ABB Ring-Geared Mill Drives:

SINGLE-AND DUAL-PINION

Introduction

The grinding process is a significant part of the ore winning process (the excavation, loading and removal of coal or ore from the ground; winning follows development). Selection of the drive solution for the mill has a direct impact on performance, flexibility of operation, total efficiency, reliability and the aging of the system.

As the size of mills driven by ring gears has increased, the requirements for soft, controlled starting and operation, optimized process control and increased efficiency have become more demanding.

ABB ring-geared mill drive solutions correspond to the latest technology and are designed for reliable, long life and low maintenance operation. Different configurations can be designed for single- and dual-pinion mills.

The most economical electrical capital expenditure is provided by ABB's high-speed solution—i.e., a combination of frequency converter and squirrel-cage induction motor.

Or, the ABB low-speed solution—including a frequency converter and brushless synchronous motor—eliminates the costly gearboxes of the high-speed solution.

Both solutions start with the motor directly coupled to the mill—thus eliminating the air clutch typically required for a fixed-speed solution. This allows a significant reduction in mechanical parts and maintenance, and improves total efficiency.

In designing a power supply and control center, you can integrate the power, control and ancillaries into your existing E-rooms, or go for a self-contained, pre-commissioned solution. The containerized E-house is fully air-conditioned and includes the power supply and control of the mill auxiliaries such as motor control center, PLC and visualization system.

Competence in grinding. ABB maintains a team of over 200 engineers for designing, installing and commissioning mill electrification and automation systems. ABB provides everything needed, from design to service and equipment support.

An ABB Solution

ABB ring-geared mill drive solutions offer a modular concept that provides a common drive control platform for induction and synchronous motors in single- and dual-pinion configurations. These drives are well-suited for all type of mills and ball mill applications, and are able to cover the power range up to the mechanical limit of the gearbox or the ring gear.

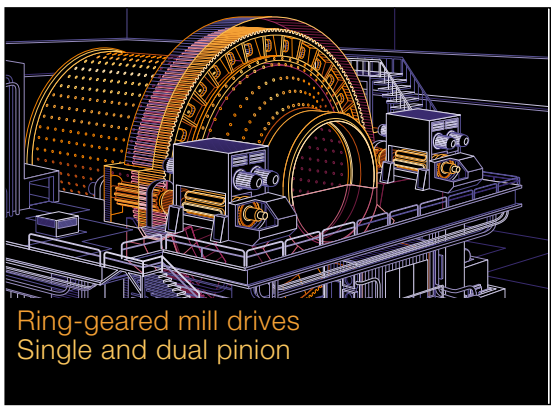
The solution provides adjustable speed for AG and SAG mills, or the opportunity to tune the speed of the ball mills for optimal grinding and maximum throughput, without the need to change any mechanical components (e.g., pinions).

Partial-load operation at any speed is possible; this ability means the grinding throughput can be matched to the up- and down-stream process requirements.

The availability of low operational speed allows filling and emptying of the mills during any process interruption, while still protecting the liners and minimizing their wear.

With the ABB solution, all inherent benefits and possibilities of using drives are available. In addition, the functionality required for grinding applications is implemented in the mill drive controller. This offers operational features such as frozen charge protection and remover, a smooth starting sequence, creeping speed, automatic positioning and controlled rollback without additional equipment such as auxiliary motors.

When dual-pinion mills are used, care must be taken that the load is shared equally between the two pinions. ABB's fast direct torque control (DTC) ensures accurate and coordinated load-sharing. DTC is the ABB advanced motor control method for drives as it allows precise control of the motor's torque and speed.



Ring-geared mill drives
Single and dual pinion

Because the drives show a very smooth starting behavior, with low starting currents, they are well-suited for weak networks. Furthermore, the power factor to the network is greater than 0.95 under all conditions. If an "active front end" is included, then the drive system can operate at unity or leading power factor to the network, as required.

ABB's ring-geared-mill-drive solution protects mechanics during normal operation and starting by limiting the torque and providing frozen charge protection. The mechanical stress on the ring gear is reduced due to the smooth

starting behavior. The precise torque control during all operating states of the mill does not generate significant torque pulsations, thus limiting backlash on the pinions and gearboxes.

Why ABB?

Mill control. The mill drive can be operated manually or remotely. The communication via serial bus contains command and alarm words to control and monitor the drive, as well as for specific functions such as frozen charge protection or operating modes such as inching and creeping.

A dedicated controller is used for the mill-specific programming via an internal, high-speed fiber optic link to achieve best performance. This enables accurate monitoring and control of the system, as well as precise load-sharing in case of dual-pinion mills, for example.

