The High Demands of Off-Highway Drive Systems

Customization takes center stage in the push for more efficient motor, brake and drive concepts.

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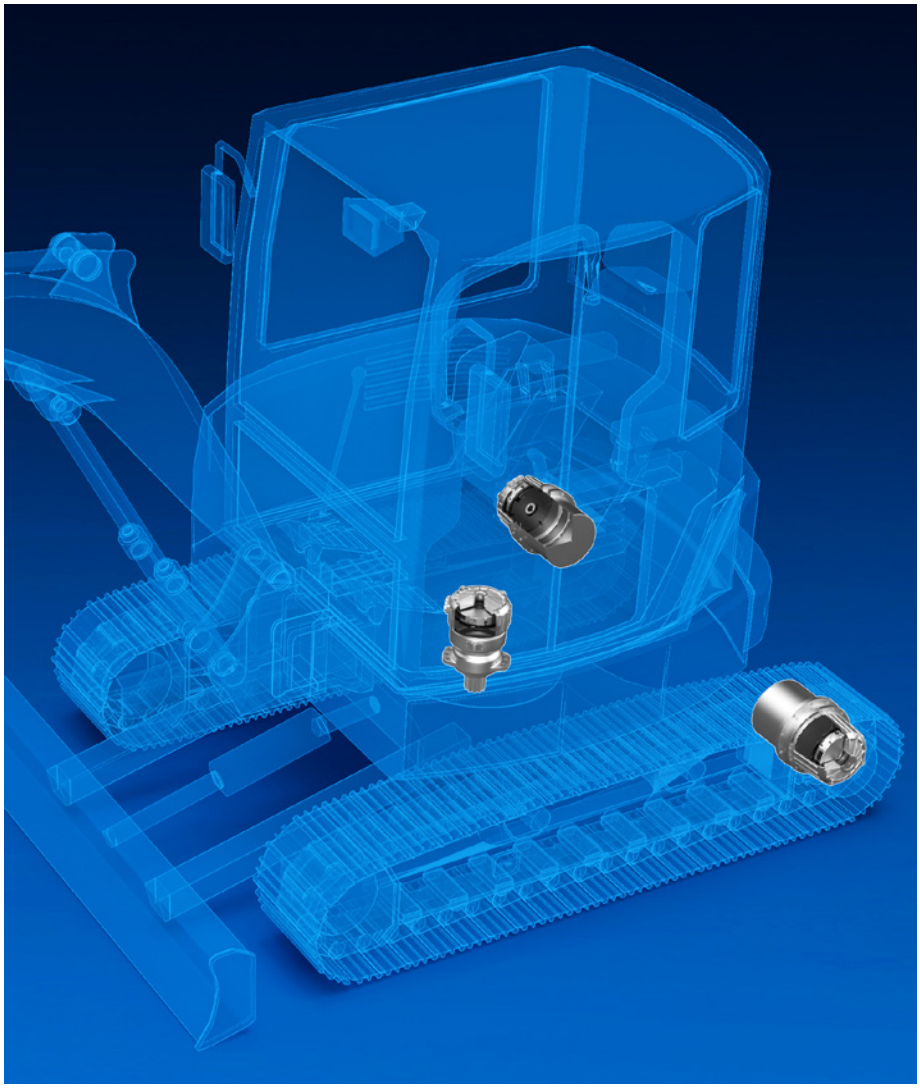

Warner Electric application engineers routinely work with Tier 1 drivetrain OEMs as well as major construction equipment manufacturer engineering teams to develop compact, energy efficient braking solutions.

Motor and brake manufacturers are facing increased pressure to provide off-highway components with energy efficient and sustainable benefits. This transition starts during the design phase as engineers provide optimization in areas like noise, vibration, and harshness (NVH) as well as comfort, safety, and health considerations. The following off-highway, construction and mining solutions hint at the all-electric transition taking place across each industry.

Warner Electric Presents Customized Braking Solutions

The off-highway industry is currently moving through a significant transition. The journey started about 10–12 years ago as the forklift truck industry began converting from internal combustion engines into electric drives. Today, construction equipment, more precisely, compact construction equipment, has also begun the transformative conversion to electric drives.

