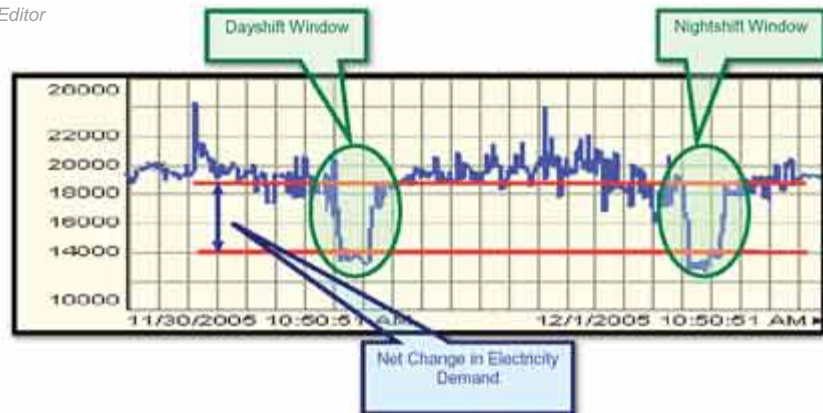


Data Drives Continuous Improvement

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Written by By Wes Iversen, Managing Editor

Six Sigma practitioners at mining company Falconbridge Ltd. are making good use of data to generate impressive bottom-line benefits.



THE LIFEblood of the Six Sigma continuous improvement methodology is data. That's one reason that Six Sigma projects at Falconbridge Ltd. were taking notably longer than anticipated back in the year 2000, when the company was launching its Six Sigma initiative.

"There was an expectation that most projects should take about six months. So when the first few projects required about nine months to complete, management started asking what was going on, and what we were doing wrong," relates Paul Roos, a Six Sigma master black belt at the \$8.1 billion Toronto-based mining company. "But I can tell you that at least two months of those first projects was taken up in gathering data, and in finding a way to 'see' the processes," Roos says.

These days, Falconbridge Six Sigma projects are typically coming in closer to schedule. That's thanks in part to the availability of data needed by Six Sigma project teams within the PI System data historians that are in place at several of the company's Canadian sites.

The PI Systems, provided by OSIsoft Inc., of San Leandro, Calif., are part of OSIsoft's Real-time Performance Management (RtPM) platform of products. And at Falconbridge, RtPM software tools are also used in conjunction with software from Bestech Inc., a Sudbury, Ontario, Canada-based engineering consulting firm that focuses on the mining industry, and which recently became an original equipment manufacturer (OEM) partner with OSIsoft.

Valuable data

Six Sigma is a quality measurement and improvement program that provides a formal, structured methodology for identifying, measuring, analyzing, making and sustaining process improvements. As such, it relies heavily on having accurate and accessible data at each step of the way. That's

why the process measurement data that is gathered in real time, recorded and archived within the Falconbridge PI System servers has become an increasingly valuable resource, Roos indicates.

Over the years, the company's Six Sigma practitioners have learned better ways to use the PI data in defining and developing projects. And when a Six Sigma process improvement project is completed, RtPM and Bestech software tools can deliver process performance data from PI to operators in real time, and can also deliver alerts when a process drifts out of specification. This makes the operators' jobs easier. And it helps promote operator "buy in" to any Six Sigma process changes, by enabling them to see the benefits of new operating procedures. "We operate now on facts and data, and we back up any solution or change with real evidence," says Roos. "PI comes in by helping us get those facts and data, and by helping dissolve any resistance to change."

The Falconbridge Six Sigma initiative has paid off handsomely to date. Since 2000, more than 700 Six Sigma projects have been completed, with an average savings of \$339,000 per project, Roos reports. During 2005 alone, 154 projects were completed that yielded \$60 million in benefits, he says. Roos adds that these numbers reflect "hard savings" alone, such as cost avoidance and process optimization that provides revenue enhancement. Falconbridge, which has a total of 14,500 employees at 28 sites worldwide, now has more than 500 trained black belts—the title bestowed upon Six Sigma practitioners who have achieved an advanced certification level in Six Sigma tools and methods.

