



Doubling Equipment Utilization with Industrial IoT and Machine Learning

“We are making the invisible visible to help our customers optimize productivity and mining efficiencies.”

— Anthony Reid, Senior Manager, Analytics,
Komatsu Mining

Komatsu Mining Corp, formerly Joy Global, is a global mining equipment and services provider specializing in solutions for the excavation of energy, industrial and hard rock minerals.

Challenge

Komatsu Mining is committed to helping its customers improve the safety, productivity and cost of their mining operations. The company offers an Industrial Internet of Things (IIoT) based service, called **JoySmart Solutions**, that helps customers optimize machine performance using real-time data and analytics obtained from its smart, connected devices and assets. Devices and assets in this application include some of the largest mobile mining equipment used in surface and underground mining: longwall mining systems, electric mining shovels, continuous miners and wheel loaders, among others.

Originally, the company's legacy data warehouse supported this IIoT service. However, as customer demand grew and more machines were connected, staff found they needed a new approach. Data growth is anticipated to reach 30 terabytes (TB) per month. “Our old environment was limited in its ability to scale and grow,” said Shawn Terry, Lead Architect, JoySmart Solutions.

Solution

JoySmart teams partnered with **Cloudera** and **Microsoft** to create a cloud-based IIoT analytics platform that provides scalability, performance and flexibility to support global service teams. The platform ingests, stores and processes a wide variety of data collected from mining equipment operating around the globe, often at very remote locations in harsh conditions. This data includes time-series data—machine pressures, temperatures, currents, voltages and other sensor data—alarm and event data, and other data from third party systems. A single machine can have hundreds to multiple thousand data metrics and generate 30,000 to 50,000 unique time-stamped records in one minute. The team plans to integrate more closely with customer's onsite systems and other data sources to better contextualize machine operations.

With a unified data management platform, JoySmart teams can now more **easily analyze data** from the company's P&H and Joy-branded mining machines, as well as from third-party programmable logic controller (PLC) based equipment, to get a systems view of mining operations. The company's **data scientists** can also produce machine learning models and better results faster than was previously possible.

“Cloudera on Azure freed us from making decisions based in part on what our infrastructure could support and allowed us to make decisions solely based on customer needs,” said Terry. “We can now scale and grow incrementally at a reasonable cost. This allows us to expand our user base, delivering services faster and better.”



Key Highlights

Industry

- Manufacturing

Location

- Headquarters: Milwaukee, Wisconsin, USA

Business Application Supported

- IIoT optimization and predictive maintenance

Impact

- Doubled utilization of Joy longwall system in one example for a coal mining customer
- Provides engineering with new insight to improve product design
- Reduced infrastructure costs by consolidating data in cloud-based platform

Data Sources

- Connected devices including P&H, Joy and third-party PLC based equipment

Solution

- Modern Data Platform: Cloudera Enterprise
- Workloads: Analytic Database, Data Science & Engineering
- Components: Apache Hbase, Apache Impala (incubating), Apache Kafka, Apache Spark, Cloudera Navigator Optimizer, Open TSDB
- Analytic tools: R, Python, Matlab
- Cloud: Microsoft Azure

Big Data Scale

- 3+ TB growing to 30 TB per month

Implementation

Anthony Reid, senior manager, Analytics at Komatsu Mining, said the company looked for a platform that would democratize access to machine data analytics for different user groups. Reid found that Cloudera delivered the fast performance, data security and customer support that would allow the JoySmart teams to successfully move to a big data paradigm with “minimum fuss.”

As it deployed [Cloudera Enterprise](#) on [Microsoft Azure](#), Komatsu Mining realized significant cost savings. “We can deliver all of the data with less compute and much less complexity,” said Reid.

Results

A more complete picture of machine health and operations in each mine enables JoySmart teams to partner with their customers to identify ways to improve equipment safety, productivity and operating costs. “We were able to make recommendations with a large coal mining company that enabled them to double the daily utilization of their Joy longwall system,” said Reid.

Because Komatsu Mining engineering staff can also easily access and analyze the data, Reid says they gain valuable insight to help them improve current products and design the next generation of mining equipment.

“We are making the invisible visible to help our customers optimize productivity and mining efficiencies,” said Reid.

About Cloudera

Cloudera delivers the modern platform for machine learning and advanced analytics built on the latest open source technologies. The world’s leading organizations trust Cloudera to help solve their most challenging business problems by efficiently capturing, storing, processing and analyzing vast amounts of data. Learn more at cloudera.com.

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