Remote Surveillance and Process Control of wastewater treatment processes

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Why do we need Smart Surveillance and Process Control?

- Increasing treatment requirements
  - Health reasons
  - Environmental reasons
  - Legal reasons
- Extreme treatment requirements
  - Micro-pollutants, nutrients
  - Footprint – cost of land
  - Process economy / cost efficient treatment
- Operational requirements
  - Unmanned – lack of resources / costs

Image: ASME.org

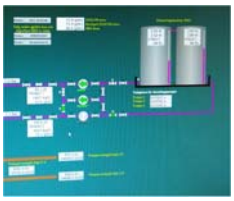
Traditional process surveillance is not enough?

Guard Automation
https://guard.no/

Ideal control system…

… should provide flexibility for operators:

- Remote access and control
- Data logging and data availability online
- Full control via SCADA
- Direct control on site
- Alarms notification
- Cyber security



DOSCON provides control solutions

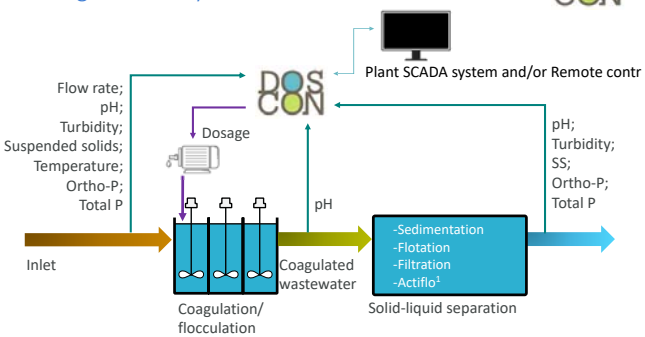
- Chemical precipitation (coagulation process)
- Biological processes
- pH control
- Carbon dosing control

- Works with domestic wastewater, industrial wastewater and drinking water

New developments

- Virtual sensors
- Floc sensor
- Use of rain-gauge data
- Floating error detection

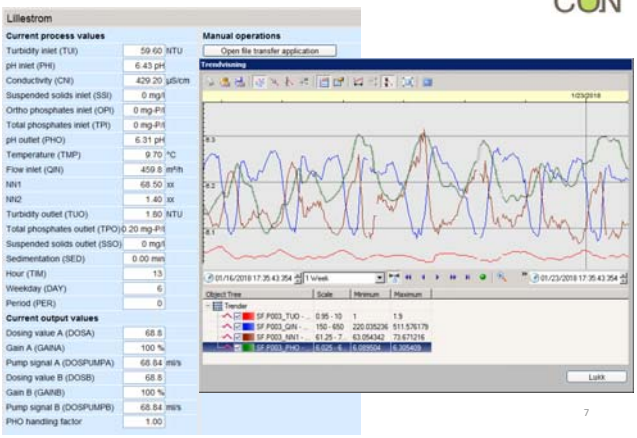
DOSCON – multiparameter-based chemical dosage control system



Dose=f(Q, pH, P, SS, temp, Cond, etc)

1 - Actiflo® Water Treatment https://www.veoliawatertechnologies.co.uk/products/actiflo
DOSCON® - Advanced dosage control system https://www.doscon.no

Surveillance with online SCADA



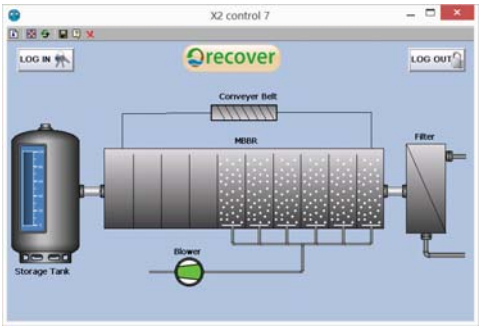
Remote access to SCADA in China

SCADA developer: Zhejiang JEC Electronic Co. LTD

Remote access to the PLC (Programmable logic controller)