Skip tracking

Falconbridge is one of the world's largest producers of zinc and nickel, and is a significant producer of copper and aluminum. The company's Six Sigma program began initially with pilot projects aimed at closing known performance gaps at three Canadian sites, and has since expanded broadly across the company.

Early projects focused on major processes at each operation, says Roos. At a mine site, for instance, "the main operation is moving blasted rock from underground to the surface," he notes. So a great deal of early Six Sigma project attention was focused on the hoisting operation, in which material is brought up in containers called "skips." A Bestech application called PORTAULS (for Plant Optimization Resource Tracking Asset Utilization and data Logging Software) proved useful in this regard.

A modular application aimed at the mining industry, PORTAULS includes a hoisting module, among others, and has been optimized for working with PI data and the RtPM platform. PORTAULS was used initially in Six Sigma projects aimed at improving hoisting operations at the Falconbridge Sudbury mine, in Sudbury, Ontario, Canada, and has now been extended for use at other sites as well, says Adam Tonnos, Bestech manager of product development.

Key performance indicators in a hoisting operation include skip availability, utilization, cycle time and capacity, all of which play important roles in determining hoisting efficiency, Tonnos notes. Indeed, according to calculations supplied by Chris Deschesnes, a senior maintenance supervisor at the Kidd mine, another Falconbridge site in Timmins, Ontario, Canada, the ability to shave a single second from a typical 180-second skip cycle time can potentially produce nearly \$2 million (Canadian) per year in operational benefits.

Fans off

While early Six Sigma projects were aimed primarily at core process improvements, a growing number of projects recently have focused on improving energy efficiency, says Roos, given the escalating impact of rising energy costs on Falconbridge businesses.

One such project involved the ventilation system at the Kidd mine. In production since 1966, the Kidd mine is among the deepest in Canada, with its lowest level now at 9,200 feet, say Roos. Maintaining operations thus requires massive volumes of air, which is drawn through the mine at a rate of 2.6 million cubic feet per minute using three large, 8,500 horsepower fans on the surface, along with underground booster fans. This ventilation system accounts for nearly 75 percent of the mine's energy consumption.

Historically, the fans were operated continuously at full power. But a Six Sigma team at the site determined opportunities for savings, by turning some fans off and reducing power consumption on others during periods of mine inactivity—including twice-daily work shift changes, for example. In all, the team identified a total of 231/2 hours each week in which mine ventilation could be reduced. PI data was used in determining the best ways to ramp down the ventilation system without impacting safety or production, and to calculate the resultant energy savings, says Bestech's Tonnos. The project was then implemented using Bestech's NRG-1, a Web-based application designed to schedule and execute operation of energy intensive assets.

NRG-1 interfaces with the Kidd mine fan system controllers to automatically shut down certain fans and reduce power on others according to the schedule developed by the Six Sigma team.

The latest technologies are built-in to ensure the safety and security of the system, says Tonnos, and operators can take manual control of the system in case of emergency or need for intervention.

The results of the project were impressive. During the periods of reduced fan operation, Kidd mine power consumption is reduced by 6500 kilowatts. The resultant energy cost savings is projected at \$730,000 (Canadian) per year, says Roos. Given the relative low cost of implementation—the NRG-1 software is priced at \$29,000 (Canadian) and the changes took roughly a week to get up and running, says Tonnos—the return on investment for the project was measured in a matter of weeks.

Bottom-line benefits

Going forward, Roos sees the Falconbridge Six Sigma program continuing to yield bottom-line benefits for the company. The savings produced from the initiative have grown for the last four years straight, he says. And he notes that “each of our operations is now mature enough to generate its own [Six Sigma] project pipeline on an ongoing basis.”

Roos sees the company’s PI Server systems and associated software as a strong enabler for the effort. “This is a data-gathering and performance-reporting tool,” he says. “And that has to go hand-in-hand if you want to improve your performance.”

For more information, search keywords “Six Sigma” and “continuous improvement” at www.automationworld.com.