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ABB drives the most modern cement kiln in Europe

Europe's most modern cement kiln, at Castle Cement's Padeswood works in North Wales, is being speed controlled by two, 300 kW ABB industrial drives. The drives work in master-follower arrangement. Here, both drives have an individual gear box which in turn drives a common girth gear that is attached to the kiln shell. The benefits of this arrangement mean that the speed of the drives change as the kiln feed increases or decreases. "This speed control is essential for the quality of the product," stresses Castle Cement's plant electrical engineer, Dave Jones.

Another benefit for Castle Cement is that the ABB AC drives, with Direct Torque Control (DTC), offer proven torque control and superior speed control accuracy, ensuring uninterrupted and stable running, irrespective of the kiln speed or the kiln load. Power supply failures and other special occasions result in the need to restart the kiln. Restarts, requiring a very high starting torque, are easily achieved with DTC. The drives superior control characteristics, enables accurate control of the kiln, thus optimising the fuel consumption and the production flow.

Not only has the new £68 million kiln 4 installation increased production at the works from 500,000 to over 800,000 tonnes of cement per year, but it operates to the very highest levels of environmental control, performance and energy saving.

Central to the greatly improved energy saving of the 65 metre long kiln is an ABB industrial drive used on the ID fan, which at 2MW is the largest drive installed at Padeswood. The ID fan, located near the preheater tower, draws gases through the kiln, precalciner and cyclones before emitting them through the exhaust stack

There are three fans involved in the kiln process and each one is controlled by an ABB industrial drive. Apart from the 2MW ID fan, there is an exhaust fan, rated at 750kW that takes gases to the atmosphere via the dust collecting bag filters and a cooler fan rated at 560kW which takes the cooler exhaust gases to atmosphere.

A further four fans, rated 110 kW, 160 kW, 200 kW and 250 kW push the air into the grate cooler to reduce the temperature of the hot clinker to a set point.

All these airflows have to be adjusted and controlled as atmospheric conditions, process conditions and ventilation needs greatly effect the flow requirements. The control method employed has a major effect on the running costs. For example, a damper with a fixed speed motor is the least energy efficient solution and the ABB industrial drives have proved to be the most energy efficient.

"We have about 3.5MW of variable speed drives on fan applications and we would expect a 25 to 30% saving over conventional technology. Low voltage AC drives are primarily used for load matching resulting in significant energy saving as well as for reduced maintenance benefits," says Dave Jones. "Maintenance is considerably reduced because many of the drives have replaced DC drives and slip ring motors which required replacement carbon brushes costing over £7,500 per year in total."

By installing the ABB industrial drives on the kiln, the ID fan and the other fans, Castle Cement hopes to improve its profitability through increased system availability, energy savings and reduced maintenance. Additional benefits of the variable speed drives include total process controllability and the elimination of motor noise and fan vibration.

ABB has supplied to Castle Cement, low voltage AC drives for over 150 other applications including mills, pumps and conveyor belts. In addition, the plant uses some 450 electric motors.

An added bonus, according to Dave Jones, is the location of ABB Drives Alliance partner and supplier of the drives, Central Electrical. "Its ability to respond with spare parts and technical advice along with access to their technical teams, training and trouble shooting is beneficial."

Meanwhile the sites' overall improved performance is attributed to the use of alternative fuels, in which Castle Cement has been a pioneer. Alternative fuels to be used at Padeswood include Cemfuel, which is processed from the residue of recycled waste solvents and Profuel, which comprises paper and plastic wastes. In the future, vehicle tyres will also be used as an alternative fuel.

The opening of the new kiln has resulted in the closure of three existing kilns at Padeswood and two wet kilns at the company's Ribblesdale works in Lancashire. This will reduce the company's carbon dioxide emissions by 17.5 per cent per tonne of cement produced against 2004 performance. Acid rain gases at Padeswood will be reduced by a staggering 75 per cent. Since the new kiln came into operation, dioxin levels have been reduced to be amongst the best in the world while sulphur dioxide emissions are down by over 90% and carbon dioxide by 20%.

Mike Eberlin, managing director of Castle Cement said: "Kiln 4 will lead to major improvements in the local environment. It will also help reduce Wales' dependence on landfill sites while using waste both for cleaner production and lower energy consumption."

The new kiln ensures an increased supply in the marketplace of light-coloured cement. The light colour is especially attractive to precast concrete manufacturers as it can allow a brighter finished product and when used, less pigment may be necessary to arrive at a specified shade.

Castle Cement is the UK arm of HeidelbergCement, the world-wide building materials group. Heidelberg Cement was founded in Germany in 1873 and now employs 76,000 people in 50 countries.

In the UK, around 1,000 people work at Castle Cement plants at Ketton in Rutland, Ribblesdale in Lancashire and Padeswood in north Wales, as well as the head office in Birmingham and marine terminals in Avon and Humberside.

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Caption: A 2MW ABB industrial drive controls the speed of a large fan that draws air through the 65 metre long kiln.

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For more information please contact:

Layla Hewitt
Marketing Communications
Phone: 01925 741517
Email: layla.hewitt@gb.abb.com

ABB Ltd.
Daresbury Park
Daresbury
Warrington WA4 4BT

Emma Jenkinson
Armitage Communications
Phone 020 8667 2218
Email: emma.jenkinson@armitage-comms.co.uk