

Rare Earths at Heart of MagnaDrive Technology

Based in Seattle, Washington, MagnaDrive Corp. designs and manufactures magnetic power transmission products that increase the efficiency of motor drive installations and reduce the initial cost, operating and maintenance expense of those installations. The secret of MagnaDrive technology is that the torque generated by motors used in industrial applications is transferred across an air gap, thus eliminating vibration and reducing noise. In addition, the technology tolerates misalignment of shafts and provides overload protection.

How can power be transferred across an air gap? By the use of a magnetic field created by high power permanent magnets made of the rare earth neodymium, plus iron and boron. Varying the air gap between the magnets and conductor changes the strength of the magnetic field and enables the operator to control the output speed of the installation. Some 17 patents protect the MagnaDrive technology.

The MagnaDrive Adjustable Speed Drive (ASD) consists of three components – a magnetic rotor assembly containing rare earth magnets (which is attached to the load); a copper conductor rotor assembly attached to the motor; and actuation components that control the air gap spacing.

Jim Cich, president/CEO, explains

that the principle of magnetic induction requires relative motion between the magnets and the conductors. Since there is not a direct mechanical connection, the output speed is less than the input speed. This is called slip and is typically between 1% and 4% of rated motor speed when the MagnaDrive ASD is fully engaged.

Rare earth magnets are more common than you may think – they are also found in computers and automobiles. When originally discovered, scientists called certain elements rare earths because they believed they were extremely rare; however, as time went on, it was realized that rare earths may be as plentiful as silver. First on the market during the 1980s, rare earth magnets made of neodymium/iron/boron (NdFeB) create the highest magnetic energy of all permanent magnets, permitting a small size coupled with high torque transmission capability. NdFeB magnets can operate in extreme conditions up to 300° F and have a half-life of over 20,000 years.

The MagnaDrive Adjustable Speed Drive system is suitable for pump, fan, blower, and centrifuge applications and is currently utilized in pulp and paper manufacturing, water and waste water treatment, raw material processing, irrigation, power generation, mining and food processing. Some mining applications include various types of conveyors, dryers, mixers, fans, potash slurry pumps and scrubber screens.

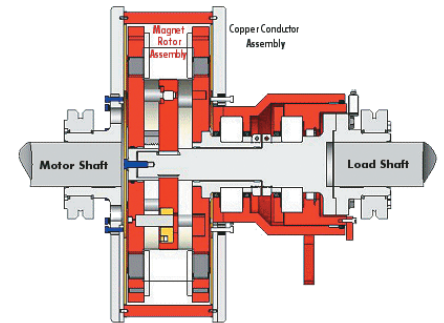
The Ash Grove Cement Company, Durkee, Oregon, has a MagnaDrive installation with a belt-driven centrifugal bag house fan powered by a 125 horsepower electric motor. With the fan running at full capacity during normal



operations, excessive vibration caused damage in the surrounding structure that cost some US \$10,000 per year in maintenance. In addition, when the fan was started, the power draw resulted in 10-second brownouts. The MagnaDrive installation has now dramatically lowered vibration, reducing long-term maintenance costs, as well as saving some 155,000 kWh/year and solving the brownout problem.

Water and wastewater treatment facilities are also benefiting from MagnaDrive applications in Oxnard and San Diego, California, Bremerton, Washington, Wilsonville and Hillsboro, Oregon.

MagnaDrive has representatives across the United States, Canada, Central America and Japan. The company has received funding from the Northwest Energy Efficiency Alliance and the U.S. Department of Energy for the commercialization of its technology. The MagnaDrive ASD technology was recently selected as a Technology of the Year by *Industry Week Magazine*. For more information, visit www.magnadrive.com. 



A cross-section of the MagnaDrive technology depicts the magnet rotor assembly from transferring power from a motor to an application. Illustration courtesy MagnaDrive Corp.