CUSTOMER CASE STUDY

Predictive maintenance transforms crane operations

Çolakoğlu Metalurji – colakoglu.com
Industry - Mining, Minerals & Metals (Steel Manufacturing)

Challenges

- Lack of visibility of crane parameters and prediction of anomalies
- Non-continuous crane operations made t raditional monitoring ineffective
- High risk of operational disruption and production loss

Solution

- Implemented existing AVEVA™ Predictive Analytics integrated with SCADA and IoT sensors to enable event-driven anomaly detection and proactive maintenance for non-continuous crane operations.

Results

- Eliminated unexpected crane wheel failures, reducing them to nearly zero over time
- Prevented approximately 350 tons of steel production loss
- Optimized maintenance interventions based on actual asset condition
- Improved operational safety and continuity

Çolakoğlu Metalurji, a leading steel manufacturer in Turkey, began operations in 1960 and is now focused on driving efficiency and productivity through digitalization. Its production process uses electric and ladle furnaces to melt steel, followed by slab and billet casters to shape it. The output—steel slabs—is either shipped directly to customers or further processed on-site into coils and rebar.

AVEVA

Unplanned crane failures led to production losses

At the heart of these operations are two melt shop cranes, each with a 500-ton capacity. These cranes are essential for maintaining seamless production. Any failure can cause operational disruptions, complications, or the need to divert melts, resulting in significant production losses. Proactive problem identification was therefore critical.

Çolakoğlu operates critical cranes under irregular, non-scheduled conditions, making failures difficult to predict. To address this challenge and prevent unplanned downtime and production losses, the company partnered with AVEVA to implement predictive maintenance tailored for intermittent operations.

> "Identifying problems before they occur and resolving those issues in a planned manner is crucial to increase the operation time of the melt shop."
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> **Özgür Özsoy**
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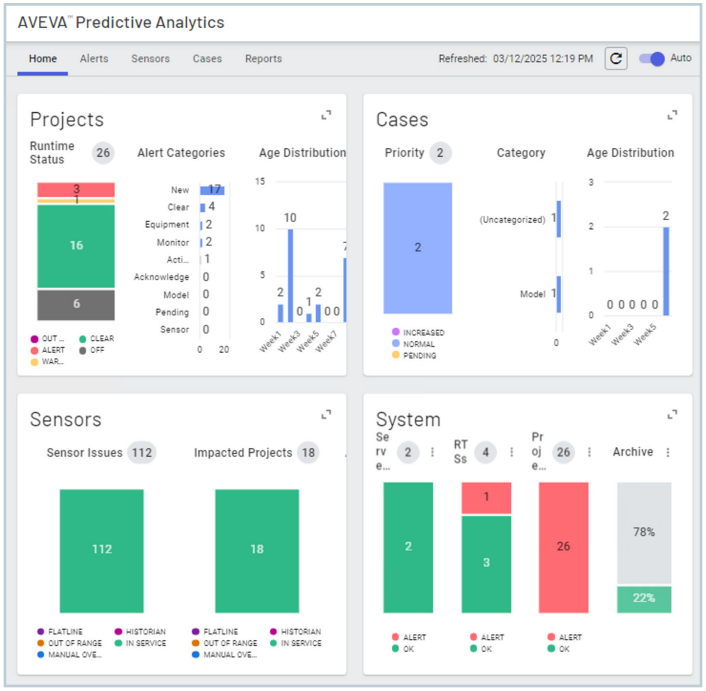
> Plant Director, Çolakoğlu Metalurji

Intermittent crane operations needed smarter monitoring

Unlike continuously running equipment, melt shop cranes operate intermittently, making conventional monitoring approaches ineffective. Failures often occurred without warning, halting production and triggering costly emergency repairs. Each breakdown meant lost hours, increased costs, and heightened safety risks for operators and maintenance crews.

The stakes were high. A single crane failure could disrupt the entire material flow, impacting throughput and delivery schedules. Operating critical cranes in a non-continuous, unscheduled environment created a significant visibility gap. Without real-time monitoring, minor issues could escalate into major failures, increasing operational risks and downtime.

This was a unique challenge because AVEVA Predictive Analytics is traditionally applied to 24/7 continuous production systems such as fans, pumps, or compressors. But in this case, the analytics needed to be implemented for cranes with operations that were non-continuous and often unscheduled. Çolakoğlu needed a smart approach that could adapt to intermittent operations and deliver actionable insights before failures occurred.



AVEVA Predictive Analytics implemented to cranes

Accurate data for reliable predictive monitoring

To address these challenges, Çolakoğlu implemented AVEVA Predictive Analytics to crane operations, integrating it seamlessly with SCADA, ensuring accurate, high-quality data for reliable predictions. Wireless communication sensors were installed on casting and slab cranes' online condition monitoring systems, enabling real-time data capture.

The deployment began with a detailed analysis of crane operations and historical failure patterns. AVEVA's team collaborated closely with Çolakoğlu engineers to define critical parameters, configure event-driven triggers, and train predictive models. Thanks to AVEVA's no-code environment, the configuration was completed quickly without burdening internal IT or data scientist teams.

