

## Very large WWTP for organic matter removal

### LA FARFANA WWTP (Chile)

• Createch360° provides an operational intelligence platform for water and wastewater facilities that supports smart monitoring, advanced process control and decision making to reduce operational costs, enhance reliability and achieve quality consent limits.

With over 150 installations implemented by our teams worldwide, experience and continuous innovation guarantees high added-value solutions enabling utilities and industrial users to achieve maximum efficiency and best performance.

## SUMMARY

### La Farfana WWTP (Chile)

- Very Large plant
- 2 biological lines
  - 16 Plug flow reactors
- OM removal

### Challenge

To **reduce the aeration costs** whilst **ensuring the effluent quality**.

### Results

- **100%** effluent quality compliance
- **18%** aeration energy savings

## PLANT CHARACTERISTICS

**La Farfana** serves the Greater Santiago area (> 6M inhabitants), together with Mapocho-Trebal WWTP. **CREApro®** aeration control was implemented on both plants.



- **Design Flow:** 760.320 m<sup>3</sup>/d (3.674.880 P.E.)

- **Biological reactor:**
  - Plug-flow configuration
  - 16 units

- **Aeration system:**
  - 6 x 1.600 kW turbo blowers
  - 3-4 regulation valves/reactor

- **Effluent discharge consent:**
  - TSS < 35 mg/L
  - COD < 125 mgO<sub>2</sub>/L
  - BOD<sub>5</sub> < 35 mgO<sub>2</sub>/L

- **Former aeration strategy:**
  - Based on pressure and oxygen measurements
  - Fixed pressure setpoint in the main manifold
  - Fixed DO setpoint

## CONTROL OBJECTIVES

Smoothing the way to transform Greater Santiago's WWTPs in energy self-sufficient biorefineries by **minimizing energy consumption** for aeration of the biological process **while ensuring effluent quality**, including:

- Intelligent control of **air production and distribution systems**
- Intelligent control of **flushing**
- Prevention of **undesired nitrification**

# Very large WWTP for organic matter removal

## LA FARFANA WWTP (Chile)

### CREApro® PLATFORM - CONTROL MODULES IMPLEMENTED

#### Instrumentation

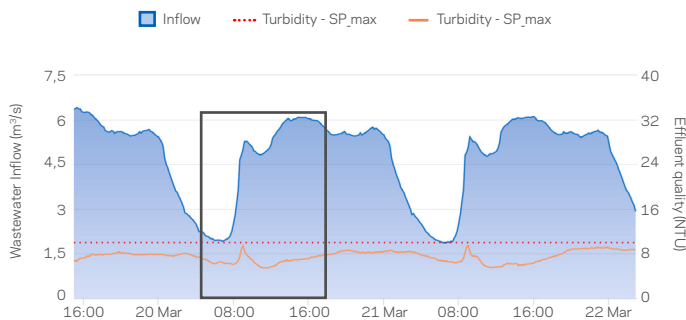
- Already implemented: pressure sensors and DO probes
- New: multiparametric probes (measuring turbidity, tCOD and sCOD,  $\text{NO}_3^-$ -N and SS) after secondary clarifiers

#### C-CONTROL + MOV-CONTROL: Intelligent control of aeration

The air production and distribution system is controlled to provide the real-time air demand in the biological process at minimum energy consumption and ensuring highest organic matter removal performance.

#### How does it work?

- C-CONTROL is based on the online values and evolution of effluent tCOD, turbidity and nitrates, and DO in each reactor. The following strategies are implemented:
  - Independent and dynamic DO setpoints in each reactor
  - Aeration/non-aeration (O/A) cycles strategy leading to simultaneous and sequential anoxic phases of variable length
- The control adjusts the dynamic DO setpoint in each compartment of the reactors based on the effluent quality. The target DO is relaxed when the effluent quality is high and increased when it tends to deteriorate.
- The control also adjusts the duration of the O/A cycles and number of simultaneous anoxic phases according to the inflow treated and the global performance of the whole biological treatment. At low effluent OM, the system applies sequential anoxic phases (in each reactor) to decrease the energy demand.



- C-Control works based on effluent quality objectives (COD, turbidity and  $\text{N-NO}_3^-$  setpoints) and wastewater inflow

