

Successful Flygt 4220 mixer trial wins over hesitant utility

Wastewater treatment plant realizes significant energy savings and increased performance with adaptive mixer technology

Considered one of the best places to live in Illinois, Vernon Hills is a suburb of Chicago with a population of 26,343. Located in Lake County, the village offers residents an urban suburban mix feel and serves as a retail hub for the surrounding area.

Vernon Hills receives drinking water and wastewater services from the Lake County Public Works Department (LCPW). LCPW maintains 390 miles of sanitary sewer main, 250 miles of water main, three wastewater treatment plants, 12 water systems and other associated infrastructure.

Currently, LCPW is focused on improving the sanitary sewer system and reducing pollutants in all water sources through a sustained program to replace the aging infrastructure that collects and treats sanitary waste.

Challenge

The Vernon Hills Water Reclamation Facility (WRF) was experiencing chronic issues with its aeration basins as a result of its existing mixers. The WRF used high-speed compact mixers from a competitor, but upon installation they had required constant downtime repairs.

“The mixers repeatedly broke down, requiring us to pull and rebuild them,” said Mike Grinnell, central plant supervisor for LCPW. “It was a maintenance nightmare.”

Xylem proposed the facility switch to Flygt 4220 adaptive mixers for more reliable operation and reduced energy consumption. Because the WRF had 12 mixers and they did not want to replace all mixers with a new mixer that may not meet their needs, LCPW was hesitant to replace Vernon Hills’ existing mixers. In order to prove the mixers high efficiency and optimized mixing, Denny Weber, a district sales engineer for Xylem suggested that LCPW do a “try and buy” solution. As part of the solution, LCPW performed remote power monitoring to monitor the electric motors on the utility’s existing mixers for efficiency and power.



After a “try and buy,” Vernon Hills NCT Water Reclamation Facility is replacing all of its mixers with Flygt 4220 adaptive mixers.

CUSTOMER: Vernon Hills, Illinois

CHALLENGE: The Village of Vernon Hills encountered chronic issues with its existing mixers, which frequently broke down resulting in downtime and costly repairs.

XYLEM SOLUTION: Xylem installed Flygt adaptive mixers on a “try and buy” basis, which proved to save energy and to be trouble free. The utility ultimately purchased the mixer at the end of the trial and has plans to replace all of their mixers with Flygt 4220 adaptive mixers.

"The customer wanted to monitor its existing mixers in order to be able to compare the electric usage of the existing mixers compared to the Flygt mixer," Weber explained.

Solution

The Flygt 4220 series mixers represent a significant departure from traditional compact mixers, even though they look nearly the same, and they do the same job in about the same way (a rotating propeller creating thrust and ultimately bulk flow in the tank to be mixed). The radical part of the adaptive mixer design is that it employs an IE4 equivalent permanent magnet motor, enabling previously unobtainable motor efficiency.

Also, integrated advanced controls and power electronics in the motor allow the adjustment of thrust and energy consumption to adapt to process changes as well as providing continuous communication with the operator. The mixer basically cares for itself and it can easily be controlled remotely by operators or other systems like SCADA via ModBus.

The trial installation ran for 6 months, during which Vernon Hills WRF operated both the Flygt 4220 and the existing mixers with a Xylem remote power monitoring and analysis tool attached. Utility operators could monitor energy performance from a web-based dashboard.

At the end of the trial period, data showed the Flygt 4220 mixer used 50% less power than the utility's existing mixers. Additionally, the Flygt mixer ran during the trial period without incident and required no maintenance. Based on those results, Grinnell went to LCPW board for purchase approval.

Results

The Flygt adaptive mixers proved to be a reliable, efficient solution for the LCPW. Since installation, the mixers have performed flawlessly and frequent maintenance calls are a thing of the past.

"The results have been outstanding," Grinnell said.

As a result of the utility's initial success with the Flygt mixers, to date LCPW has ordered six more mixers with six monitoring and control panels. LCPW also has long-range plans to replace a total of 12 mixers with the Flygt adaptive mixers.

"Most importantly, the Flygt mixers work," said Grinnell. "We have seen big energy savings."



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A facility operator pulls a Flygt 4220 adaptive mixer for inspection.



