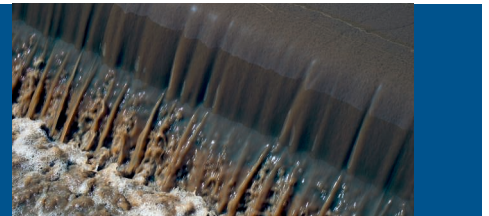




## Practice report

Application  
Burgdorf wastewater treatment plant



# Problem-free nitrogen decomposition even in the winter months

### Problem

The existing redox-based control technology was overtaxed in the cold time of year, which resulted in unstable processes and unsatisfactory decomposition rates for ammonium and total nitrogen.

### Solution

A simple-to-install real-time controller system was used in order to control the aeration on the basis of the ammonium, nitrate and oxygen concentration

### Benefits

The processes were stabilised, the decomposition capacity was improved and, at the same time, energy consumption was reduced.

## Initial situation / background



Burgdorf wastewater treatment plant

The most important driving force for the modernisation of the measurement and control technology (EMSR) carried out in April 2013 was the problems with the effluent values that particularly occurred in winter and in the transition months. The old open loop control was overtaxed under these conditions.

Within the framework of the renovation, there was the wish for aeration control on the basis of the ammonium ( $\text{NH}_4$ ) and nitrate ( $\text{NO}_3$ ) values with the possibility of direct parameterisation. In an evaluation phase, the old redox-based system and the RTC module were tested in parallel, whereby the latter was ultimately implemented for technical and price reasons.

The Burgdorf wastewater treatment plant was put into operation in the year 1973 and was modernised in 1994 to establish a 3rd cleaning stage. The plant is designed for a connected load of 35,000 PE and the total annual volume of sewage arising is 1.37 million  $\text{m}^3$ . The biological treatment of the wastewater takes place in two tanks, accompanied by intermittent aeration. Three circulation devices and four aeration rollers are used per tank. Until the installation of the RTC-N/DN module, the aeration of the aeration tanks occurred exclusively via a redox-based open loop control.

## Site / plant

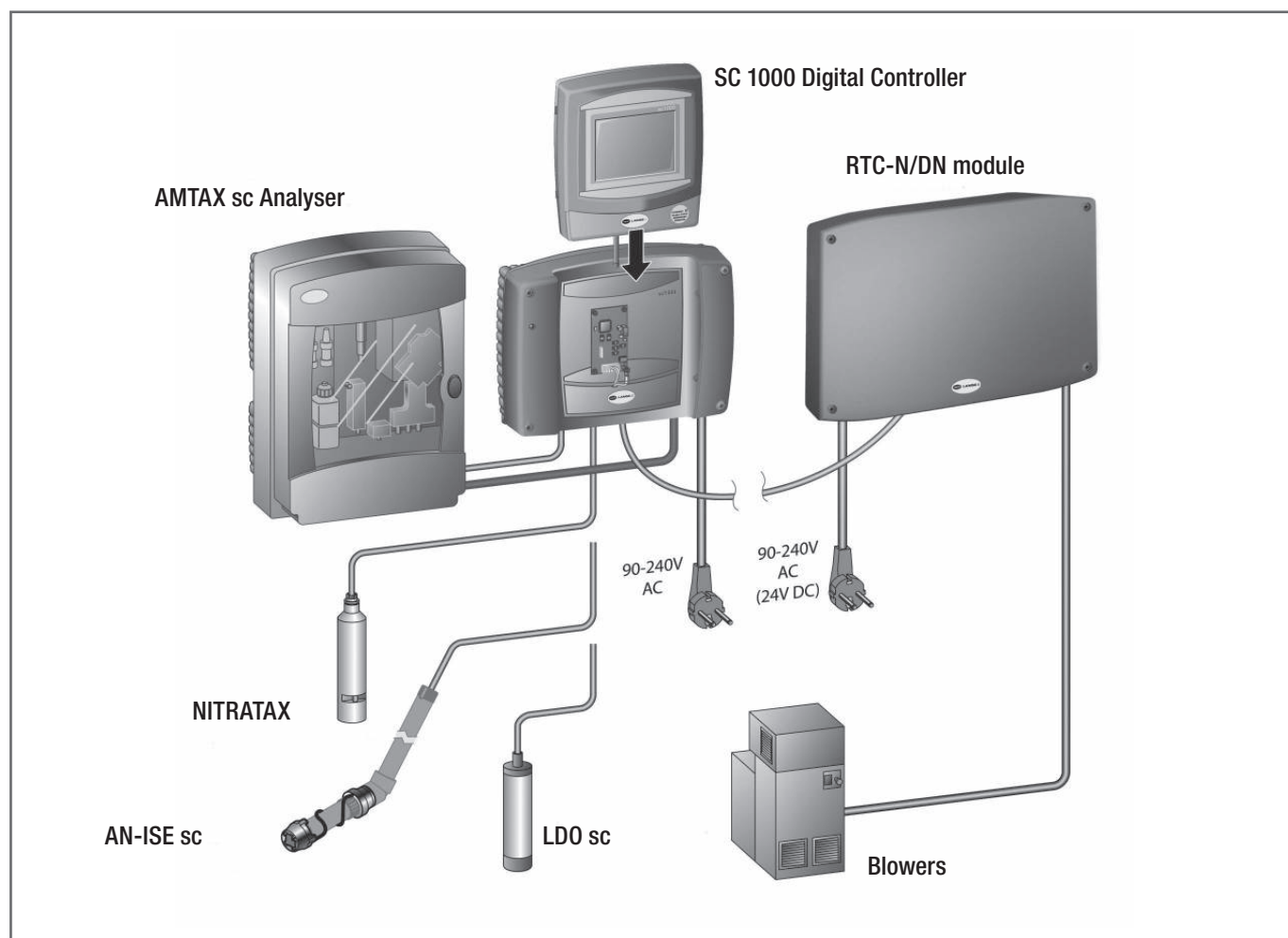
- ▶ 35,000 PE
- ▶ 1.37 million m<sup>3</sup> sewage / year
- ▶ 2 circulation tanks with intermittent aeration

