

# Wastewater Treatment Plant Schweinfurt

Entirely process optimization by RMU AG

## Initial situation:

The WWTP Schweinfurt has a treatment capacity of 250,000 PE and is actually loaded with about 200,000 PE. The biological stage of the plant was operated with an anaerobic tank for biological phosphorous removal, upstream denitrification and permanently aerated nitrification. One round tank ( $V= 3,200 \text{ m}^3$ ) was used for biological phosphorous removal and denitrification and four rectangular tanks ( $V= 15,000 \text{ m}^3$ ), which contain four separated zones, were used for denitrification and nitrification.

The existing turbo compressors were controlled by specification of a constant nominal pressure level. The air feeding of each tank line was regulated by diaphragm control valves and the determination of oxygen set points. The second zone of each line was operated as facultative D/N-zone depending on the actual concentration of ammonium in the common outlet (see Fig. 1).

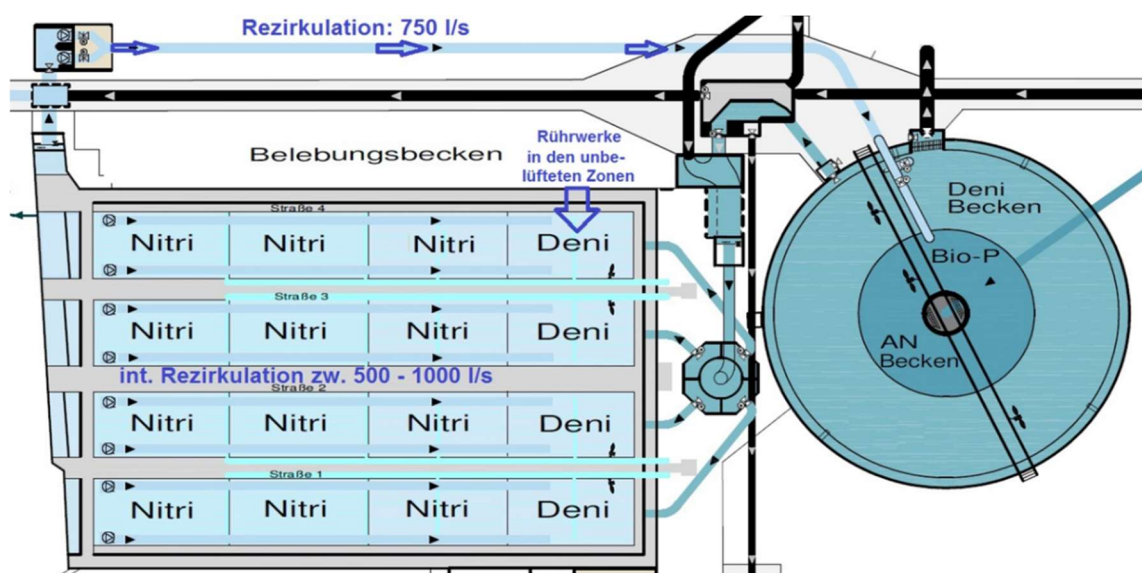


Figure 1: Operation of the biological stage before modification

## Measures:

To achieve a highly effective oxygen transfer rate and a flexible mode of operation, a very energy-efficient full floor aeration system containing 376 pieces of MESSNER® Aeration Panel has been installed (see Fig. 2).

The mode of operation has been changed from upstream denitrification to intermittent, alternating aeration without the use of flow boosters. In consequence the internal recirculation was abandoned.

The aeration system is controlled load-dependent by the interactive control system MESSNER® ICS. Important input parameters for the control system are the concentrations of oxygen, ammonium and nitrate in the activated sludge tanks.

