

Case note

ACS 5000 variable speed drive increases efficiency of steel mill's blast furnace blower



voestalpine Stahl Donawitz in Austria

voestalpine Stahl Donawitz replaced mechanical inlet guides vanes with a variable speed drive from ABB.

The ACS 5000, rated at 8.4 MW (11,300 hp), controls the blast furnace blower at voestalpine's steel mill in Donawitz, Austria.

Highlights

Energy savings: approx. 10 percent

Reduced maintenance costs: approx. 90 percent

voestalpine Stahl Donawitz

voestalpine Stahl Donawitz GmbH & Co KG manufactures rails for railroad customers around the world. Its products include flat-bottomed rails for heavy cargo railways and grooved rails for light rail public transportation. The products are manufactured at a steel mill in Donawitz, Austria.

voestalpine Stahl Donawitz is part of voestalpine AG, a leading European processing group, with headquarters in Austria.

Blast furnace blower

During steel production the blast furnace produces molten iron from iron ore, coke and limestone. Air generated by a turbo blower is blasted into the foot of the furnace.

The hot air starts a chemical reaction that converts iron oxides into liquid iron, which is then processed into rails.

Challenges

The basic requirements for a blower drive are reliability and efficiency since a shutdown of the blast furnace blower causes time-consuming condition checks or even repair of the equipment, each reducing production time.

The blast furnace blower at voestalpine's plant in Donawitz is driven by electricity. Mechanical inlet guide vanes used to control the blower. However, the optimal process capacity, which gives the best quality output, is difficult to achieve with mechanical control, such as inlet guide vanes.

In addition, mechanical control methods are energy intensive, which increases the plant's CO₂ emissions.

Solution

The inlet guide vanes are replaced with ABB's ACS 5000 variable speed drive.

To ensure uninterrupted operation, the ACS 5000 is equipped with a synchronized bypass, which enables direct connection of the motor to the 6 kV network, if required. Thus, the motor can also be operated direct-on-line in case of disturbances.

Mechanical vs. electrical control

With the mechanical fixed-speed solution it is difficult to achieve the optimal process efficiency over the entire speed range. With variable speed drives, however, a change in production volume is simply achieved by changing the motor speed. This saves energy, decreases CO₂ emissions and minimizes total operating costs.

Benefits

Energy savings

By replacing the mechanical control with ABB's ACS 5000 electric variable speed drive, voestalpine Stahl Donawitz achieves some 10 percent saving in energy.

Maintenance costs

Maintenance costs were reduced by approximately 90 percent.

Smooth system integration

The ACS 5000 is equipped with all major fieldbus adapters which enabled a smooth and simple integration into voestalpine's modern process control system.

Remote monitoring

The ACS 5000 is equipped with DriveMonitor™, an intelligent monitoring and diagnostics system, which allows real-time access to the drive. Long-term monitoring functions deliver important information on equipment status, tasks needed and possible performance improvements. It speeds up fault-finding and reduces downtime, thus increasing the total production time.



This picture shows the two blast furnaces at voestalpine Stahl Donawitz in Austria

Customer satisfaction

Dr. Hackl, director of the department of energy & media, voestalpine Stahl Donawitz GmbH & Co KG, says: „After a thorough analysis, we came to the conclusion, that the ACS 5000 is the ideal solution for our blast furnace. The determining factor in our decision is the fact, that the ACS 5000 is a ‚real‘ 6 kV drive suitable for standard motors, which can be synchronized to a 6 kV network. If there is a disturbance which does not lead to an immediate trip of the drive, the ACS 5000 synchronizes the motor to the network. The motor can then be operated direct-on-line until the problem is fixed. The process is not affected by the disturbance. Another big plus is ABB’s modular drive concept, which allows for simple and efficient maintenance. We found a reliable partner in ABB, who supplies highly efficient and reliable drives and provides excellent support.“

ACS 5000 key data

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



Blast furnace blower motor (8.4 MW) which is controlled by an ACS 5000



ABB's ACS 5000 variable speed drive

For more information please contact:

www.abb.com/drives

www.voestalpine.com/stahldonawitz/en