

Medium plant for nutrients removal – Dual P-control: chemicals dosing for P removal

MANRESA WWTP (Spain)

Createch provides an intelligent platform for water and wastewater facilities that includes real-time control and decision-making tools to reduce operational costs, enhance reliability and comply with quality consent limits. With over 100 installations worldwide, our broad experience and continuous innovation guarantee high added-value solutions enabling municipal and industrial users to achieve efficiency and facilities performance.

Summary

| Plant features | Challenge | Results |
|---|--|---|
| <ul style="list-style-type: none"> └ Medium-size plant └ Plug-flow configuration └ Chemical dosage └ Phosphorus removal | <ul style="list-style-type: none"> └ To better ensure effluent quality └ To optimize chemical dosage of ferric chloride and aluminium polychloride. └ To reduce reagents costs. | <ul style="list-style-type: none"> └ 100% quality compliance. └ 26% reduction of chemical dosage └ 17% reduction of kg chemical per kg of phosphorus removed. |

The wastewater treatment plant (WWTP) of Manresa is located NE of Spain, operating at half of the design flow capacity, with an inflow of 21,858 m³/d and phosphorus (P) load of 170 kg P/d. The WWTP does chemical P-removal by dosing of ferric chloride (FeCl) and/or aluminum polychloride (PAC), depending on the season. FeCl is exclusively dosed for chemical P-removal, while PAC dosing is also assisting sludge separation in secondary clarifiers. Both dosing systems were operated under fixed – manual strategy, leading to high chemicals consumption while not ensuring compliance with effluent consent limits due to lack of response to P-load peaks. The implementation of the CREA platform’s P-control module aimed to improve the overall WWTP performance and efficiency by upgrading chemical P-removal. Control is based on the online P-PO₄ concentration measurement at the final effluent. FeCl and PAC dosing points were different, implying specific dosing strategy for each chemical. P-control targets were ensuring effluent quality requirements compliance while optimizing chemicals dosing for a reduced FeCl and PAC consumption.

Plant characteristics



- **Design flow:** 53.500 m³/d
- **Biological treatment:**
 - └ 2x plug-flow reactors for biological N removal
- **Dosage system for chemical P-removal:**
 - └ 2x dosage pumps of ferric chloride.
 - └ 2x dosage pumps of aluminium polychloride.
 - └ Regulable pumps via VFD.
- **Dosage location:**
 - └ FeCl: Effluent of biological reactors (just before P-PO₄ on-line measurement)
 - └ PAC: Inflow to biological reactors
- **Effluent discharge consent**
 - └ TP < 1 mg P/L

Technical solution

- **Platform solution:** CREApr[®]
- **Control modules integrated:**
 - └ N-Control
 - └ Time-zone
 - └ P-Control
 - └ MOV-Control
 - └ RASi-Control
- **Measurement equipment (new instrumentation)**
 - └ Phosphate analyser installed at the final effluent (after secondary settlers)

Medium plant for nutrients removal – Dual P-control: chemicals dosing for P removal

MANRESA WWTP (Spain)

Results

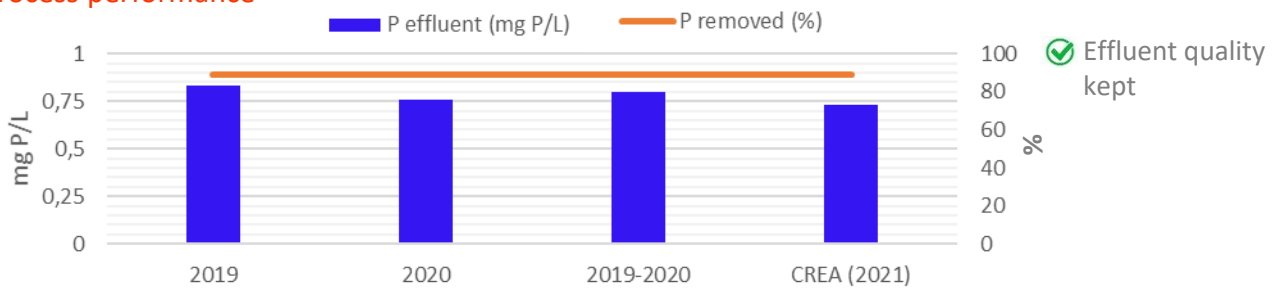
The results obtained since CREPro P-control is governing chemicals dosage (1st January 2021 – 1st July 2021) are compared with the former plant's consumption (reference period, 1st January 2019 – 1st January 2021). The savings obtained in FeCl and PAC consumption are depicted below:

Inlet loads

| | 2019 | 2020 | 2019-2020 | CREA (2021) |
|------------------------------------|--------|--------|-----------|-------------|
| Treated flow (m ³ /day) | 21.347 | 22.370 | 21.858 | 21.689 |
| Treated load (kg P/day) | 176 | 164 | 170 | 150 |

✔ Similar treatment conditions

Process performance



✔ Effluent quality kept

Chemical dosage

| | 2019 | 2020 | 2019-2020 | CREA (2021) | Savings |
|----------------------------|--------|--------|-----------|-------------|---------|
| Chemical dosage (kg/month) | 41.996 | 35.308 | 38.652 | 28.417 | -26% |

Efficiency dosage (kg chemical consumed/kg phosphorus removed)

