

Case note

ACS 5000 variable speed drives increase efficiency and production output of cement plant

Four ACS 5000 variable speed drives have replaced cascade converters controlling the flow rate of induced draft fans at Siam City Cement in Thailand. The drives, each rated at 2.5 MW, have resulted in \$250,000 of energy savings per year.



Siam City Cement plant, Saraburi, Thailand

Siam City Cement

Siam City Cement (Public) Company Limited (SCCC), headquartered in Bangkok, is Thailand's second-largest cement producer. The Group's principal activities are manufacturing and distribution of cement, ready-mixed concrete and fiber cement tiles. SCCC is a subsidiary of Holcim, one of the world's largest cement makers.

SCCC's cement plant in Saraburi has 3000 employees and a production capacity of 16.5 million tons of cement per annum.

Preheater tower induced draft fans

The preheater tower has a series of cyclone chambers through which the raw material passes on its way to the kiln. To save energy, modern cement plants preheat the material before it enters the kiln. The induced draft (ID) fans extract the hot gases from the kiln, heating the raw material as it swirls through the cyclones.

Challenge

The ID fans are a major consumer of electrical energy. Previously the fans were controlled by sub-synchronous cascade converters. Cascade converters, however, have a restricted operating range which had a limiting impact on the plant's capacity.

Because of their age, the cascade converters were proving expensive to operate and maintain as the carbon brushes needed replacing on the machines every few months. Spare parts for the cascade converters were becoming scarce.

As cement making is a continuous process, the drives need to operate 24 hours a day and only be taken off line at planned maintenance intervals. With each kiln stop costing several thousand dollars, maximizing uptime of the process is paramount.

Highlights

- Energy savings of \$250,000 per year
- Reduction of CO₂ emissions
- High reliability and availability
- Wide range of fan operation
- Harmonics within IEEE limits
- Ride through of power supply disturbances



Motor and preheater ID fan at Siam City Cement's Saraburi cement plant in Thailand

Solution

The challenges were overcome by replacing the cascade converters with ABB's ACS 5000 variable speed drives with integrated input isolation transformer. The drives are rated at 2.5 MW.

Using AC drive technology meant that the slip rings on the existing wound rotor motors could be removed, resulting in less maintenance.

Benefits

Wide speed control range

Compared with the limited operating range of cascade converters (60 – 100 percent), variable speed drives offer a much higher flexibility over the entire speed range (0 – 100 percent).

Energy savings

After upgrading to ABB's ACS 5000 variable speed drives, the annual energy consumption is reduced by 2,500 MWh. With fuel costing \$0.1/kWh, the annual energy savings are approximately \$250,000, comprising \$62,500 in electrical energy and \$187,500 in alternative fuels.

Reduction of CO₂ emissions

The annual energy savings of 2,500 MWh reduce the CO₂ emissions by about 1,250 tons per year.

Ride through of power supply disturbances

The ACS 5000 variable speed drive features a ride through function which ensures that the system is unaffected by prolonged voltage fluctuations on the supply network without tripping. This feature, together with flying start, results in a fan drive system that is robust towards supply network fluctuations.



Air-cooled ACS 5000 variable speed drives controlling the flow rate of the preheater ID fans

Reduced maintenance costs

Compared to the cascade converters, the new variable speed drives greatly reduce maintenance time and costs. As the drives need to operate 24 hours a day and only be taken off line at planned maintenance intervals, this is of paramount importance.

Key data of ACS 5000 product family

Inverter type	Five-level Voltage Source Inverter (VSI)
Power range	Air cooling: 2 - 7 MW
	Water cooling: 5 - 32 MW
Output voltage	6.0 - 6.9 kV (optional: 4.16 kV)
Maximum output frequency	75 Hz (optional: +250 Hz)
Converter efficiency	Typically > 98.5% (incl. auxiliaries)
Special feature	Available with integrated or separate input isolation transformer
Type of motor	Induction, synchronous or permanent magnet motor

For more information please contact:

www.abb.com/drives

www.siamcitycement.com