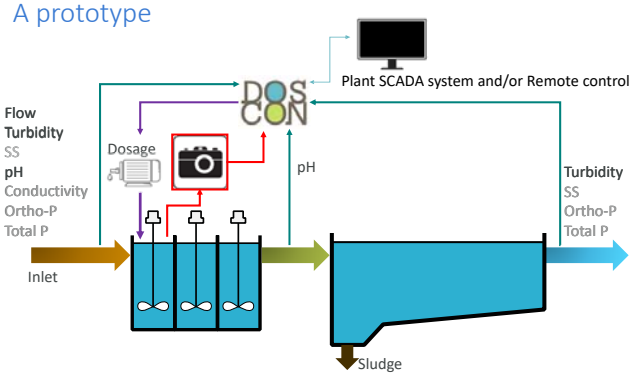
Industrial wastewater treatment. Coagulation process. Jiaxing, China

Remote access to the PLC



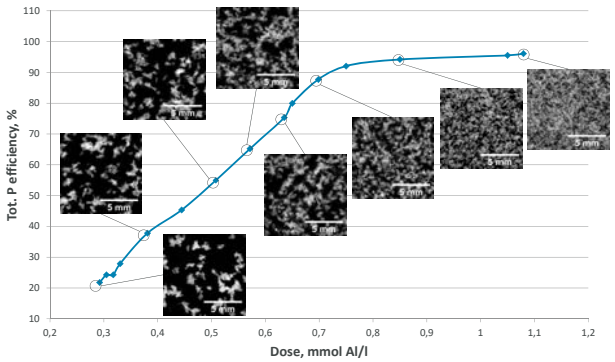
MBBR pilot plant for nutrients recovery. Recover project, NTNU, Trondheim, Norway

Replacing expensive sensors with Floc sensor for Smart Surveillance and Control. A prototype

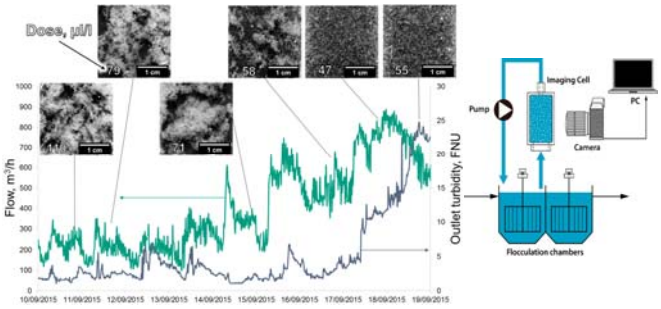


DOSCON® - Advanced dosage control system
https://www.doscon.no

Optimal dosages and images of flocs

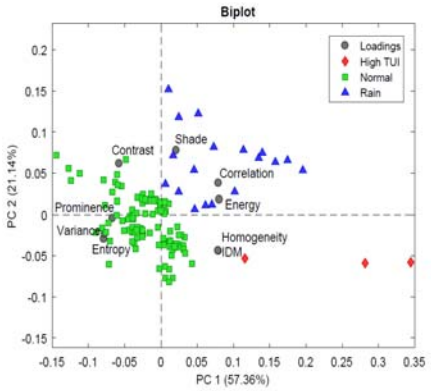


Images of flocs for an early indication of changes in the process

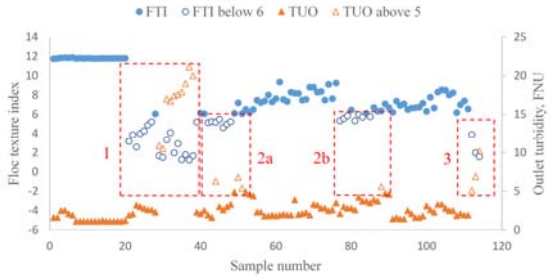


Skiphelle wastewater treatment plant. Drøbak, Norway

Principal component results



Floc Texture Index (FTI) as an early alarming system



$$FTI = (Contrast + Entropy + Homogeneity + Variance) \times 10^{-2}$$

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