

## PrO2 Series Super-Oxygenation System

The PrO2 Series is a proprietary gasification system, developed and manufactured in the US. The system injects controlled levels of dissolved oxygen (DO) at extremely low operating costs. The unit uses a small slip stream from a clear water source, supersaturates it with oxygen, and utilizes precision applicators to reintroduce oxygenated fluid back into the targeted waste stream. This supersaturated oxygen discharge cures a wide variety of environmental issues from odor control, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), anaerobic conditions and more. Also, the pressure in the process causes a stirring effect which allows it to instantly mix with the water body and rapidly raise the levels of DO. Standard aeration systems cannot come close to these results.

The PrO2 utilizes “cutting edge” nano-technology to accelerate the natural cleansing systems that improve the environment. The electro-mechanical properties of the nano-bubbles create a dense separation allowing clear water to be decanted from the process while the DO works to remediate/consume the organic material in the waste. The PrO2 provides the technology required to lower cost and improve the effectiveness of wastewater treatment. It does this by enhancing the natural process of biodegradation through the delivery of large quantities of concentrated oxygen where it is needed – when it is needed.

The PrO2 Series treatment system efficiently delivers extremely large amounts of dissolved oxygen into waste matter with up to 96% oxygen transfer efficiency. As a result, the oxygen rich environment will accelerate the natural breakdown of organic matter while creating and preserving an odor free environment.



## **How the PrO2 Works!**

Our waterways utilize aerobic and anaerobic organisms to naturally clean themselves. The aerobic organisms feed on organic matter and O<sub>2</sub>; the byproducts of aerobic organisms are H<sub>2</sub>O and CO<sub>2</sub>. The anaerobic organisms feed on the decaying organic matter and their byproducts are H<sub>2</sub>O and O<sub>2</sub>. The colonies of organisms will multiply doubling in size every twenty minutes until they have depleted either of their food sources. Once the organisms consume the waste they render themselves harmless. PrO<sub>2</sub> scientifically introduces super-saturated oxygenated fluid into a stressed environment to “wake up” and accelerate the dormant organisms. This process allows for the organisms to continue consuming the waste material that has been building up. The PrO<sub>2</sub> gives the technician the ability to deliver and manage sufficient oxygen levels in their system for the organisms to consume up to 95% of organic waste, with an energy efficient system that drastically reduces conventional aeration costs by up to 75%. It also can treat multiple issues at once by introducing simultaneous delivery zones for differing DO demands.

The PrO<sub>2</sub> System is an efficient and economical way to increase oxygen delivery into the treatment process. The particulate in the influent is filtered down to 100 microns with an integrated Micro-Filtration System, which includes an automated backwash. The filtered influent is then sent to the PrO<sub>2</sub>, which mixes the oxygen and influent into an emulsion that contains “never-seen-before” high levels of dissolved oxygen. This emulsion is then sent through independent zones and injected into the waste material being treated.

## **What Differentiates the PrO2**

The PrO<sub>2</sub> is the most productive and efficient oxygen delivery device in the marketplace (measure as pounds of oxygen delivered per kilowatt). This efficiency is further leveraged by the extraordinary control offered by the PrO<sub>2</sub> custom control system. Stated simply, with a 96% oxygen transfer efficiency, dissolved oxygen is delivered when and where it is needed in the body of wastewater.

Typically in most biological processes, oxygen is delivered to a wastewater process with little or no control, creating enormous inefficiencies. With the PrO<sub>2</sub> an oxygen emulsion is generated and delivered into the wastewater as scheduled by the operator. While operating under Dissolved Oxygen (DO) control mode, when the DO falls below a preset low level target, PrO<sub>2</sub> delivers oxygen until the

DO reaches the preset target. Because oxygen is only delivered when demanded, no oxygen is wasted.

Equally important, the operator can monitor the biological activity by monitoring the oxygen consumption. The frequency with which the system demands additional oxygen relates directly to the consumption (BOD). If the oxygen consumption is reduced, the operator knows that either the BOD load has been reduced or that the biological process has been inhibited. This allows the operator to make proactive decisions BEFORE the resulting effluent is affected.

