

Fibreglass or stainless steel impeller blades for your treatment plant's mixers?

By Water Active | 05-05-2017

At one of the largest research parks in the world, there is no shortage of expertise in weighing up whether one material is more suitable than another. With more than 200 companies and over 50,000 people skilled in fields such as micro-electronics, telecommunications, biotechnology, chemicals, pharmaceuticals and environmental services, Research Triangle Park in Durham County, North Carolina is a place where you'll find no shortage of answers to all sorts of technical questions.

At the nearby Triangle Wastewater Treatment Plant though, you'll find a pretty emphatic case for mixers with stainless steel impellers over fibreglass. Based on years of experience, this specialized plant has gradually been replacing its fibreglass-bladed mixers in favour of stainless steel.

As well as 70% of its intake being industrial wastewater, Triangle WWTP also has to handle the large fluctuations in flow from the huge 50,000 weekday workforce influx at Research Triangle Park, to just 6,000 local residents on weekends, when flows are appreciably slower.

Joseph R. Pearce, Deputy Director for Durham County's Engineering and Environmental Services Department, said: "Although our percentage intake of industrial wastewater is significantly higher than the national average, we still have to deal with all the hair and rags that despite pre-screening can cause clogging problems for any treatment plant."

Indeed. During his near 10-years at Triangle WWTP, Joe says that he and his team have laboured long and hard to keep the fibreglass-bladed mixers going.

Fibreglass blade's gel-coat front edge wears off, making them split

"We've been doing everything that we can, but the clogging, especially during a storm event became more and more frequent, having to pull the mixers up from which heavy hair mixed with plastics and cotton swabs were hanging, taking them out of service. It became normal for this to be once per month, per mixer, in some of the treatment facility mixing zones. Eventually, the fibreglass blade's gel-coat front edge wears off, making them split - and at up to almost \$20,000 per blade to replace, this was something we had to address."

Originally Built in the early 1960s and expanded in the 1970s, Triangle Wastewater Treatment Plant was upgraded in 2005 when the 6 MGD tertiary treatment facility was replaced with a 12 MGD Five Stage Enhanced Biological Nutrient Removal System that provides biological nitrogen and phosphorous removal during treatment with carbon source addition and chemical phosphorus treatment using sodium aluminate. In 2005, the mixers installed had fibreglass impellers.

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In 2013, a new sludge handling facility was constructed. This time around, with Joe Pearce at the helm, the decision was made to use mixers from Landia that have solid stainless steel impellers.

The Sludge Handling (Biosolids) Facility consists of two aerated sludge holding tanks with a capacity to hold 1,000,000 gallons, three centrifuges, and an automated truck loading station. Excess biomass flows to sludge holding tanks. The waste sludge thickens by gravity and the supernate is decanted into a side stream equalization tank.

Landia mixers and jet aerators were installed to mix and aerate the thickened sludge (1% dry solids), to ensure a uniformed sludge solids concentration and to minimize anaerobic conditions.

Polymer is added to the thickened sludge before it moved to the centrifuge where a cake sludge (20% dry solids) is produced and pumped to trailers before transport to a nearby commercial Class A composting facility for stabilization and distribution to the commercial landscape market

“In our sludge facility, we have no issues whatsoever with the Landia mixers,” added Joe. “They were very reliable, so we then retrofitted a Landia mixer into one of our problem basins to try it. After a seven-month run we had no clogging whatsoever, so one by one as the fiberglass-bladed mixers inevitably split, we’ve been replacing them with the stainless steel propeller mixers from Landia, because we fully expect fewer clogging problems and blade wear not to be an issue.”

Triangle WWTP now has a total of 15 Landia mixers, with that figure set to almost double as the gradual switch to much longer lasting

stainless steel units takes its course. In addition to anoxic and anaerobic zones, the mixers will also be installed in 18-foot deep oxidation ditches requiring propellers approximately five feet in diameter, which work at just 47rpm.

Big saving on our maintenance program

“Not surprisingly,” continued Joe, “we’ve made a big saving on our maintenance program and I’m also pleased for our team that there is now much less use of winches and crane hoists and exposure to rags because we don’t really have to do much to the Landia mixers. We’re extremely happy with our investment in a much higher quality product because improving Durham County’s facilities and improving safety is very much our mission.”

Setting standards at Triangle WWTP is nothing new. The facility’s wastewater administration building was the first to be LEED-certified (Leadership in Energy and Environmental Design). Low-energy, recycled, and regionally manufactured materials were used in its construction. The building’s wastewater is also treated and rerouted to the HVAC system and low-flow toilets. Using reclaimed water has reduced potable water use by 32%.

In addition, Triangle’s WWTP’s Recycled Water Facility consists of four turbine pumps, a hydropneumatic tank, a 500,000 gallon storage tank, instrumentation and metering, a dual disinfection system and a distribution system. Recycled water has become a valuable community asset for landscape irrigation, cooling towers, and construction activities - and in Research Triangle Park, having a redundant water supply is important for water-critical facilities, such as computer database services, pharmaceutical plants, LED manufacturing and agricultural greenhouse R&D.

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Triangle's proactive recycling certainly didn't escape Joe Pearce recently when he snapped up some 12-year-old Landia mixers from another treatment plant in North Carolina.

"Even though these mixers are over a decade old," he said, "the blades are in excellent condition. I'll gladly have these superior quality and longer lasting stainless steel units on board as back up, rather than fibreglass, which I know will break."

For more information, visit www.landia.co.uk

