Advanced treatment technology by controlling single tank nitrification denitrification process with ICT and AI

Project Contractor

    Consortium between METAWATER Co. Ltd., Japan Sewage Works Agency, and Machida-city
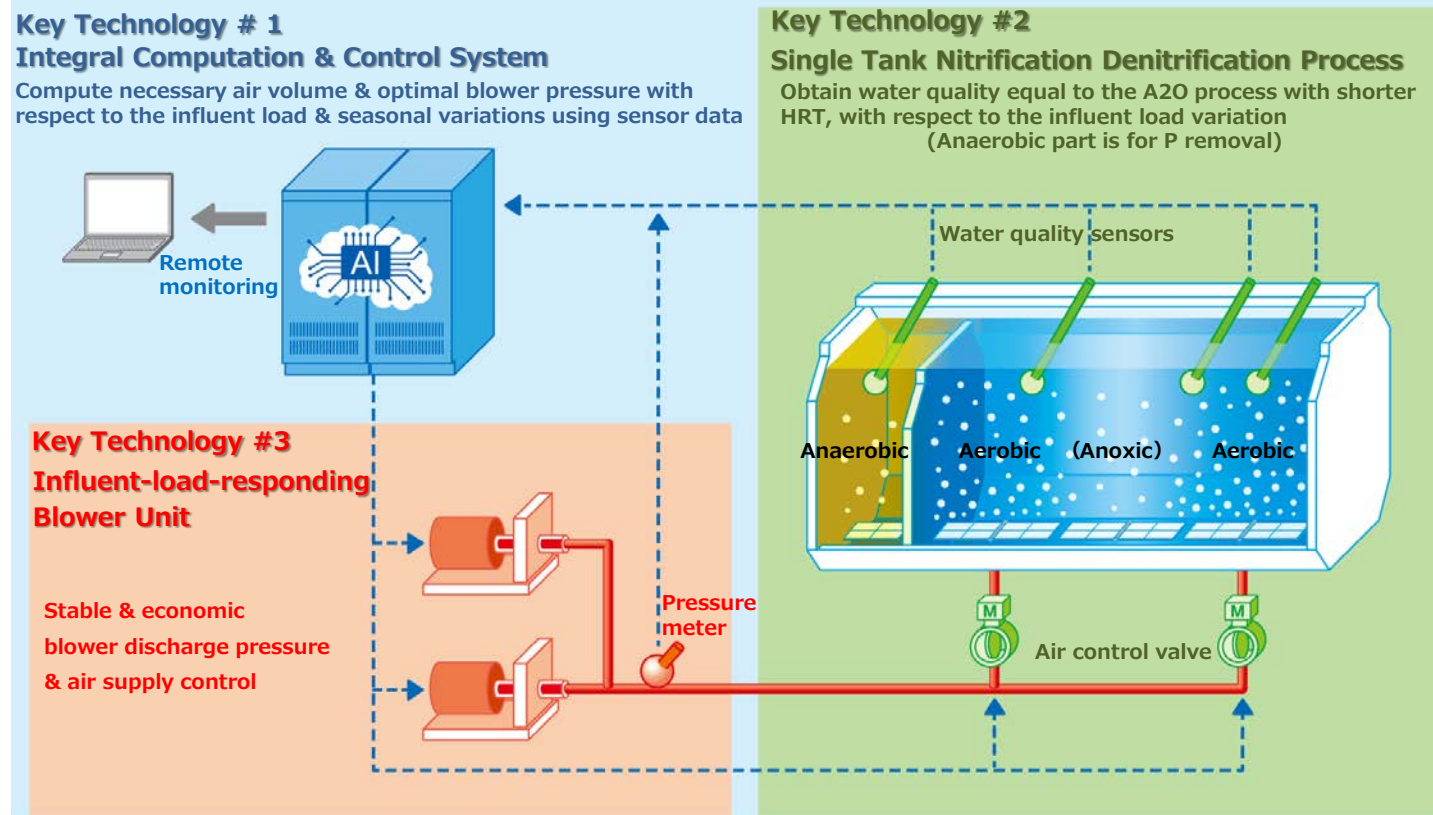
Demonstration Field

    Naruse Clean Center in Machida-city, Tokyo

Demonstration Overview

Demonstrate the single tank nitrification denitrification process with ICT and AI

(i) Obtain water quality equal to the A2O process with shorter HRT using influent-load-responding aeration control

(ii) Reduce electricity consumption with blower discharge pressure computation & control linked with aeration control

Advanced Treatment Process with 3 Key Technologies

Key Technology # 1
Integral Computation & Control System
Compute necessary air volume & optimal blower pressure with respect to the influent load & seasonal variations using sensor data

Remote monitoring

AI

Key Technology #3
Influent-load-responding Blower Unit

Stable & economic blower discharge pressure & air supply control

Pressure meter

Key Technology #2
Single Tank Nitrification Denitrification Process
Obtain water quality equal to the A2O process with shorter HRT, with respect to the influent load variation
(Anaerobic part is for P removal)

Water quality sensors

Anaerobic   Aerobic   (Anoxic)   Aerobic

Air control valve

【Effect】**Promote advanced treatment process adoption by**

(i) Reducing the construction cost (shrinking aeration tank size)

(ii) Reducing electricity consumption (of mixer, pump, blower)

(iii) Mitigating operational burdens (with automatic operations throughout seasonal variations and other circumstances)

Innovative Features

(i) Achieve short HRT with ICT aeration control
- Compute necessary air volume using NOx & NH4 sensors in real time to form ideal aerobic & anoxic zones upon varying influent load.
- Reduce electricity consumption by eliminating mixer and circulation pump for the A2O process.

(ii) Reduce blower electricity consumption by optimizing blower pressure with ICT
- Integrate control between aeration tank & blower
- Compute optimal blower discharge pressure using necessary air volume in real time to reduce blower electricity consumption

(iii) Mitigate operational burden with AI
- Auto-tune the parameters for necessary air volume computation using machine learning.
- Obtain stable effluent water quality without operational burdens such as parameter tuning.