Providing **TOTAL** Water Management Solutions

Visit our website at www.aqua-aerobic.com to learn more about the AquaSBR® Sequencing Batch Reactor and our complete line of products and services:

**Aeration & Mixing**

**Biological Processes**

**Membranes**

**Filtration**

**Controls & Monitoring Systems**

**Aftermarket Products and Services**

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**Typical Applications**

- **Biological Nutrient Removal**
  - 1.65 MGD Avg. Daily Flow
  - Replaced flow-through activated sludge system for enhanced biological nutrient removal (EBNR) to meet Chesapeake Bay Initiative.

- **Phosphorus Removal**
  - 0.3 MGD Avg. Daily Flow
  - Utilizes the ballast decanter option with process control via the IntelliPro system.

- **Nitrification**
  - 0.075 MGD Avg. Daily Flow
  - Treating high strength dairy waste since 1991.

- **Reuse**
  - 2.7 MGD Avg. Daily Flow
  - Dissolved oxygen control optimizes power consumption
  - Process control achieves 98% removal of typical municipal wastewater’s total influent phosphorus

- **Industrial Pretreatment**
  - 0.75 MGD Avg. Daily Flow
  - Treating high strength dairy waste since 1991.

- **Retrofit**
  - 12 MGD Avg. Daily Flow
  - Replaces existing lagoons to meet today’s stringent requirements.
AquaSBR® Phases of Operation

The AquaSBR sequencing batch reactor system features time-managed operation and control of aerobic, anoxic and anaerobic processes within each reactor including equalization and clarification. The AquaSBR system utilizes five basic phases of operation to meet advanced wastewater treatment objectives. The duration of any particular phase may be based upon specific waste characteristics and/or effluent objectives.

1. **Influent Flow enters the reactor**
   - Mixing is initiated with the AquaDDM mixer to achieve complete mix of the reactor contents in the absence of aeration.
   - Anoxic conditions are created which facilitate removal of any residual dissolved oxygen (DO) via the process of denitrification.
   - In systems requiring phosphorus removal, the Mix-Fill phase is extended to create anaerobic conditions where phosphorus accumulating organisms (PAOs) release phosphorus freely ready for subsequent luxury uptake during aeration times.
   - Anaerobic conditions exist in the control of some types of filamentous organisms.

2. **React-Fill**
   - Influent flow continues under mixed and aminated conditions.
   - Intermittent aeration may promote anoxic or aerobic conditions.
   - Biological/chemical oxygen demand (BOD/COD) and ammonia nitrogen (NH₃-N) are reduced under anoxically.
   - Luxury uptake of phosphorus is produced under anoxic conditions.
   - NO₃-N is reduced under aerobic conditions.
   - Suction of aeration and mixing allow the aeration source to be turned down during low flow conditions to conserve energy while the systems flexibility allows reactivation/reattachment to be easily managed.

3. **React**
   - NO₃-N is reduced under aerobic conditions.
   - Excretion of N and mixing allow the aeration source to be turned down during low flow conditions to conserve energy while the systems flexibility allows reactivation/reattachment to be easily managed.
   - Influent flow enters the reactor.
   - Mixing and eaneration continue in the absence of influent flow.
   - Nitrification and removal of any residual dissolved oxygen (DO) via the process of denitrification.
   - CO₂ can be delivered or "as needed" base on dissolved oxygen probe while maintaining completely mixed conditions.
   - Provision of final treatment prior to settling to meet targeted effluent objectives.

4. **Settle**
   - Influent flow does not enter the reactor.
   - Mixing and aeration are terminated.
   - Ideal solids/liquid separation is achieved due to perfectly quiescent conditions.
   - Adjustable time allows slowing settling time to match prevailing process conditions.

5. **Decant/Sludge Waste**
   - Influent flow does not enter the reactor.
   - Mixing and aeration are terminated.
   - Decantable volume is removed by subsurface withdrawal.
   - Floating decanter follows the liquid level, maintaining distance between influent flow and the settling tank.
   - Small amount of sludge is wasted near the end of each cycle.
Aqua MixAir System

The Aqua MixAir system provides process advantages and lower energy consumption.

- No secondary clarifier and return sludge ejection (RAE) issue
- Capable of enhanced biological nutrient removal
- Total nitrogen (TN) ≤ 5 mg/l
- Total phosphorus (TP) ≤ 0.3 mg/l
- Hydraulic fluctuations are easily managed through the flexibility of a time-managed process operating strategy
- Low cost of ownership

Advanced Decanter

The Aqua-Aerobic floating decanter follows the liquid level, maximizing the distance between the effluent withdrawal and sludge blanket. It is an integral component to the AquaSBR system and provides reliable, dual barrier sludge withdrawal with low entrance velocities to ensure surface materials will not be drawn into the treated effluent. The electric actuated or ballast decanter option is easily accessible from the side of the basin and requires minimal maintenance.

- Influent flow is terminated creating true batch conditions
- Mixing and aeration continue in the absence of influent flow
- Biodegradable/chemical oxygen demand (BOD/COD) and ammonia nitrogen (NH₃-N) reduction continue under aeration conditions
- Oxygen can be delivered on a “as needed” basis via dissolved oxygen probes while maintaining completely mixed conditions
- Provides final treatment prior to settling to meet targeted effluent objectives

AquaSBR Phases of Operation

The AquaSBR sequencing batch reactor system features time-managed operation and control of aerobic, anoxic and anaerobic processes within each reactor including equalization and clarification. The AquaSBR system utilizes five basic phases of operation to meet advanced wastewater treatment objectives. The duration of any particular phase may be based upon specific waste characteristics and/or effluent objectives.

