PRESSURE SENSING TECHNOLOGY ENSURES SMOOTH RUNNING PROCESSES IN DRINKING WATER SUPPLY SYSTEMS

VEGA SENSORS ENSURE SMOOTH RUNNING PROCESSES IN DRINKING WATER SUPPLY SYSTEMS

Fresh drinking water from the tap is generally a thing taken for granted in Germany. Given the huge reservoirs in this country, be it groundwater or water in lakes and dams, people can usually count on the ready availability of fresh water at all times. However, the massive technological efforts that are sometimes necessary to make this possible only become apparent when suddenly the usual way of doing things has to be abandoned, as the example of the Steinbachtal dam in Rhineland-Palatinate shows.

Ensuring a reliable supply of drinking water requires a high degree of responsibility and attention. But the tasks and responsibilities involved can quickly become even greater, as the Wasserzweckverband (Water Association) Birkenfeld had to learn. This organisation supplies around 80,000 people in the municipalities of Baumholder, Birkenfeld and Herrstein as well as the city of Idar-Oberstein with drinking water. "The heart of our water supply system is the Steinbachtal dam near Kempfeld," explains Daniell Merscher, head of electrical engineering at the water association. With a total volume of 4.8 million m³, the dam ensures the drinking water supply of the entire district; the water comes from a 14.8 km² catchment area, the Ringelfloß and Lochwiese headwater regions as well as the river Steinbach. However, the dam was built in the 1960s and must now be refurbished. "In particular, the bitumen waterproofing in the water change zone has to be renewed, but nowadays such structures also have to meet a multitude of new technical requirements." The problem here: the dam has to be drained, leaving the association with no drinking water of its own for years.

The solution was 32 km distant, in Nonnweiler, in the form of Primstal dam, which has four times the volume of the Steinbachtal dam. The challenge: "Something like this, i.e. connecting two dams, has never been done before in Rhineland-Palatinate," adds Merscher. The investments were correspondingly enormous; among other things, a DN 500 PN 40 pipeline had to be laid and a number of pumping stations built. Altogether, the measures cost around 27 million euros.

A reliable buffer

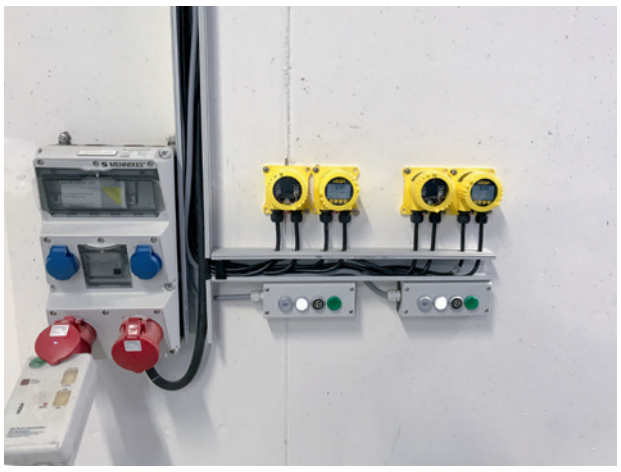
The many high and low points in the mountainous landscape proved to be especially problematic. The water must first be pumped 190 m from the Primstal dam over a mountain and into an intermediate reservoir before it can flow towards Kempfeld. There it is processed directly in the waterworks.

In all of this, supplying drinking water to the population is the top priority. "Many questions had to be answered beforehand, such as what happens if there's a power failure or a pump breaks down, or what do we do if a pipeline breaks," continues Merscher, mentioning just a few points that had to be considered. In addition, one has to take into account that the force of the water column, which acts on the pumping station due to the steep gradient, is enormous. In the event of a pump failure, the water column would suddenly press on the pumping station, delivering a huge blow that could destroy the entire station, including the pumps and the pipeline.

The water association has been working together with VEGA for ten years. Before that collaboration began, pressure transmitters on an elevated tank caused a lot of problems, Merscher recalls. "They were extremely complicated and difficult to operate, and always failed when a voltage surge occurred. Finally we switched to pressure transmitters from VEGA and haven't had any malfunctions since then." So for Daniell Merscher and his team it was clear that they would rely on VEGA's expertise in the upcoming mammoth project. "The measuring instruments simply have to be reliable," says Merscher, putting it succinctly.

A whole array of safety measures were implemented on the new drinking water pipeline. For example, drop weight flaps were installed to prevent damage in case of a pipe break. And to ensure that a power failure would not have any devastating consequences, several pressure chambers were installed at the Primstal dam as well as in the waterworks. These vessels are filled half with water and half with compressed air. If a damage event occurs, the compressed air layer acts as a damper by absorbing the enormous energy of the water column. This prevents mechanical damage to the pumping station and the surrounding components.

