



DHI SOLUTION

OPTIMISATION OF WASTEWATER TREATMENT PLANTS

Custom solutions to increase efficiency and reduce resource consumption

MANY WWTPS HAVE A LARGE POTENTIAL TO INCREASE EFFICIENCY AND REDUCE COSTS

Wastewater treatment plants (WWTPs) are key infrastructures for ensuring a proper protection of our environment. However, the plants are also major energy consumers and cause environmental impact on receiving waters.

Many WWTPs are operated in a less-than-optimal manner with respect to both treatment and energy efficiency. Investigations suggest that up to 30-40% energy savings could be achieved if all WWTPs were optimally operated.

OPTIMISATION VERSUS EXTENSION

Increasing volume of wastewater and tougher effluent requirements results in insufficient treatment capacity. A classical approach to solve this problem is to expand the capability of a treatment plant with the addition of new tanks. However, not only is this more costly and demands more space, it might also lead to higher consumption of energy.

A better solution is to optimise the operation and processes of the existing WWTP tanks. This will result in threefold benefits of

- increased capacity,
- reduced effluents of pollutants into the receiving waters and
- reduced consumption of energy and chemicals.



On top of that, an optimised WWTP is more stable and robust to cope with variable conditions such as changing inflow amount and composition as well as weather conditions.

SUMMARY

CLIENT

Water utilities and WWTP operators

CHALLENGE

- Improve treatment efficiency of water utilities
- Increase the treatment capacity of WWTPs
- Regulate consumption of energy and chemicals
- Reduce the environmental impact on receiving waters
- Cut financial overspending

SOLUTION

Thorough understanding of the involved processes allows for their optimisation through using on-line sensors, data processing, process control and involvement of staff

VALUE

- Reduced consumption of energy and chemicals
- Reduced effluent of pollutants
- Reduced effluent tax
- Postponed or reduced investments in expansion
- Increased efficiency of wastewater treatment
- Improved quality of the receiving water
- Return of investment typically in 1 to 4 years
- Well-trained staff for sustainable optimisation

DHI's solution to WWTP optimisation has proven its value through applications at numerous WWTPs ranging in size from 3,000 PE to 2,000,000 PE.

Documented savings on effluent tax, energy and chemicals show a return of investment (ROI) in typically 1 to 4 years.

AUTOMATED PROCESS MONITORING AND FINE-TUNING

Most modern WWTPs are automated with SCADA (supervisory control and data acquisition) systems, and are typically operated using fixed set points defined by the operators. Local control loops, such as dissolved oxygen controls and return sludge rate controls, ensure that set points are achieved. This type of automation has resulted in a significant increase in the efficiency of wastewater treatment.

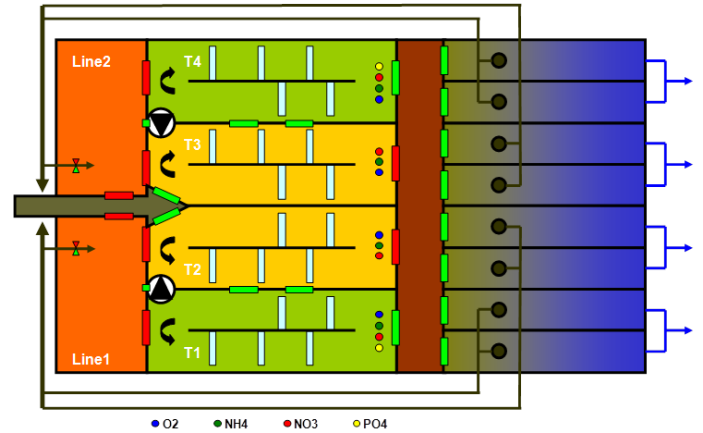
However, it is possible to further increase efficiency by taking the automation a step further using an automated set point control for process optimisation. For example, the set point for ammonium is dependent on nitrate and phosphorus, and can be adjusted accordingly in an automated system. With the DHI solution, process optimisation is achieved by real-time monitoring of the processes and by automatically keeping the processes fine-tuned to operate efficiently during variable conditions.



STEP-BY-STEP OPTIMIZATION

In a typical optimisation project, the first step is to identify possible bottlenecks in daily operations. The next step is making a priority list of different possible optimisation measures that will solve or mitigate inefficiencies without major construction works. This list may contain the following:

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- Changing the plant configuration, which may include minor construction work
- Adding sensors and actuators (like variable speed drivers)
- Describing the set point control to be implemented
- Estimating the results of the optimisation measures divided into yearly values of:
 - reduction of resources use – savings on energy and chemicals
 - reduced effluent values – lower effluent tax
 - increased capacity – postponed investment

Costs estimation of process optimisation measures and an estimate of the ROI period are required in order to be able to select the most profitable measures.



WELL-TRAINED STAFF FOR OPTIMISED RESULTS

Last but not least, an important factor in a successful implementation and long-lasting effects is the active involvement of the WWTP's operational staff. DHI will implement the solution by harnessing the available technology and knowledge, but continued optimal operation and savings are only ensured through local ownership and commitment.