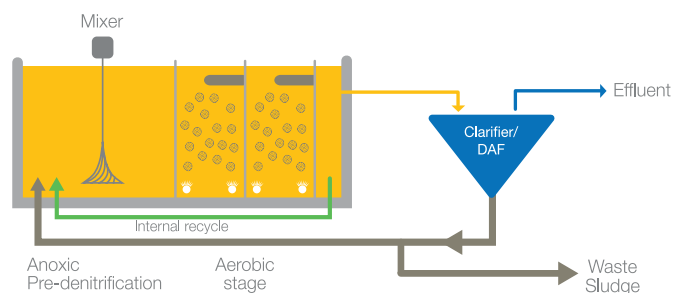
MBBR is typically used for either high load industrial applications or for robust simple-to-operate municipal facilities.



AGAR® – IFAS

The Integrated Fixed-film Activated Sludge (IFAS) process combines the advantages of conventional activated sludge with those of biofilm systems by combining the two technologies in a single reactor. Typically, an IFAS configuration will be similar to an activated sludge plant (utilizing all of the different process configurations such as MLE, UCT, Bardenpho, etc.), with biomass carriers introduced into carefully selected zones within the activated sludge process. This allows two distinct biological populations to act synergistically, with the MLSS degrading most of the organic load (BOD), and the biofilm creating a strongly nitrifying population for oxidation of the nitrogenous load (NH_4^+).

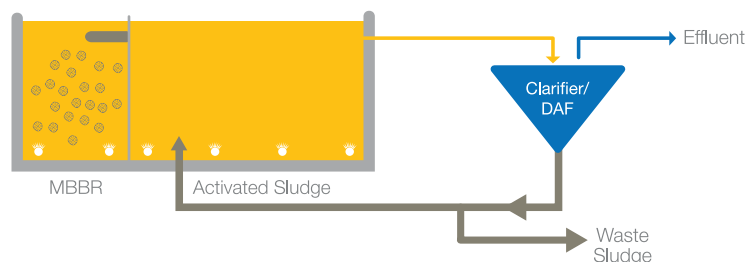
IFAS is typically used to upgrade existing plants in order to enable extensive Nitrogen removal, or in designing new plants with significantly smaller footprints for extensive BOD and Nitrogen removal.



AGAR® – MBBR FOLLOWED BY ACTIVATED SLUDGE

In this configuration, typically an MBBR will precede an activated sludge system. Unlike IFAS, where biomass carriers are introduced into the MLSS, here the wastewater is first treated in an MBBR in order to reduce the organic load, and then polished in an activated sludge system to create a high quality effluent.

The initial MBBR phase will drastically reduce the high organic load in a relatively short retention time (which translates into a small footprint), and the final reduction of pollutant levels is achieved in the following activated sludge phase. Besides offering an overall footprint reduction compared to an equivalent activated sludge system, the MBBR offers a buffer against shock loads or inhibitory substances, protecting the downstream activated sludge from process upsets.



AQWISE PORTFOLIO OF INTEGRATED SOLUTIONS

As a leading provider of biological processes, Aqwise's integrated solutions offering includes a complementing set of technologies for effective, robust, cost-efficient and small footprint end-to-end solutions.

These range from solids separation and sludge dewatering systems to comprehensive water and wastewater treatment units.

AQWISE PACKAGE PLANTS

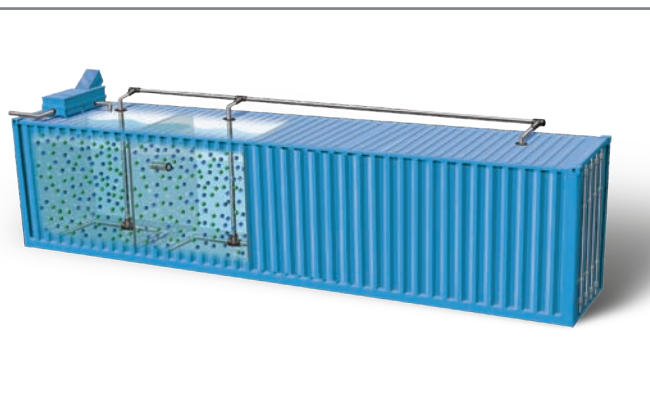
COMPREHENSIVE, COMPACT 'PLUG & PLAY' SOLUTIONS

Aqwise offers various package plant configurations to address diverse client needs, using either prefabricated elements or fully containerized units.