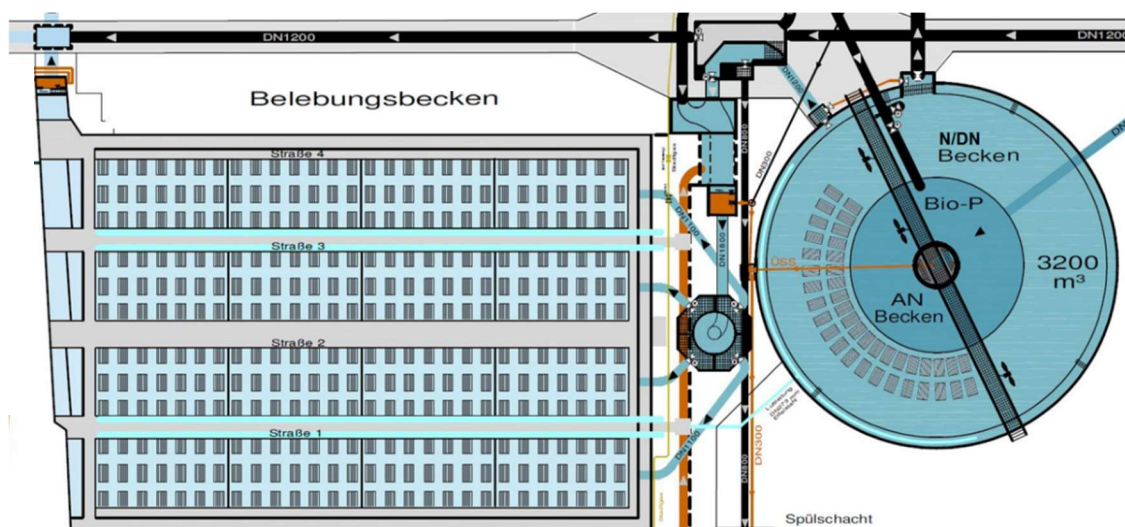


Figure 2: Operation of the biological stage after modification

The required air amount is controlled by a determined pressure, which is calculated by the MESSNER® ICS, following the principle of sliding pressure control. The mixing of the activated sludge during unaerated denitrification phases is realized by the RMU Air pulsing. This Air pulsing method emits periodic air impulses, so flow boosters will no longer be required.

After one year of operation with the aeration system consisting of MESSNER® Aeration Panel and MESSNER® ICS enough data had been collected to perform the planned replacement of the existing, but redundant turbo compressors. The four existing turbo compressors were replaced by a combination of three new turbo compressors and one screw compressor. By implementation of this combination, the aeration system could be adjusted to the air demand of the wastewater treatment plant perfectly.

## Results:

The installation of MESSNER® Aeration Panel in combination with the implementation of the MESSNER® ICS, the conversion of the operation mode in the biological stage and the renewal of the compressor station led to a significant reduction of the effluent concentrations and energy consumption. The effluent values for  $P_{tot}$  and  $N_{tot}$  were reduced by 34% and 20 %, respectively. Furthermore, an energy saving of approximately 1.000.000 kWh/a was achieved. This is equivalent to 30 % of the total energy consumption of the biological stage!

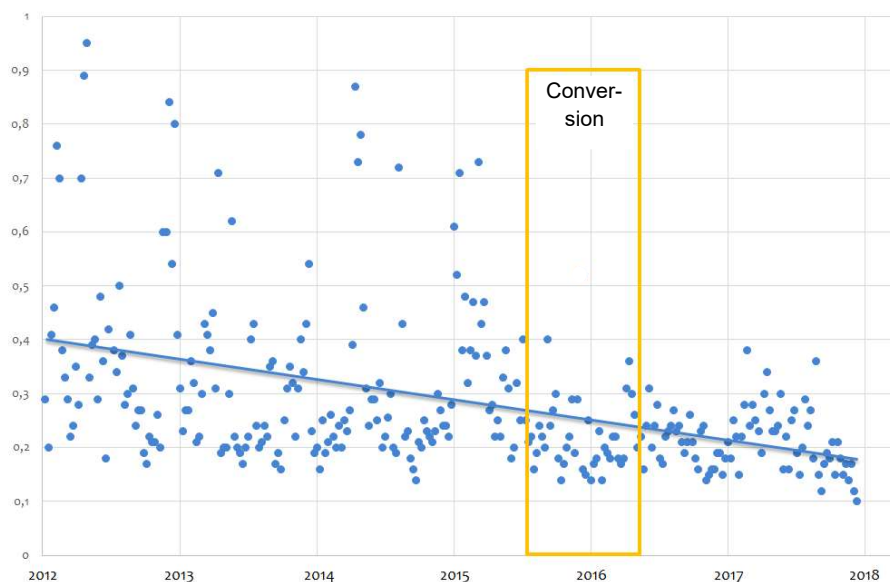


Figure 3: Effluent values [mg/l] for  $P_{tot}$  of the WWTP Schweinfurt before and after modification in the years 2015/2016