

Efficient Feeding

A NEW POLYMER BLENDING AND ACTIVATION SYSTEM HELPS AN ILLINOIS TREATMENT PLANT REDUCE CHEMICAL COSTS AND IMPROVE THE SOLIDS PROCESS

By Greg Kriebel

In fall 2007, operators at the Marengo (Ill.) Wastewater Treatment Plant were experiencing challenges with the liquid-polymer feed system, a key part of the biosolids process.

The 0.9 mgd Marengo plant, serving a growing municipality of 8,000 about 60 miles northwest of Chicago, uses an oxidation ditch secondary treatment process and discharges to the Kishwaukee River. In solids processing, the material is run through a thickening centrifuge, where liquid polymer is introduced. The thickened material is then transferred to an anaerobic digester before dewatering, storage and land application.

The solids process was beginning to be compromised by the unreliability of the polymer feed system. "It was an old liquid-polymer system that was failing a lot and didn't really function very dependably, and we were afraid that it would fail completely at some point," said Steve Fiepke, then plant superintendent. "We knew we needed to look into getting a new system and upgrading the operation."

The plant solved the problem with a dynaBLEND liquid polymer blending technology supplied by Fluid Dynamics, a division of Neptune Chemical Pump Co.

"I was not familiar with the system when I got here, but it has been operating great. It delivers the polymer at either a low-flow rate or high-flow rate. It is pretty much maintenance free, it's easy to operate and troubleshoot, and, perhaps best of all, it's a workhorse."

JAY BERMAN

THE SOLUTION

In seeking a solution, Fiepke turned to LAI Ltd. of Rolling Meadows, Ill., a manufacturers' representative serving the water, wastewater and stormwater industry in parts of Illinois, Indiana and Wisconsin. The company offered to let the Marengo plant test the dynaBLEND system.

The system is designed to handle all types of liquid polymer. A nonmechanical mixing chamber provides high reliability, and the system's injection check valve allows easy disassembly and inspection.

The system has a small footprint (24 inches deep, 24 inches wide



UPPER PHOTO: Operator Tim Mack, left, and Jay Berman, superintendent of the City of Marengo Wastewater Treatment Facility, use the dynaBLEND liquid-polymer activation and blending system from Fluid Dynamics, a division of Neptune Chemical Pump Co. RIGHT PHOTO: The processed biosolids material is eventually used as fertilizer.



PHOTOS COURTESY OF FLUID DYNAMICS

and 68 inches tall), conserving space in usually crowded solids processing areas. Liquid polymer can be pumped directly into the system as needed from a storage vessel such as a 55-gallon drum, helping to reduce the risk of polymer spills.

The nonmechanical activation and blending system uses Hydro-Action technology for high-energy mixing. It operates in three stages. First, a pressure drop across a variable-orifice water-control valve produces a high-velocity waterjet (70 feet per second) that impinges on the polymer as it enters the mixing chamber. Here, the only point where high energy exists in the mixing chamber, the polymer is coiled up and is not susceptible to damage.

Second, in the concentric mixing chambers, the blended polymer recirculates multiple times for additional exposure to non-damaging turbulence, completing the blending process. The recirculation ensures that the polymer solution is present directly after the point of neat, concentrated polymer injection for a favorable activation and blending environment.

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Finally, the mixing energy naturally diminishes in the concentric chambers, while the flow path through the chambers further ensures optimum polymer performance by preventing polymer from short-circuiting the process. The three-stage process helps prevent polymer damage and gelling, reducing polymer use.

SIMPLER PROCESS

“The dynaBLEND process operated very well when we tested it,” said Fiepke. “It was much easier to set the dials for the feed rates for the dewatering or thickening processes. We also noticed a reduction in the amount of polymer we were using, so there was a monetary savings. Anytime you can save money on a chemical, that’s a plus. After a couple months of testing it, we decided to purchase it.”

That was one of Fiepke’s last major decisions at Marengo, as he left in May 2008 for a new leadership position at the nearby village of Algonquin’s 35 mgd treatment plant, which uses two dynaBLEND systems for solids dewatering and thickening.

His successor at Marengo, Jay Berman, observed, “I was not familiar with the system when I got here, but it has been operating great. It delivers the polymer at either a low-flow rate or a high-flow rate. It is pretty much maintenance free, it’s easy to operate and troubleshoot, and, perhaps best of all, it’s a workhorse.

“The condition of the sludge we’re trying to thicken or dewater makes a difference in polymer usage. There are times where we save a lot on polymer, but the dynaBLEND does the job no matter what type of sludge we’re handling.”

ABOUT THE AUTHOR

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