Stromag Trials Next Generation IIoT 'Smart' Gantry Crane

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The monitoring of key assemblies and components on cranes has been standard practice for some time now. However, crane operators have a desire to utilize collected data to extend maintenance intervals and boost crane availability. To achieve this, Duisport turned to Stromag to trial a new intelligent crane monitoring system utilizing Industrial Internet of Things (IIoT) technology at the world’s largest inland port. If successful, the pilot program could herald the arrival of the ‘smart’ crane.

Stromag’s service team commissioning the intelligent crane monitoring system utilizing Industrial Internet of Things (IIoT) technology at the world’s largest inland port.

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A new concept

Ensuring profitability in logistical operations relies on efficient handling and transfer of cargo. With ships and trains arriving almost constantly, delivering and receiving cargo, quick transfer is imperative for achieving schedules and fulfilling contracts. Any delay can cause a knock-on effect through the supply chain, forcing port operators to play catch-up. Therefore, ensuring that cranes operate reliably between scheduled maintenance periods is exceptionally important for logistical efficiency.

Stromag is a global supplier of braking and power transmission solutions to the crane market. Heavily involved in providing specialized, high-performance systems for gantry/port cranes and knuckle boom cranes – Stromag is a world leader in crane technologies.

Stromag, a leading brand of Altra Industrial Motion Corp., was looking to develop a new concept by combining its world-class products with the latest IIoT technologies, as Christian Klein, IP Global Product Manager at Stromag, explains: “For some time, we have wanted an opportunity to combine our products for the crane market with IIoT technology to produce a ‘smart’ crane. The desire is to rationalize data automatically via models hosted on the cloud, so we can gain an insight into how this data can be used to extend maintenance intervals and boost crane availability. The Duisport Crane Authority provided us with the perfect opportunity to trial these new technologies in the field.”

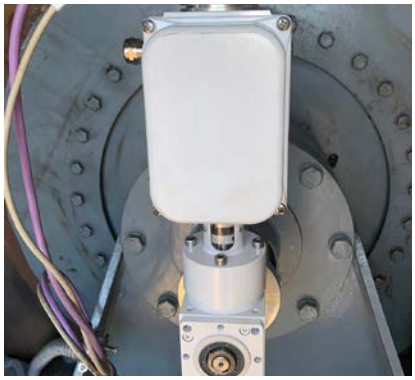
Building a smart crane

In conjunction with Duisport personnel on the ground, Stromag set about installing new systems on a gantry crane located in the container terminal. Another crane of exactly-the-same specification was kept in original specification as a benchmark for the new system. Stromag provided free components, while Duisport organized equipment, mobile cranes and operatives.

The brakes for elevation, the mounted winch and hoist were all replaced. Geared cam limit switches matched with encoders were installed, which provided data on position, speed, overspeed and possible faults. Hydraulic power units (HPUs) were fitted with

intelligent controls. The main aim was not to influence the normal operation of the crane, to ensure accurate real-world results.

A PLC installed on the crane communicates with an external PLC, providing recommendations to operators via a dashboard. Soon, additional systems will be installed to provide data on wind speed, temperature and other environmental factors. The crane is currently undertaking a three to six-month data collection period, a 'learning' phase, which will provide enough information to inform maintenance strategy.



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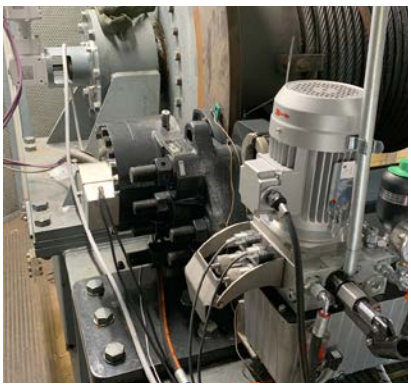
Going beyond monitoring

However, the capabilities of the system go well beyond simply monitoring for faults, Christian enthuses: "The problem with traditional monitoring is that it only gives data on downtime, which for a port, is far too late. Once we have a sizable sample of data uploaded to the cloud, we can start rationalizing it intelligently to proactively influence maintenance. We will utilize a modular-based modelling program to achieve this. "When complete, we can rely on artificial intelligence (AI) to identify parameters that affect the performance of key systems on the crane, which allows for highly-targeted predictive maintenance scheduling. This will eventually promote uptime and logistical efficiency for Duisport".

This global development of IIoT technology for gantry cranes also offers the possibility of next generation maintenance support. By utilizing augmented reality (AR) models of the crane and its systems, informed directly from data collected on-site, Stromag is aiming to provide remote maintenance support to Duisport further down the line. In the future, data models will be combined with an intelligent e-commerce platform to streamline the procurement of replacement parts or components inventory. By utilizing virtual reality (VR) headsets and these highly accurate models, Stromag can offer a new service approach too.



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Realizing the future

Christian explains the future of the trial: "Our development of IIoT technologies at the Port of Duisburg has the option for expansion. The Crane Authority has been incredibly supportive and open during the trials, providing us with an opportunity to demonstrate how new 'smart' technologies can be applied to cranes. If we can prove a tangible benefit during this pilot program, we will continue to work together to maximize the availability and extend the maintenance intervals of cranes operating on-site."

By utilizing the IIoT in gantry cranes, Stromag is setting a new standard. Using monitoring systems, in conjunction with models

hosted on the cloud, the business is exploring the opportunities interconnectivity and AI can provide for proactive crane maintenance. This promises to avoid unplanned downtime via predictive maintenance procedures, while simultaneously improving overall system performance. For operators utilizing hundreds of cranes in application environments where efficiency and equipment uptime is all-important – it's time to take notice.

The Stromag package of products included a TDXB thruster service disc brake, a SHC18 spring-applied, hydraulically-released emergency disc brake, a hydraulic power unit (HPU), a Series 51 geared cam limit switch combined with a bevel gearbox, a disc and hub assembly and a SIMAN IIoT monitoring system.

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P-8867-SG 11/20