Remote diagnostic. Remote diagnostics can be done through a secure internet connection.

Frozen charge protection. ABB's dedicated mill control system features critical monitoring during the starting period, protecting the mill against damage when dropping a frozen charge.

Service mode. As the mill drive control has operating modes for creeping and positioning, these drives do not need additional equipment for performing maintenance work. Creeping speed can be used for slowly rotating the mill to perform a visual inspection or grinding out the mill. Fast and automatic positioning of the mill based on angle or liner reference reduces the downtime needed for changing liners.

Controlled rollback. The drive has a "controlled rollback" function for bringing the mill smoothly to a rest position where both speed and torque are zero; upon reaching the balance the drive switches off.

Ride-through function. Operation and starting at reduced voltage are possible, so the drive is designed to stay on-line as long as possible. The ride-through function transfers the energy of the rotating mass of the load into the DC link and keeps the drive on-line as long as the DC bus voltage stays above a minimum level. An uninterruptible power supply (UPS) is used to keep the drive control system alive, thereby allowing quick restart after a longer power failure.

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Air Pressure Series

SUPPORTS VARIETY OF FLOW MONITORING TASKS

The Precision Controls Division (PCD) of Marsh Bellofram Corporation has announced the global market introduction of the Type 41 high-performance air pressure regulator series, designed to support a variety of demanding industrial and OEM flow monitoring requirements. Available in two different packages with identical performance characteristics, both with ¼" NPT BSPT port size, design of the Type 41 incorporates the use of a patented Bellofram rolling diaphragm for greater sensitivity and improved accuracy, along with low-friction operation and extended useful service life, in a compact size. The rugged construction of the Type 41 further incorporates the use of precision die-cast aluminum housings, finished with scratch- and weather-re-

sistant vinyl paint, to increase resistance to harsh environmental conditions. In addition, units are pressure- and chromate-treated for internal corrosion resistance. A rubberized, soft-seat valve stem provides stability and "forgives" dirt and other foreign matter. An aspirator maintains downstream pressure and compensates for droop when high flow occurs. The gauge port is convenient for installation and can also be used as an additional full flow outlet. Users can select from among pipe, panel or bracket mounting options. The unique design and performance characteristics of the Marsh Bellofram Type 41 allow it to be used as a drop-in replacement for other manufacturers' models, particularly in applications where high flow capacity, low droop at high flow, repeatable accuracy, fine adjustment sensitivity or panel mounting may be required, and available installation space is limited. Typical applications include constant flow monitoring, low- or zero-flow monitoring, downstream flow, or corrosive environment air pressure monitoring.

For more information:

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MICO Brake System

PROVIDES ADDED CONTROL

MICO, Incorporated offers a full-power brake system with ABS and traction control to provide added control for multi-wheeled vehicles operated both on and off-highway. The system enhances vehicle stability while decreasing stopping distances and improving acceleration under low traction conditions. As many as eight wheels can be controlled independently of the others, making the system easily adaptable to four-wheeled, six-wheeled and eight-wheeled vehicles. The electronic control unit (ECU) monitors wheel speed and brake line pressures with sensors added to the machine. When wheel lock-up or wheel slip conditions exist, the electronic control unit's embedded software algorithms determine the current needed

at the electrohydraulic control valves to improve the operator's control of the vehicle. System status outputs are provided to light ABS and low traction lamps for operator warning and to meet on-highway regulations. In addition to controlling outputs, the embedded program in the electronic control unit allows it to communicate via CAN (controller area network) with a laptop computer running Windows 2000 or XP. Communication between the electronic control unit and the laptop requires a USB-to-CAN dongle and *Diagnostic Interface* software on the laptop. The *Diagnostic Interface* has various user levels that are password protected to allow access to viewing diagnostic information and modifying system parameters.

MICO works with manufacturers to custom design products to meet their specific needs. In addition to providing a full-power brake system with ABS and traction control tailored to particular vehicle requirements, the company also can customize system options. A skid-steer option can be incorporated to shorten the turning distance on long, multi-wheeled vehicles by electronically applying brake pressure to the inside wheels. Downhill speed control can be incorporated, which, when activated, would prevent the vehicle from over-speeding on a decline by applying the brakes to maintain desired speed.

The system is available in whole or in part, based on custom needs. ABS and traction control can be added to a vehicle that already has a full-power brake system installed. Furthermore, the brake system can be implemented with either ABS or traction control—or both.

