AVEVA

Quebec Iron Ore digitally transforms mining operations with AVEVA solutions

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Industry - Mining

Goals

- Reduce reaction times from event to resolution

- Create a robust data architecture to collect, visualize, and analyze operations and asset data

- Increase real-time visibility of pit-to-port operations

Challenges

- The company lacked data management capabilities to efficiently generate business and operational reports

- Phase II of the expansion required greater asset reliability and availability

- Ore lacked traceability after leaving the mine

AVEVA Solutions

- AVEVA™ PI System™

- AVEVA™ Operations Control

- AVEVA™ Predictive Analytics

Results

- Teams can perform their own analysis and generate more detailed reports

- Real-time asset analysis tools made assets more reliable for the phase II expansion

- Unified data management tools provide the data foundation to achieve complete pit-to-port visualization

Quebec Iron Ore digitally transforms mining operations with AVEVA solutions

Mining operations don't just occur at the mine site. The mining value chain may include multiple sites and ore may travel hundreds of kilometers to reach buyers. To manage operations, assets, and product traceability from pit to port, one company accelerated its digital transformation by taking advantage of AVEVA's advanced mining software solutions.

Quebec Iron Ore's (MFQ) open-pit mine in Bloom Lake, Québec produces 7.4M tons per annum (Mtpa) of high-grade 66.2% Fe iron ore concentrate in its phase I facility. The company's vision for phase II expansion includes an ambitious goal to double production capacity to 15 Mtpa of 66.2% Fe iron ore concentrate over a 20-year mine life. To support the expansion project, MFQ developed a digital transformation roadmap to serve as a guide to improving the efficiency, sustainability, and ease of its operations.

"Having a solid data foundation improves the availability of our data and gives operators the power to visualize the analytics".
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Nicolas Toupin
Programmer, Business Intelligence

A robust data framework provides the foundation for digital transformation

The initial goal MFQ hoped to accomplish through its digital transformation was shortening reaction times from events to resolution. To accomplish this, the company needed a structured data repository to monitor operations and assets in real time. It also wanted to use its data to generate business and operational reports so it could make faster, more informed decisions. Multiple isolated control rooms across the mine also hampered data management. There was no system to holistically manage operations.

To support phase two of its expansion and double its output, MFQ also needed to improve asset reliability.

The company aimed to improve asset visibility and add predictive maintenance capabilities to further shorten the time required to identify a problem with an asset and respond appropriately.

Production traceability and real-time supply chain visibility also required better data management solutions. The company needed to track ore from the pit to the rail lines and then to the port. With data distributed across many systems, it was impossible to track ore from the mine to the port in one system.

Unified systems provide better visibility and improve asset analytics

The architecture MFQ developed uses asset framework, a capability of AVEVA PI System, to structure and analyze temporal data, such as sensor data and equipment status data. It also includes structured data from sources like mining dispatch systems, a LIMS system and a train loading system. AVEVA PI System provides a layer of abstraction over data sources, so users can view all the information related to an asset in one place. AVEVA PI System's asset framework adds context and structure to assets in an asset hierarchy. With access to all data streams, teams can create their own dashboards in AVEVA PI Vision.

MFQ has multiple control rooms for different operations, which are isolated and connected to the network via PLCs. To maintain its isolated control rooms, the company uses multiple redundant AVEVA System Platform servers distributed over the site to maintain operability even when the network is down. Combined with AVEVA PI interfaces, this ensures data is preserved, even when an event occurs. This architecture draws SCADA and HMI data from redundant distributed AVEVA InTouch HMI to the main server to get a broad view of site operations.

To increase critical asset reliability, MFQ uses asset framework, a capability of AVEVA PI System, together with AVEVA Predictive Analytics to increase asset reliability. While condition-based monitoring in AVEVA PI System focuses on real-time conditions and sensor measurements, AVEVA Predictive Analytics focus on the early detection of problems using precise models based on historical information and real-time asset health.

In a recent beta trial, MFQ used historical data that included asset breakdowns to see if the system could detect them. After verifying that the tool detected breakdowns reliably, MFQ expanded the project to monitor ten critical assets, including coarse tailing pumps and autogenous mills.

