

Certified Vibration Analysis

Vibration analysis identifies structural issues at the world's largest wastewater treatment plant

Background

At Blue Plains, the world's largest wastewater treatment plant, DC Water reported high vibration issues and a noticeable sway with the Chemineer™ 23GTP-15 agitator with a 61-in. RL-3 impeller. The agitator's mounting structure broke free from the concrete vessel shortly after startup. Standard calculations indicated that there should be no issues; however, the data showed otherwise.

Solutions

Our certified vibration analyst conducted modal analysis including an impact test and operational deflection shape (ODS), a vibration animation, and proved what was wrong and how to fix it on the first try.

The impact test determined that the natural frequency of the C-Channel structure decreased in a few weeks due to the loosening or weakening of the mounting bolting, which allowed the agitator to sway. It should be noted that the natural frequency was not driving the vibration at the site, but a sudden shift is indicative of a change in the stiffness of the system. The ODS confirmed issues with the structure including excessive beam deflection in the main C-Channel, across the hold down bolting of the agitator mounting plate to the C-Channel, and by the concrete bolting.

Our team recommended repairing the concrete bolting and grout and adding cross beams to stiffen the main beams.

Results

Once our recommendations were followed and a redesigned stiffer mounting structure was installed, vibration levels were much better. A second round of testing validated the operation to ensure longevity and performance for the customer. The municipality accepted our agitator and is now operating at the facility that treats, on average, about 300 million gallons of wastewater and up to 1 billion gallons per day.

Case study facts

Location: Blue Plains wastewater treatment plant in Washington, D.C.

Customer: DC Water

Timeframe: January to November 2022

Results:

- The overall vibration level dropped from 1.1 ips 0-P in the horizontal direction at 70% speed to .20 ips 0-P at 100% speed.
- Discovered and fixed the problem on the first trip. By using advanced analysis techniques, our data helped the engineering firm redesign the mounting structure. The end result was a satisfactory operating agitator in one iteration.



Installation Case Study

Summary

- **Maintenance benefits**

- Customer had to drain the basin and increase flow rate to other basins which required manual changes to the process
- Outfitting personnel for basin entry and removal of fibrous material is eliminated
- Disposal issues of fibrous material eliminated

- **Mechanical benefits**

- Increased up-time of your plant
- Reduces load on agitator system such as gears, bearings, motor, shaft, and impeller blades
- Reduced vibration and increased life of agitator

- **Process benefits**

- Increased process up-time and elimination of manual process changes
- Elimination of fibrous material on impeller maintains top to bottom flow pattern which improves solids suspension and blending uniformity in basin
- Reliable and consistent discharge within plant operating permit limits

- **Application and sales support at your disposal**

- Local sales engineers:

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