



Customer Success Story:
ESB Bocholt (Waste disposal and service company in Bocholt)

Market segment:
Water and wastewater

A filter to make things clear

Self-cleaning filter reduces maintenance costs and increases efficiency in wastewater treatment

Location:

Bocholt, Germany

Challenge:

Filter out coarse particles in the wastewater flow in the mechanical cleaning stage to ensure trouble-free operation of hydro-cyclones and to enable automated operation of the entire system.

Solution:

Pre-filtration of the wastewater by mechanical self-cleaning MCS-500 filter with magnetically coupled pneumatic actuation.

Result:

The self-cleaning filter reduces maintenance, enables automatic pre-filtration of the wastewater, ensures smooth operation of the hydro-cyclone unit and in this way, increases the efficiency and operational safety of the entire sewage treatment plant.

“After extensive tests and long periods of use in regular operation, our experience has been consistently positive. With the installation of the filter, we no longer have any failures in the hydro-cyclone system.”

*Andreas Wehren,
Operations Manager at the
ESB sewage treatment plant*

Background

Reducing the energy consumption of sewage treatment plants is a major challenge in achieving climate goals. To contribute to this, the waste disposal and service company Bocholt (ESB) — the operator of the central sewage treatment plant in the Mussum district — decided to optimize the system's energy efficiency, in which the wastewater from more than 70,000 homes and several commercial operations is treated. The measures not only include reducing energy consumption through highly efficient pumps and low-consumption motors, but also an innovative process to improve the existing activated sludge process: After mechanical pre-cleaning with a rake and sand trap, the new process accelerates the sedimentation of the sludge through the use of hydro-cyclones and reduces the load on the secondary clarification.

Challenge

Hydro-cyclones are centrifugal separators for liquid mixtures that separate solid particles from suspensions in a process based on centrifugal force. Thanks to this process, the sewage treatment in Bocholt is more stable and efficient. However, the innovative process has one challenge: Larger contaminants such as plastic material or leaves that happen to pass through the rakes in the mechanical pre-treatment can clog the hydro-cyclones. If several cyclones breakdown at the same time, it can lead to a shutdown of the entire plant.

To prevent unplanned downtimes as much as possible from the outset, the ESB previously used a manual basket strainer that was installed between the mechanical pre-rake and hydro-cyclones. The filter reliably removed contaminants with sizes of over 0.4 inch (9 millimeters). The disadvantage: The filter element had to be cleaned three times a day. The sewage treatment plant employees had to plan one to two hours every day for this process.

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This manual cleaning reinforced the need for a higher degree of automation at ESB. In addition, the employees came into contact with the just pre-cleaned wastewater every time. For reasons of hygiene and employee protection, ESB was therefore looking at alternatives.

Solution

The company found what it was looking for at Eaton. The Filtration Division of the energy management company has decades of expertise in filtration with a wide range of products and solutions. "In many applications, basket strainers are ideally suited for coarse filtration of the process media," says Ulrich Latz, Technical Sales Engineer in Eaton's Filtration Division, who has already installed several of his company's self-cleaning filters in customers' systems. "In our opinion, the operation in a sewage treatment plant with a very heterogeneous, debris loaded medium required a different solution," explains Latz, "especially since the filtration step should not be a bottleneck with the desired degree of automation of the entire system."

After the first few discussions with the customer, we struck upon the idea to use a filter from the MCS series from Eaton. MCS filters work on a simple but effective principle: A cylindrical stainless steel housing contains a filter element. The liquid to be filtered enters the housing, flows through the filter element from the inside to the outside and leaves the housing through the outlet. During this process, the solids are deposited on the inner surface of the filter element. Slotted wedge wire elements are used as filters in typical areas of application.

"So far, the MCS series has mainly been used in industrial processes, for example in treatment of process water and cooling water, or in the production of paper and cellulose or food and beverages," says Latz, describing the areas of application.

"For use in a municipal sewage treatment plant, it was clear from the start that we would have to replace the usual filter unit with a perforated filter element to avoid sudden filters clogging," Latz continues. In keeping with the size of the system in Bocholt and the specifications of the hydro-cyclones, he and his team decided on an MCS-500, which enables throughputs of up to 500 gallons per minute (114 cubic meters per hour), and a filter element with a perforation of 1/4 inch (6.35 millimeters).

"The highlight of the MCS series is the automatic mechanical cleaning," Latz emphasizes. The process is continuous: The differential pressure before and after the filter is measured continuously — once a certain pressure is reached, cleaning starts automatically. A cleaning disc sweeps the entire surface of the filter element and removes any accumulated dirt particles. In the same step, the accumulated dirt is directed to a collection area. When this has reached its maximum capacity, a dirt drain valve is opened and the dirt is discharged in a highly concentrated manner.

"The total travel time of the cleaning disc is only about five seconds per stroke," explains Latz. Only one to two automated cleaning processes per hour are necessary in the sewage treatment plant in Bocholt, which amounts to a few minutes every day. "Compared to the previous technology, this is already an enormous saving," Latz emphasizes. "If you also consider that the previous manual cleaning is being replaced by a fully automatic solution, the result is of course significantly better."

To use the filtration unit with automatic cleaning in this application, a considerable upgrade was necessary: The actuation for the cleaning system is a special Eaton solution. "Employing a magnetically coupled linear actuator in fluids had not yet been attempted," recalls Latz.

"We then worked with an actuation expert vendor to develop a solution that had passed extensive tests and was reliable in operation."

Result

The system displays its strengths especially when used in the sewage treatment plant in Bocholt: Without dynamic seals, the filter unit is completely leakproof and enables continuous operation without interruptions. The maintenance-friendly design also saves operating costs and simplifies routine work. "The MCS-500 is easily serviced without any special tools," explains Latz. "The filtration unit can be completely disassembled and reassembled in five minutes," he adds. During the design phase, Eaton engineers also kept ergonomics in mind: Thanks to the 45-degree incline, the filter can be dismantled without a crane. In-line filtration also enables the inlet and outlet to be at the same level, which means that there is no need for additional, cumbersome pipe work during installation.

The MCS-500 has been in use successfully in Bocholt since its installation and ensures stable process conditions, significantly lower maintenance costs and reduced contact between employees and wastewater. "After extensive tests and long periods of use in regular operation, our experience has been consistently positive," confirms Andreas Wehren, Operations Manager at the ESB sewage treatment plant. "With the installation of the filter, we no longer have any failures in the hydro-cyclone system" — a decisive prerequisite for the trouble-free and efficient operation of the entire sewage treatment process. Since the filter unit can be operated fully automatically, it was integrated into the process control system of the sewage treatment plant so that all parameters can be retrieved centrally at any time.

Wehren is particularly pleased about the seamless collaboration with the filtration experts from Eaton.

"We were very pleased with the communication between the partners, especially during the test phase," recalls Wehren, and adds: "During the transition from testing to purchasing the system, the entire process took place just as easily."

The keys to achieving the climate goals are everywhere — in industry, with consumers and in municipalities. With the energy saving upgrade of its sewage treatment plant, the city of Bocholt has taken a huge step towards assuming responsibility as a municipality and significantly reducing the ecological footprint of its service groups. The Eaton solution provides an indispensable contribution to this, with its reliable and efficient filtration solution for the pre-filtration of the wastewater.



With a quick-cleaning actuation, the **MCS-500 strainer basket filter** model reduces costly maintenance work and downtime.



In the sewage treatment plant, the fully automatic **MCS-500 strainer basket filter** replaces a manual solution that cost the operating staff several hours of work every day.

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