Case note

More reliability and efficiency - Modernizing a cement factory

The production of cement requires large amounts of energy as well as raw materials. In the Holcim Group's Merone plant (Como, Italy), an installation improvement project carried out in cooperation with ABB enhanced the process and reduced energy consumption much beyond expectations.

A market leader

Founded in 1928, the Merone cement factory is a historical industrial site for the production of construction materials. Having been acquired in 1996 by the Swiss group Holderbank, which changed its name to Holcim in 2001, today Merone is part of one of the largest global groups in the cement sector, with 80,000 employees in 70 Countries.
In Italy, Holcim produces cement in three different plants: Merone and Ternate (Varese) are full-cycle plants including the baking process, while Ravenna is the grinding mill.
Traditionally, Holcim Italia's core business is cement production; however, over the years its activities have been extended to the production of other construction materials, e.g. aggregates (sand and gravel) and concrete, thus becoming a strongly integrated group and an important industrial company in the northwest of Italy.
Holcim's main competitive advantage is its strategic location, which makes it the only manufacturer able to supply the Lombardy market with cement, aggregates and concrete.
In parallel with its expansion activities, the Company has also increased its technical expertise and started a sustainable development process designed to combine economic growth, social responsibility and environmental protection.

A strategic furnace

Cement is produced through the grinding and mixing of clinker and corrective materials (gypsum, limestone, slag, pozzuolana). Clinker is the basic semi-finished product, and is obtained by baking a mix of raw materials (limestone and clay) in a furnace at high temperature (1450 °C). The Merone plant has two furnaces, numbered 4 and 5 respectively, of which only the former is currently in operation: furnace no. 5 was turned off in 2009 because of dropping demand brought about by the economic crisis.
Therefore, furnace no. 4 operates on a 24 hour basis and is strategic for the plant. The unit dates back to the 1960s; in the 1980s, changes were made to its mechanical parts only.
The electrical system, whose engineering is considerably outdated, includes four main electrical motors: the three larger ones are for the main fan, the filter fan, and the furnace rotation. The fourth one is smaller and is used on the heat recovery fan. All the motors were DC because at the time the furnace was built it was not possible to control AC motor rotation through inverters.
The unit's service life was about to end: the type and age of the motors required frequent and prolonged shutdowns for maintenance of the brushes of the three main machines. The servicing lasts four hours and is performed every month and a half, with significant production losses of up to 400 tonnes of clinker per shutdown.

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The project

Based on this situation, it was decided to replace all the motors with more advanced equipment – by installing inverters and AC motors to replace the DC power supply bridge - and to rebuild the electrical cabinet completely. Because of budget constraints, the project was planned in steps to be completed over three years. The first step included the replacement of the main fan motor only (1,400 kW); however, due to a failure and evident signs of stress on the filter fan motor (800 kW), it was decided to replace it at the same time as well. Agreements signed with ABB and full cooperation by the agency D-Tec allowed us to deliver the materials in advance of the expected date.
The new motors belong to the AMI series, designed for MV but rewound for LV, manufactured at ABB's Helsinki plant. For the inverters, the choice fell on ACS 800 low-harmonic inverter.

Benefits

After startup, measurements were made to assess the benefits provided by the new unit. The most significant improvement was expected to come from strongly reduced maintenance requirements resulting in increased annual production, which was duly achieved. However, the results exceeded expectations: it was observed that switching to two AC motors with inverter, combined with the new installations in the electrical cabinet, ensures large absorption reduction equal to more than 1,500,000 kW per year. Investment payback time, which had been estimated to be three years considering the shutdown times only, has been significantly shortened.
The customer chose ABB for this project because of equipment reliability, spare part availability, and the fact that over time Holcim personnel have become familiar with these products.

ABB and cement: in-depth experience

To supervise the furnace, the customer chose ABB's Expert Optimizer control and management system, which optimizes the production by automatically determining the parameters. Almost thirty years ago, the Merone plant was selected for the installation of the first prototype of this successful technology, which ABB has been constantly updating.
During the furnace shutdown we also installed two smaller ACS 800 inverters on 90 kW motors of the coal transport and dosing system (coal is the main fuel used by the burners). Transport speed was previously controlled by mechanical equipment, and changing it required the system to be stopped.
The new chimney emission measurement and analysis systems, which ensure over 95 percent availability, are also supplied by ABB.
Lastly, it is worth mentioning that in early 2011 ABB signed with Holcim an agreement for the installation at their cement factory in Untervaz, Switzerland, of a new system that generates power by recovering heat from flue gas at low temperature.

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