Figure 1

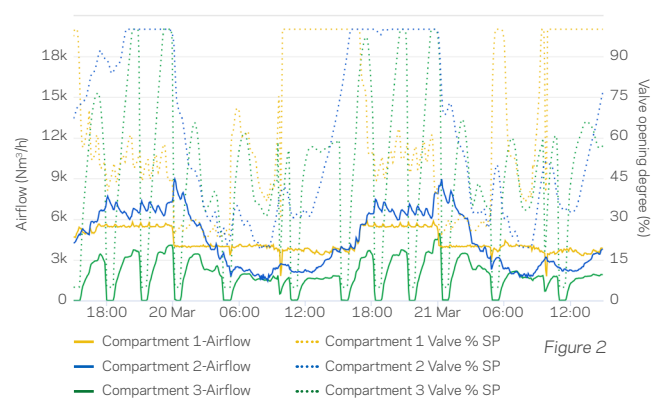


Figure 2

- MOV-control sets valve opening % accordingly to adjust airflow

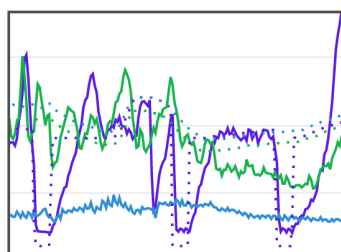


Figure 3\*

- Anoxic phases trigger and length according to actual performance

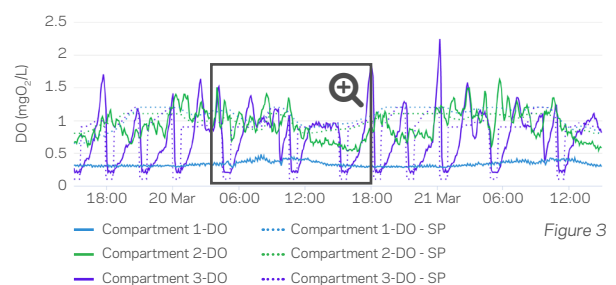


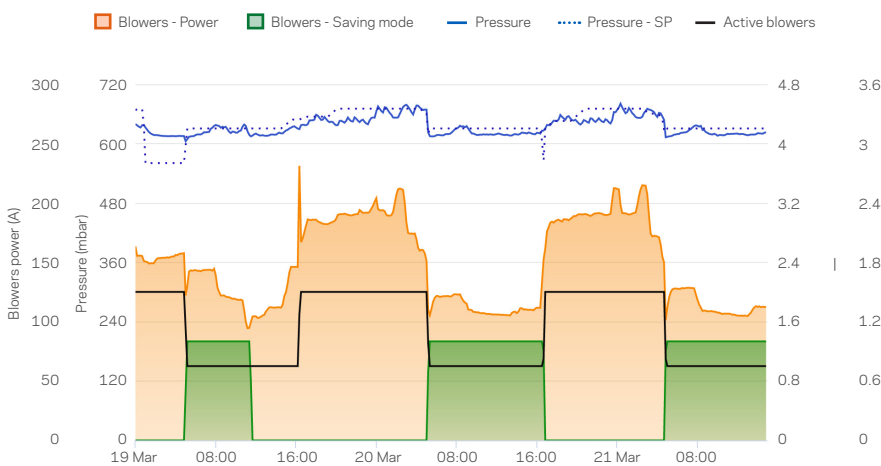
Figure 3

- DO setpoints are lowered when effluent OM is far lower than the limit and/or shows a decreasing trend

## CREApro® PLATFORM - CONTROL MODULES IMPLEMENTED

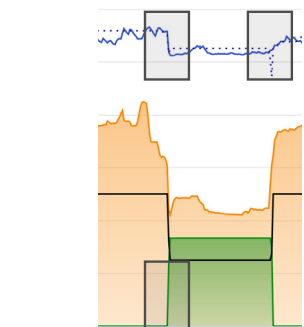
### How does it work?

- MOV-CONTROL provides a strategy that delivers desired oxygen levels by applying **dynamic pressure control** in the main manifold, ensuring the maximum aeration system efficiency in terms of performance and energy consumption.
- Advanced management of flushing**, which is only applied when a valve has not reached the target range of the opening degree/airflow in 24h.



- MOV-control sets the dynamic pressure setpoint to reach the desired air supply and max valves opening degrees
- Blowers are indirectly controlled by playing with the pressure setpoint

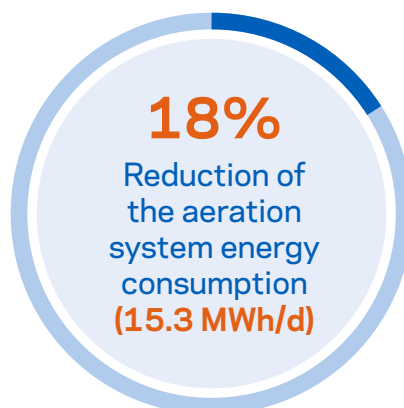
### Advanced control of blowers: saving mode



- Blowers' saving mode is activated when possible according to inflow, effluent quality and other parameters
- The control sharply decreases the pressure setpoint to force the supplementary blower to switch off
- When the saving mode ends, the pressure is sharply decreased to avoid shock in manifold

## RESULTS

### Energy and sustainability KPIs



## CASE STUDY

Very large WWTP  
for organic matter removal

### LA FARFANA WWTP (Chile)

## CLIENT CONCLUSIONS

**Jordi Fontana**  
GENERAL MANAGER  
EDAM



*"The implementation of the intelligent aeration control system in La Farfana, has been advantageous for EDAM not only in terms of a significant saving in energy consumption for aeration (which represents the main energy consumption of the plant), but also for the plant supervision tasks. The intelligent control platform facilitates online control of the performance of the biological process as well as the water quality of the effluent.*

*In very large plants such as La Farfana or Mapocho-Trebal, the investment in this type of technology presents very short payback periods that make them highly recommended."*