A standard freight container may enclose a complete wastewater treatment plant for sanitary wastewater flows of up to 200 m³/day. The unit can produce effluent quality to meet all environmental discharge requirements both in terms

of BOD and Total Nitrogen requirements. The plant is fully automated, the processes are inherently simple, leading to only minimal operator intervention required.

This unit is specifically useful for hotels and resorts in remote and secluded areas, marine Oil & Gas platforms, mining facilities, small or remote communities, industrial parks, business parks and rest areas.



	Flow (m ³ /day)	After Clarification	After Tertiary Treatment
BOD Removal	20-100	COD/BOD/TSS <125/<20/<30	COD/BOD/TSS <70/<10/<10
	40-200	<125/<20/<30	<70/<10/<10
Nutrients Removal	40-100	COD/BOD/TSS/TN <125/<20/<30/<10	COD/BOD/TSS/TN <70/<10/<10/<10

KEY AQWISE PACKAGE PLANT ADVANTAGES

- 'Plug & play' easy-to-operate solution
- Unit may be 'tailored' to particular client specifications
- Minimal footprint - Two options: up to 100 m³/day in a 20ft. container and up to 200 m³/day in a 40 ft. container
- Ability to upgrade capacity by adding parallel package plants to the same site
- Unit may be used as an interim or temporary solution, for seasonal operation (e.g. resorts and hotels affected by high and low seasons)

Integrated Solutions

SOLIDS SEPARATION

DISSOLVED AIR FLOATATION (DAF)

Dissolved Air Flotation (DAF) is a widely used method for separating solids and floatables such as oil and grease out of liquids. DAF is used extensively together with the MBBR technology in industrial applications, typically in two main configurations: Primary DAF before the MBBR, in order to remove solids and reduce the organic load to the biological system; or by applying the DAF process after the MBBR stage, in order to separate bio-solids coming out of the MBBR from the final effluent.

KEY DAF ADVANTAGES

- Small footprint – When compared to other solids separation technologies (e.g. clarifiers)
- Highly efficient solids separation
- Low operational costs - Efficient design allowing for low chemicals usages and low energy requirements
- High solids concentration – The DAF achieves 4-6% of dry solids concentration and thus eliminates the need for sludge thickening prior to dewatering
- Maximum longevity – The DAF construction materials ensure maximum durability of the DAF even under the most harsh environments (e.g. pH, salinity, corrosion)

A POWERFUL MBBR & DAF COMBINATION

The combination of DAF and MBBR is an extremely powerful one for high load industrial applications, where available space is limited: while the DAF is extremely efficient at physically removing particulate material out of the wastewater stream, MBBR is extremely efficient at biologically removing dissolved pollutants. Combining the two technologies presents a very compact, highly efficient system which addresses all the major pollutants in the wastewater - both particulate and soluble.



SLUDGE DEWATERING

THE AQWISE SLUDGE PRESS (ASP)

The compact ASP dewatering unit offers a simple, economical alternative to existing dewatering systems. The unit is based upon an innovative, simple, field-proven approach to sludge dewatering, utilizing a fully automated continuous batch-treatment system.

KEY ASP ADVANTAGES

- Minimal footprint - Self contained unit, requires small footprint and minimal site preparation
- Low energy consumption - Significant energy savings in comparison to conventional systems
- Operational simplicity - 'Plug-and-play' approach with off-the-shelf spare parts for easy maintenance
- Robustness - Simple & rugged construction suited for both indoor and outdoor operation
- Flexibility - Skid-mounted or containerized unit designed for easy transport within the plant or to remote destination- perfect for ad-hoc desludging campaigns

COST-EFFICIENT UNIT FOR DIVERSE OPERATIONAL NEEDS

The ASP dewatering system is a perfect solution for small to medium WWTPs, most industrial applications, and may complement the Aqwise package plant.

The system is capable of treating 10-60 m³/day of digested or undigested sludge with inlet concentrations as low as 0.5%, producing a dry cake of 18%-25% DS while consuming only 10-15 kWh/day.



DANA - INTEGRATING ANAEROBIC & AEROBIC PROCESSES

DYNAMIC ANAEROBIC & AEROBIC SOLUTION

The DANA solution combines anaerobic and aerobic biological processes into one in-line process.

The DANA system produces a high quality effluent at comparatively low operational costs, while avoiding the need for two parallel biological systems that would otherwise necessitate a significantly larger footprint installation and operational complexity.

