SULZER

CASE STUDY

Chartres wastewater treatment plant uses HST turbocompressors to boost energy efficiency

With an eye firmly on energy economy, Aqualter, the constructors and operators of the Chartres Métropole wastewater treatment plant and owners of the facility, have opted for magnetic bearing technology for the production of the compressed air required for basin aeration.

“The production of air represents a very substantial part of the site’s energy consumption. In 2018, it represented 27% of the annual total of 6.8 MWh.”

Mr Fabien Monmousseau, Sanitation operations manager at Aqualter

Launched in 2017, the Chartres Métropole conurbation wastewater treatment plant in Mainvilliers (28) has twice the capacity of the old plant at Lèves. This new installation, which today receives wastewater from the conurbation’s twelve municipalities, operates with a capacity of 160’000 population equivalents, with the possibility to be adjusted as the area develops and the potential to increase treatment capacity by a further 25%.

The plant’s equipment has been designed to limit the smell and noise nuisance as well as to allow the adaptation of energy consumption to the actual needs.

The challenge

In aeration basins, the air generation consumes the most energy. Indeed, air compressing accounts for close to a third of the entire system’s total energy consumption.

The Chartres Métropole treatment plant is separated into two parallel and identical biological treatment lines, each consisting of a succession of one anaerobic basin and two activated sludge basins, making a total of four aeration basins equipped with air diffusers.

“The production of air represents a very substantial part of the site’s energy consumption. In 2018, it represented 27% of the annual total of 6.8 MWh,” says Mr Fabien Monmousseau, Sanitation operations manager at Aqualter.

Being keen to keep energy consumption to a minimum and greatly reduce the plant’s energy bill, Mr Monmousseau turned to equipment suitable for applications which simultaneously require constant pressure and substantial variations in output.

The solution

After careful consultation, Aqualter opted for Sulzer’s offer with HST turbocompressors, which offer outstanding energy performance and a low level of noise.

“The initial project plan provided for a traditional compressor, but switching to a turbocompressor has allowed us to reduce energy consumption by 20%,” Mr Monmousseau observes.

The result is that each of the four basins at the Chartres plant has been aerated by a dedicated HST 20 turbocompressor since 2017, while a fifth unit ensures backup for any of the others.

“A performance study based on the produced airflow was conducted on each basin to optimize the machines’ settings. The result is an operating time that is slightly greater than was initially foreseen, for lower total consumption,” Mr Monmousseau adds.

The HST turbocompressor range sets the standard today for energy efficiency, thanks in particular to the high-speed permanent magnet motor, driven by a variable frequency drive and magnetic bearings which reduce the need for maintenance.

Customer benefit

- 20 % improvement in energy consumption compared to a traditional compressor.
- Wide adjustment range for air output.
- Low noise emission, with no need for extra soundproofing.
- Maintenance limited simply to air filter replacement.

The Sulzer difference

- The unit's compact size and lower weight make for easier maintenance.
- Longer equipment service life, because there is no mechanical wear.
- Reactivity of the project teams, upstream, and availability of Sulzer engineers.
- Assistance in the procedures for obtaining Energy Savings Certificates (White Certificates).

Product data
HST 20-6000-1-190 turbocompressor

- Covering a variable airflow range of 2'000 to 7'000 Nm^3/h, the HST turbocompressor features a 190 kW motor which allows for a discharge pressure between 300 and 900 mbar.
- The HST 20 turbocompressor is an entirely integrated assembly, designed for simplicity of installation and operation. The air cooling system, outlet diffuser, silencers and other components are all integrated in the machine's frame, removing the need for expensive accessories.
- The low noise level (62 dB) means there is no need for additional soundproofing.
- Thanks to its synchronous variable speed motor using permanent magnets, the HST 20 adjusts automatically to developments in requirements for higher overall energy yields.
- The magnetic bearings, which can support very heavy loads with no friction, allow for very high speeds that are impossible to attain with traditional technology.
- The HST turbocompressor features only a single moving part: a motor shaft, on which the turbine and the cooling fan are mounted.
- The active and intuitive control of the HST 20 allows for any necessary actions to be displayed on a touchscreen, and constantly records the operation data to optimize the process.

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