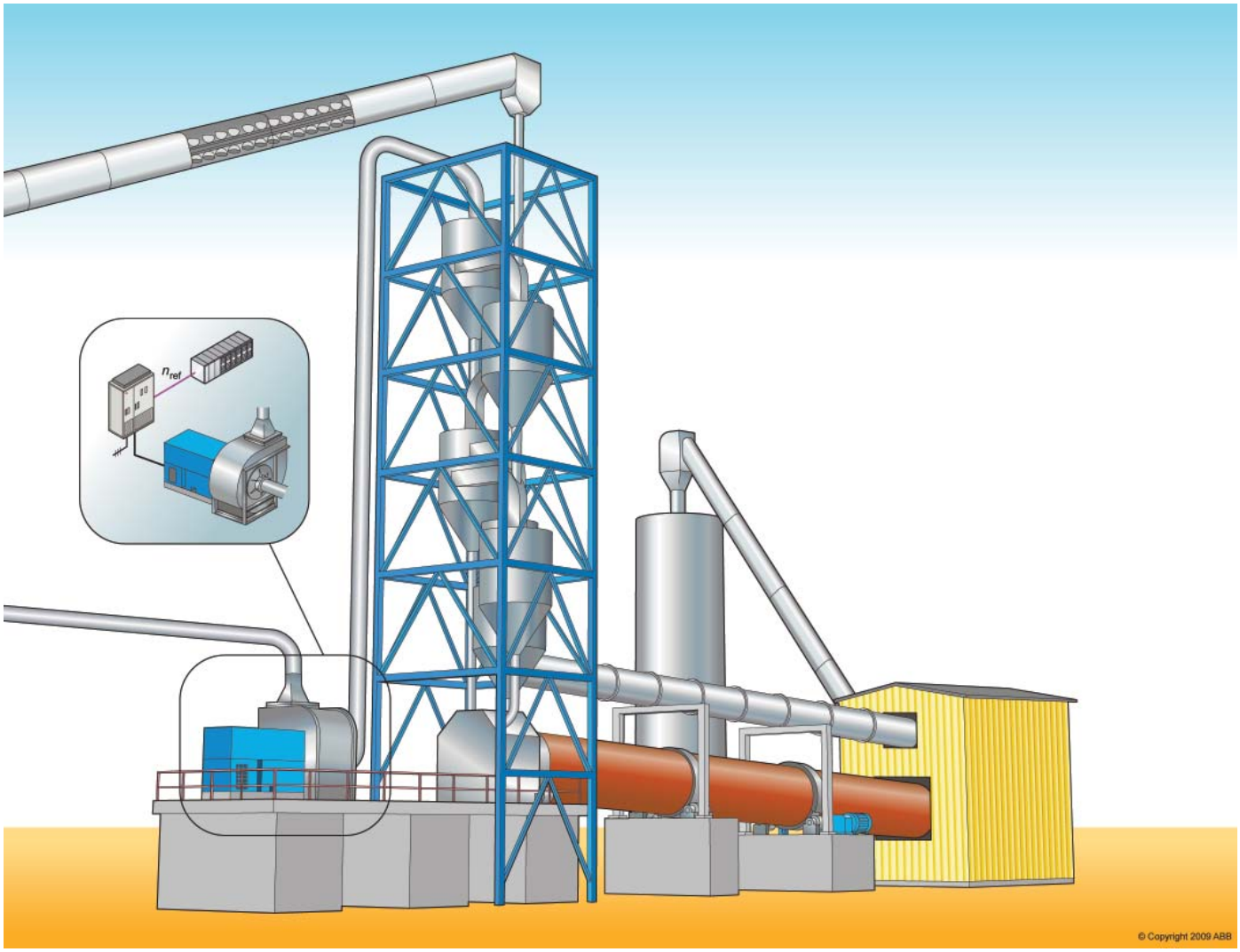
Application note
AC drives enable precise gas flow and reduce energy consumption of cement ID fans



The cement plant's automation system controls the operation of the AC drive according to air demand.

