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New Magna Rotor aerators from Lakeside at West Unity, Ohio, have reduced energy consumption.

Modern Challenges, Modernized Plant

UPGRADED AERATORS AND NEW HEADWORKS EQUIPMENT HELP AN OHIO CLEAN-WATER PLANT DEAL WITH HIGH AMMONIA LEVELS AND A GROWING POPULATION

By Chris French

S ince 1990, toilets in new construction projects have been required to use no more than 1.6 gallons of water per flush — a measure designed to save water.

Some newer low-flow toilets use just 1.3 gallons per flush, while some newer urinals use just half a gallon per flush, or no water at all. While successful as a water conservation measure, these changes have created some issues downstream. For example, buildings in numerous communities have unpleasant odors, as the deficiency of water released to the sewer system causes sludge to build up inside the pipes.

In the Ohio village of West Unity, 50 miles west of Toledo, the wastewater treatment plant found itself in violation from a heavy ammonia load. The village solved the problem with a major plant improvement that included upgraded aerators and new screen and grit collection system in the headworks.

LONG SERVICE

The West Unity treatment plant was designed in 1970. Treatment challenges arose in 2010 when the village began supplying water to and receiving wastewater from an Ohio Turnpike toll road service plaza close to the Michigan and Indiana state lines, where three major highways converge.

As more and more people with camper vans and RVs used the plaza's waste dump stations, restrooms and food service facilities, the low-flow toilets and urinals began triggering ammonia levels to reach all-time highs.

"It's fair to say we only had rudimentary bar screens and grit collection," says Josh Fritsch, village administrator. "But we were struggling to get enough dissolved oxygen in. We tried all sorts of things, but the oxidation ditch



rotors, installed in 1997, weren't designed for such a load and couldn't cope. It was particularly bad in the heat of the summer.

"We were also having to cope with endless rags and therefore having to perform lots of maintenance. We had reached a point where we needed an upgrade to get the plant back to meeting its consent limits."

Washing, dewatering and compacting the screenings significantly reduces volume and disposal costs.

UP WITH PERFORMANCE

The original treatment plant was equipped with cage rotor aerators (Lakeside); these were upgraded in 1997. Two decades on — to meet increasingly stringent permit limits, serve a growing population and deal with the service plaza wastewater — the village replaced those aerators with larger Magna Rotor aerators (also Lakeside).

Those high-performance rotors are designed to provide oxygen to the biomass and mix microorganisms uniformly to prevent solids from settling in the biological treatment system. They also make it possible to sustain high microorganism populations so the system can absorb variations in organic loading and shock loads.



Josh Fritsch, West Unity (Ohio) village administrator (left), with Randy Mahlman, water and wastewater treatment plant superintendent

The plant is now running so much better. And despite the new rotors being larger, we have seen a decrease in horsepower, so we are saving on power consumption."

The wide range of oxygen transfer gives plant operators maximum flexibility to match demands on the system. Oxygen enrichment efficiency is enhanced by flow-control baffles.

The plant upgrade project also included a new headworks with a Raptor microstrainer screen and SpiraGrit system (both from Lakeside) in a masonry building. In addition, the project included a new administration building, replacement of the UV disinfection equipment, flowmeters, variable-frequency drives, a SCADA system, piping upgrades and electrical work. A \$2.68 million principal forgiveness loan from the Ohio EPA State Revolving Loan Fund covered the project cost.

COST REDUCTIONS

Randy Mahlman, West Unity water and wastewater treatment plant superintendent, observes, "We wanted equipment that would stand the test of time and so insisted on highly efficient stainless steel rotors for aeration. Lakeside's oxidation ditches have a track record here that goes back more than 40 years, so we were confident that we were also investing in superior-quality engineering with the new screen and the grit collector." Well-suited for smaller treatment facilities, the Raptor microstrainer screen uses a semicircular basket with apertures from 0.04 to 0.25 inches to capture small debris that passes through coarser screens. Screenings are washed, compacted and dewatered to 40% solids as they are transported up an inclined screw for disposal. This step reduces volume by 50% and weight by 67%, significantly reducing disposal costs.

The grit system removes inorganic grit in a mechanically induced vortex environment. Rotating paddles maintain the flow velocity in the vortex chamber, keeping organics suspended while grit settles to the chamber floor before dropping into a hopper.

NOTABLE IMPROVEMENT

"The plant is now running so much better," Mahlman says. "And despite the new rotors being larger, we have seen a decrease in horsepower, so we are saving on power consumption."

Fritsch states, "Lakeside and agent Paul Matrka at Smith Environmental have worked very closely with us, helping optimize the equipment with some adjustments. We thought we would see piles and piles of rags, but the equipment washes them and compresses them efficiently, meaning we don't need a big dump container.

"Before the improvements, we might see DO levels of 0.2 mg/L, but now we're up at 1.5 mg/L and higher. We saw an immediate improvement in the plant's performance, and as a result, we now easily meet our effluent permit limits." **tpo**



The Raptor microstrainer screen (Lakeside) is well suited for smaller clean-water facilities. Share Your Ideas TPO welcomes news about interesting methods or uses of technology at your facility for future articles in the How We Do It column.

Send your ideas to editor@ tpomag.com or call 877-953-3301



FLEXIBILITY IS ONLY ONE ADVANTAGE OF OUR CLOSED LOOP REACTOR PROCESS.

We have more than 50 years of experience in oxidation ditch technology and more than 2000 installations. Lakeside's CLR process offers a variety of wastewater treatment options, including several operational modes, nitrogen and phosphorus removal, and an adaptable configuration, providing maximum flexibility with consistently high quality effluent. The CLR process is simple to operate and can be configured in several shapes, including the conventional racetrack, folded U-shape or concentric multichannel designs. Lakeside's staff delivers full service from initial concept through construction to plant operation. The result: reliable results with minimal operator attention and maintenance. When performance counts, count on the industry leader for more than 90 years!

Speak to one of our experts at 630.837.5640, email us at sales@lakeside-equipment.com, or visit www.lakeside-equipment.com for more product information.



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