Effluent Control at a Fruit Juice Manufacturing Plant in Germany

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STIP Isco on-line TOC analyzer

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The importance of taking over responsibility for the control of production and in-house wastewater increases in most middle-size and large manufacturing plants because of official regulations. Any non-compliance with the concentrations fixed in the official paper for wastewater suppliers bring an immediate financial loss. The negative effect of environmental accidents is even higher than the financial loss.

Therefore, the Waldnieler Fruchsaft GmbH, a German manufacturer of fruit juce, has a biological wastewater treatment plant on its grounds. Here the wastewater coming from production is treated. A modern measuring technique is used to control the treatment plant and to avoid high effluent concentrations.

The wastewater treatment plant

In general the wastewater treatment plant of Waldnieler Fruchtsaft GmbH includes two large groundlevel basins of 300 respectively 500m^3. The smaller basin is used as staple or buffer basin. The biological treatment takes place in the larger basin. The wastewater which runs in daily is 150m^3 on average resulting in a maximum staple capacity of about two working days which is fast for a treatment plant of this kind. Because of a high volume of fruit acids the average pH value of the productional wastewater is 4. The pH value can increase to 13 during the treatment cycles in the plant. Therefore, the plant is equipped with a NaOH submission of 1m^3 for neutralization. In case of an accident there is a tank of 50m^3 that can collect wastewater.

The treatment

The production wastewater stream is pumped to a pump shaft and then pumped into the staple basin. Here a pH probe is installed which activates the automatic neutralization unit in case it is required. The pH-neutral wastewater is then pumped into the bioreactor. The wastewater purification is done in a batch procedure, i.e. the biological purification and the following separation of the treated water takes place in succession in the same basin. The bioreactor has 9 aeration panels which take in and spread 500-600 m^3 air/h via a screw-type compressor. The dissolved oxygen concentration is continuously measured in the basin. According to the value measured the oxygen supply of the aerators is controlled. The aerators are already started while the basins are being filled. Thus, right from the beginning an optimal blend of the medium and optimal contact of wastewater and micro-organisms is ensured. Having reached the maximum filling level the oxygen supply continues for another hour. Heterotrophic micro-organisms oxidize the pollutants biologically and reduce the COD value which is decisive for the wastewater outlet.

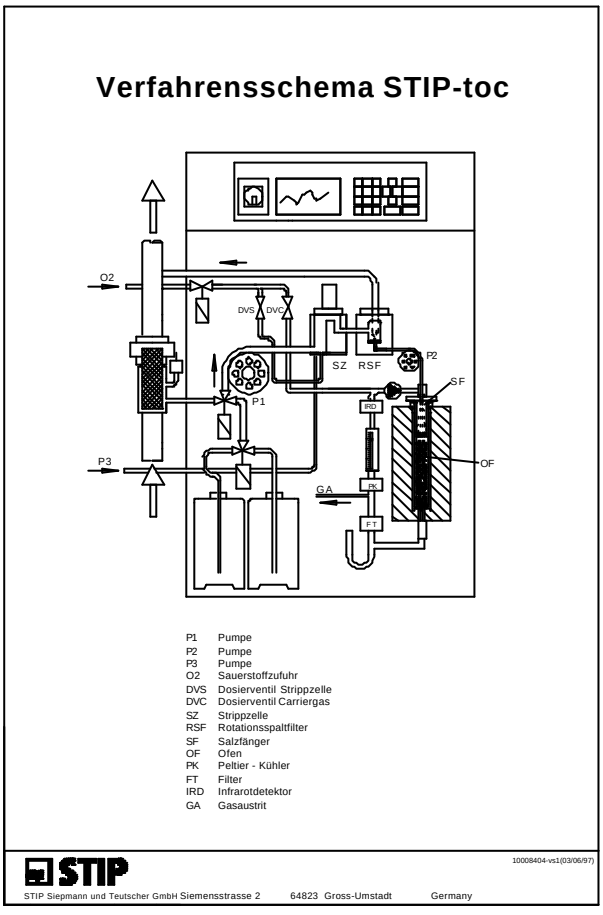
A better COD reduction could be achieved by a short-term interruption of the oxygen supply and the anaerobe situation in the basin. It is just being discussed and investigated if a stirrer should be used to avoid sludge settling during these phases.

After the aeration period the compressor is turned off and the activated sludge settled out. During the entire cleaning and subsequent settling-out process the staple basin is being filled and then used as a pattern for the following cleaning cycle.
The projecting water flows by means of the floating drain into the delivery shaft and from there into the public sewer network.

