LIFE EXTENSION FOR A SHIPLOADER WITH AKSELOS DIGITAL TWIN

Case Study
This operating context offers decision makers a roadmap to manage risks and ensure assets continue to operate safely.

As a key solution, Akselos Integra creates an incredibly detailed, analysis-ready digital twin, a fully-detailed model of the equipment. With the software’s component-based modeling approach, engineers can incorporate relevant inspection data such as cracks, corrosion, and damage into the Akselos digital twin model for a level of detailed analysis that today’s conventional finite element analysis tools can’t offer. This allows engineers to analyze their equipment’s function and determine its structural integrity. They can run any number of what-if studies to evaluate the equipment’s risks of failure, find the best maintenance schedule to minimize unplanned downtown, and determine how best to maintain the equipment.

Can’t Afford a Breakdown

With an Akselos Digital Twin, owners can extend the life of their machines for years, making a crucial difference to a company’s bottom line.

Take the example of a shiploader owned by a major operator in the mining industry. The huge machine had been at work around the clock for 35 years. Its owner couldn’t afford for this piece of equipment to break. A breakdown would mean $300,000 in revenue lost hourly. And it could put staff in danger.

But after years of operation, the shiploader was showing its age. It had accumulated its share of rust, cracks, dents, corrosion, and other types of structural defects. The owners wanted a way to evaluate the effects the defects had on the shiploader’s structural integrity.

For the mining company, the answer was Akselos Integra software, which it used to create a condition-based

The shiploaders that operate like cranes to transfer heavy cargo into ships’ holds or into mines are critical for operations in the mining and port infrastructure industries. They’re put to work around the clock, moving heavy loads, for years on end. Like all equipment, shiploaders are subject to cracks, stresses, and strains that accumulate over time. If not dealt with in a timely manner, these structural defects could put the entire structure at risk.

With owners counting on this equipment, they’re under pressure to maintain their aging shiploaders and keep them operating safely and effectively. So they need a way to get an accurate look at the asset’s current condition and its state of degradation using the best engineering tools available.

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digital twin of its shiploader. The component-based modeling approach meant engineers could rapidly incorporate defects at the component level without having to update the global model.

With the Akselos Digital Twin, engineers were able to analyze the heavy-duty machine’s loading sources and identify those that were driving structural damage.

The mining company’s engineers also ran hundreds of load-case simulations to assess the shiploader’s risks and to plan operations. Engineers reported a simulation response time of literally “minutes per run” with Akselos Integra. This compared to the days per run required using conventional methods, at lower resolution.

Because of the tremendous speed and accuracy of these simulations, the company was able to create a full array of distinct scenarios as needed for compliance, what-if studies, contingency planning, hot spot identification, fatigue, and buckling analysis. This is only possible because of the unique and patented modeling method in Akselos Integra.

Should engineers find defects during a scheduled inspection, the defects can easily be integrated into the digital twin. Going forward, the Akselos Digital Twin will help the shiploader’s owner maintain its critical, aging asset long into the future.

Engineering the Solution

The Akselos Integra platform offered the shiploader’s owner an excellent decision support system. Solutions across the platform are structured in the following manner:

1. A detailed CAD model that represents the full geometry of the shiploader is incorporated into the Akselos Integra Modeler. Full structural modeling is incorporated to create:

2. The shiploader’s Akselos Digital Twin of the shiploader. This model provides a detailed representation of the shiploader’s primary structure, including conveyors and feeders, its tripper, extendable arms and booms, and the mobile structure that supports the arms or boom.

3. The Component Library adds parameterized beam, shell and solid elements to the model.

4. Using the Akselos Modeler, engineers update the Akselos Digital Twin with relevant inspection data to incorporate cracks, corrosion, damage, etc.

5. Finally, engineers use the Akselos Cloud to perform fast structural analysis. The Decision Support system is used to evaluate various load combinations and to detect which structural components have a higher risk profile for each scenario.

The Akselos digital twin enables the company to:

• Analyze for condition-based results under real-world operating conditions.

• Reduce OpEx costs by optimizing repair strategies and eliminating unplanned maintenance interventions.

• Perform asset integrity assessments and analyze its costs effectively.

• Plan operations through by using simulations to aid in engineering decisions.

• Understand operational safety margins to ensure a company can develop contingency plans to be ready for the unexpected

Components identified at high risk of failure after running an automated analysis study using Akselos Decision Support system.
Akselos is a digital technology company headquartered in Switzerland, with operations in Europe, the USA and South East Asia. The company has created the world’s most advanced engineering modeling, and fastest simulation technology, to protect the world’s critical infrastructure today and tomorrow. The technology has the power to revolutionize how we build and manage our critical infrastructure, and pushes the boundaries of what modern engineering and data analytics can achieve. Developed by some of the world’s best minds, the MIT-licensed technology builds something far beyond the capability of a conventional digital twin – a digital guardian that allows operators to not only monitor an asset’s condition in real time, but helps them to see the future.