



SuperOx Box™ - A New Age Oxygenation Solution

Technology that Delivers Efficiency & Lower Costs

From a foundation of research that began in the early 1880's concerning the oxidation of organic matter through aeration, subsequent testing in 1912 and 1913 lead to the discovery of the activated sludge process in the UK¹. In the early 1920's this general process was adopted, with a plug flow activated sludge process being the most common type used until the late 1970's. In the late 1960's industrial wastes were increasingly discharged into domestic wastewater collection systems and forced a change in the activated sludge process to a complete-mix reactor that could better handle the more toxic industrial waste. Throughout this evolution in design, the industry largely relied first upon coarse bubble diffusers followed by the introduction of fine bubble diffusers in the 1970's. Throughout the last 90 years we've basically approached the introduction of oxygen into the aeration basin in the same old way, relying on blowing ambient air where only 20.9% is the oxygen that we need. That means that almost 80% of the gases moved through this traditional blower system are not oxygen and is thereby very inefficient.

There is now a better and substantially more efficient way to oxygenate water and it is called the SuperOx Box. The SuperOx Box™ produces and delivers concentrated oxygen in water as a molecular solution - a quantum leap forward in oxygen transfer technology. In operating plants where it has been tested and installed, the SuperOx technology has reduced electricity consumption over 40% and produced a healthier plant without chemicals or other consumables.

The SuperOx Box™ creates supersaturated oxygenated water and delivers it at ambient pressure through a process of treating a stream of non-potable water delivered to the SuperOx Box™. This innovative patented and proprietary process creates a water stream ready for injection into the aeration basin with oxygen saturation levels of 400 – 1200% or more under atmospheric conditions, depending upon the application.

¹ Metcalf & Eddy, Inc.'s Wastewater Engineering, Treatment and Reuse 4th Edition

The SuperOx Box™ achieves a “Quantum Leap” in aeration technology and provides a radically new approach to aerating activated sludge.

More than 60% of the treated water flow from the SuperOx Box™ contains **molecular** oxygen “in solution” in a concentration of up to 100 mg/liter or more. Think of the benefits from being able to mix oxygen like salt or sugar into water instead of as a bubble that is constantly trying to

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escape. About 20% of the water flow of the supersaturated oxygenated water is embedded and entrained with **submicron** or **nano** size oxygen bubbles providing for a very efficient transfer of oxygen to the aerobic wastewater treatment process. The final 20% of the oxygen is delivered in a combination of fine and coarse bubbles.

Another unique aspect of this technology is that the oxygen in solution remains entrained in the water for an extended period of time adding to the system efficiency of delivering usable oxygen to the wastewater facility. For example, an open top tank test of the supersaturated oxygenated water degraded from slightly above 500% saturation to slightly below 500% saturation over a period of 4 days with a water temperature of at 85^o F and higher!

Applying the SuperOx Box™ to a wastewater treatment plant dramatically reduces the electricity needed to deliver the required quantities of oxygen for efficient waste treatment. Using a better technology to deliver oxygen means substantially less horsepower required, translating into lower power bills and improved overall plant health with less sludge, odor and an improved carbon and GHG footprint. This also provides a new tool for the wastewater industry to meet the Texas legislative mandate to reduce power consumption and thereby reducing greenhouse gas emissions. There have been successful field tests of the SuperOx Box™ completed at operating plants where electricity usage was reduced over 40% and general plant health was improved.

If you started with a blank sheet of paper and tried to determine a better solution, you would probably want a radically new answer to an old problem with the following features:

- **Oxygen efficiency** – My process needs O₂ how can I get it as efficiently as possible, but not be stuck buying the equivalent of costly razor blades every month from my liquid oxygen supplier.
- **Energy efficient** – I don't want to be wasting 80% of my energy on something that I don't need.
- **Healthier plant** – There are advertised solutions that save power costs by basically choking off oxygen to my aeration basin. That's like saying I can save money taking care of my dog, by not feeding it – it doesn't make sense. I want a solution that saves me substantial money AND doesn't force me to compromise the healthy operation of my plant.
- **Oxygen retention times** – Just because my blower is down, I don't want to immediately lose my desired DO level. Is there a way to keep my DO for a longer period of time?
- **Little or no Capital Spending** – budgets are tight, power bills are high and there is little extra capital for plant improvements – is there a solution that avoids traditional major up-front capital costs?
- **Low O&M** – I don't want to create a new headache from something I don't understand or can't maintain. My team is already stretched thin. I want to reduce my existing O&M and I want someone else to maintain the new solution.
- **Reliable** - Is the solution robust and does it rely on proven components?
- **Little or no impact to how I want to operate the plant** – I know that what I have works – can we create a solution that supplements and improves what I have?

- **Other quantifiable benefits:** I'm always looking for other benefits, like reduced biosolids, decreased odor, smaller carbon footprint, reduced GHG and, an effective increase of the existing plant capacity are among other desirable benefits that would be part of the ideal solution.

The SuperOx Box™ delivers such a solution

After successful field testing on existing plants, SuperOx Wastewater Company is now contracting with end users to install the SuperOx Box™ and deliver higher efficiency and lower costs. The SuperOx Box™ is acquired through a Service Agreement that minimizes upfront capital costs and has immediate economic benefits that allow the customer to immediately share in the savings delivered year after year, instead of waiting years and years for an investment payback.

www.superobox.com

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