For more information:

MICO Incorporated
1911 Lee Boulevard
North Mankato, MN 56003
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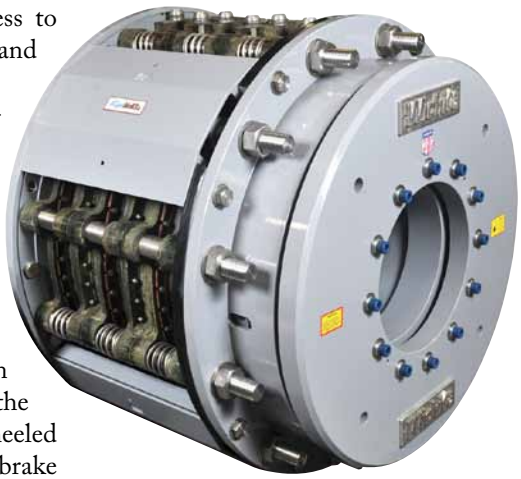
Water Cooled Brakes

PROVIDE ACCURATE TORQUE CONTROL

Wichita Clutch has developed a new dual action head assembly for their line of AquaMaKKs water cooled brakes that provides both failsafe parking and precision tension braking capability in one unitized assembly. AquaMaKKs water-cooled brakes are optimized to provide accurate torque control for constant tensioning in heavy-duty continuous slip tension applications such as draw works and other hoisting systems. Copper wear plates are utilized for suitable heat absorption. A unique, patent pending water jacket design ensures high heat absorption and torque stability, allowing for greater heat absorption over similar sized competitive units. A spring-set feature can be used to assist primary braking systems in parking and E-stop events by providing additional torque from this dynamic brake during a controlled system failure and adds an additional level of braking redundancy for maximum safety. The dual-action head assembly can be retrofitted onto existing pneumatically controlled 25 and 36 size AquaMaKKs units. Spring-set and tensioning functions can be either



pneumatically or hydraulically operated with fewer parts for simple installation and maintenance, and a shim design that makes it easy to maintain. Adjustment for wear is easily accomplished by removing shims without any unit disassembly. AquaMaKKs can be utilized for field retrofits, rebuilds or new OEM applications.

For more information:
Wichita Clutch
2800 Fisher Road
Wichita Falls TX 76302
Phone: (800) 964-3262
www.wichitaclutch.com

Kollmorgen Stepper Motors

IMPROVE MACHINE PERFORMANCE

Kollmorgen's Powermax II series stepper motors, like most other Kollmorgen stepper motors, are now UL recognized. This enables OEMs who build UL-certified equipment to integrate high-performance stepper technology into existing designs without requiring re-certification. These NEMA 23 (60 mm) step motors are available in half, single and two stack configurations, and provide holding torques from 42 to 253 oz-in. Speeds up to 3,000 rpm more than satisfy the velocity demands of most high torque applications. "UL recognition on high-performance step motors is a relative rarity, so machine builders who might otherwise benefit from this technology are sometimes faced with choosing between moderate performance steppers or other motor options that are less than ideal for the application. So UL recognition of Kollmorgen's Powermax II step motors is significant in that it enables OEMs whose machines need to be UL-certified to improve machine operation with high-performance steppers, without having to re-submit their equipment to UL for re-certification," explains Josh Inman, product manager.

For more information:
Kollmorgen
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www.kollmorgen.com

Pittman 8540 Series

IMPROVES POWER DENSITY

Pittman 8540 Series brush-commutated DC motors are designed using the latest advancements in materials and manufacturing technology. This product line is suitable for customer applications requiring high performance in a small package size. The 8540 Series is a significant improvement over similar sized older generation Pittman motors and is perfect for high-tech applications found in medical devices, lab instrumentation, data storage, and precision automation machinery, to name a few. The most significant feature of the new design is a greatly improved power density through the use of bonded neodymium magnets. The 8540 has approximately twice the continuous torque rating, compared with the previous generation of motors. The 8540 Series motors are 1.18" (30 mm) in diameter and are available in three lengths; 2.114" (53.69 mm), 2.585" (65.66 mm), and 3.057" (77.65 mm). Depending on the model, they can achieve a continuous torque rating from 2.5 oz-in (0.018 Nm) to 8.3 oz-in (0.059 Nm) without the use of a heat sink. The 8540 Series motors are available with 8 standard windings ranging from 9.55 V to 48 V. Customized windings also can be designed to optimize performance for a specific application requirement. The motors have standard pre-loaded ball bearings, allowing high speeds, radial and axial shaft loading, and higher temperatures. A new bearing support system, a 7-slot armature, and improved manufacturing techniques allow more balanced armatures resulting in very low vibration and audible noise characteristics. At low speeds, the motors exhibit very low cogging as a result of an optimized magnetic circuit design. Low vibration and low cogging make the 8540 Series suitable for position control in servo applications. Complementary products include gearboxes, encoders and brakes. The motors have the capability of extensive customization including shaft configurations, lead-wire assemblies, optional EMI/RFI filtering components, transmission components (shaft gears, pulleys or sprockets) and a variety of brush materials (including standard graphite).