Utilizing biomass carriers in both the aerobic and the anaerobic processes enables the system to operate under higher Volumetric Loading Rates (VLR) which results in significantly smaller reactors in both stages. Moreover, unlike the conventional anaerobic processes (UASB, EGSB, etc.) where a complicated and expensive 3-phase separator is required, in the DANA system the biomass is attached to the biomass carriers, making a 3-phase separator unnecessary.

THE TECHNOLOGY

The anaerobic and aerobic systems are integrated in one reactor. In both treatment steps, the active biomass is concentrated on Aqwise Biomass Carriers featuring a unique open structure with a highly protected effective surface area. Wastewater enters the system at the top of the anaerobic reactor, flowing downwards through the media. The effluent from the anaerobic stage, flowing out of the bottom, is transported upwards to the aerobic stage.

Methane gas produced in the anaerobic process accumulates in the zone between the two stages. The gas is collected and used as an energy source for producing electrical energy and other plant heating requirements.

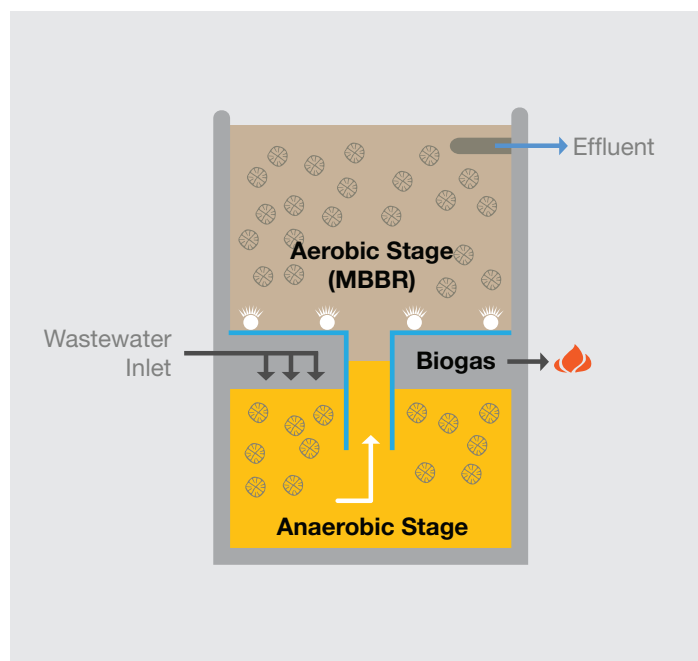
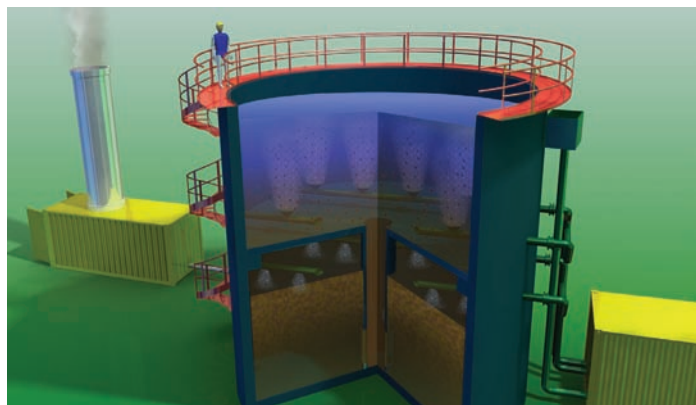
The anaerobic stage removes 80 - 85% of the organic matter, while very little sludge is created at this stage. The following aerobic stage treats the rest of the organic load to the required level. Potential odor components are also decomposed at the aerobic stage. The aerobic stage can also be used for Nitrogen removal by nitrification and denitrification processes.

The DANA system allows anaerobic and aerobic reactors to be placed one on top of the other, further simplifying the workflow and resulting in a smaller footprint.

DIVERSE APPLICATIONS

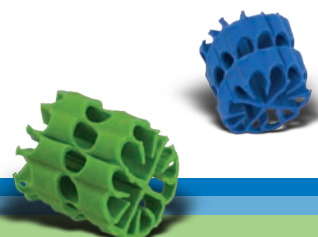
The DANA system is a perfect solution for industrial applications in sectors such as Food & Beverage, Pulp & Paper and other industrial plants processing high organic loads.

The system can either replace or upgrade existing treatment facilities, resulting in less sludge disposal and efficient biogas production for energy recovery.