Application description

For cement quality, the operation of the ID fan plays a very important role. The ID fan sucks air through the kiln and through the preheater tower. When burning, the mix of air and fuel turns into gas. The burning temperature inside the kiln and the temperature in the preheater tower cyclones are kept constant.

The most common way to control the ID fan's speed, and hence maintain gas flow, is to use an AC drive.

AC drive leads to accurate process control

Controlling the ID fan's speed with an AC drive, compared to other control methods (see comparison on back page), enables accurate control of the gas flow while considerably saving electrical energy and minimizing fuel consumption.

The cement plant's automation system controls the operation of the AC drive according to air demand. Thus, the process is under accurate control, unlike mechanical systems such as damper control.

AC drives also enable soft start of the ID fan, which minimizes mechanical stress on the fan, pipes and other mechanical equipment. Through soft start, the supply network can be dimensioned with a low starting current, thus reducing the low voltage switchgear, transformers and cabling costs.

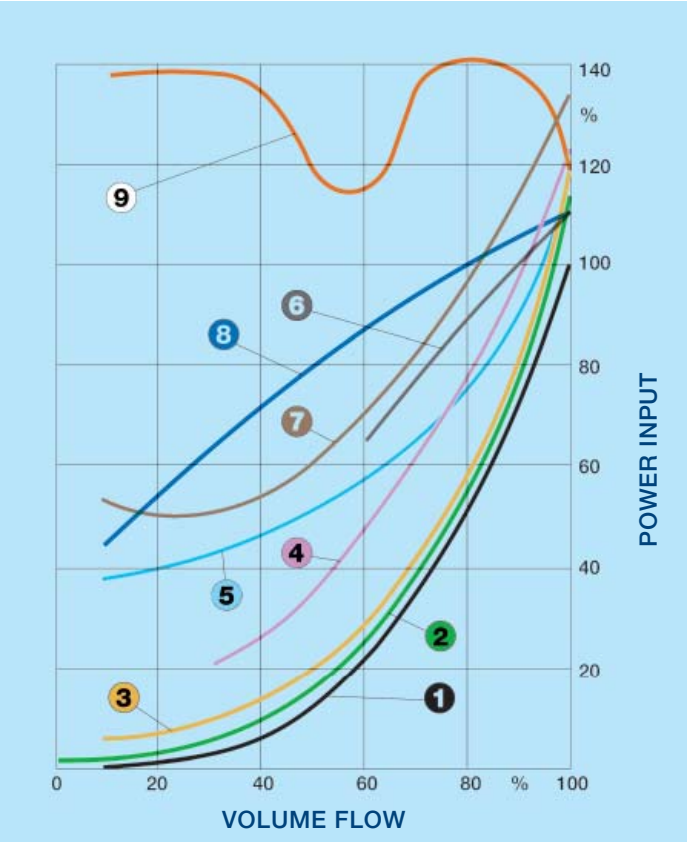
The dynamic Direct Torque Control (DTC) of ABB AC drives eliminates mechanical resonances of the ID fan installation, and it is even possible to jump over the critical frequencies.

Benefits

AC drives provide many benefits such as:

- Substantial energy savings through optimal process control
- Enables the use of totally enclosed AC induction motors designed for harsh environments, e.g. dust
- Enables removal of mechanical control devices, e.g. damper (plates) of fans, and inlet vanes -- which require regular maintenance due to process dust
- Soft start of fan motors
- Flying start of fan motors without high starting torques or high starting current peaks thanks to DTC
- Power loss ride-through, i.e. in case of power failure in the supply network, the AC drive can utilize the energy from the fan's rotating inertia in order to keep the control electronics operational during the power failure
- Jump-over of critical frequencies
- High power factor

ABB drives can provide the biggest energy saving potential for fans.



Power consumption of fan installations with different control methods.

1 Required fan power
2 Speed control by AC drive
(both for centrifugal and axial-flow fans)
3 Variable pitch angle (for axial fans only)
4 Fluid coupling (slip control)
5 Inlet vane control
(for centrifugal fans with backward-curved impeller)
6 By-pass control (for axial fans)
7 Damper control
(for centrifugal fans with forward-curved impeller)
8 Damper control
(for centrifugal fans with backward-curved impeller)
9 Damper control (for axial fans)

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