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Winning the War

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A rotary fan press helps a treatment plant in Virginia dewater biosolids cost-effectively, relieve capacity issues and satisfy regulators

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Sludge was winning the battle at the Front Royal (Va.) Wastewater Treatment Plant outside Washington, D.C. An outdated belt press was inefficient, producing cakes too wet to land-apply in winter or pass landfill requirements. In any case, insufficient land was under permit for land application.

Depending on a contractor to manage the biosolids was a nightmare for plant operator Tim Fristoe. The hauler took two weeks to empty the 375,000-gallon digester, and did not return for a month. The tank was too small to meet the 60-day storage requirement for land application, and the plant had no drying beds or covered storage. Regulatory officials noticed and responded.

The town planned to upgrade the facility to a membrane bioreactor (MBR) with autothermophilic aerobic digestion in 2010. Fristoe, however, needed an economical solution to last three or more years until the upgrade and comply with state regulations. A magazine article on rotary fan presses prompted him to call Prime Solution Inc. in Allegan, Mich.

Area representative Matt Winschel made the trip from Richmond in two hours. Before the visit ended, he scheduled a demonstration trailer to process sludge at the plant and promised Fristoe a loaner until his 48-inch dual-chamber Prime Solution rotary fan press was ready. The unit paid for itself in the first year and cleared up the regulatory issues.

Bottom line

In 2005, the Department of Public Works put out a bid to replace the two-meter belt press. It came back at more than \$400,000. A year later, the bid reached \$500,000. The contractor who land-applied the sludge charged \$400,000 per year. The town budget included \$400,000 to replace the belt press over two years, but no provisions for the hauler.

The Front Royal plant (design flow 4 mgd, average flow 3.3 mgd) produces 350 dry tons of aerobically digested biosolids per year. "To handle that volume, we needed the largest rotary fan press the company made," says Fristoe. "The \$220,000 we saved by hiring a waste disposal company to landfill the biosolids from that press instead of land-applying them paid for it."



The demonstration unit, a 36-inch dual-chamber rotary fan press on a trailer, ran for three days. "I was impressed with its clean, odorless operation," says Fristoe. "We didn't have water spraying all over. We had no wash water consumption issues and we did not have to treat that water. The unit was self-contained, and once we learned how to make operational adjustments, it needed little attention."



Biosolids, fed into two rectangular channels, slowly moves between two parallel revolving stainless steel filter plates. Filtrate passes through these slotted, wedge wire plates as the flocculated material advances. Dewatering continues until the material reaches a tapered restriction zone at the outlet of the press. An adjustable two-piece pneumatic restriction plate squeezes the material into the final dry cake.

In a pinch

The 48-inch dual rotary fan press was back-ordered for 12 months. Winschel, appreciating Fristoe's dilemma, sent a 36-inch dual unit on skids, enabling him to dismiss the liquid contractor. "The loaner arrived in January 2007 and didn't leave until my 48-inch press came in February 2008," says Fristoe.

The 36-inch unit is rated for 70 gpm, but Fristoe fed 40 gpm. Running it two 8-hour shifts per day kept the plant ahead of the biosolids. Some cakes were as high as 28 percent solids, but the average was 22 to 24 percent. Fristoe stored the cake in three 20-cubic-yard covered roll-off containers that were emptied twice per week.

Officials from 20 towns and as far away as Chicago came to see the 36-inch press. "The technology is so new that few have seen it in action," says Fristoe. "People spent a couple of hours with me, watching and learning. I ran the daylights out of that machine."

When the 48-inch unit arrived, Fristoe hooked up his biosolids pumps and fed 80 to 100 gpm into the press, which is rated for 140 gpm. Depending on the season, the feed material sludge varies from 1.8 to 4 percent solids. Cakes consistently average 23 to 24 percent solids.

"The numbers on the solids are phenomenal for aerobically digested sludge," says Fristoe, who processes 30,000 gallons in eight hours. "Power consumption isn't bad either. Every 100,000 gallons probably uses a 55-gallon barrel of polymer."

Simple adjustments

Unless the biosolids change, Fristoe makes all the daily adjustments within 30 minutes of starting the press. A touchscreen with icons controls the programmable automatic wash cycle and the pneumatic-operated pinch valves with magnetic flow meters that equalize flow for maximum efficiency. Other icons control gear ratios for variable speed and emergency stops of the press, water and polymer.

“Anyone can figure out the touchscreen given 45 minutes running the machine,” says Fristoe. “It’s easy to operate.” The press is shut off and cakes removed every 15 to 20 minutes.



“We dreaded shutting down the old belt press because it took an hour to restart,” says Fristoe. “This rotary fan press is like a light switch. Once I dial it in and set it up, nothing changes no matter how often I turn it off and on.”

The rotary fan press enabled Fristoe to defeat the encroaching biosolids, satisfy regulatory officials, save money and renew the plant’s operating permit. He can meet EPA and landfill regulations and is no longer haunted by the 60-day storage requirement.