KEY DANA ADVANTAGES

- Efficient COD, BOD and nutrient removal
- Treatment, operation and control in one unit
- Simple solids-liquid-gas separation
- Initial investment and operation costs are relatively small compared to other anaerobic-aerobic combinations
- Biogas production for energy recovery
- No odor problems
- Small sludge yield
- Small footprint



Process Innovation

FIELD-PROVEN SOLUTIONS

WORKING WITH OUR CUSTOMERS WORLDWIDE TO PROTECT THE ENVIRONMENT

MARINES MUNICIPAL WWTP, SPAIN In operation since 2007 (380 m³/day)

THE CHALLENGE

- Upgrade in order to comply with EU directives for effluent discharge
- Plant originally designed for removal of organic carbon only, lacking components necessary for nutrients (Nitrogen & Phosphorus) removal
- Process occasional peaks of organic load from local food industry
- Minimal down time

THE SOLUTION

- Introduce the Aqwise AGAR® technology (IFAS Configuration)
- Basin volume divided into three consecutive stages using prefabricated vertical partitions

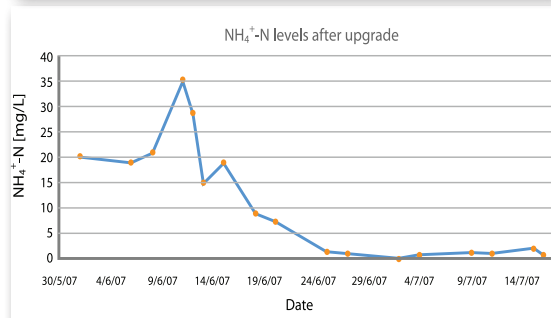
THE RESULTS

- Effluent quality complies with EU directives
- The upgrade project did not require additional reactor volume and was completed within five days

"The AGAR® system by Aqwise was deployed in just five days. It immediately reached the desired Nitrogen and Phosphorus biological removal levels, and stabilized the effluent quality below EU requirements, despite food industry discharge peaks and 20% flow over design."

Ignacio Bernácer and Francisco Martínez

Government Municipal WWTPs for the Marines Community, Valencia, Spain



AQUAMAR SEAFOOD PROCESSING PLANT, ECUADOR In operation since 2009 (1,700 m³/day)

THE CHALLENGE

- Treating wastewater with BOD levels of 1,300 mg/l and TSS of 500 mg/l
- Effluent for discharge to local stream, required quality: BOD 80 mg/l, TSS 50 mg/l

THE SOLUTION

- Screening and primary DAF unit for reduction of solids load
- MBBR and a secondary clarifier for biological treatment

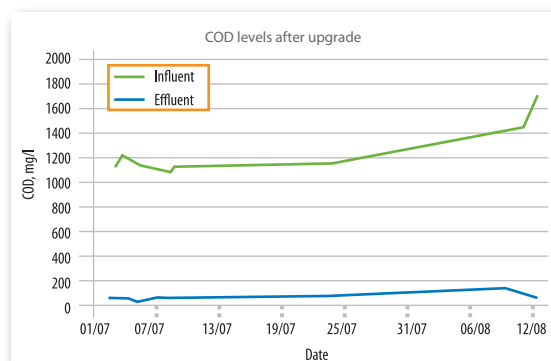
THE RESULTS

- Consistently exceeding BOD and TSS requirements

"The integrated Aqwise and World Water Works solution was deployed in record time, with minimal interruption to our operation, and provided effluent quality even beyond the specified target"

Alfonso Delfini, Manager and Owner

AQUAMAR – Quality Surimi Seafood Products, Ecuador



ABOUT AQWISE

Aqwise is a leading provider of biofilm-based biological processes designed to increase the capacity and efficiency of BOD and nutrient removal in water and wastewater treatment plants. Aqwise's innovative AGAR® technology is used worldwide for rapid, scalable and economical upgrade of existing plants as well as for new plants which require a limited footprint and process stability.

Aqwise's diverse portfolio of integrated solutions features a complementing set of technologies for effective, robust, cost efficient and small footprint end-to-end solutions. These range from solids separation and sludge dewatering systems to fully comprehensive water and wastewater treatment units and package plants.

With dozens of municipal and industrial plants successfully implemented worldwide, Aqwise project deployment methodology and wide range of services are designed to meet global clients' priorities and operational needs.

The company is headquartered in Israel and has regional offices in Latin America, as well as commercial representation in North America, Europe, the Middle East and Asia Pacific.

THE AGAR® ADVANTAGE



Cost efficient



Small footprint



Fast deployment



Scalable & simple operation



Flexible & innovative technology



Durable & stable



Intensive nitrification



Environmentally friendly



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