A modular model design divided each crane into six primary components for targeted evaluation: two electrical motors and four bridge components. Electrical motors were monitored for critical parameters such as motor speed, temperature, and bearing vibrations (velocity, acceleration, and defect coefficient), while bridge wheels were analyzed for temperature and condition to detect overheating and predict potential failures.

Instead of relying on static thresholds, the system employed advanced algorithms like locality sensitive hashing (LSH) to cluster training data and flag real-time deviations from healthy operating patterns. Additionally, the overall model residual (OMR) metric quantified differences between predicted values and actual sensor data, providing precise anomaly detection. To accommodate the irregular and short-duration nature of crane operations, an event-based evaluation strategy was introduced: each event consisted of five consecutive data points, triggering an alarm if three out of five were unhealthy—minimizing false positives.

This architecture ensured data was captured only when cranes were active, reducing noise and focusing on meaningful operational events. Predictive models trained on historical and live data enabled early anomaly detection, allowing maintenance teams to act before issues escalated.

"AVEVA Predictive Analytics predicted failures successfully."

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Özgür Özsoy
Plant Director, Çolakoğlu Metalurji

Unexpected crane failures eliminated

The implementation of AVEVA Predictive Analytics delivered remarkable results. Unexpected failures of crane wheels were completely eliminated, bringing the number of unplanned breakdowns down to zero. By providing timely and actionable insights, the system helped Çolakoğlu Metalurji prevent nearly 350 tons of steel production loss (348.1 tons).

The predictive capability was demonstrated in a specific case: the system detected rising OMR values on the bridge, triggering an alarm. Engineers traced the anomaly to two wheel temperature sources that were causing the OMR increase. A forecast study predicted a moderate risk for another wheel, estimating failure within approximately 15 days. Maintenance was scheduled and the wheel was replaced during planned downtime. Upon disassembly, flaking damage was found on the inner ring of the bearing, confirming the accuracy of the AVEVA system's prediction.

Beyond technical success, the project overcame initial resistance to change, ensuring maintenance teams adopted predictive insights for proactive decision-making. By driving efficiency and sustainability through digitalization, Çolakoğlu Metalurji A.Ş. is now leading the way in predictive maintenance—even in challenging, non-continuous operational environments.

"Nearly 350 tons of steel production loss was prevented."

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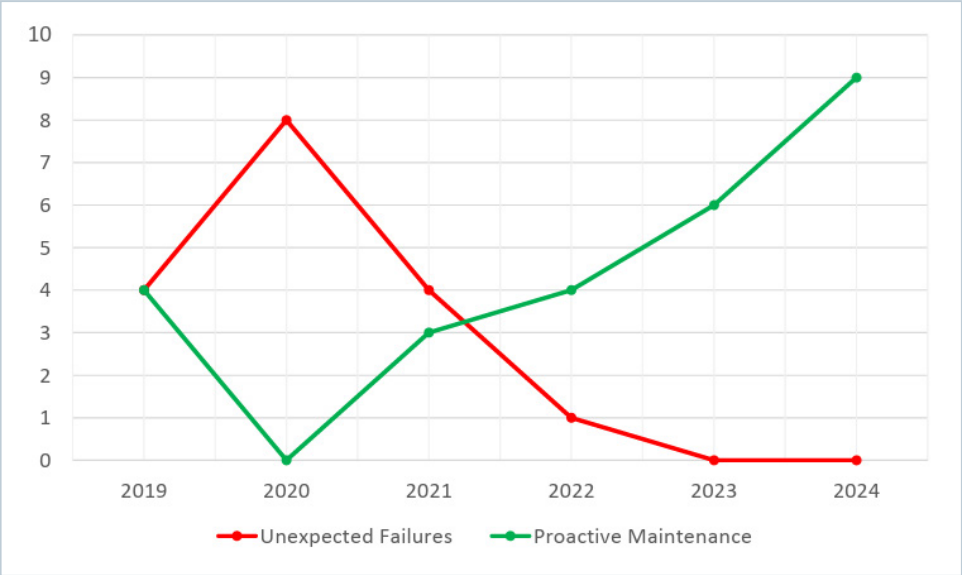
Özgür Özsoy
Plant Director, Çolakoğlu Metalurji



Wheel failure records of a crane over the years

More predictive maintenance planned

Building on this success, Çolakoğlu Metalurji plans to expand predictive maintenance across other critical assets, including rolling mills and conveyor systems, to achieve plant-wide reliability. The company is also exploring AVEVA's Advanced Analytics and AI-driven optimization tools to unlock deeper insights, optimize production schedules, and further enhance operational performance. By continuing its digital transformation journey, Çolakoğlu is positioning itself as an industry leader in efficiency, safety, and sustainability.

"We want to be the driver of digitalization in the steel industry."

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Özgür Özsoy
Plant Director, Çolakoğlu Metalurji

Citation:

Özsoy, Özgür. "ÇOLAKOĞLU Metalurji A.Ş.: Predictive Maintenance for Industrial Cranes – Implementing Event-Driven Analytics to Reduce Downtime." aveva.com/en/perspectives/presentations/2025/-olakoglu-metalurji-a-s---predictive-maintenance-for-industrial-cranes---implementing-event-driven-analytics-to-reduce-downtime