On-line COD drainage measurement monitors the discharge values

Before the cleaned wastewater can be handed over to the public sewer network an automatic final verification of the relevant parameters pH and COD is performed. For this, there is a sample pump installed at the drain of the Bio-basin which starts after the cleaning process has finished. This pump continuously takes a sample to the discharge-analyzing-ward by means of a bypass-pipeline. Here, one more pH-analysis is performed and a STIP Isco on-line COD analyzer is installed. Since the monitoring device does not have to test samples constantly it is equipped with a standby modus. It

recognizes automatically if there is wastewater in the sample bypass and if there is, it returns to operation. After a short self-test the analyzer continuously extracts a small sample quantity. It is cleaned inside the instrument, homogenized inside the maintenance-free rotational streamline filter and the water components that are to be analyzed are being oxidized thermally and-catalytically into CO_2. The formed CO_2 quantity is proportional to the COD concentration inside the sample. With the help of a regular calibration of the monitoring device the stability of the correlation CO_2/COD is checked and guaranteed by the analyzer.
The discharge of the bypass pipeline is used as a pattern and is led back into the buffer basin. This way it is guaranteed that no wastewater that does not meet the discharge quality standard is leaving the factory grounds. The analogous measuring signal of the COD analysis is transmitted to a programmable controller. Only if the analysis results show an acceptable COD value over several minutes and the pH value meets the standards, the dis charge-slider opens and the cleaned wastewater can run into the delivery shaft and from there into the public sewer network. From the public sewer network it goes into the municipal wastewater treatment plant.
If the discharge analysis shows that the discharge quality does not meet the required standard, the aeration of the basin is started and the biological cleaning process continues.

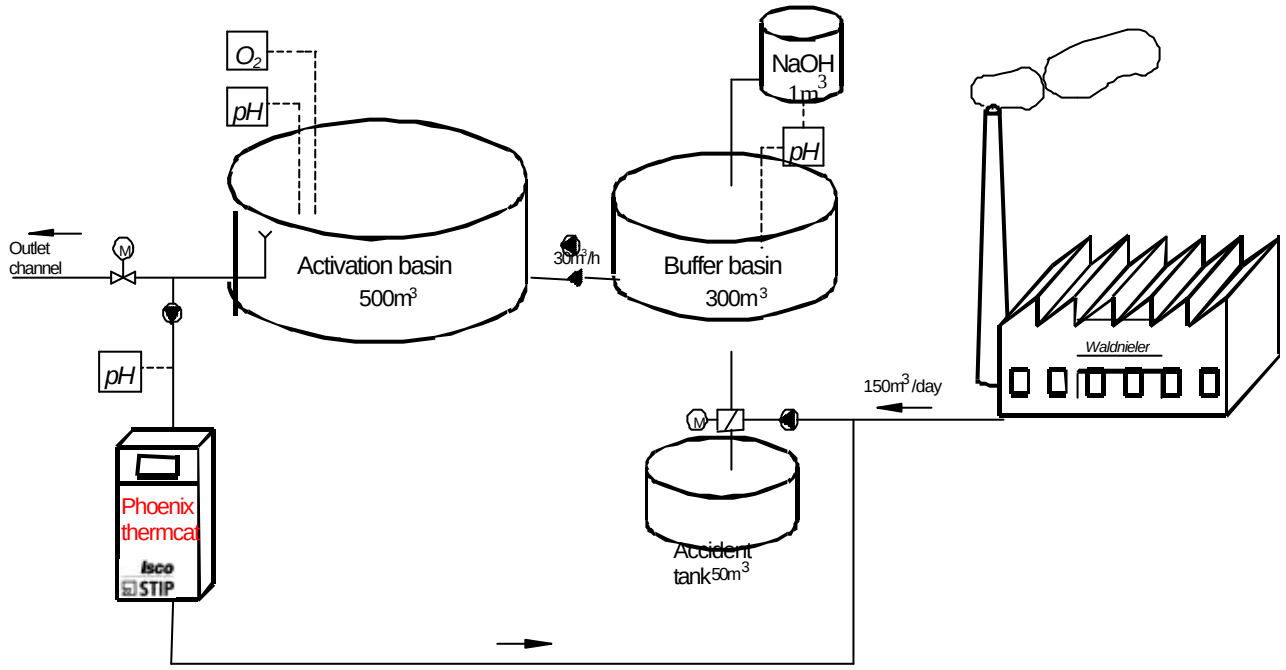


Result

The Waldnieler Fruchsaft GmbH guarantees, due to the high automation of the plant, that the discharge values always meet the given official standards. Due to the application of the STIP Isco COD analyzer the analyzing time and with it the batch time of a cleaning cycle were reduced distinctively. This has created additional capacities. In the past a sample of the cleaned wastewater had to be extracted and checked manually in the laboratory after each cleaning cycle. Now this test is completely automated. Also, storage of the data and initiation of further steps is an automated process. The plant operates largely independently from the operating personnel. Only the „damage tank“ has to be filled manually which is done by switching the pump. And this only has to be done during operational tests.

Effluent Control

at Waldnieler Fruchtsaft, Schwalmtal



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