



inovex

Case Study

KROHNE

Industrial Internet of Things

Innovative data analytics solutions

- ✓ An IIoT platform for greater safety and efficiency
- ✓ Agile project implementation with SCRUM
- ✓ First use case implemented

KROHNE

Abstract

What do breweries, mining, and water management have in common? Experts in measuring technology KROHNE Messtechnik GmbH link these three industries – as well as many others. KROHNE provides the measuring equipment required by many companies to monitor their handling of all the liquids, gases, and solids they require and to ensure their appropriate use.

KROHNE has now partnered with inovex to develop a platform which uses the Internet of Things to collect data from these measuring instruments and make it locally retrievable. The companies are also deploying state-of-the-art machine learning technology to automatically detect system errors and anomalies.

An IIoT platform for greater safety and efficiency

What do breweries, mining and the water industry have in common? At the expert for measuring technology, KROHNE Messtechnik GmbH, these three and many other industries come together. KROHNE provides the necessary measuring instruments for many industries, which monitor the handling of all required liquids, gases and solids in the respective companies and ensure their intended use.

KROHNE, a long-established company based in Duisburg, Germany, has been providing its customers with measuring solutions for all types of liquids, gases, and solids for over 100 years. While industry requirements have not fundamentally changed during that time, they have expanded significantly. Today's measuring solutions still have to ensure the maximum possible degree of process reliability and availability. Equipment errors can lead not only to lower production output and thus to loss of revenue, but also, in extreme cases, to the failure or damage of critical infrastructure. Accurate, robust, and safe measuring instruments are indispensa-

ble for the rapid, early detection of such scenarios.

Modern data analytics solutions guarantee even more security, efficiency, and stability for KROHNE's customers and offer a useful and often necessary supplement to the company's proven range of high-tech measuring equipment.

The company has therefore partnered with inovex to develop an Industrial Internet of Things (IIoT) platform. This platform not only enables the measurement data from the KROHNE devices to be collected at a central point and made locally available to all users, it also enables errors in the system to be detected automatically using state-of-the-art machine-learning technology.

This has resulted in an intelligent, innovative extension of existing measuring solutions which will, in future, not only merge and display measurement data for this initial use case, but also detect anomalies in operation.



Building on joint project successes

KROHNE and inovex can already look back on a longer-term partnership. During the Service-Meister research project (<https://www.service-meister.org/>), the companies worked together to develop an AI-based service platform for medium-sized firms. This platform uses AI methods to analyse sensor data, predict faults, and optimise the deployment of specialist staff. Chatbots serve as an interface between the systems and service staff to facilitate the simple, intuitive querying of all relevant information. This enables even service technicians without years of extensive training to reliably identify and remedy problems with industrial equipment.

An agile project implementation with SCRUM

The companies' successful collaboration on the Service-Meister project gave rise to their idea of developing a separate IIoT platform for KROHNE.

inovex provided KROHNE with a complete Scrum team for the project, including developers for the frontend, backend, and IT infrastructure, as well as data engineers, UI/UX designers, and a Scrum Master. A KROHNE employee served as Product Owner to ensure that all busi-

ness requirements were communicated to the Scrum team and prioritized.

At the beginning of the IIoT project, the rough scope of the project and the individual project phases were defined in joint workshops. From the initial project idea through the creation of a proof of concept (PoC) to a minimum viable product (MVP), a solution was created which harnesses state-of-the-art technologies to collect, process, and visualize data from measurement sensors in the cloud and uses machine learning (ML) to analyse it on a deeper level.

The IIoT solution complements KROHNE's product portfolio

This IIoT platform represents a strategically important and logical step towards the digitalization of KROHNE's product portfolio.

Connecting the measuring instruments to a cloud-based IIoT platform creates many new use cases which, combined with data analytics, make the stable, secure, and efficient operation of KROHNE's customers even easier, thus increasing their long-term sustainability.

Because solution sustainability is an important factor in all areas, the project teams analysed and compared various cloud providers during the early PoC phase.

The KROHNE solution was deliberately developed without vendor lock-in. This prevents KROHNE from being tied to a specific cloud provider and ensures that switching to other cloud solutions or using third-party providers from the cloud can be achieved easily and flexibly.


KROHNE and inovex also paid particular attention to data protection and to ensuring that the cloud-based solution can be operated in compliance with the GDPR.

The Microsoft Azure cloud infrastructure was therefore chosen as the basis for the platform. It both fulfils the framework conditions laid down by KROHNE and provides the technical prerequisites necessary to expand the solution flexibly in future. It can also be easily supplemented with further Azure services if required.

First use case implemented: water management

The first use case that emerged from the inovex/KROHNE collaboration, an important water management project, has already been successfully implemented. To ensure greater safety and efficiency, KROHNE and inovex equipped the measuring instruments with edge gateways and connected them to the IIoT platform.

