CloudRAIL

nexineer
digital GmbH
the digital company of the KAMAX group

KAMAX

▶ How KAMAX connected their industrial machines to AWS in hours instead of weeks

- Implemented real-time condition monitoring in the production of an automotive supplier for high-strength fasteners

- The IIoT integration automated a manual piece counting process and saved 3.5% of total operator time

- Production machines are interconnected with AWS services, dashboards and SAP ERP systems

The Customer

KAMAX is a leading manufacturer of high-strength fasteners and form parts for the mobility industry and beyond. With 20 locations in the three leading economic regions of Europe, America and Asia, KAMAX is a key supplier for almost all major automotive manufacturers and suppliers worldwide. A comprehensive and unique product range allows tailor-made solutions that are perfectly coordinated for every requirement.

The Nexineer digital GmbH is the digital incubator of the KAMAX Group. Building on it's smart factory platform, Nexineer rapidly prototypes and scales digital solutions all across the manufacturing process to enable lean and zero-waste production.
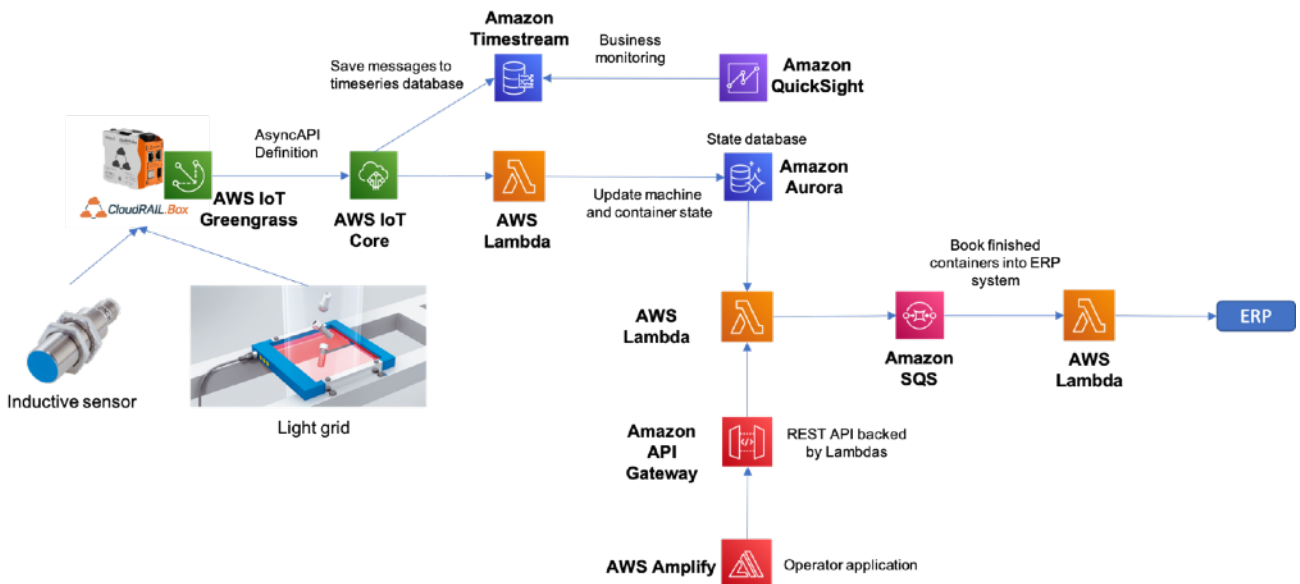
The Challenge

KAMAX aims to set standards in the areas of manufacturing innovation, quality, and profitability. To remain competitive while still increasing profits, KAMAX wanted to take advantage of advanced technologies that were unavailable when their plants were built. KAMAX and nexineer theorized that an Industrial IoT (IIoT) solution would help better manage and report on production output, better manage order fulfillment accuracy and could also increase production output by automating manual tasks. This would allow them to assign skilled operators to higher value tasks, a benefit in the current tight labor market. So, their search for an IIoT solution began.