For more information:

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Cone Drive

LAUNCHES SELECTION PROGRAM

Cone Drive Gearing Solutions has recently launched a new online servo gear head selection program—*AccuMate*. With *AccuMate*, engineering professionals have the ability to match their servomotors with a Cone Drive gear head. *AccuMate* will select the correct gear head for an application based on a number of variables provided by the engineer including size, speed, etc. Once the motor specifications have been entered into the program, *AccuMate* recommends the correct Cone Drive servo gearhead, and can print out the gearhead specifications for the engineer to obtain a quote or to keep in his project file. *AccuMate* also allows a user to download a 2-D or 3-D model.

For more information:

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ExxonMobil

RELEASES ADVANCED GEAR LUBRICANTS

ExxonMobil Lubricants and Petroleum Specialties recently announced the introduction of its new lineup of high-performance, fully-synthetic industrial gear oils, known as the Mobil SHC Gear series. The latest addition to the Mobil SHC brand of high-performance synthetic lubricants, Mobil SHC Gear fluids are approved by Siemens for use in Flender gearboxes and meet or exceed nearly every other major industry and OEM specification for industrial gearbox applications. Suitable for a wide range of industrial gearbox applications, the new Mobil SHC Gear lubricants also offer valuable energy ef-

ficiency benefits. "For many industrial businesses, gearboxes are a critical source of power transmission. That is why today, as gearbox technology continues to become more advanced, companies are increasingly seeking higher-performing synthetic lubricants, such as our new Mobil SHC Gear lubricants, to protect their gearbox investment," said Mike Hawkins, global brand manager, Mobil SHC Brand, ExxonMobil Lubricants & Petroleum Specialties Company, a division of Exxon Mobil Corporation. "By leveraging ExxonMobil's exceptional application-specific expertise and relationships with leading OEMs, we were able to ensure that our new Mobil SHC Gear lubricants feature the most advanced technology to help our customers reduce equipment downtime, minimize maintenance costs and maximize their productivity."

For more information:

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R+W

UPDATES RANGE OF LINE SHAFT COUPLINGS

One of the key competencies of R+W, a German based manufacturer of flexible couplings and torque limiters for high speed and high precision applications, is the design and manufacturing of line shaft couplings. Fabricating with highly straight (generally 0.2 mm/m) extruded intermediate tubing allows for the line shaft couplings to span very large distances (> 6 m) unsupported, and at unusually high speeds, depending upon the application requirements. New designs include lightweight CFK tubing, which makes for reduced inertia and higher critical speeds for a given length. New high torque versions handle up to 150,000 Nm with flexible bellows joints and up to 25,000 Nm with elastomer jaw style coupling ends. These newer line shaft coupling designs have been successfully deployed in material handling, printing, and sheet metal fabricating equipment, as well as some custom designed solutions for cooling tower applications.

For more information:

R+W America
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www.rw-america.com

Mach III

OFFERS INDUSTRIAL FRICTION CLUTCHES

Mach III Clutch, Inc. recently announced a new spring engaged industrial friction clutch for torque transmission in the absence of air pressure or during power-off conditions. Mach III spring engaged clutches are available in both regular duty and heavy duty models offering fixed torque transmission from 506 to 24,375 pound inches. These clutches release when air pressure is applied to overcome spring pressure. Catalog models currently available mount at the end of the shaft and include a finished pilot for easy mounting of a sprocket or pulley. Spring engaged friction clutches are made to order with bore and keyway sizes specified by the buyer for shaft sizes from 0.625 to 3.5 inches. Metric sizes are also available. A rotary air union is included. Mach III is one of a small number of manufacturers offering spring engaged air released industrial clutches. The advantage of a friction design, according to Peter Buckley, the company's senior applications engineer, is that "In contrast with spring engaged tooth clutches which must be engaged at zero or low speed, friction clutches slip slightly when engaged dynamically allowing engagement at any speed." No lubrication or periodic maintenance is required. When worn, friction linings can be replaced in the field. Features include soft start engagement, enclosed design, bored and keyed to suit for easy installation; no bushing required, no anti-rotation arm is required and rotary air union included.

For more information:
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