

Customer Success Story: Magnetation, Inc.

Markets Served
Mining, Metals & Minerals



Location:

Reynolds, Indiana

Segment:

Mining and minerals processing

Challenge:

Reliable power distribution and motor control systems within a rigorous project timeline to allow Magnetation's newest processing plant to quickly begin operations and meet the needs of its largest steel-producing customer

Solution:

Integrated solution including Eaton's SC9000 EP medium voltage drives and VCP-W metal-clad switchgear to significantly reduce electrical system cost and time to production

Results:

Eaton's power management solutions and engineering expertise allowed Magnetation to eliminate the need for multiple substation transformers, reducing equipment costs by approximately \$565,000 and annual energy cost by nearly \$250,000.

Additionally, by coordinating equipment shipment, installation and commissioning within Magnetation's construction timeline, Eaton was able to help the company avoid project delays resulting in potential lost revenue up to \$1 million per day.

Eaton helps Magnetation advance productivity and profitability of iron ore processing

"Eaton brought a distinct level of professionalism to the table and delivered value beyond on-time product delivery, providing an innovative and expertly engineered solution that exceeded our business goals."

Dave Chappie, Vice-President of Engineering, Magnetation

Background

Founded in 2006, privately-held Magnetation Inc. is an iron ore processing company that utilizes magnetic separation technology to capture iron ore particles left over from previous mining operations dating back to the 1890s. A special process developed by the company enables the manufacturing of iron ore pellets from the remaining materials with equal quality and consistency of the original mined rock.

Today, the company owns three iron ore concentrate plants located in Keewatin, Bovey and Grand Rapids, Minnesota, and recently began operations at a 3 million metric tonne per year iron ore pellet plant in Reynolds, Indiana.

The Reynolds location was chosen due to its proximity to its customer's manufacturing facilities. The company planned to ship processed iron ore from its Minnesota mines via rail to the new Reynolds plant, where other raw materials could be added and processed into pellets for use by steel customers.

To meet customer needs, Magnetation committed to a rigorous build schedule for the Reynolds facility—knowing a compressed schedule would allow them to begin servicing their customer contract sooner while commencing an early revenue stream to maximize return on investment.

Challenge

After the business and financing for the new Reynolds facility was complete, the project team set out to integrate the most reliable process equipment possible to ensure end product consistency.

To identify equipment vendors and effective system designs, Magnetation worked with local design engineers and utilized in-house resources. The project team sought to partner with suppliers that could offer innovative ideas to reduce the scope and complexity of on site systems to lower the installed cost, with the added capability to deliver on a very short cycle and maintain the project timeline.

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Solution

One key element of Magnetation's process is maintaining accurate control of the drying systems. To achieve this control, large variable speed 4,160V fan motors needed to be tightly regulated to ensure proper airflow and pellet moisture consistency.

While developing a plan for the drying systems, Magnetation investigated product technologies available from several manufacturers of medium voltage variable frequency drives. Eaton's 4,160V SC9000 EP drives were ultimately selected as the most innovative and reliable technology. The drives incorporate encapsulated power pole components in a transparent silicone gel. This encapsulation protects sensitive electronics from the dirt, dust and moisture that is common in iron ore pellet plant production environments. Magnetation viewed this technology as a tremendous advantage since downtime proves very costly and the operating environment would be constantly clouded with iron ore powder. The project team also found value in the compact design of the SC9000 EP, the medium voltage drive with the smallest footprint in the industry, allowing for a reduction in the planned size of electrical rooms.

The most significant applied benefit of the Eaton SC9000 EP was the result of an idea by Eaton's expert design engineers. Because of the unique topology of the Eaton drive, Magnetation was able to eliminate the purchase of several medium voltage substation transformers along with the space and cost to install them. As the Reynolds plant's incoming electrical service was at 13,800V,

traditional designs would have incorporated 13,800V metal-clad switchgear, cable or bus connected to 13,800V-to-4,160V step-down substation transformers, which would then be cable-connected to the new 4,160V drives to power the motor loads.

However, the SC9000 EP design incorporates a unique multi-winding input transformer used to develop a 24-pulse input to the drive converter section, which also reduces drive input harmonic currents by employing phase shifting harmonic cancellation. For the Magnetation project, Eaton engineers recommended a medium voltage drive design incorporating a 13,800V-to-4,160V multi-pulse transformer, effectively eliminating the need for six large and costly step-down substation transformers totaling over 8 mega-volt-amperes of power rating.

Eaton coordinated a regionally manufactured and customized solution, comprised of 13,800V metal-clad medium voltage switchgear close-coupled via insulated bus to SC9000 EP drives with a 13,800V top-mounted main bus, along with a 15 kilovolt class isolation switch and incoming fuses feeding the multi-pulse transformer input. This design required fewer components to enhance reliability and simplify maintenance, while increasing energy efficiency and reducing total footprint.

Magnetation was so impressed with Eaton's drives solutions and engineering support that the company implemented Eaton's Magnum DS low voltage metal-enclosed switchgear and B-Line series cable tray throughout the plant.

Results

By eliminating the need for the multiple substation transformers, Eaton's innovative product design and application engineering expertise helped Magnetation reduce project equipment costs by approximately \$565,000 and annual energy cost by nearly \$250,000.

Additionally, by coordinating equipment shipment, installation and commissioning within Magnetation's rigorous construction timeline, Eaton was able to help the company avoid project delays resulting in potential lost revenue up to \$1 million per day.

"Due to the fast-paced nature of our construction process, it was invaluable to have vendors on board that understood the demands of the project and its impact on our business," explained Dave Chappie, Vice-President of Engineering at Magnetation. "Eaton brought a distinct level of professionalism to the table and delivered value beyond on-time product delivery, providing an innovative and expertly engineered solution that exceeded our business goals."

The Reynolds plant began operation in September 2014 and was able to quickly ship high-quality iron ore pellets to meet customer needs. As a testimony to the very successful start-up utilizing Eaton technologies, Magnetation was able to start the plant within the project timeline.

To learn more, visit
Eaton.com/mining.



SC9000 EP drives



Process fan for one SC9000 EP drive



Magnum DS low voltage switchgear



B-Line series cable tray

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Printed in USA
Publication No. CS083034EN / MZ807
April 2015

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