KAMAX manufactures fasteners and complex formed parts for mobility and beyond. A cold heading machine at KAMAX produces an average of 2 bolts per second, which fall directly from the machine onto a conveyor belt. Output was not tracked or managed in real-time, but relied on periodic bulk weight measurements. This entailed transferring the produced pieces in large containers across the factory to the scale. The manual weighing process took roughly 3 minutes and was done up to 16 times per shift in just one production facility. Not only was this process time consuming, it hindered KAMAX's ability to gain real-time insights into their production output, which delayed reporting by up to 60 minutes.

The Approach

KAMAX's goal was to eliminate the labor-intensive manual inventory count and redirect those employees and their efforts to higher value production tasks as well as to enable remote monitoring of their machines for production-related issues. KAMAX intended to count the bolts as they are produced rather than estimate the number by weighing them afterwards.

nexineer's leadership narrowed its evaluation down to two types of potential solutions: either a camera-based system or a sensor-based system. Although the camera-based system worked well with a high degree of accuracy, it proved to be too high of an investment within the constraints of this project, from the initial startup costs to running costs and ongoing maintenance costs. In addition, a camera-based system posed many concerns and potential hurdles with the German labor unions and European data protection laws (GDPR), specifically regarding recording images of people working within a factory environment and privacy issues associated with that.

nexineer's next move was to evaluate a sensor-based solution. They thought that collecting operational technology (OT) data from sensors and migrating it to AWS might be difficult and require additional investments in personnel and expertise. However, in collaboration with AWS and CloudRail, they learned this was not the case. To count the number of bolts, the machine was retrofitted with a light grid sensor that could detect a new object every 0.2ms. CloudRail's edge gateway provided a quick, secure, and efficient OT to AWS connectivity solution allowing KAMAX to connect their first machine and send piece counting data to AWS in a matter of hours.

KAMAX's maintenance team installed the high-resolution light grid sensor on the machine. The sensor let them detect objects as small as 2 mm and conduct complex volume calculations with maximum precision and reliability. From there, the KAMAX team set up the CloudRail.Box gateway in a nearby cabinet along with an IO-Link Master and supplied it with internet access. Through the CloudRail Device Management Cloud (DMC), they completed the remote setup and configuration in minutes without requiring any IoT experts onsite.

The CloudRail.Box gateway additionally runs AWS IoT Greengrass to prepare the time series data before sending it to AWS IoT Core. Once in AWS IoT Core, KAMAX used AWS Lambda functions to generate production count KPIs and to monitor the overall machine performance. This data was shared through a mobile application, built using AWS Amplify, for production staff, and pushed into the SAP Enterprise Resource Planning (ERP) system through REST APIs for order fulfillment. With these changes KAMAX can now count exactly how many products are associated with each order vs estimating based on the weight as done before.

The Results

KAMAX saw several significant benefits after implementing the monitoring systems. First, the near real-time condition monitoring of the machines allowed operators to handle production-related issues proactively versus reactively. This freed up 2.5% – 3.5% of the operators' time for higher value tasks. Second, KAMAX used the real-time insights to schedule the forklift routes (used to resupply the machines with raw materials and transport the produced goods to the next process step), further reducing unproductive waiting times. Third, the accurate real-time product tracking within the entire supply chain has allowed KAMAX to improve how they plan production operations, something that was not possible with the old, manual weighing process.

CloudRail's fleet management capabilities that allow remote security patches combined with AWS' Well-Architected Framework will ensure that the solution continues to operate reliably and securely.

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> The combination of AWS and CloudRail enable our development teams to setup and validate new use-cases within hours instead of days and weeks. With the heavy lifting of data ingestion taken away, they can focus on building applications and processes that bring the business forward instead of fighting with infrastructure topics. Together with the operational excellence AWS brings to the table, we can easily move these solutions forward and scale them throughout the whole global organization. With AWS and CloudRail we can live out our passion, to create lean, creative and successful digital solutions.
> Tobias Haungs, Managing Director of nexineer digital GmbH

For more information, visit
https://cloudrail.com