

# casestudy

## Worldwide Joy Global

Smart connected equipment and Big Data analytics are allowing underground coal mining operators throughout the world to achieve unprecedented utilisation rates.

The use of data generated by mining equipment has evolved considerably over the years. Initially coal producers were interested in machines that could generate data on an individual machine basis. Data generated by a machine was used to drive equipment operation and maintenance decisions that resulted in increased equipment reliability. In other words, underground mining companies wanted each machine to provide data that could be used to improve machine efficiency – and mitigate, or even prevent, breakdowns of that machine. However, while very valuable, individual equipment data alone was not sufficient to make a significant impact on a mine's overall production and operation costs.

Several years back, Joy Global, a leading supplier of advanced equipment, systems and direct services for the global mining

industry, noticed that overall mining equipment utilisation rates at many of its customers' mines were below 50 percent. Meanwhile, the same producers were asking for new products and services designed to push already high equipment reliability rates a few percentage points higher – from 90 percent to 95 percent – or even, in some cases, from 95 percent to 98 percent. This caused Joy Global's experts to question whether improving the already high reliability of individual pieces of equipment was really the biggest opportunity for these mines.

Getting a machine running at 98 percent reliability, for example, seems like a success if all you're looking at is the



A Joy longwall system in action.

data from that particular machine. But what if running that machine so efficiently overloads the conveyor belts or other equipment farther down the production line? Analysing the data each machine provides in isolation can neither predict nor solve problems of this nature.

To meet increasingly challenging annual production and cost per tonne objectives, it is necessary to understand the overall mining equipment system's performance. Only by analysing data from all the equipment in a mine is it possible to identify improvement opportunities and increase equipment utilisation as well as reliability.

But with some mining machines capable of reporting a new data point every 20 milliseconds, no human being can possibly process all the data provided by a smart connected machine. This is one reason why Joy Global developed JoySmart Solutions – integrations of the company's smart connected products and systems, using advanced analytic

*“Mining is not an industry that quickly adapts to change, but the clear benefits of smart connected equipment are resulting in much more rapid acceptance.”*

**Ben Snyman, VP Product Management,  
Joy Global Underground Mining**



engines powered by intelligent algorithms that enable local mine teams to focus on known anomalies as well as the opportunities flagged by the Prognostics engine. Big Data analytics capable of aggregating all the data generated from the machines and interpreting it on a system-wide basis are a major step forward, driving data to information, which will deliver results through customised actions.

The results go far beyond increased reliability. Some coal producers have increased equipment utilisation at their coal mines from below 50 percent to as high as 70 percent. These smart solutions can help prevent roof collapses and other potential disruptions by, for example, predicting the formation of roof cavities. They also contribute to removing mine personnel from potential harm as many of the equipment adjustments, recommended by the prognostic engine, can be made remotely from service centres across the world.

These clear health and safety benefits have helped mitigate many of the usual speed bumps industries encounter as automation

increases. By turning overwhelming data into usable information, it's possible to demonstrate to mine operators how smart solutions can deliver benefits to production, operating cost and safety.

Mining companies with worldwide operations can realise even greater value from smart connected mines by performing advanced analytics across mining operations in different locations and countries. Through benchmarking, mining operators can investigate differences and discrepancies between mines, discover why some are operating more efficiently than others, and apply innovations and best practices at mines worldwide.

Mining equipment manufacturers no longer create value simply by selling individual pieces of mining equipment to their customers. Now it's about providing smart connected machines with high levels of automation integrated into systems, using advanced big data analytics, and creating recommendations for actions that deliver much needed improvement in production, operating costs and safety to the mining operations.



**85%**  
new industry average utilisation rate for key machinery

#### CUSTOMER MINE EXAMPLE



**20%**  
Increase in equipment utilisation from 50% (less than 50 hours a week) to 70%



**65%**  
increase in production

*“Greater autonomy means greater safety, because you’re moving workers out of harm’s way.”*

**Doug Blom, Chief Marketing Officer,  
Joy Global**

#### Find out more

To read more about Joy Global visit [www.joyglobal.com](http://www.joyglobal.com)

To find out more about the World Coal Association and our work, visit [www.worldcoal.org](http://www.worldcoal.org) or email [info@worldcoal.org](mailto:info@worldcoal.org)