



Practice report

C and N Decomposition
Winterberg Wastewater Treatment Plant (8500 PE)



High level performance when breaking down substances with a fluctuating load.

The initial situation

It is not only winter sports that cause widely fluctuating loads in the influent of the Züschen wastewater treatment plant in Winterberg. Many (short-stay) holiday makers visit Winterberg and the surrounding area in the summer as well. It is therefore no surprise that gastronomy has the biggest influence on the otherwise pure composition of the communal wastewater. However, it takes an entire day for the effects of the weather or other variables to get past the long flow paths in the drainage area and for these to become noticeable in the influent of the wastewater treatment plant. Without the installed measurement technology, this effect would remain undiscovered, much like the frequent lack of response from the plant control system to load peaks. This is because important parameters such as ammonium and nitrate could not be detected directly:

- ▶ Aeration times via REDOX control system, often time/pause only
- ▶ No direct measurement of the relevant nitrogen parameter
- ▶ Degree of operational reliability not satisfactory
- ▶ Delay of one day due to long flow paths



Figure 1: "The RTC module is easy to integrate into existing plant control systems."

The plant

- ▶ Connected load: 8,500 PE
- ▶ Capacity utilisation: 8,000–10,000 PE
- ▶ Volume of sewage: 1,153,000 m³ per year
- ▶ Aeration: two circular basins, each with a volume of 1,330 m³ and intermittent aeration
- ▶ Equipment: one circulation device each, one rotary-piston fan each, 540 membrane aerators
- ▶ Final sedimentation: one circular basin with a volume of 2,042 m³
- ▶ One former final sedimentation basin in case of damage



The advantages

The N/DN-RTC module ensures that the level of process stability is high when breaking down substances and that the oxygen concentration is regulated to between 1.5 and 2.5 mg/L during the aeration phases. The investment is calculated on the basis of the reclaimed costs using the COD parameter.

- Reduction of COD load in the outlet by > 20%
- Ability to offset costs against waste water charges
- High level of process stability when dealing with fluctuating loads
- Full transparency thanks to menu-guided operation
- Easy connection to existing plant control systems

The solution

By installing two process probes for the oxygen and ammonium/nitrate parameters, it became possible to gain an insight into the treatment processes.

The process of load-dependant aeration control made possible by an N/DN-RTC module lengthens the aeration phases when NH₄-N values are high. In addition, the COD effluent load has been significantly reduced by more than 20%.



- Continuous measurement of ammonium, nitrate and oxygen via process probes
- Load-dependant aeration control via an N/DN-RTC module with oxygen control
- Reduction in the COD load by more than 20%; therefore suitable for offsetting costs against waste water charges

Ø 82,7 kg/d → → → → Ø 63,1 kg/d
- 23,7%

	Ø Q _{Effluent} [m³/d]	Ø COD load [kg/d]	N/DN RTC	Ø Q _{Effluent} [m³/d]	Ø COD load [kg/d]
Oct 10	3972	68.32	Oct 11	4052	51.90
Nov 10	6631	99.46	Nov 11	2072	24.99
Dec 10	3347	52.63	Dec 11	7791	87.05
Jan 11	7048	109.95	Jan 12	7199	79.67
Feb 11	5689	111.36	Feb 12	4935	77.63
Mar 11	2735	54.23	Mar 12	4499	57.15

Reference data for reclaiming costs via COD

The measurement data

Tailored aeration times according to load.

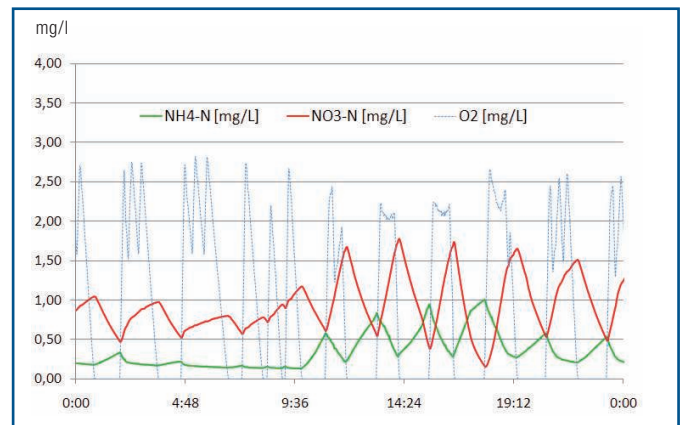


Figure 2: The N/DN module controls the aeration times based on the difference between target specifications and current concentrations of ammonium and nitrate. The oxygen control system limits O₂ ingress during the aeration phase.

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