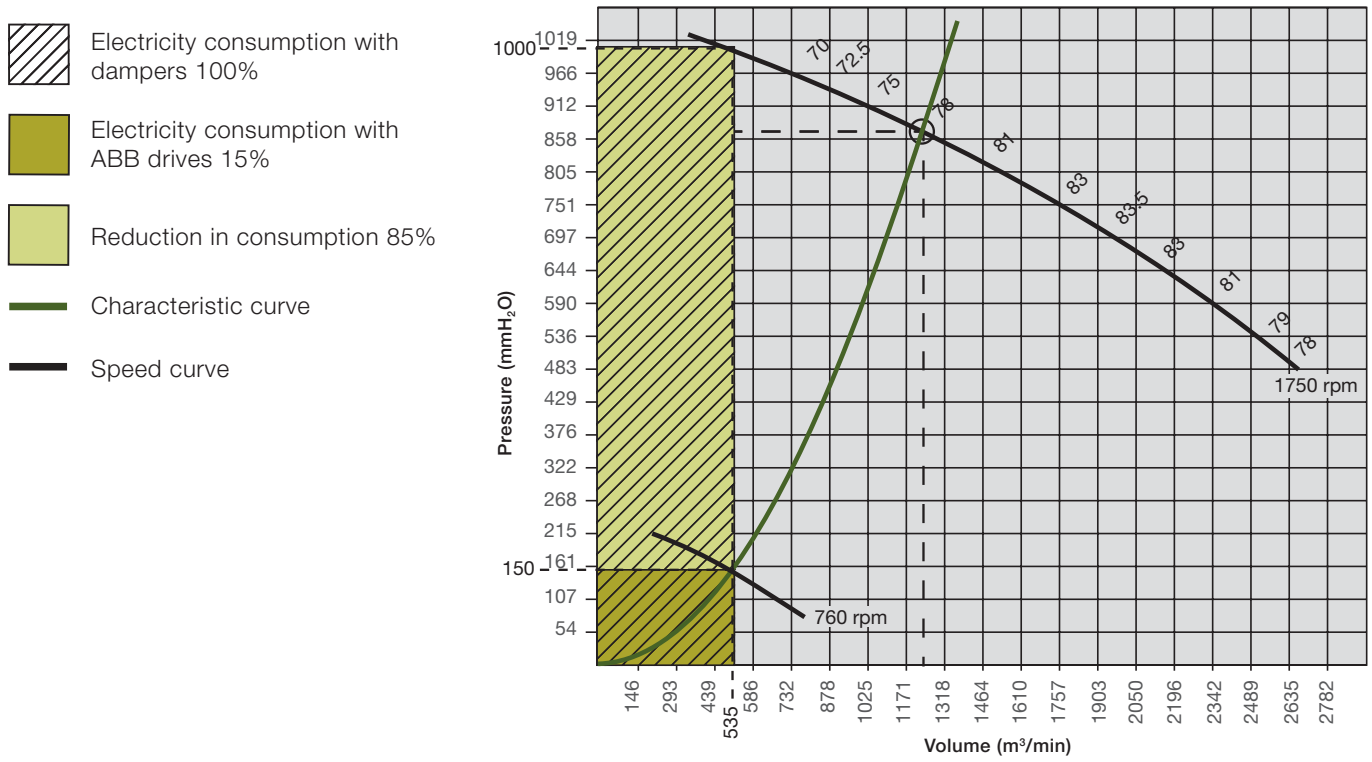
Partner note
ABB industrial drives deliver 85% energy saving in fan application



Rhodia is a specialty chemical company and member of the Solvay Group, a multinational concern with its headquarters in Belgium. At its plant in Santo André, Brazil, Rhodia manufactures polyamide based products.

