

Cyanide oxidation with NaOCl in galvanic industry

AHC Benelux optimises thanks to pH+ORP sensor combined



AHC Benelux BV, located in The Netherlands, is specialised in high-tech galvanic applications. With, in total 100 employees and 8 production lines, they work 24 hours per day on ennobling mainly technical components and materials. During these processes, frequent rinsing is required and therefor wastewater appears. During these processes, frequent rinsing is required, creating wastewater. One of the most important steps during this cleaning is the removal of cyanides.



Luc Heldens in front of the 2 cyanide oxidation tanks

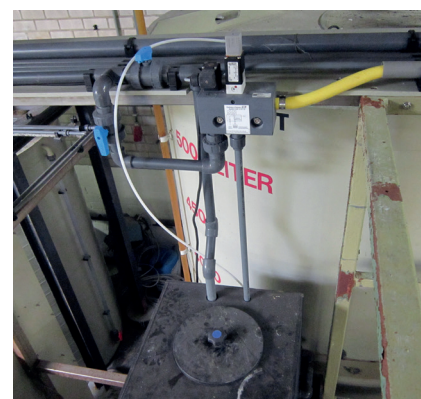
Cyanide is a necessary evil during the galvanizing process. It ensures a very even precipitation of metals on the subject that is to be galvanized. In the rinsing baths the cyanides are rinsed off. The removal of cyanides from the wastewater is a difficult task. The free and bound cyanide is oxidized with NaOCl in an alkaline environment (presence of NaOH). Now, with a Memosens combined pH and ORP sensor, the oxidation process is greatly improved.

The results

- Optimized process control of cyanide removal
- Reduction of metal discharge to the surface water
- Future: minimized dosing of chemicals

Customer challenge

In the past, AHC Benelux BV used a percentage ORP sensor that was difficult to calibrate. Because of this, more chemicals were added than



Chemoclean CYR10 injector ensures automatic cleaning with HCl

necessary for the cyanide removal. During the process itself, pH is also an important parameter, it needs to be above pH 10 in the presence of NaOCl. In this way, all cyanides are converted to the harmless N₂ and CO₂ gas.

Our solution

The solution comprises:

- Memosens CPS16D combined pH+ORP sensor
- Liquiline CM444 transmitter
- Chemoclean injector CYR10

The previously used ORP sensor suffered from rapid fouling, therefore it was decided to go for a chemical cleaning, so-called Chemoclean, of the CPS16D pH+ORP sensor. The injector CYR10 is controlled by the Liquiline CM444 transmitter which activates a cleaning cycle every two hours. The solenoid valve on the CYR10 opens and 'drive water' flows to the pH+ORP sensor.

“By using the Memosens CPS16D combined pH+ORP sensor in our 2 cyanide oxidation tanks, we control this process accurately. With the Liquiline CM444 transmitter also the rH value is calculated and in this way an optimised process control is realised. The measurements have been in use since May 2013 and since then discharge values of 0,0 mg/l heavy metals or cyanides to the surface water have been achieved.”

Luc Heldens

Chemical and R&M Supervisor, AHC Benelux BV, Eindhoven, Nederland

This drive water creates a small vacuum in the CYR10 that is used for suction of 5% HCl acid from a container. This 5% HCl is automatically diluted with the drive water and arrives at the sensor. In this way, the sensor remains clean without any manual intervention.

Besides the instrumentation, Endress+Hauser was also responsible for the commissioning of the measurements to ensure proper control of the Chemoclean and also the chlorine- and alkaline dosing through the Liquiline CM444 transmitter.

Optimalisation setpoint ORP and pH

The quality of the wastewater is now excellent and the concentration of discharged heavy metals and cyanides has dropped to almost zero. Currently the process starts at pH 11 and an ORP value of 250 mV. With the rising of chlorine concentration, the ORP value also rises to 450 mV. Now has come the point for AHC Benelux BV to evaluate the pH + ORP setpoints more critically to further decrease consumption of chemicals. This will offer an additional environmental and financial advantage.

Guarding this process with a vacuum sampler

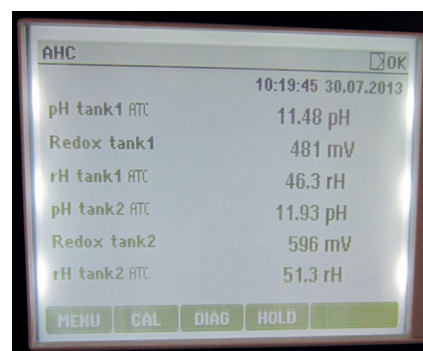
The wastewater that is discharged to the surface water is continuously sampled with an automatic vacuum sampler from Endress+Hauser. For every 100 liters of wastewater, the sampler takes one 50 ml sample with the vacuum principle. A 24 hour composition sample is gathered and checked in the laboratory with an ICP analyzer.

Future developments

Besides the optimization of chemical dosing, AHC Benelux BV is also working to improve their main production process. For instance, future steps are aimed at cyanide-free galvanizing baths to further improve their environmental management.



Via the nozzle, the pH+ORP sensor is flushed periodically



Display of pH, ORP, rH values on both cyanide oxidation tanks on one Liquiline CM444 transmitter

Nederland

Endress+Hauser BV
Nikkelstraat 6
1411 AJ Naarden
Postbus 5102
1410 AC Naarden
Tel. +31 35 695 86 11
Fax +31 35 695 88 25
info@nl.endress.com
www.nl.endress.com