As with the automotive industry, national and municipal emission regulations are rapidly becoming more restrictive for off-highway vehicles and equipment. In some areas, the use of gas-powered equipment has already been completely banned. Some analysts believe that by 2030, 50 percent of the construction equipment market will be electric powered.

As environmental awareness grows, construction equipment manufacturers have begun to respond with electric powered equipment that meets various mandated emission regulations. However, they are also being driven by voluntary environmental policies adopted by construction contractors and large equipment rental companies. This new generation of much quieter equipment is not only environmentally friendly, but also provides increased operator comfort, health and safety benefits.

Warner Electric offers innovative braking solutions designed to reduce power consumption on a wide variety of battery-powered construction equipment, including slewing and track drives on excavators, wheel and track motors on compact track

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Customization of a Warner braking unit includes IP rating, manual release cables, connectors, sensors, and friction material.

loaders, skid steers, wheeled excavators, compact dumpers and mobile elevating work platforms (MEWPs).

Highly experienced Warner Electric application engineers routinely work with Tier 1 drivetrain OEMs as well as major construction equipment manufacturer engineering teams to develop compact, energy efficient braking solutions to meet the needs of each vehicle requirement, whether it's for a completely new design or the electric conversion of existing equipment.

The design process typically starts with one of Warner's existing braking solutions, including the PK and CBTB ranges. Once selected, customization of the unit begins, including IP rating, manual release cables, connectors, sensors, and friction material. The result is a "plug and play" product that the OEM can easily integrate into a drivetrain.

Warner Electric's PK (Very Thin) brakes are used for parking and offer emergency stop capabilities. The vehicle's AC motor is used in combination with the PK brake for regenerative braking of the vehicle.

The benefits of this cost competitive range include one-piece design for easy assembly, lower power consumption, longer battery life, and overall lower maintenance costs. These brakes are enclosed to withstand harsh outdoor environments. IP67-Rated models are available to meet challenging washdown application requirements.

The recently launched PK–Low Noise Design brake features a unique patent-pending dampening system that significantly reduces operating (engagement) noise to below 70 db. The new brake was developed for applications where high noise levels can be annoying such as under-cab slewing drives on mini excavators.

The CBTB family of electromagnetic axle brakes are specifically for use on battery-powered, dual-drive vehicles with capacities generally up to eight tons (17,900 lbs.). These advanced high-speed, high-torque brakes provide reliable emergency and parking brake functionality and allow for increased maximum vehicle speed and improved productivity.

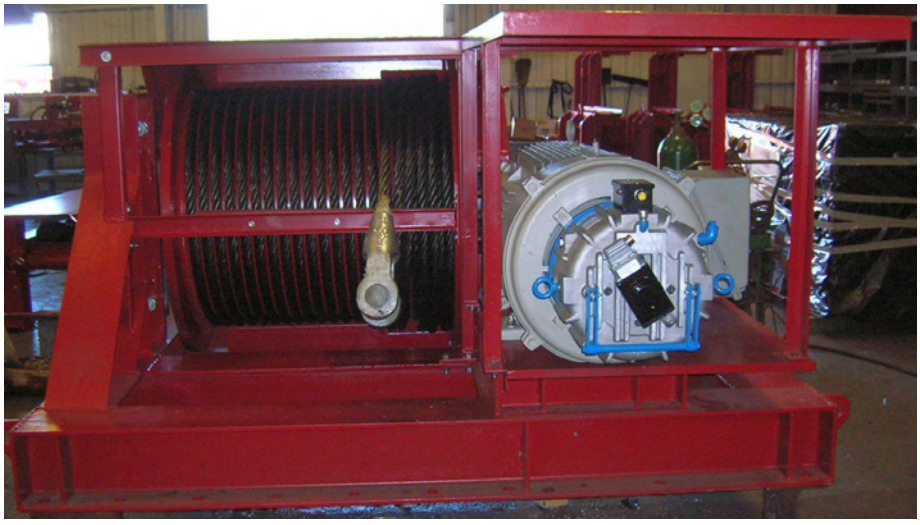
Proprietary W134 nonstick dry friction material, designed and manufactured in-house, is available on PK and CBTB models for increased high-capacity braking requirements at very high speeds. The linear speed of the friction material determines the speed limit, certain brakes and design sizes have been functionally tested at speeds of 12,000 rpm.