### **Other PrO2 Advantages**

All PrO2 units have the ability to be remotely operated or monitored when a customer purchases the modem option or installs the machine to their network. Remote control is obtained through the use of smart phones, mobile devices and PC's through an IP address specific to that machine. All communication must pass through a secure network where password protection is created and administered by the end-user.

The PrO2 System has many possible configurations available dependent on the site needs, including options for permanent as well as temporary installations. Because of the compact size of each system, a mobile "trailed" package is available.

The zones have multiple configurations, and can be set individually to prioritize the operation.

- It is possible to treat up to four different tanks with one PrO2.
- Zones can be set to run by batch, timed, or metered.

The PrO2 System monitors all conditions, giving warnings, alarms, and ultimately shutting down to protect it from any harmful conditions. It can also utilize its automated purging system to flush lines with oxygen on shutdown. This helps to prevent the lines from winter temperatures when it is not in use and ease of zone maintenance.

Another advantage, of the well thought out control structure, is a technician can run the system based on dissolved oxygen demand (which is determined by sensors monitoring the process), or schedule operation based solely on time. The

numerous zones can be scheduled independently giving the customer the ability to deliver a controlled amount of oxygen exactly where and when it is needed.

## **PrO2 Primary Applications**

Although current market focus is on municipal wastewater aeration, odor management, and raw sewage lagoon remediation, the systems can be applied to serve the following applications as well:

- Aquaculture, Aquaponics, Hydroponics
- Storm Water Retention Pond Aeration
- Lake and Reservoir Restoration
- Auto and Truck Wash Water Remediation
- Bio-fuel Wastewater Separation
- Hydrocarbon Remediation
- Hydraulic Fracturing Wastewater Remediation
- Landfill Leachate Remediation
- Animal Wastewater (i.e., CAFO's)
- Food and Beverage Processing Waste

## **Community Benefits**

The impact that the PrO2 has on the community is significant. This machine has the ability to decrease the amount of taxpayer dollars that would typically be needed to operate and or upgrade traditional Waste Water Treatment Plants' infrastructures. In discussing these benefits with Jim Wonacott, Village Administrator for the Village of Blissfield, the vast capability of the PrO2 system was realized. "Our wastewater system is like many others in the state; the process itself ends with the collection of sludge. This sludge is aerated and decanted before final collection and transport to farms for 'fertilization'" explained Jim. "Prior to two years ago our village had seen the water demand increase over the previous 10 – 15 years; most of which can be attributed to the addition of the Ethanol plant." This increase produced 1.4 to 1.5 million gallons of sludge per year and was not a situation that the Village's waste system could efficiently process.

In 2012, Jim and the Village began looking over the available options to assist in solving this problem. "We had no other options; we found ourselves to the point where we were running out of storage space for the sludge, our dates for waste transportation to the farms were too far out for us to continue to store the

sludge” stated Jim. The Village was being faced with hauling 420,000 gallons of sludge to the farm; they decided they needed to make a move.

The Village arranged for a trial of the PrO2 system, and within two weeks the portable system was installed. In just a few days the PrO2 system enabled the Village to be able to aerate the sludge and decant more water from it. The system was effective to the point where the final shipment of sludge ended up being around 300,000 gallons. After seeing what the system was capable of, the Village decided to move forward with the purchase of the PrO2 and has since achieved their initial goal of a 50% reduction in sludge but Jim feels there is still room for improvement and may be able to achieve an annual 75% reduction. Currently the Village is processing around 820,000 gallons of sludge a year; a huge decrease from the 1.2 – 1.3 million gallons just a few years ago.

All information regarding the PrO2 is proprietary and the process is protected under numerous US and International patents and licenses. Greener Planet Systems is the Master Distributor of the PrO2 Series machines. For more information on the PrO2, or to inquire about distributorship and dealer opportunities please visit online at [www.greenerplanetsystems.com](http://www.greenerplanetsystems.com) or contact us by phone at (641) 275-5405.