1. **React**
   - Influent flow enters the reactor
   - Mixing is initiated with the AquaDDM mixer to achieve complete mix of the reactor contents in the absence of aeration
   - Anoxic conditions are created which facilitate removal of any residual nitrates/nitrites (ON) via the process of denitrification
   - In systems requiring phosphorus removal, the Mix-Fill phase is extended to create anaerobic conditions where phosphorus accumulating organisms (PAOs) release phosphorus freely ready for subsequent luxury uptake during aeration times
   - Anoxic conditions assist in the control of some types of filamentous organisms

2. **Mix-Fill**
   - Influent flow continues under mixed and aerated conditions
   - Intermittent aeration may promote anoxic or aerobic conditions
   - Biodegradable/chemical oxygen demand (BOD/COD) and ammonia nitrogen (NH₃-N) are reduced under aerated conditions
   - Luxury uptake of phosphorus is produced under aerated conditions
   - NO₃-N is reduced under aerobic conditions
   - Excesses of sludge and mixing above the aeration source can be turned down during low flow conditions to conserve energy while the system’s flexibility allows de-activation/reactivation to be easily managed

3. **React**
   - Influent flow does not enter the reactor
   - Mixing and aeration are terminated
   - Ideal solids/liquid separation is achieved due to perfectly mixed conditions
   - Adjusted time values allow settling time to match prevailing process conditions

4. **Settle**
   - Influent flow does not enter the reactor
   - Mixing and aeration remain off
   - Decantable volume is removed by subsurface withdrawal
   - Floating decanter follows the liquid level, maximizing distance between the withdrawal point and the sludge blanket
   - Small amount of sludge is wasted near the end of each cycle

System Advantages

-独立的aeration和mixing with the AquaMixAir系统提供了过程优势和降低能源消耗
-没有secondary clarifier和return sludge ejection (RAE)问题
-能够实现enhanced biological nutrient removal
-总氮(TN) ≤ 5 mg/l
-总磷(TP) ≤ 0.3 mg/l
-液压波动可通过灵活的时间管理过程操作策略轻松管理
-低的运营成本

过程特点和优点

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AquaSBR® Sequencing Batch Reactor

AquaSBR®是Aqua-Aerobic Systems在序批式生物反应器技术方面30余年的领导者的延续。系统利用五个基本阶段：

1. React
   - 污水进入反应器
   - 混合通过AquaDDM搅拌器启动，在没有供气的条件下实现彻底混合
   - 厌氧条件在没有供气的条件下被创造，促进剩余氮和氨的去除
   - 厌氧条件有助于控制某些类型的丝状菌

2. Mix-Fill
   - 污水连续在混合和供气的条件下
   - 间歇供气可以促进厌氧或好氧条件
   - 可生物降解/化学需氧量(BOD/COD)和氨氮(氨氮(NH₃-N))在有供气的条件下被减少
   - 豪华富集在有供气的条件下被充分利用
   - 厌氧条件在控制某些丝状菌中发挥作用

3. React
   - 污水不进入反应器
   - 混合和供气被终止
   - 最佳固体/液体分离被实现，由于完全混合条件
   - 清算时间调整允许在匹配现有条件时的沉淀时间

4. Settle
   - 污水不进入反应器
   - 混合和供气被关闭
   - 可清算体积通过通过地表抽吸去除
   - 浮动沉降器跟随液面，最大化的表面距离
   - 用于去除污泥的最小量

5. Decant/Sludge Waste
   - 污水不进入反应器
   - 混合和供气被关闭
   - 污泥通过地面抽吸去除
   - 浮动沉降器跟随液面，最大化的表面距离
   - 用于去除污泥的最小量
AquaSBR®

Typical Applications

**Biological Nutrient Removal**
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**Phosphorus Removal**
- 0.3 MGD Avg. Daily Flow
- Utilizes the ballast decanter option with process control via the IntelliPro system.

**Nitrification**
- 0.075 MGD Avg. Daily Flow
- Treating high strength dairy waste since 1991.

**Reuse**
- 2.0 MGD Avg. Daily Flow
- 3-basin system followed by 2 (2) AquaDisk® cloth media filters supplies reuse water to the nearby U.S. Army base for irrigation and cooling water.

**Industrial Pretreatment**
- 0.75 MGD Avg. Daily Flow
- Treating high strength dairy waste since 1991.

**Retrofit**
- 12 MGD Avg. Daily Flow
- Replaces retrofit case existing lagoons to meet today’s stringent requirements.

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AquaSBR®

Typical Applications

**Phosphorus Removal**
- 2.7 MGD Avg. Daily Flow
- Dissolved oxygen control optimizes power consumption.
- Process control achieves 85% removal of typical municipal wastewater’s base influent phosphorus.

**Nitrification**
- 0.75 MGD Avg. Daily Flow
- Treating high strength dairy waste since 1991.

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- 0.3 MGD Avg. Daily Flow
- Utilizes the ballast decanter option with process control via the IntelliPro system.

**Nitrification**
- 0.075 MGD Avg. Daily Flow
- Treating high strength dairy waste since 1991.

**Reuse**
- 2.0 MGD Avg. Daily Flow
- 3-basin system followed by (2) AquaDisk® cloth media filters supplies reuse water to the nearby U.S. Army base for irrigation and cooling water.

**Industrial Pretreatment**
- 375 MGD Avg. Daily Flow
- Treating high strength dairy waste since 1981.

**Retrofit**
- 2.0 MGD Avg. Daily Flow
- 3-basin system followed by (2) AquaDisk® cloth media filters supplies reuse water to the nearby U.S. Army base for irrigation and cooling water.