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Let's Solve Water

Case Study
Diffuser Liquid Cleaning Service

Diffuser Liquid Cleaning Saves Treatment Plant 50,000 kWh Per Year

VESZPRÉM, HUNGARY

Veszprém is one of the oldest urban areas in Hungary and is the country's 16th most populated city. Lying approximately 15 km north of Lake Balaton, the city is also the county seat of Veszprém County.

The area's wastewater is treated at a local plant with a capacity of 24,000 m^3/d and an average load of 14,000 m^3/d. Sanitaire® membrane diffusers provide the aeration in the plant's aerobic basin. Aeration can account for as much as 60% of the total energy demand of a wastewater treatment plant, so making it more efficient creates significant operational savings.

Addressing more than 10 years of build-up

One proven method for improving aeration efficiency is regular cleaning of the diffusers. In September 2021, the Veszprém wastewater treatment plant engaged Sanitaire to provide diffuser liquid cleaning service, which uses formic acid injected into the main aeration pipe to clean the diffuser membranes while they are operating. Since formic acid is an easily degradable organic acid, and is highly diluted before injection, it does not harm the basin's sludge communities.

Originally, the plan was to clean one line consisting of about 1,080 9" Sanitaire membrane diffusers. This line, referred to as Line 2, had not been touched for more than 10 years, nor had the tank been emptied during that time for regular maintenance purposes.

The liquid cleaning showed a result almost immediately, and by the end of the dosing period, the pressure had dropped by approximately 30 mbar. Readings during the cleaning process showed several early drops in operating pressure before the curve slowly leveled out over the remainder of the operation (Figure 1).

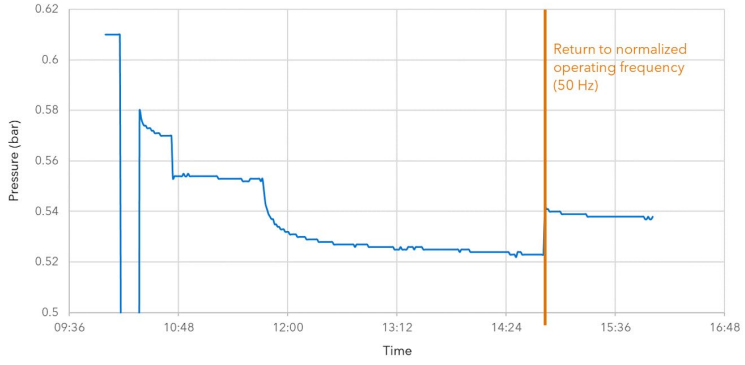

Figure 1: Operating pressure for Line 2 during the diffuser liquid cleaning process

CUSTOMER:	Veszprém Wastewater Treatment Plant
LOCATION:	Veszprém, Hungary
APPLICATION:	Wastewater treatment (municipal)
SOLUTION:	Diffuser Liquid Cleaning Service
YEAR:	2021

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To validate the results, the technicians returned the blowers from the 40 Hz frequency used during cleaning to the 50 Hz normalized operating frequency tested before the dosing. This allowed direct comparison of the pre- and post-cleaning pressure and showed a 32 mbar pressure improvement as a result of the liquid cleaning, from an average 570 mbar to approximately 538 mbar. The amount of acid consumed during the cleaning was 20 L.

Given the success with Line 2, the plant decided to proceed with diffuser liquid cleaning of Line 1, which had the same number of diffusers. The cleaning used the same amount of cleaning agent and had a similar impact (Figure 2). From 600 mbar, the pressure dropped to 572 mbar, a 28 mbar improvement.

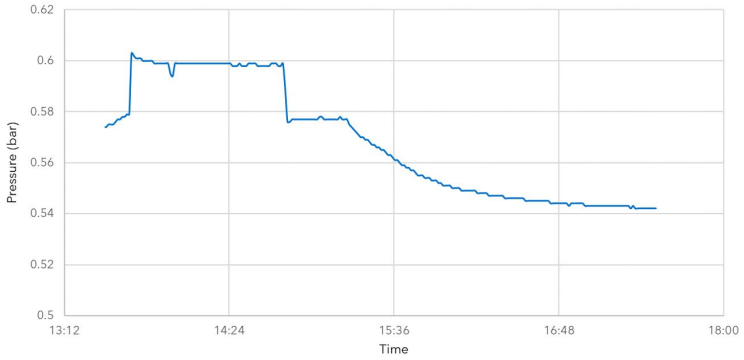

Figure 2: Operating pressure for Line 1 during the diffuser liquid cleaning process

The result: Energy and cost savings

The pressure savings translate to approximately 2 kW of energy savings per blower at maximum operating speed. Assuming the blowers run at full speed 60% of the time and at minimum speed 40% of the time, the four blowers feeding these diffusers can save a total of more than 50,000 kWh per year – which creates a significant reduction in operating costs. Moreover, with regular cleaning, the new consumption values can be maintained.

	Before Cleaning	After Cleaning	Reduction
Pressure (mbar)	600	570	30 (5%)
Blower recorded power (kW)	42.2	40.4	1.8 (4.3%)
Estimated annual energy consumption per blower (kWh)	295,738	283,123	12,615 (4.3%)

From a mobile unit at the top of the basin, cleaning agent is injected into the main air supply pipe and evenly dispersed to the diffusers with the blower air.