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City of Globe installs innovative technology including adaptive mixers for better aeration and energy efficiency

Wastewater treatment plant upgrades replace existing aeration system, realizing better treatment and 50% savings in operating costs

Globe, Arizona is a small-town jewel located about 90 minutes east of Phoenix. Founded as a mining town in 1876, the city is located in the heart of Arizona's Tonto National Forest and surrounded by spectacular mountain vistas. Today, Globe remains an important copper mining center and ranching community.

Challenge

The existing aeration system at the Pinal Creek Wastewater Treatment Facility (WWTF) that serves the City of Globe had been in use since the 1980s. By 2019, the aging equipment had compromised flow circulation and significantly reduced treatment capabilities and energy efficiency.

"We had an old jet header system, but we lost a few of the jet headers so that handicapped the system and the circulation," said Frank Baroldy, retired facility manager.

Recognizing the need to rehab and upgrade the WWTF's existing system to improve effluent quality and facility efficiency, the Globe Public Works Department partnered with JCH, Inc. (JCH), a regional equipment provider, and Xylem.

Together, engineers at JCH and Xylem designed a new aeration system that consists of new fixed fine bubble diffuser grids, new slow-speed adaptive submersible mixers, new positive displacement blowers, and process optimization through the Sanitaire OSCAR control system.

Solution

As part of the upgrades, the city sought to replace its jet aerators to improve aeration and energy efficiency. The complete solution provided by JCH and Xylem, includes a Sanitaire Bioloop oxidation ditch that uses dedicated Flygt adaptive mixers and Sanitaire aeration to provide flexibility and energy efficiencies that traditional mechanical aeration/mixing systems can't match.



Two Flygt adaptive mixers regulate channel velocity, reduce air requirements, and keep particles in suspension.

CUSTOMER: Globe, Arizona

CHALLENGE: The City of Globe, Arizona, sought to upgrade the existing aeration system at the Pinal Creek Wastewater Treatment Facility to improve treatment, increase energy efficiency and prevent settling in the treatment tanks.

XYLEM SOLUTION: JCH, Inc. and Xylem designed and installed a complete solution, which included the Sanitaire Bioloop oxidation ditch, two Flygt adaptive mixers and the OSCAR process performance optimizer.

The Bioloop provides air from the bottom, utilizing full floor aeration coverage. The fine bubble diffusers are installed as grids along designated portions within the oxidation ditch, allowing the respective oxidation ditch to operate with simultaneous nitrification and denitrification. With the aid of the Flygt adaptive mixers, the channel velocity within the Oxidation Ditch is kept at a minimum velocity of 1 foot per second to prevent settling, without adding additional air that would be needed if used to prevent settling.

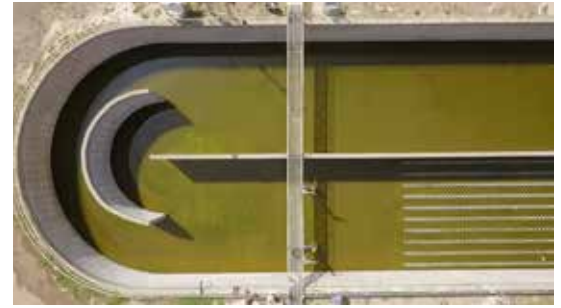
To save on costs, an existing raceway oxidation ditch built in 1986 was retrofitted to accommodate the Sanitaire Bioloop treatment solution and two adaptive mixers. When the ditch was emptied for the new system installation, crews discovered six feet of sludge at the bottom, resulting from the prior systems inability to keep the wastewater contaminants in solution.

The WWTF also installed the OSCAR process performance optimizer to continuously regulate the Bioloop oxidation ditch. The OSCAR system identifies the amount of air going into the treatment process and in response, the speed of the Flygt adaptive mixers adjusts automatically to the correct thrust needed to keep the velocity in the ditch that prevents solids settling.

Results

Since the completion of the retrofit project, the WWTF has realized a savings of over 50% in operating costs. According to current facility manager Vince Mariscal, the WWTF has seen several benefits from using the adaptive mixers, including an increase in energy efficiency and savings, less time spent maintaining the mixers and improved quality of effluent.

“In regards to energy savings, we’ve seen 50% in reduction of energy use,” said Mariscal.



An existing oxidation ditch was retrofitted with a new Sanitaire Bioloop treatment solution, including Flygt adaptive mixers.



The Pinal Creek Wastewater Treatment Facility has seen a 50% reduction in energy use since project completion.

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