Case study: Making a Colloide' continuous filtration plant work

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Executive summary

An existing tertiary continuous filter plant (manufacturer: Colloide), installed at a UK water utility, was refurbished to make a non-functioning system work and to meet consent levels for solids, iron and phosphorus, in line with UK EA standards. Ever since day-to-day operations are remotely monitored. With consistent results.

Background and challenges

In 2019 a tertiary continuous filter plant, consisting of two units, each with 7 m^2 filter area and 2 m bed depth has been built to remove solids and phosphorus, in order to meet annual average total-P concentrations of 0.5 mg/L. Previous efforts to achieve stable filter operation were unsuccessful. In 2021 Brightwork executed a site survey and filter inspection on behalf of the end-user to determine the possibility to remedy the plant to make it work according to the initial targets. Between 2019 and 2021, the utility performed several interim assessments and partial adjustments, but these did not result in stable performance.

Our approach

By examining both the technical infrastructure and the process conditions of the plant, a refurbishment plan was developed in order to revitalize the filter plant. The refurbishment consisted of the exchange of vital filter internal components and adjustments in the process set-up and monitoring and control system. Together with the utility's framework contractor the refurbishment was executed. We designed, manufactured and supplied the parts and supervised proper implementation.

Results

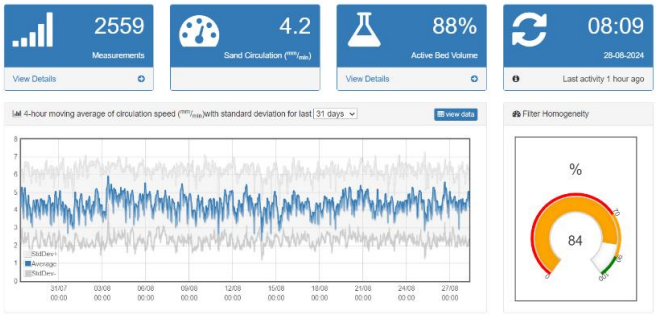
After refurbishment the filter plant was recommissioned at design flows (14 L/s average, 30 L/s maximum) and loads (solids, phosphorus). Thanks to a well-controlled, flow-proportional dosage of 3–5 mg/L Fe, ortho-P was effectively removed and residual Fe-levels were well below the consent level of 4 mg/L Fe.

Water quality analysis tertiary filter plant (during commissioning phase, 2023)

Parameter	Tertiary filter feed (prior to dosing)	Tertiary filter feed (post dosing)	Tertiary filter filtrate
Ammonia-N (mg/L)	0.3 – 0.6		0.04 – 0.10
Fe-total (mg/L)	0.8 – 1.9	5 – 6	0.4 – 1.4
Ortho-P (mg/L)	0.3 – 0.5		0.02 – 0.06
Total-P (mg/L)	0.4 – 0.8		< 0.30
TSS (ppm)	11 – 18		4

Analysis

The commissioning results were in line with our expectations. However, aiming for long-term consistent results, Sand-Cycle monitoring and control proved to be powerful to manage that. The remote monitoring allows both the process operators and us to regularly check the crucial filter system parameters. Consistent sand circulation rates, homogeneous sand movement and sand volume are monitored and visualized in dashboards. Whenever an anomaly is detected, a rapid intervention prevents deterioration of the filter performance.



Sand-Cycle dashboard

Conclusions

This case study clearly shows that a filter plant, which was deemed to be discarded, can be revitalized if refurbished in a proper way and taking into account the site process conditions and peripheral components. The continuous monitoring by both the end-user and technology supplier contributes to long-term stable and reliable operations. This approach leads to a cost effective and sustainable solution. We are working on various other schemes with a similar approach. For example, we are currently supporting similar refurbishments at two additional UK sites with comparable challenges.

Please feel free to contact us to learn more about our services, products and technologies!

Brightwork BV - The Netherlands - tel. +31 515 79 65 50 - e-mail: info@brightwork.nl - www.brightwork.nl