



## Articles

### **INFOCUS News and Views from the Coatings Community**

#### **The Dirt on Biofiltration**

To modify a popular aphorism, one organism's pollution can be another organism's meal ticket. And if PPG has its way, a lot of hungry microbes will be eating heartily.

PPG Total Service Solutions (Troy, MI) has partnered with Bio Reaction Industries to offer the Greencell bio-oxidation system to coatings users and other manufacturers. The system can reduce VOC emissions and odors generated by the finishing process by up to 95%, PPG says. Further, the Greencell bio-oxidation system can also cut operating costs by 15 to 55% and lower capital costs by 20 to 35% compared to conventional incineration systems.

Unlike traditional incineration systems that require fuel and combustion to break down VOCs and odors, the Greencell bio-oxidation system uses benign, naturally occurring microorganisms to convert VOCs in polluted air streams to carbon dioxide and water. The process eliminates the production of hazardous combustion byproducts, such as nitrous oxide and carbon monoxide, and decreases carbon dioxide output caused by incineration.

Biofiltration systems, essentially beds of dirt containing microorganisms that eat pollution, have been around for decades. Traditionally used for controlling odor, they weren't practical for pollution abatement until recently.

"With the Greencell system, manufacturers have more flexibility in choosing coatings based on their performance, appearance or ease of application rather than their ability to meet compliance for VOC emissions," says Scott Follett, global director, PPG Total Service Solutions. The system can handle small or large airstreams with varying concentrations of VOCs and has a footprint that is comparable to traditional incineration systems.

According to Jim Berry, a consultant formerly with the EPA, "After a number of false starts, biofiltration is on the threshold of finding a market as a compliance solution for air pollution regulations."

Unlike traditional oxidizers that must operate at 1,600°F or catalytic oxidizers that operate above 600°F, the optimum operating temperature for biofiltration is 80 to 100°F—that of a warm summer day, Barry says. "What is especially important as the nation turns its attention to better control of nitrogen oxide emissions is that, unlike thermal and catalytic oxidizers, bio-oxidizers form no nitrogen oxides. They convert, or metabolize, volatile organic gases directly to carbon dioxide and water without creating any other pollution."

Previous biofiltration systems were unacceptable because they were too large, the compost beds were subject to channeling and to complete collapse of part of the bed, and filtered air was discharged directly to the atmosphere.

“Perhaps their most unacceptable characteristic was the fragile nature of the catalyst,” Barry says. “As with traditional catalysts, contamination would kill the activity of the microbe population. Their activity is proportional to their numbers, and their numbers were vulnerable to changes in either the composition or concentration of the feed system. Further, when the microbe population suffered significant loss, the time required to recover the activity of the bacterial-based catalyst system took weeks, even when concentrated volumes of microbes were injected into the compost system.”

But companies such as Bio-Reaction Industries (Tualatin, OR) have made significant progress in recent years to make these systems viable.

“The three most important parameters that determine the overall effectiveness of any bioreactor are moisture, temperature and pH,” says Jim Boswell, a senior scientist at Bio-Reaction Industries.

If the bed of biomass is too dry or too moist, treatment capacity will be lost. Temperature control is important because it affects the metabolism of the microbes, helps maintain the proper moisture and makes record keeping and compliance demonstration easier.

Recent tests at paint manufacturing and finishing facilities have been successful, resulting in lower capital expenses, significantly less operating costs and high rates of pollution removal—in excess of 95% in one case. Its just a matter of time before the technology catches on, Boswell says. “We’re trying to get the word out.”

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