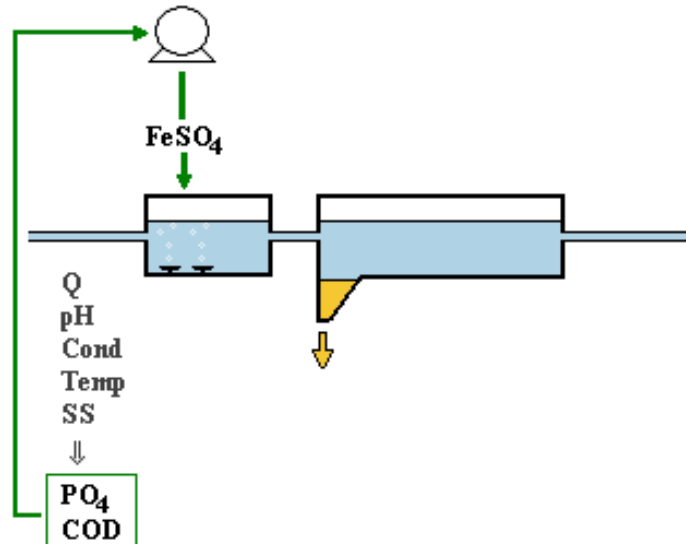


SoftSensor



Collaboration partners

Hammarby Sjöstadsverk, Cerlic AB

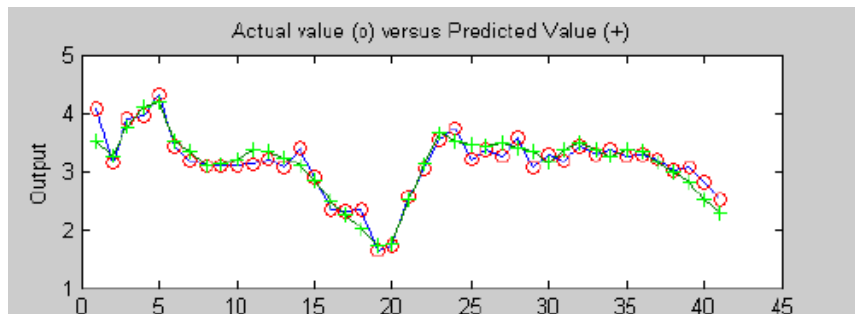
Summary

Wastewater is a very complex fraction to work with. Its composition and flow varies widely both over the seasons as well as over the day. Due to its heterogeneity, some of the parameters of interest for the treatment results, such as Phosphorous, Nitrogen and BOD can be difficult to measure with on-line sensors. The physical sensors available on the market, regarding these parameters, are usually very expensive and in need of continuous maintenance. Therefore, these parameters are usually analysed as daily or weekly samples in a laboratory, sometimes several days after the samples were taken. Due to this, it is very difficult to control the wastewater plant and make needed adjustments in time, concerning the parameters of interest. This also implies increased costs and environmental impacts due to inefficient chemical and energy use.

Description

The hypothesis in the project is that the parameters in the wastewater are somewhat dependent, that parameters that are more easy to measure, such as pH, temperature, flow, conductivity, redox and suspended solids can help predict the parameters that are more difficult to measure such as N_{tot} , NH_4-N , NO_3-N , P_{tot} , PO_4-P , BOD, nitrification denitrification speed. The predictions will be developed by using multivariate mathematical methods such as PCA and PLS. The predictions developed will be called soft sensors, as they are predicting parameters but no physical sensors are involved the prediction.

In addition, other types of sensors are planned, but the details of these will be set later in the project. A pilot-scale copy of Stockholm's largest wastewater treatment plant will be used for the testing. The testing will be carried out in a number of measurement campaigns during the project period.



Graph of measured (o) versus soft sensor predicted (+) PO_4-P after pre-sedimentation.

Goal

To be able to predict wastewater parameters that are difficult to measure on-line by using parameters that are easy to measure on-line.

Expected benefit

It is very expensive to purchase on-line sensors for the parameters focused on in this study. They are also usually in need of much maintenance and the costs and time spent on getting the parameters to function properly can be very consuming for the WWTP.

An expected benefit of this project is that the developed soft sensors, predicting these parameters, can be used either as complete replacements to the physical sensors or as a complement to the physical sensors when they are out of order or giving unrealistic measures. In that way, no or a minimal amount of time with un-functioning sensors will pass which is extremely important both for surveillance but mostly if the parameters are used for automatic plant control including regulation of chemical and energy use.

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