

Customer Success Story: ArcelorMittal

Markets served
Mining, metals and minerals



Eaton adjustable frequency drives help ArcelorMittal reduce energy costs

Location:

Burns Harbor, Indiana

Segment:

Mining, metals and minerals

Challenge:

Help ArcelorMittal progress toward energy efficiency by modernizing laminar cooling controls with enhanced accuracy and electrical efficiency

Solution:

Eaton's SC9000™ EP adjustable frequency drive (AFD) offering improved reliability and enhanced safety with a small physical footprint

Results:

Estimated monthly energy savings up to \$45,000, as well as an integrated design contributing to reductions in material costs and timely delivery minimizing plant downtime

"Eaton went the extra mile to help us meet our aggressive delivery and installation schedule."

Melecio Magallon, Engineering Project Manager, ArcelorMittal

Background

ArcelorMittal is a multinational steel manufacturing corporation headquartered in Avenue de la Liberté, Luxembourg. Formed in 2006, the company is the world's largest steel producer, with an annual crude steel production of 93.1 million metric tons in 2014.

Guided by a philosophy to produce safe, sustainable steel, the company is the leading supplier of quality steel products in all major markets including automotive, construction,

household appliances and packaging. Due to this commitment to quality products, ArcelorMittal has grown with active operations across 60 countries.

ArcelorMittal's second largest facility in the United States, Burns Harbor, is a fully integrated steelmaking facility located on Lake Michigan in Northwest Indiana, 50 miles southeast of Chicago.

The plant is capable of producing five million tons of raw steel annually to serve many leading customers in the automotive industry, as well as other key markets like construction, shipbuilding and rail.

Challenge

ArcelorMittal's Burns Harbor facility utilizes a hot rolling process to reheat semi-finished steel slabs nearly to their melting point before reaching 13 successive rolling mill stands driven by motors, and finally coiling up the lengthened steel sheet for transport to the next process.

After exiting the finishing mills, the steel is carried down a succession of more than 300 individually-driven rolls through ten banks of low-pressure, high-volume water sprays that cool the red-hot strip to a specified coiling temperature between 1000°F and 1250°F and into one of three downcoilers.

The cooling system was reliant on many antiquated electrical starters for control of the pumps powering the process, however these devices did not provide intelligent load management and operated 24/7 regardless of necessity. This constant operation led to energy waste that could easily be prevented through the application of a responsive control solution capable of reducing or completely stopping motor operation during times of lower demand.

The plant identified the benefits of adjustable frequency drives, which are designed to adjust a motor's speed to closely match output requirements, resulting in typical energy savings of 10 to 50 percent. Thus, ArcelorMittal's design team began to search for a trusted drives manufacturer.

Adding a layer of complexity to the project, the new drives system would need to fit within the existing plant layout, and delivery and installation would need to be rapidly coordinated in order to fit within the plant's planned period of maintenance downtime.

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Solution

ArcelorMittal opened the door for proposals. Following the recommendation of a trusted systems integrator, the company began to explore Eaton's power management solutions.

The design team then visited Eaton's Asheville, North Carolina plant for a tour of its medium voltage drives manufacturing line and learned about the benefits of Eaton's SC9000 EP drive when applied in a process application such as steel manufacturing.

ArcelorMittal was impressed with Eaton's custom manufacturing capabilities and overall industrial expertise. The company also had the opportunity to see the Eaton drives in action within a controlled test chamber and knew the solution would provide robust, reliable control along with the energy efficiency benefits. As a result, the company decided to move forward with five 4160 volt, 400 horsepower medium-voltage drives from Eaton.

"It was invaluable to see the Eaton drives operating in an environment that perfectly mirrored our plant conditions," said Melecio Magallon, an engineering project manager at ArcelorMittal. "We were able to address details that might have otherwise not arisen until installation, which helped us

save time and greatly reduce complexity before the solution was even shipped."

Contributing to the selection, the SC9000 EP drives feature a powerpole inverter with heat pipe technology to provide a high power density in a compact footprint, while enabling the drive to withstand harsh environmental conditions. This Eaton technology offered the benefit of the smallest physical footprint of all equipment proposals, meeting the stringent space requirements for the application.

Further, by incorporating a 3-level neutral point clamped (NPC) inverter topology, the drive reduces the number of power switching devices in the inverter, improving reliability by reducing the overall component count.

Additionally, the Eaton drives feature a standard main common bus design, allowing for connection of three upstream breakers rather than five. This streamlined design, known as Eaton 'Integrated Control-Gear', required only one set of three-phase cables for each pair of drives to help reduce installation time and labor.

"I was impressed with the technology's capability of running a standard squirrel cage motor at unity power factor," said Hot Strip Mill Project Engineer, Tom Milosoff.

Results

Following manufacturing and delivery, the customer's engineering team was able to seamlessly integrate the SC9000 EP drives into their existing control room. Eaton's service engineers then helped with commissioning to ensure seamless start-up, while the systems integrator managed project programming and communications.

"Eaton went the extra mile to help us meet our aggressive delivery and installation schedule," said Magallon. "Pulling service engineers from across the country, Eaton worked closely with our electricians and contractors to ensure that the whole process went smoothly."

"Eaton even sent out field service engineers days before the initial installation to provide staff training and support of the commissioning process," Magallon continued.

After applying the drives to the new runout table system, ArcelorMittal was able to improve the efficiency of operations and make progress toward securing valuable incentive from the local utility, with estimated annual energy savings of over \$500,000. The steel manufacturer is reaping the following added benefits from the Eaton drives:

- Improved uptime due to the industry's lowest inverter part count and simplified maintenance with a modular powerpole design, roll-in/roll-out inverter
- Encapsulated power pole inverter with heat pipe technology helping increase power density, reduce overall equipment size and protect sensitive electronic components in harsh environments
- Common bus design allowing five drives to be connected to three upstream breakers with one set of three-phase cables for every pair of drives to greatly reduce installation time and complexity
- Ability to view key operating variables directly from the drives via an integrated keypad system

"Aside from the performance of the drives, the best part of the project was Eaton's eagerness to work with us," explained Magallon. "From the project lead to engineering and design staff, Eaton made every possible resource readily available to ensure all our requirements were met or exceeded."

To learn more, visit Eaton.com/SC9000.



HROT cooling water.



New Eaton drives (right) next to existing starters.

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