Pacovis wastewater treatment plant, Sassenberg (D)

Increased performance through dynamic SBR control

During the production of marinades for meat and herb mixtures, the Pacovis company in Sassenberg (D) produces wastewater with a high concentration of COD (chemical oxygen demand). In order to relieve the local sewage plant, an SBR (Sequence Batch Reactor) treatment plant was installed, which pretreats the waste water and reduces the COD concentration to below 800 mg/l before it is discharged into the public sewage system.

> «Thanks to the second opinion of STEBATEC,
> no additional storage basins had to be built.»

In a preliminary project, we calculated the possible cleaning performance of the plant based on the existing operating data and defined this as the optimisation target. The analysis showed that the blowers were not optimally controlled, which severely limited the cleaning performance.

In case of low freight load, the blower power was manually limited to reduce the number of switching operations. However, when the freight load was high, the blowers had to deliver more power again to be able to reduce the freight in the available time.

Figure 1 shows how the oxygen concentration rises and falls repeatedly during the aeration phase. If the oxygen concentration is kept constant, the biological degradation of COD becomes much more efficient. In addition, the many switching operations can have a negative effect on the service life of the blowers.

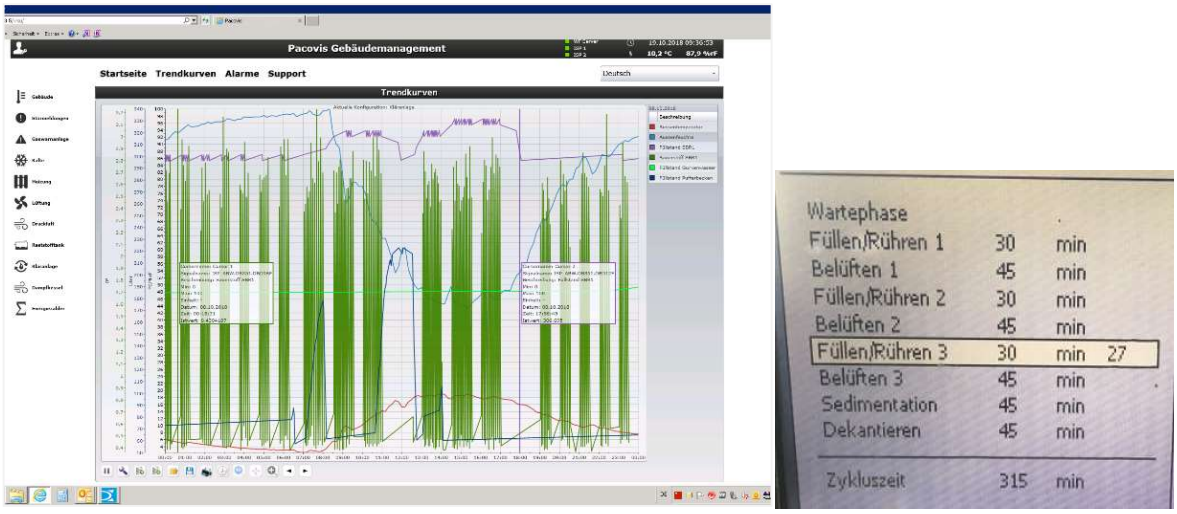

Figure 1. Trending (left) and parameterization (right) of the old controller. In the oxygen concentration (green lines) the many circuits of the blowers are clearly visible. Each time the oxygen concentration increases, the blowers are in operation; when the set point is reached, the oxygen concentration decreases, after which the blowers are switched off again. The maximum oxygen concentration is also very high (3 mg/l) and does not make sense from a process engineering point of view.

This analysis has led the company to bring more intelligence to the existing system instead of building more volume and capacity. A new dynamic control of the plant and a visualization of the data should increase the cleaning capacity, bring stability and transparency and stop the exceeding of the discharge conditions.

Figure 2. The technical staff responsible for the treatment plant. From the left: Fabian Röhrig, Ludger Hennemann and Alexander Scheller (external companions process engineering).

New PLS with dynamic control installed

Thanks to the visualization, transparency has now been created. To ensure that the cleaning process runs optimally, the control system can be parameterized. The Pacovis operating personnel responsible for the maintenance of the wastewater treatment plant can now see what is happening in the plant. The process is fully traceable, and every step can be followed.

The cycle length is now dynamically controlled according to freight and hydraulic load. If there is sufficient storage volume available, the cycle length is only determined by the COD load reduction. However, if the hydraulic load becomes too great, the system automatically switches to an accelerated program. The step lengths are minimized. The cleaning performance is maintained, however.

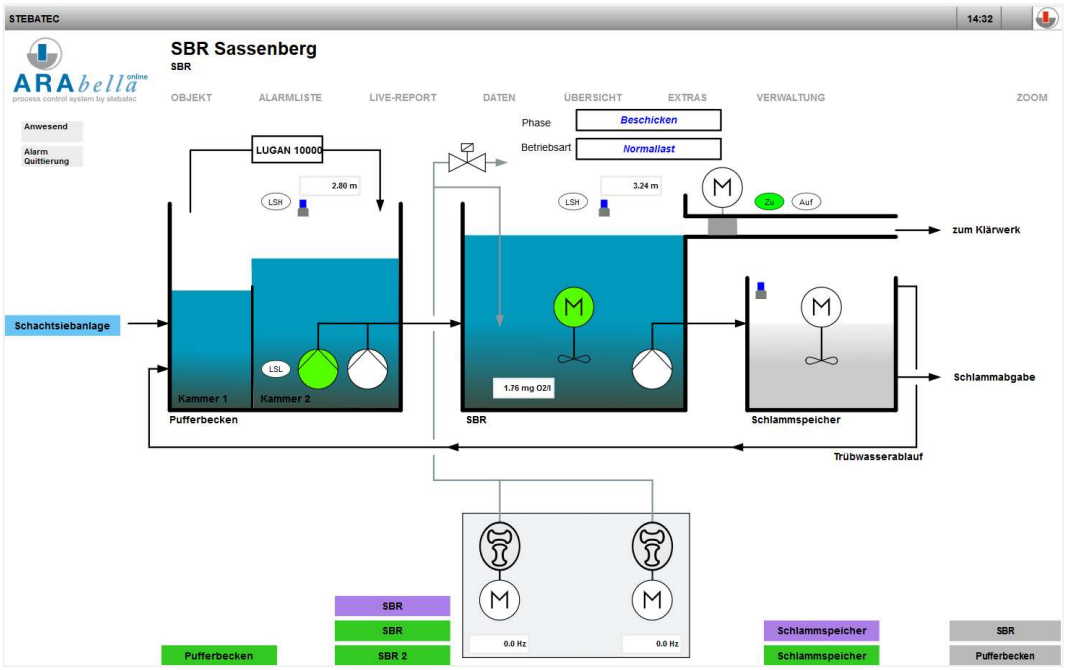

Figure 3. PLS Illustration of the SBR reactor with the storage tanks, the sludge storage and the blowers.

Figure 4. The graphs represent 3 cycles. The duration of the cycles is not the same for each cycle. The aeration phase is terminated when the oxygen concentration rises above 1.8 mg/l.

Thanks to the visualizations and the clear description of the process steps, the operating personnel has gained a lot of process engineering knowledge. They now feel comfortable in supervising the plant, the cleaning performance is stable and is completely sufficient to maintain the discharge conditions.