Reliable Water-Quality Monitoring and Efficient Process Control using state-of-the-art Sensor Technology and Real-time Data Validation

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Most applications related to water, such as drinking water treatment, drinking water distribution or waste water treatment do not only consume significant amounts of limited and valuable resources but are also crucial for health and safety of people and the environment. For operators of water related facilities, it should therefore be a natural interest to know as well as possible the actual status of the installation and the processes taking place. To perform monitoring and control in an optimal way requires a huge number of measurement values that are continuously refreshed. Until recently, the only way to get reliable online data was by the use of hugely expensive chemical analyzers. As a result, real time measurements have remained limited to a small number of the most basic parameters.

With the arrival of a new generation of low-cost and low maintenance sensors, a global trend towards large scale, high resolution water quality monitoring networks can be observed. The largest networks today consist of several 100 monitoring stations. It will, however, not be long before networks with several 1000 stations will become a reality. What was an unrealistic vision only 5 years ago is becoming a reality today. The availability of spatially resolved, highly dynamic and accurate data establishes a radically new basis of information for water managers and decision makers. With this new flood of information, new challenges arise, first and foremost how to ensure quality control and how to validate this huge flow of data. A further challenge consists in the aggregation of all these data into simple and useful information.

The need for quality controlled and validated operation of sensors was first identified in process control applications where drifting sensors cause unnecessary costs. The need became urgent in alarm- , event detection- and water security systems that will constantly cause false alarms using unreliable and poorly-documented sensor data. Previously, sensor and controller software has not adequately addressed any of these needs. It therefore happens regularly that measurement results cannot be interpreted as a result of sometimes very basic but untraceable causes, and full advantage from the potential wealth of information is not obtained.

This contribution demonstrates that well organized sensor and station management in combination with online data validation is a prerequisite for the successful operation of any substantial network of online sensors. Furthermore, the operational benefits of these tools will be shown through examples from installed sensor networks.

About the speaker: Helmut Lindner received the Mag. and Dr. degree in chemistry in 1997 and 2003, respectively. Since 2000 he is working in the field of developing analytical instrumentation. The starting point was spectroscopy (VIS, FTIR) instrumentation and application for the petroleum industry. After that he focused on non-ambient chambers for SAXS and x-ray diffraction. He is currently with "scan Messtechnik GmbH", Vienna, as Head of R&D. The topics are online fresh and waste water analysis and event detection. His research interests are standardization and process control.