Build-up monitoring

Increased process insights in groundwater extraction

Your benefits in brief

- Optimized cleaning cycles to save costs
- Reduced risk of unexpected downtime caused by build-up in the process
- Continuous process insights without interruption
- Integrated feature, no separate device for build-up measurement necessary
- Reliable measurement based on a calibrated value
- Increased energy efficiency in water extraction
- Ease of use thanks to an indexed value

A water treatment plant in Germany faced the problem of unexpected downtime due to clogged water wells. The customer now uses Promag W 400 with Heartbeat Technology build-up index to successfully monitor iron hydroxide build-up in the groundwater extraction process. With this new feature, build-up can be monitored reliably and continuously without interrupting the process, leading to an improved maintenance plan, optimized cleaning cycles, less downtime and higher efficiency in the process.

The challenge

Build-up or clogging of water wells due to iron hydroxide as well as manganese oxide deposition in groundwater is a common aging problem for operators. Iron(II) oxide dissolved in water comes into contact with oxygen and oxidizes to iron(III) oxide which is water-insoluble and thus precipitates in wells, drainage shafts, pumps and pipes as well as in any flowmeter. If users don't realize that build-up reaches critical levels, downtime due to unexpected interruptions of measurement signals or a clog in the process takes them by surprise. Moreover, iron hydroxide deposition causes additional pressure loss due to reduced pipe diameter. This in turn causes energy loss which leads to increased costs.

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Our solution

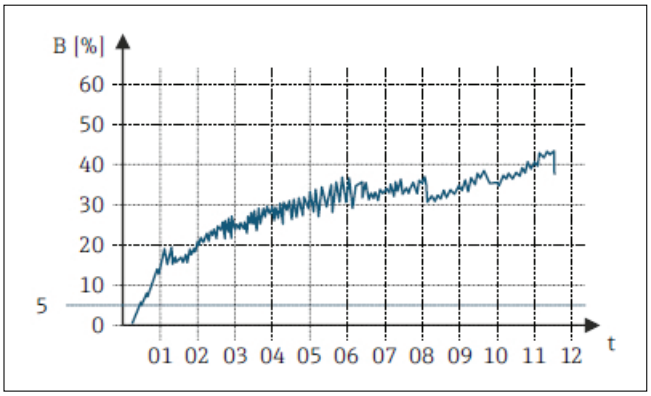
To solve these issues, Promag W 400 with the patented build-up index monitoring feature integrated into Heartbeat Technology was installed in the customer's water extraction pipe at the well.
The feature is based on the fact that the electrical conductivity of the fluid and the build-up differ from one another. The distribution of electrical conductivity within the measuring tube is analyzed to compute an indexed value that changes proportionally with the build-up thickness. This allows to monitor the increase of build-up during operation as well as the decrease of build-up during the cleaning process. The indexed value is displayed between 0% (no build-up) and 100% (max. detectable build-up). 0% corresponds to the reference values calibrated after production, in a clean measuring tube.

During two 12-month-periods, the build-up of iron hydroxide in the customer's application was continuously monitored. Every second month, the build-up thickness was measured and compared with the build-up index value. Build-up index reached 20% (3 mm; 0.12 inch thickness) in the second month and 40% (10 mm; 0.39 inch thickness) after 11 months. After 12 months, a cleaning was conducted and during another 12-month-period, the build-up index values and build-up thickness were compared. The results of the first year could be confirmed, proving that for the same fluid the values are identical and therefore repeatable.

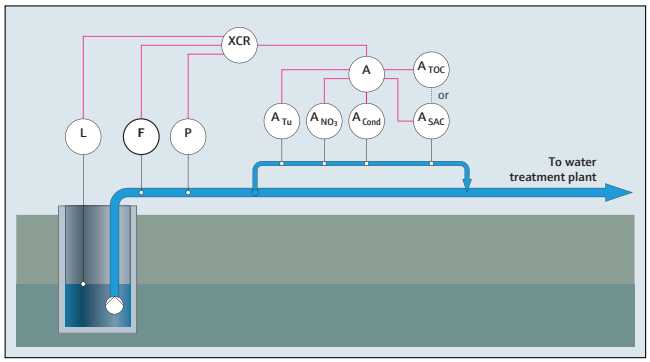
Besides other parameters like pump performance loss and lower flow rate, the operators can now monitor the build-up index to estimate the optimal cleaning time of the well to avoid unexpected downtime. Furthermore, the feature reduces the duration of the cleaning process since the operator knows exactly when the device is clean.

Results

After evaluating the build-up during the first year, a more accurate maintenance plan for the well was established. The customer was able to track and shorten the cleaning process. Additionally, the customer set a self-defined switch point which initiates planning of process maintenance in case build-up increases faster than expected.
Moreover, continuous process insight reduced unexpected downtime, giving the customer a higher reliability and confidence to control the process.



Build-up value over one year



Ground- and well water extraction

Heartbeat Technology is a software package that continuously monitors, diagnoses and verifies the measuring devices. Without interrupting the process, Heartbeat Technology tests the instrumentation for measuring flow, level, temperature and analytics and documents the status in accordance with regulatory requirements. Build-up index is integrated into the monitoring feature of Heartbeat Technology. It offers permanent monitoring of build-up in the process for external trend analysis and enables condition-based maintenance.

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