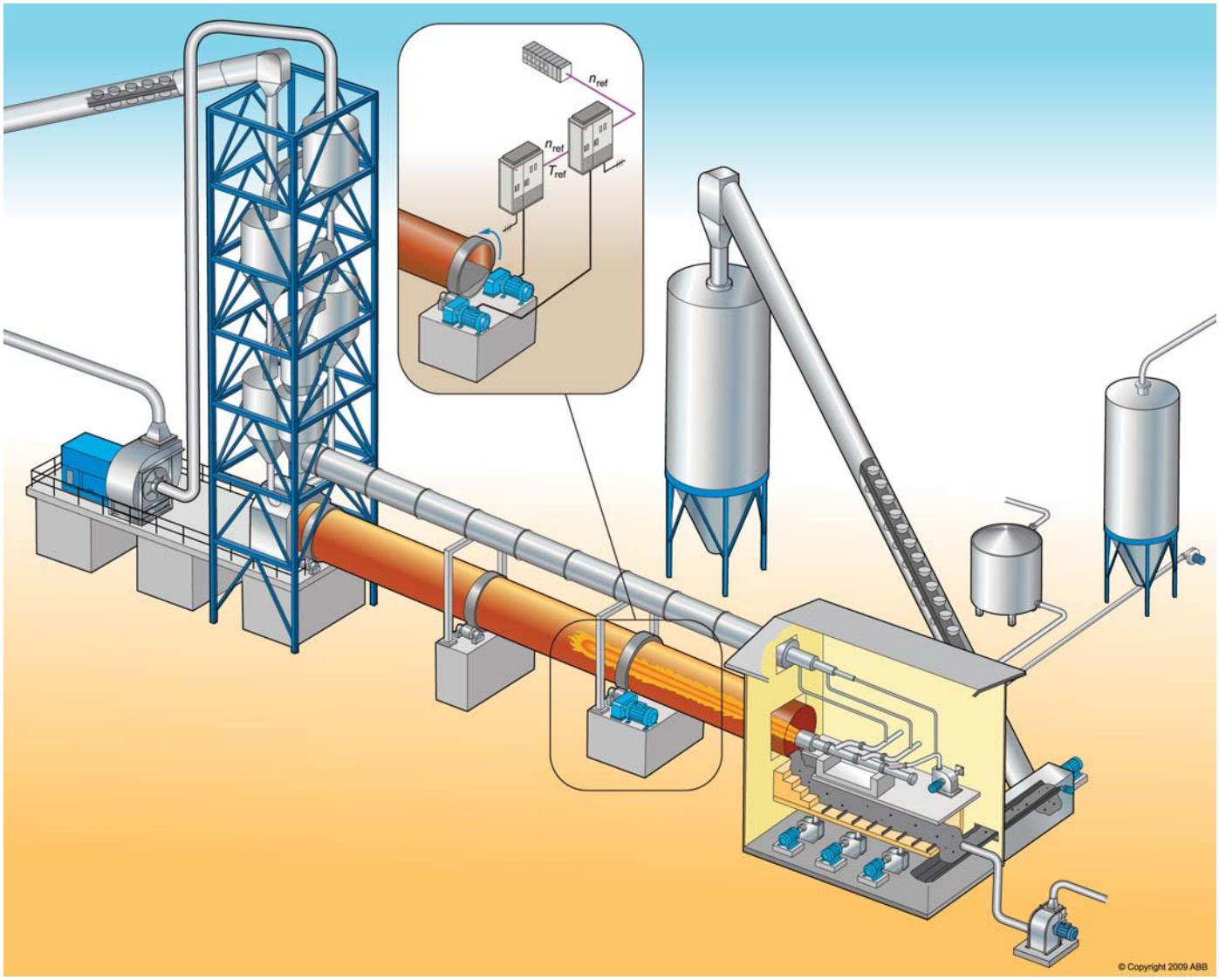
Application note
AC drives improve cement kiln control and reduce energy consumption



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Application description

The kiln is the most critical element in the cement making process. It is where the chemical processes occur that turn raw mix into clinker. The kiln also consumes the greatest amount of energy (fuel plus electricity) within a cement plant.

The kiln rotation is continuous and is never allowed to stop. Very high starting torque, accurate speed regulation and dynamic torque regulation are key requirements.

Accurate control is needed to ensure that the kiln is used to its capacity, whilst optimizing fuel consumption, maintaining low running costs and meeting environmental standards.

The most common way to rotate the kiln, in modern installations, is to use AC drives. This enables full control to cope with varying demands such as changing production volumes, and inconsistent quality of the raw mix.

AC drive brings uninterrupted and stable running

Kiln control is best carried out by controlling each kiln motor separately using an AC drive. When there are two motors, both are mechanically connected to the same kiln. Thus, the rotation speeds of the motors must be identical and the load has to divide equally between the motors.

The AC drives are connected with each other in a master-follower arrangement. The master drive is given the speed reference by the automation system. It then sends a speed reference and a torque reference to the follower drive. This arrangement ensures that the speeds of both motors are identical and that the load is equally divided between the motors.

Should a fault occur in any of the two motors or two AC drives, the kiln can be rotated by the one remaining functional motor/AC drive pair. In this situation the master-follower arrangement cannot apply. Also in this case, the automation system controls the one motor/AC drive pair only.

AC drives using direct torque control (DTC), with independent control of speed and torque, ensure uninterrupted and stable running, irrespective of the kiln speed or load. This gives accurate speed control as well as dynamic torque control, enabling high starting torque to be produced.

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

Benefits

AC drives provide many benefits such as:

- Minimized consumption of fuel and electricity, maximized production volumes through optimized control of kiln speed and production flow
- Less maintenance through reduced mechanical wear of the kiln and other equipment
- High up-time and increased throughput through high torque during start and operation if needed
- Equal distribution of load between the kiln motors, resulting in reduced maintenance
- Ease of controlling the operation of the entire kiln through the automation system
- Changing of kiln rotation speed (e.g. if higher speed is required), e.g. if production conditions/requirements change
- High power factor, resulting in lower reactive power consumption and substantial energy savings

ABB drives' DTC plays an important role in the efficient running of kilns.

For more information please contact:

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