

# MINING MONTHLY

motors & drives

## Drive technology marches on

THE usage of magnetic drive couplings in mineral processing equipment is helping to reduce maintenance costs and increase reliability.

The magnetic drive couplings eliminate any physical connection between the input and output shafts. While some of the directness of the drive is lost with this design when compared to physically connected drives (leading to a degree of "slippage"), the significant advantage is a distinct reduction in vibration. Less vibration means less wear, less noise and smoother operation.

Essentially, magnetic drive couplings address the problem of maintaining the reliability of rotating equipment while tolerating variations in system conditions that can cause vibration and premature wear.

US drive coupling manufacturer MagnaDrive said regardless of good alignment practices, a variety of conditions could affect the alignment of the shaft and therefore necessitate premature maintenance.

While conventional couplings — those utilising gears, metal discs and elastomer materials — are capable of operating with some degree of misalignment, they still transfer vibration forces when the shafts are not coaxial.

Alternatively, rotating equipment and power transmission devices that incorporate permanent magnetic couplings (PMCs) have the advantage of transmitting torque through an air gap. MagnaDrive said the air gap

creates a "disconnected connection" which isolates vibration between motor and load, handling misalignment, protecting equipment from shock loads and providing a cushioned start for rotating equipment.

In essence, PMCs have two primary components: an aluminium rotor populated with permanent magnets that is attached to the output shaft; and the conductor rotor assembly comprising copper conductor plates, which is connected to the driver (input) shaft that rotates at constant driver speed.

plates, the slower the output shaft turns, the greater the speed difference between shafts. PMCs with this capability are called adjustable speed drives (ASDs).

General applications and service conditions for PMCs are up to 5000hp and 3600rpm in ambient temperatures of between minus 30C and 55C.

MagnaDrive spokesman Donald Jacques told *Australia's Mining Monthly* the first PMCs sold in Australia went to Alcoa's refinery at Pinjarra, Western Australia. He said these units replaced fluid couplings in a

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However, because the drive is not as direct as physically connected drives, a PMC must slip in order to transmit torque, and the difference in power is called slip loss.

When operating at maximum efficiency, the slip loss is between 1% and 4%. However, the advantage of the setup is that, where needed, the speed of the output shaft can be adjusted by varying the distance between the magnets. The further away the magnets are from the copper conductor

de-scale plant on a rake drive that had been a constant source of aggravation for Alcoa's maintenance department. The MagnaDrive units have been operating since 2000.

MagnaDrive has been represented in Australia since February by the Newcastle-based firm Integrated Reliability Solutions. Prior to this, it operated without representation in Australia. Jacques estimated that at the time of writing, there were 25 PMCs and 10 ASDs installed in Australia. — **Alex Forrest**