The platform begins with a data analytics solution for monitoring flow in water distribution networks. This solution is used, for example, to detect water loss. The data for the analysis is transferred from the edge gateways to the central platform via the mobile network and then is clearly displayed in a user dashboard.



We worked with the inovex team to successfully expand our offering through new digital services. In addition to our measuring instruments, we can now also offer our customers decentralized monitoring of their infrastructure. It's safer, clearer, and more cost-effective.

— Daniel Schmitz, Business Development Manager, KROHNE

As well as the obvious economic advantages of this scenario in eliminating what is known as “non-revenue water”, the solution’s sustainability is also a factor. After all, detecting leaks in the water supply faster and earlier helps conserve this precious natural resource.

Key technical data

Edge gateways are connected to instruments measuring (among other things) water flow, temperature, and pressure. These gateways collect data and transmit it to the IIoT platform using the MQTT protocol. The collected data is represented graphically and archived and can be used to trigger alarms if certain thresholds are exceeded or not met.

At the same time, state-of-the-art machine-learning technologies perform data analysis in order to automatically notify the appropriate water supply company of any anomalies. This enables problems to be identified and resolved at an early stage, a must in such critical infrastructures as the water supply.

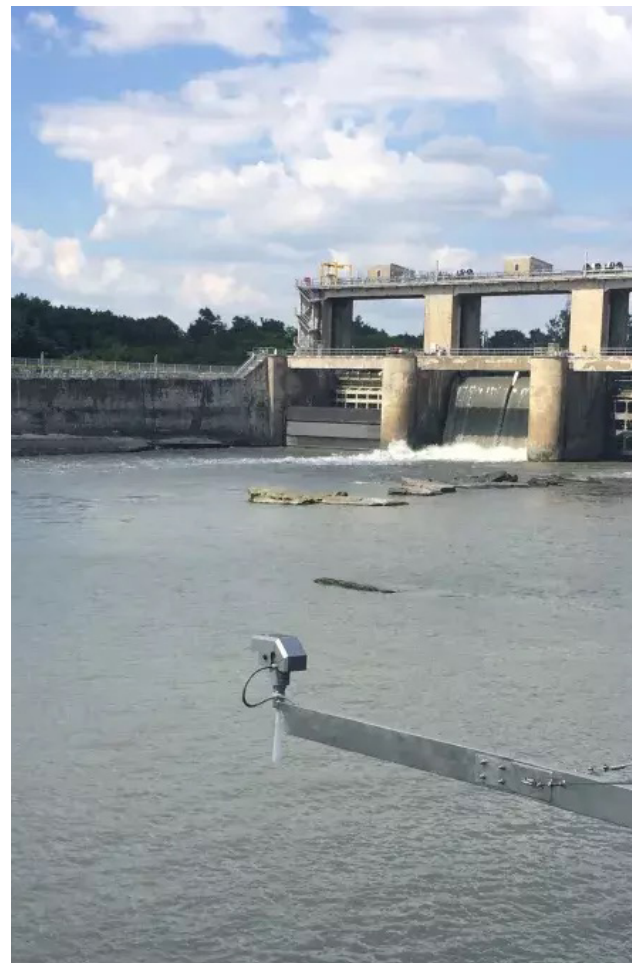
The necessary infrastructure was provided by inovex using Azure Kubernetes Services, and updates are performed automatically. inovex developed the required backend services in .NET, and Angular formed the basis for the frontend. HiveMQ is used as the MQTT broker.

KROHNE measures the facts – prepared for the future

Using the IT infrastructure described above, KROHNE and inovex have successfully set up an IIoT platform that ensures greater security, efficiency, and sustainability in the water supply.

This is the first use case for this particular infrastructure, which has the potential to be further developed for use in additional scenarios in other areas and industries.

With this joint project, KROHNE has taken another major step towards the digitalization and diversification of its already extensive product portfolio.



inovex is an IT project center driven by innovation and quality, focusing its services on 'Digital Transformation'.



Over 450 IT experts provide comprehensive support to companies in making their core business digitised and agile and in the implementation of new digital use cases.

The solutions we offer include Application Development (Web Platforms, Mobile Apps, Smart Devices and Robotics – from UI/UX design to Backend Services), Data Management and Analytics (Business Intelligence, Big Data, Searches, Data Science and Deep Learning, Machine Perception and Artificial Intelligence) and the development of scalable IT infrastructures (IT Engineering, Cloud Services), within which the digital solutions are operated in DevOps mode. We modernise existing solutions (Replatforming), strengthen systems against external attacks (Security) and share our knowledge through Training and Coaching (inovex Academy).

inovex has locations in Karlsruhe, Pforzheim, Stuttgart, Munich, Cologne and Hamburg and is involved in projects throughout Germany.



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