## Solution

With the installation of sensors for the continual measurement of oxygen (LDO sc) and the nitrogen parameters ammonium and nitrate (AN-ISE sc) in both aeration tanks, the metrological preconditions for the closed loop control were created. The actual optimisation occurred through the integration of the RTC module to control the nitrogen decomposition. All data necessary for the closed loop control were hereby simply entered via the touch screen display of the transmitter.

The module determines the times for the aeration on the basis of the current load of ammonium. The closed loop control evaluates absolute measurement values, as well as the rise and fall rate of the concentrations. Reliable operation is ensured even in the event of a failure of all measurements.

In addition, "PROGNOSYS", software that permanently monitors and visualises the condition of the connected sensors, monitors on the transmitter. On the one hand, maintenance measures can hereby be better planned and, on the other, an impairment of the sensors, e.g. by exceptional contaminations, can be detected reliably and early enough.



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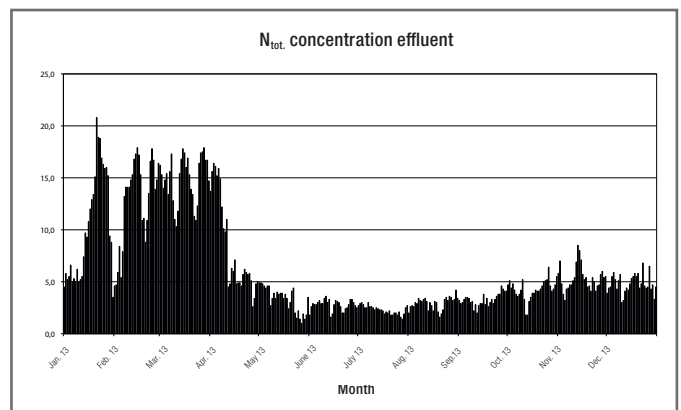
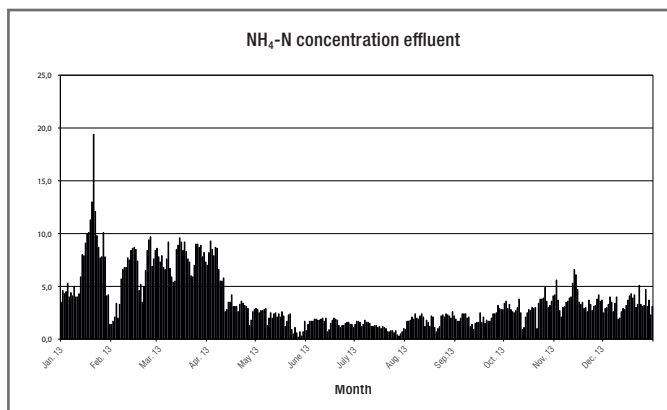
# Benefits

- ▶ Stable effluent values for ammonium and total nitrogen
  - ▶ Clearly improved decomposition capacity
  - ▶ Reduced maintenance
  - ▶ Reduced energy consumption
- 

## Improvements

Process stability and decomposition capacity could be clearly improved by the commissioning of the RTC module. Beforehand, the ammonium values were on average 7.1 mg/L (12.8 mg/L total nitrogen) in the problematic months January to April. After the commissioning, the values were on average 3.5 mg/L (5.1 mg/L total nitrogen) even in the colder months November and December. The decomposition capacity had improved by 50 % in terms of ammonium, even by 60 % in terms of total nitrogen.

A further positive effect was given by the reduction of maintenance. The old system had to be controlled daily for deviations and partially re-adjusted, which meant approximately 1h of effort per week. With the newly installed system of RTC controller and PROGNOSYS, software that permanently monitors the condition of the sensors and thus guarantees the quality of the measurement values, the effort is restricted to a brief morning visual check, time that can now be sensibly used otherwise. Last but not least, due to this measure the total power consumption of the wastewater treatment plant could be reduced by 16 % from 1.095 MWh to 0.912 MWh per year which leads to future savings of approximately €27,000 per year, money that is now available to the municipality for other investments.



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