

JetMix™ System Reduces Weight Watchers Wastewater Woes



To meet community wastewater discharge standards, the Weight Watchers Gourmet Food Company, a division of Heinz, implemented a complex system overhaul. The JetMix Vortex tank mixing system provided a crucial component to the project's success.

Weight Watchers Gourmet Food Company installed a 31-ft. diameter, 66,000 gallon capacity, open top, glass-lined flow retention tank as part of its upgraded effluent treatment system.

pH Issues Motivate Upgrade

In 1998, confronted with compliance issues, the Weight Watchers Gourmet Food Company's Massillon, Ohio facility needed to make significant upgrades to its wastewater discharge system.

The facility learned that the wastewater it regularly discharged into the Massillon sewer system exceeded pH levels allowed by its industrial permit. The upgrades had to be substantial, effective, and immediate. The company needed to control its pH levels or suffer the legal and financial repercussions.

One aspect vital to successful implementation was an effective tank mixing system. The food-making facility would ultimately opt for the JetMix Vortex mixing system—a good choice, it turned out, as the system proved to be energy efficient and nearly maintenance-free. Together with the other upgrades, the JetMix system helped the facility accomplish its goal of bringing pH levels down to an acceptable level.

pH Control Study

When Weight Watchers realized it had a problem, it

called upon CTI Environmental, Inc., a Massillon, OH consulting engineering company specializing in water and wastewater design. CTI first performed a wastewater pH control study that monitored the plant's discharge.

The study indeed determined that the wastewater discharged from the facility regularly exceeded the pH values allowable by its industrial wastewater discharge permit (5.0 pH to 10.0 pH). The pH levels fluctuated between 1.8 pH and 12.1 pH. Specifically, CTI monitored the wastewater discharge continuously for a 10-day period. The study concluded that the average weekday flow for the monitoring period was 0.54 MGD. Saturday flow averaged out at 0.38 MGD, while Sunday's average was 0.12 MGD.

System Requirements

CTI project manager Richard Reed investigated several alternatives and determined that achieving the desired compliance required an extensive improvement project. The proposed revisions to the plant's wastewater discharge system would have to be tied into the existing sanitary sewer discharge upstream of the flow-metering manhole.



At the Weight Watchers Gourmet Food Company's Massillon, Ohio facility, the Jet-Mix system creates a torroidal flow pattern that mixed the tank's entire contents completely in only 30 minutes.



Powerful floor-mounted nozzles efficiently mix very large volumes of liquid while chopper pumps reduce solids.

Necessary measures included pumping the flow from a submersible variable speed pump station into a flow retention tank, adjusting the pH of the liquid within the tank, overflowing the tank to a new flow-metering manhole, and discharging to the Massillon sanitary sewer system.

Obviously, the flow retention tank would play an integral part of the upgrade. The project proposal stipulated that this flow retention tank be an above-grade, open top, glass-lined bolted steel tank. This circular tank would be 31 feet in diameter, 15 feet high, with a side wall water depth of 12 feet.

Project engineers based the size of the proposed retention tank on the diurnal flow pattern for one day's wastewater output. They used results from the day that had the highest daily flow as well as the highest peak flow rate determined from a previous study.

Mixing Key to Solution

As it turned out, the key to solving the pH problem was the JetMix tank mixing system. At the design peak instantaneous flow rate of 3.25 MGD, the flow would be retained within the tank for about 30 minutes.

This retention period, it was determined, would dampen the drastic changes in the pH of the wastewater

and allow the respective chemical feed systems to control the pH to within the limits established by the City of Massillon. JetMix was the only mixing technology guaranteed by its manufacturer (Liquid Dynamics) to completely mix the tank within 30 minutes.

There were other considerations in providing the necessary retention period. The flow retention tank would have to be big enough to hold 66,000 gallons and at the future average daily flow rate of 0.81 MGD, the flow would

need to be retained inside the tank for about two hours.

The design also included a centrifugal chopper pump placed next to the tank to pump the water through the rotatable nozzles and hand cranks at the side of the tank to swivel the nozzles to optimize the energy. Tank contents would be discharged over a three-foot-wide rectangular weir placed near the top of the tank and close to the operator platform for viewing and access.

For all of this to work, there couldn't be any settlement of contents inside the tank. Settled contents result in accumulated solids—"dead areas" in the center of a tank—or chunks of sludge that rise to the surface. This could create a chemical imbalance that would negatively impact the facility's pH values and create odors. A mixing system that prevented solids from forming would be crucial to the project.

Realizing this, Reed recommended that the JetMix Vortex mixing system be employed. JetMix is a proven, high efficiency, low maintenance tank mixing system developed by Liquid Dynamics Corporation of St Charles, IL. He elected to go with the mixing system because his firm had enjoyed good success with it in other projects and other applications. Reed especially liked that the nozzles are located at the bottom near the center of the tank and can be rotated 360°. This enables operators to address unusual accumulations within the tank without having to drain it, thus saving money on maintenance.

Importantly for this application, JetMix would provide the system with the capability of continuous mixing. The resulting homogenous mix would prevent any short-circuiting. That is, it would eliminate areas of very high or very low pH levels throughout the retention tank.

Additional Benefits

Implementation of the JetMix system at the Weight Watchers plant resulted in some other important benefits. Specifically, the new system:

- Kept all solids suspended, while preventing odors.
- Helped buffer pH level changes in discharge, thus avoiding violation of permit limits and fines.



- Provided a torroidal flow pattern that mixed the tank's entire contents completely in only 30 minutes and met the spec/mix at the designed peak flow (a half-hour window) required at the Massillon facility. (In fact, JetMix is the only mixing system that could meet the spec for peak flow conditions requiring complete mixing in the tank for no more than 30 minutes. By the 15-minute mark, JetMix can mix 90% of the tank. By the 30-minute mark, it can mix 100% of the contents. Conventional mixers that require more time could not meet the 30 minute mixing requirement.)

Reverse Helical Flow Dynamic

In that unique flow pattern, a vortex is created where contents are swept from the center of the tank. With its nozzles mounted in a circular pattern, the JetMix system takes advantage of the hydraulic characteristics of circular tanks by creating an effective, "reverse helical" flow dynamic. At the same time, powerful floor-mounted nozzles efficiently mix very large volumes of liquid while chopper pumps reduce solids.

The system's floor nozzles can be adjusted to suit needs. The nozzles are aimed perpendicular to the radius of the tank, and their angle can be varied to provide complete coverage for the tank floor, enabling resuspension of solids anywhere in the tank. JetMix systems can also be equipped with an extra rotatable top mounted nozzle, which can be used to break up a tank's surface crust and to clean the walls after the tank has been emptied.

Reduced Chemical Use & Cost Savings

At the Massillon facility, the JetMix system also provided financial benefits. It reduced chemical usage and cost by virtue of its effective and efficient mixing. Any time chemicals are added (magnesium hydroxide to raise the pH and sulfuric acid to lower the pH), mixing speeds up chemical reactions. Effective mixing can reduce the amount of chemical required. Maintenance costs have been reduced, as the rotatable nozzles make it easier to clean the tank. The system also has lower energy costs. JetMix only required 15 horsepower. Conventional mixers may require as much as 20 to 25 more horsepower.

As demonstrated by the example of the Massillon Weight Watchers facility, the Jet Mix system can handle the requirements of a very specific problem—and it fits in well with any plant's general operational principles of low-maintenance and cost-efficient operation.



The right mix.

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