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Speakers:

Geoff Harmon / MagnaDrive

Gharmon@magnadrive.com

Matthew Derner / MagnaDrive

Mderner@magnadrive.com

Ken DeGroot / ArcelorMittal Riverdale

Ken.DeGroote@arcelormittal.com>

ABSTRACT:

Title:

As an alternative to a Variable Frequency Drive, ArcelorMittal Riverdale saves energy and increases reliability through the installation of MagnaDrive’s Adjustable Speed Drive with permanent magnet torque transfer.

Abstract:

The introduction of Permanent Magnet Adjustable Speed Drives (PMASD’s) has given industry another option to consider for adjustable speed applications. For Arcelor Mittal Riverdale, a MagnaDrive 26.5 / 28.5 Magnetic Adjustable Speed Drive was installed on a 400 HP – 900 RPM Fan application that provides primary off-gas draft for the BOF (Basic Oxygen Furnace).

PMASD's consist of two primary components. The first component, a set of copper conductor plates, is connected to the motor shaft; the second component of the permanent magnet drive is a rigid assembly of permanent, rare earth magnets which is connected to the load. During operation, relative motion between the two components creates an eddy current field that transmits torque across the air gap. To adjust the speed of the driven load, the amount of torque transmitted from the motor to its load is controlled by changing the distance between the conductor plates and the magnet assembly. During operation and throughout the entire speed range, no physical connection exists between the motor and the load. This air gap power transfer has demonstrated vibration reductions up to 85%. The combination of the electrical energy savings and the utility company rebate has produced an ROI of 1.3 years. Since the motor now starts uncoupled, the high amperage/torque issues have virtually disappeared with an average daily savings of 1600kWh.

The permanent magnet adjustable speed drive is controlled via 0-100 degree rotary actuator. The system requires a closed loop signal feedback (4-20 mA) connected to a control system where the system will need to control pressure or flow from the PID connected to the fan system. The Beck rotary drive will adjust the magnetic plates and control torque into the fan which results in speed control to match the process requirements. Control is stable and repeatable to within a few RPM.