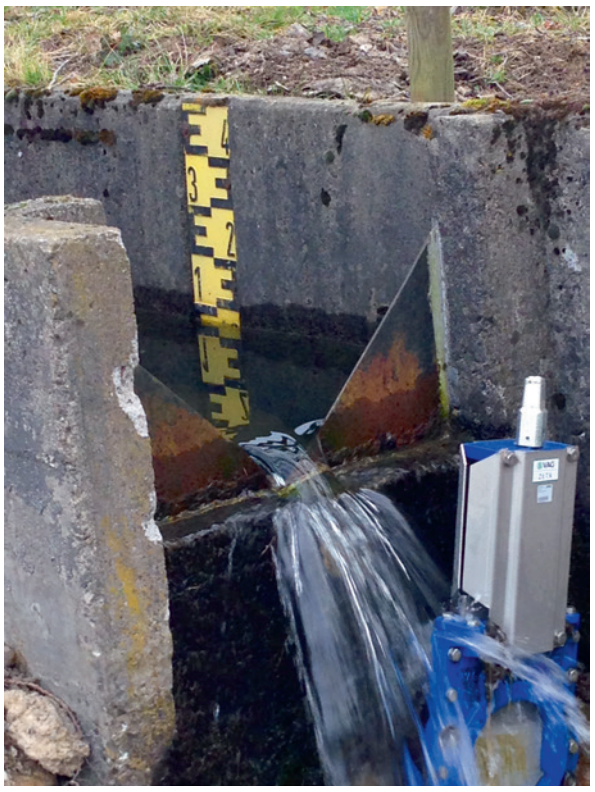
This is where VEGAPULS 64 comes into play, monitoring every one of these pressure vessels. This high-precision radar level transmitter measures the exact level in the pressure vessel contactlessly and reports it to the controller. At the same time, VEGABAR 82 pressure transmitters check the pressure in the vessel and along the entire pipeline and report it too. The correct level is immensely important in ensuring that the damping function works reliably at all times. Because over time, the compressed air diffuses into the water, changing the level. Minor pressure fluctuations are tolerated, but an alarm is issued if a limit value is exceeded. This does not always have to be dramatic, as Merscher explains: "Sometimes air gets into the pipe, which then makes it necessary to increase the pump output to discharge the air." Nevertheless, the measured values from the VEGA sensors are important reference variables for reliable operation of the system.



The measured values from VEGA sensors are important command variables that guarantee reliable operation of the system, and thus a dependable drinking water supply around the clock.

But it is not only the radar measurement technology and the pressure transmitters that ensure safety and reliability. At the same time, the pressure upstream and downstream of every pump is measured to ensure a smooth-running process, i.e. of the pump and the pipeline. The residents of the Birkenfeld district ultimately depend on this drinking water supply. A monitoring system independent of the internal safety functions of the pump adds even more security.

The high-precision radar level transmitter VEGAPULS 64 measures the level in the pressure vessel contactlessly and reports it to the control system.



The flow in the open channel is measured by means of a V-weir at the inlet. VEGABAR 86, an immersible pressure transmitter for level measurement in wells, basins and open vessels, is used here.

Since no power connection is available at this location, the measured values are recorded every hour by a PLICSMOBILE T81 with accumulator and solar panel and forwarded to VEGA Inventory System.

All data are displayed in the respective control cabinets by the external, digital indicating and adjustment unit VEGADIS 82. If the location of the sensor makes it necessary, the measurement data can also be displayed remotely via the display and adjustment module PLICSCOM. "We also tried displaying measurement data at the Primstal dam via Bluetooth. It works perfectly and makes maintenance a lot easier," points out Merscher. He especially appreciates the simple adjustment and operation of VEGA sensors: "They are intuitive to use, and thanks to the plain text display, you know exactly what to do – setup and adjustment is so easy!"

Future-oriented supply

Even before the renovation began, VEGA had been involved in setting up a measuring station of a different kind. The Steinbachtal dam is fed by three streams. The quantity of water these three tributaries brought in was measured for a long time by old analogue chart recorders without data transmission. Especially in view of climate change, the amount of water flowing into the reservoir will play an important role in the future. For that reason the water association decided to record the flow in the inlets continuously. But not every inlet has a power connection on site. Nevertheless, VEGA was able to offer an elegant solution here. The flow in the open channel is measured by means of a V-weir at the inlet. VEGABAR 86, an immersible pressure transmitter for level measurement in wells, basins and open vessels, was chosen for the task. The measured values are recorded every hour by a PLICSMOBILE T 81 with accumulator and solar panel and transmitted to VEGA Inventory System. That is a web-based software hosted by VEGA and designed specifically for data acquisition and visualisation of level data, e.g. in storage tanks and silos. VEGA takes over responsibility for acquisition, visualization and archiving. The association also reads in the quantity balances every month, which is particularly interesting for future water management concepts. Merscher finds it to be a very pragmatic solution. "Previously, there was a paper roll recorder at each inlet. The paper lasted exactly one week. You always had to be there on time," says Merscher with a chuckle. The current solution, which has already been in use for three years, is ideal wherever there is no electricity or data transmission line available, such as a well in the forest. "We had to specify how often we needed the data, what data had to be sent, and what measurement unit the data had to be in. When that was done, our work with that particular task was finished," adds Merscher in conclusion.

The upshot: All work is currently focused on preparations for the trial run of the new pipeline, which is scheduled to go into operation in mid 2019. Since a project like this is new to everyone involved, many new processes and procedures have to be introduced. For example, various adjustments have to be made, malfunctions simulated and emergency concepts drawn up. Even after the renovation it will still be possible to obtain water from the Primstal dam. The list of things to do is very long at the moment, so Merscher is happy about every component that works reliably, like the VEGA sensors.

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