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Case Study: CEMEX Aggregates

Overview

BRAMMER has been a long-standing supply partner to CEMEX Aggregates' Goddard Quarry, near Sheffield, South Yorkshire. With a reputation for industry-leading customer service and technical expertise, BRAMMER was asked to solve an unusual problem affecting one of the quarry crushers.

BRAMMER has a significant technical team devoted to inverter drive technology, and in this case one of its technical drive specialists was called upon.

The Problem

CEMEX engineers had identified that the range of aggregate produced did not always match exacting customer requirements. Existing crusher speeds created too much waste aggregate in the form of dust particles of 5mm diameter and under.

To keep the waste to a minimum, optimum crusher hammer speeds were identified as:

- 1,030rpm for new hammer heads
- 200rpm for part worn hammer heads

It is difficult to achieve these speeds precisely and consistently using the traditional speed control method through V-belt drives, and changing the V-drives for a new speed takes two engineers at least two hours, time that could be used more productively.

The Solution

Following site visits by a technical drive specialist from BRAMMER's significant technical team devoted to inverter drive technology and discussions with CEMEX engineers, BRAMMER recommended an inverter drive as the best possible solution to the problem.

Inverter drives can infinitely vary the electric motor speed, so the optimum crushing speed for new and part-worn hammer heads can be quickly identified

and easily programmed. This method does not require the changing of any of the mechanical drives, saving significant production and engineering time.

The Benefits

The benefits of this solution for CEMEX are:

1. Accurately running the hammer heads at 1,030 rpm gives approximately 20% less waste product and therefore 20% more saleable product.
2. With waste product now reduced, it is not necessary for the tertiary crusher speed to be reduced, resulting in higher production rates.
3. As the crusher now runs at the optimum slower speed, the life of the hammer heads has increased by approximately two weeks
4. One of the advantages of using inverter drives is the enhanced control of production processes. In this case, the inverter drive has been programmed to detect feed starvation. This has been achieved by monitoring the upstream motor current and reducing the relative motor speed to its lowest setting. This saves energy and significantly reduces the 'windmill' effect of the empty rotor acting as a fan, reducing the often large volumes of dust-laden air forced into the atmosphere. The inverter drive will sense the feed motor restarting and ramp up the motor speed accordingly to take the load.
5. Inverter drives have the ability to control the ramp up and ramp down of electric motors. In this instance, this control eliminates the shock loading of the mechanical drive elements and enhances the life of V-belts and bearings.

The Payback

Despite a five figure investment, CEMEX engineers indicated that a payback period of less than two months had been achieved through:

- 20% increase in saleable product
- Increased life of crusher hammer heads

Technical Specifications

Inverter Drive – 200Kw, 361A, FLC 400V, 3Phase AC, IP20 enclosure and line choke incorporating:

- True open loop vector control with high torque and fast dynamic response
- Self-tuning for automatic drive set-up to match the drive to motor and load in vector modes
- Lacquered PCBs providing greater ingress, short circuit and condensation control

- Unique *Optimal Braking* function eliminating the need for braking resistors
- User-friendly parameter structure for easy set-up
- Three-year warranty
- Stock availability from BRAMMER National Distribution Centre

Inverter Panel – the inverter panel was designed to house both the inverter and line choke, comprising:

- Floor standing enclosure 2200H x 1200W x 600D c/w 100mm high plinth
- Paint finish RAL7032 beige
- Ingress protection rating – IP54
- Complete with door interlocks, neutral link, main earth bar, cooling fans and filters, labels, trunking and wiring.

The panel was fully wired and tested as far as is practical before despatch. The following panel documentation was supplied:

- Works test document
- General arrangement drawing
- Schematic diagram

An ambient temperature of 26 degrees Celsius was assumed when calculating the panel heat dissipation requirements.

The panel mounting plate and framework were stiffened with additional cross braces due to the weight of internal components.

The products are covered by a 12-month back to base warranty, which can be extended to three years.

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