

KAMAX transforms machine connectivity: AWS integration achieved in hours with CloudRail

Case Study

Customer

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

Nexineer Digital GmbH is the digital incubator of the KAMAX Group. Building on its smart factory platform, Nexineer rapidly prototypes and scales digital solutions across the manufacturing process to enable lean and zero-waste production.

Challenge

KAMAX aims to set standards in manufacturing innovation, quality and profitability. To remain competitive while increasing profits, KAMAX sought to leverage advanced technologies that were unavailable when their plants were built.

KAMAX and Nexineer theorized that an Industrial Internet of Things (IIoT) solution would help better manage and report on production output and improve order fulfillment accuracy. Additionally, they believed it could increase production by automating manual tasks.

To remain competitive while increasing profits, KAMAX sought to leverage advanced technologies that were unavailable when their plants were built.

This would allow them to assign skilled operators to higher-value tasks, a significant benefit in the current tight labor market. Thus, 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 two 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 process involved transferring the produced pieces in large containers across the factory to the scale. The manual weighing process took roughly three minutes and was done up to 16 times per shift in just one production facility. This time-consuming process hindered KAMAX's ability to gain real-time insights into their production output, delaying reporting by up to 60 minutes.

CloudRail's edge gateway offered a rapid, secure and efficient OT to AWS connectivity solution. This enabled KAMAX to connect their first machine and transmit piece counting data to AWS within hours.



Solution

KAMAX aimed to eliminate the labor-intensive manual inventory count and redirect those employees to higher-value production tasks. They also wanted to enable remote monitoring of their machines for production-related issues. KAMAX intended to count the bolts as they were produced rather than estimate the number by weighing them afterward.

Nexineer's leadership evaluated two potential solutions: a camera-based system or a sensor-based system. Although the camera-based system worked with high accuracy, it was too costly for this project, considering initial startup, running and ongoing maintenance costs. Additionally, the camera-based system raised concerns with German labor unions and European data protection laws (GDPR). These concerns were particularly related to recording images of people working in a factory environment and associated privacy issues.

Nexineer's next move was to evaluate a sensor-based solution. They initially 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 0.2 milliseconds.

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KAMAX's maintenance team installed the high-resolution light grid sensor on the machine. The sensor allowed them to 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 Input-Output-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 also runs AWS IoT Greengrass to preprocess time series data before sending it to AWS IoT Core. AWS IoT Greengrass is an open-source edge runtime and cloud service designed to help build, deploy and manage intelligent device software.

Once in AWS IoT Core, KAMAX utilized AWS Lambda functions to generate production count Key Performance Indicators (KPIs) and monitor overall machine performance. AWS Lambda is a serverless compute service that allows to run code without provisioning or managing servers.

This data was shared with production staff through a mobile application built using the development platform AWS Amplify and integrated into the SAP Enterprise Resource Planning (ERP) system via Representational State Transfer (REST) APIs for order fulfillment.

With these changes, KAMAX can now accurately count the number of products associated with each order, rather than estimating based on weight as done previously.

CloudRail has joined Belden's Automation Solutions (AS) business, which includes prominent brands like Hirschmann, ProSoft Technology, OTN Systems and Lumberg Automation. The combination of CloudRail's strengths in data acquisition and cloud connectivity with Belden's expertise in industrial networking and edge computing creates a comprehensive networking infrastructure solution. This synergy enhances automation and digitalization efforts, providing seamless connectivity from sensors to the cloud.



Results

KAMAX experienced several significant benefits after implementing the monitoring systems:

Proactive issue handling: Near real-time condition monitoring allowed operators to address production-related issues proactively, freeing up 2.5% – 3.5% of their time for higher-value tasks.

Optimized forklift routes: Real-time insights enabled KAMAX to schedule forklift routes more efficiently, reducing unproductive waiting times by ensuring timely resupply of raw materials and transport of produced goods.

Enhanced production planning: Accurate real-time product tracking throughout the supply chain improved production planning, a significant upgrade from the previous manual weighing process.

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

With AWS and CloudRail by Belden, customers enjoy faster connection to innovative, reliable and seamlessly integrated solutions that scale effortlessly to meet their needs, delivering exceptional value and a superior experience.

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