"The AVEVA PI System asset framework architecture is detailed, so users can see all the information related to an asset in one place".

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Nicolas Toupin
Programmer, Business Intelligence

One system for pit-to-port operations

Digital transformation is a journey that is never fully complete, and MFQ is continuously exploring ways to improve its visibility of the entire value chain. The current iteration of the project has already yielded benefits for the company, and the AVEVA solution provides a sturdy foundation for further improvements. With time-series data in AVEVA PI System, teams can perform their own analysis and generate detailed reports. AVEVA Predictive Analytics allows operators and maintenance crews to predict asset failures weeks or months in advance, which allows them to be more proactive in maintaining assets.
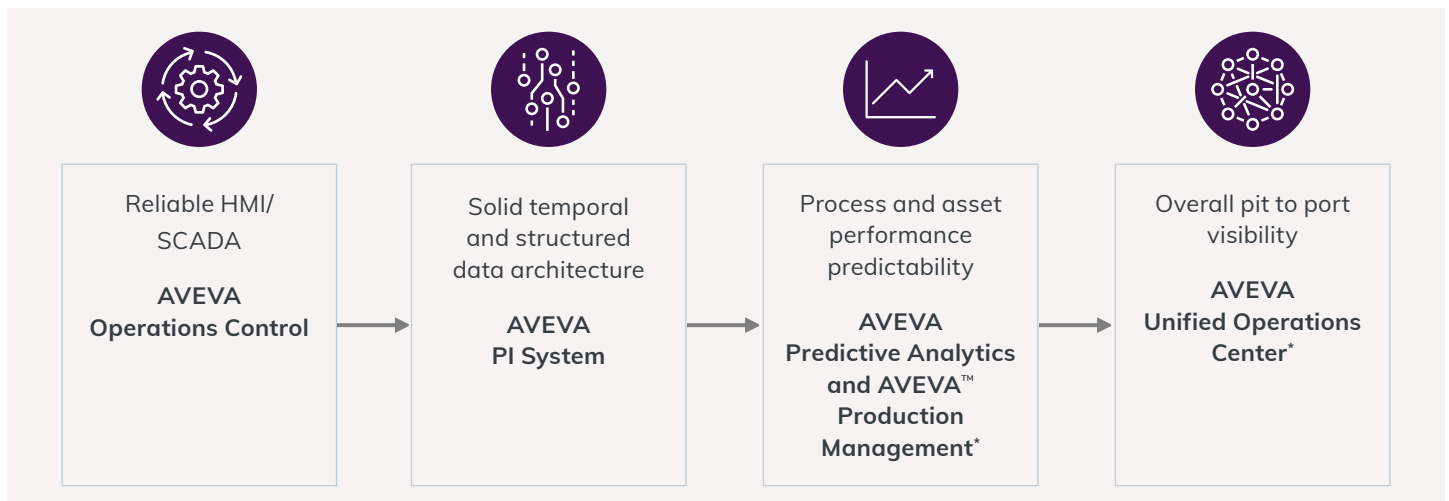
Improved asset management, driven by predictive insights into asset failures, play a large role in reducing event response times.

"Our path for next year is to improve production traceability. We want to monitor quality throughout the entire process, keep a live inventory of stockpiles, and send quality manifests to train operators".

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Nicolas Toupin
Programmer, Business Intelligence

The next phase of the project is even more exciting. With a solid data foundation in place, MFQ is making strides to track and trace its ore as it travels from the mine to the port. It hopes to automate data reports and quality manifests to share with the railway operator and the companies unloading and loading the material at the port site. To improve traceability and visibility, MFQ aims to transition to an automated system that predicts and tracks material quality, provides a live inventory of stockpiles, and produces quality manifests. As it digitally matures, MFQ is currently exploring the potential of AVEVA™ Unified Operations Center for Mining to unify systems and data sources to achieve a holistic view of its entire value chain.

Main challenge: Reducing reaction time from event to resolution

| Reliable HMI/ SCADA **AVEVA Operations Control** | → | Solid temporal and structured data architecture **AVEVA PI System** | → | Process and asset performance predictability **AVEVA Predictive Analytics and AVEVA™ Production Management*** | → | Overall pit to port visibility **AVEVA Unified Operations Center*** |

*Potential implementations

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