A boiler at the plant produces 37 t/h of process steam and operates 24/7 all year round. The boiler has two motor-driven FD (forced draft) fans to provide the furnace air flow. Until recently, the two 220 kW 440 V motors were run at their nominal speed of 1750 rpm and the air flow was controlled by means of mechanical dampers. On average the dampers were operated at only 30% open, resulting in significant energy waste. Annual electricity consumption by the two fan motors was 2176 MWh.

Authorized value provider

ABB

ABB authorized value provider label

In order to save energy, the company decided to replace the dampers with AC drives, which would control the air flow by adjusting the speed of the fan motors. Based on its application knowledge and experience, APS Componentes Eletronicos Ltda recommended the use of two ABB industrial drives as the optimal solution. Located in São Paulo, APS Componentes Eletronicos Ltda is now an ABB authorized value provider for Low Voltage AC Drives.

Dramatic reduction in energy consumption

Running a fan at constant speed and using mechanical means to restrict the air flow is very inefficient – it is often compared to driving a car with one foot on the accelerator and the other on the brake. By installing ABB industrial drives to control the fan speed according to the needs of the process, Rhodia was able to reduce the electricity consumption of the fan motors by a remarkable 85%.

The principle behind the energy saving is shown in the graph. Assume that an air flow of 535 m^3/min is required, for example. With the motors running at a constant 1750 rpm and the air flow adjusted by dampers, the characteristic curve for the fans indicates that the air pressure in front of the dampers will reach approximately 1000 mmH_2O. The energy used is represented by the whole of the hashed area.

When a drive is used, the fan motor speed is adjusted to generate the pressure needed to deliver the desired air flow. For the same flow of 535 m^3/min, the fans will be driven at around 760 rpm and the pressure will be approx. 150 mmH_2O. In this case the energy used is represented by the dark green area. The light green area therefore shows the amount of energy that is saved.

Lower maintenance costs

In addition to energy savings, the use of ABB industrial drives has improved the lifetime of the motors. Running at lower speeds has reduced vibration and wear, helping to cut maintenance costs. Lower speeds also mean quieter operation, with the sound pressure level (SPL) reduced from 94 to 78 dB(A).

The ABB industrial drives selected for this application incorporate DTC (direct torque control), a motor control method that allows accurate control of both motor speed and torque without the need for pulse encoder feedback from the motor shaft. Rhodia has confirmed that the drives provide precise and consistent control of the furnace air flow and combustion process.

Challenge

– Reduce energy consumption of boiler fans while retaining reliable operation and full control over combustion

Solution

– Replace mechanical dampers with ABB industrial drives (2 x ACS800) to control air flow by adjusting the speed of the fan motors

Benefits

– Energy consumption of fan motors reduced by 85% from 2176 to 317 MWh per year
– Motor lifetime improved
– Reduced vibration and mechanical wear due to lower motor speed, so maintenance costs decreased
– Sound pressure level reduced by 16 dB(A)
– Precise and consistent control of the air flow and therefore of the combustion process
– System redundancy achieved by leaving mechanical dampers in place (set fully open)

The ABB industrial drives control the furnace air flow by adjusting the speed of the fan motors.

APS Componentes Eletronicos Ltda and ABB drives

APS has been working with ABB since the 1990s. The company was initially based on the Santa Ifigênia, a street well known throughout Brazil for its concentration of electrical businesses. In 2007 it relocated to Santo Amaro, and the new site enabled it to expand its inventory of low voltage drives and start offering maintenance services.

Focused industries:

– Automotive
– Electrical and Electronics
– HVAC
– Mining
– Plastics and Rubber
– Water and wastewater
– Chemicals
– Food and Beverage
– Metals
– Pharmaceutical
– Textiles

Focused applications:

– Crane
– Extruder
– Pump
– Elevator
– Fan
– Winder

APS Componentes Eletronicos Ltda is a technical distributor and a member of the ABB Value Provider Program. It provides consistent quality in sales and support for ABB drives. In addition to its in-depth knowledge of local markets, the company is conversant with ABB low voltage AC drives products and processes.

For more information, please contact your local ABB representative or visit:

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