Force Control MagnaShear Brakes Provide Conveyor and Mining Solutions

MagnaShear motor brakes, which provide a secure, no-maintenance, no-adjustment, holding brake solution for mining conveyor applications were recently featured at Minexchange 2023.

In addition to holding brakes, MagnaShear are ideal for mining applications where the motor is stopped, or reversed, each cycle such as loaders/unloaders, conveyors, rail car spotters and dumpers, overland and internal tripper cars, rotary coal sweep samplers, and more.

These proven motor brakes are available to accommodate a wide range of applications. Spring set torque ratings from three to 1,250 foot-pounds are available. The MagnaShear motor brakes can be sized to the correct torque value independent of the motor frame size or horsepower by



MagnaShear brakes are ideal for conveyors, rail car spotters and dumpers, overland and internal tripper cars, rotary coal sweep samplers, and more.

Magnashear brakes working in a mining application.

changing the combination of springs and friction discs.

MagnaShear motor brakes feature a "quick mount" feature for quick and easy mounting to drive motors in NEMA frame sizes 56 to 449 or some IEC frame motors. They are shipped ready to install, with no assembly or adjustments required.

MagnaShear motor brakes can be furnished as a complete motor and brake assembly (assembled brake motor), or to mount on a machine frame or other special mounting configuration.

These proven motor brakes are totally enclosed from outside contaminants, with seal integrity for harsh and washdown environments. A modular design/assembly allows for ease of servicing and maintenance.

Hazardous duty units for class II, Group a, b, c, d, e and f are also available, as well as low temperature or Artic duty down to –40 degrees.

The totally enclosed MagnaShear motor brakes are impervious to moisture, dirt and dust that is common in mining applications, as well as concrete block plants, asphalt shingle manufacturing, bulk material handling, forest products manufacturing, and more.

forcecontrol.com

Bosch Rexroth Offers Drive Solutions from Hägglunds

The products and solutions Hägglunds recently displayed at Min-exchange 2023 leverage the unique characteristics of hydraulic direct drive technology—delivering power directly to the drive shaft with full torque from zero speed and protection from shock loads—to maximize the efficiency and uptime of conveyors, feeders, crushers, drums, bucket wheel reclaimers, kilns and more.

Torque Control: Direct drives with low speed and high torque can provide full torque from standstill, without time restrictions. Hägglunds hydraulic direct drives can operate continuously throughout their power range up to their rated torque, from zero to full speed.

Start-Stop-Reverse: A Hägglunds hydraulic direct drive reacts especially quickly due to its very low moment of inertia. They can switch automatically from driving to braking mode, and the direction of rotation can be switched quickly by changing the direction of the oil flow.

Shock Load Resistance: Shock loads can damage critical equipment and lead to major unplanned downtimes. With direct drive motors applying power directly to the core of conveyors, crushers and feeders, the direct drive offers a solution without mechanical play and with a low moment of inertia so it can easily withstand vibrations, external shock loads and changing load directions.

Fusion Direct Hydraulic Drive: Released in 2022, Hägglunds Fusion won industry recognition two times. The Fusion is a unique drive system that puts everything on the torque arm, from the hydraulic motor and pumps to the cabinet that houses them, making high torque and total reliability available from a single unit – in a footprint that was previously unthinkable.

Atom Hydraulic Motor: Combining the right size with Hägglunds performance, it offers the right fit for mining applications where both compact size and high-power density are required. With a maximum torque of up to 13.6 kNm and a specific torque of 40 Nm/bar, the Hägglunds Atom hydraulic motor can supply maximum power of 394 kW, outstripping other motors in its class.

CB Direct Drive Motors: Tough and rugged with a wide range of sizes and displacements, the Hägglunds CB provides the right solution for many heavy-duty applications, such

Multiple Hägglunds direct drive systems offer solutions for key mining applications.

as shredders, feeders and roll mills. It combines space-saving designs with a wide range of sizes and displacements.

Rineer Motors: Bosch Rexroth's Rineer motors offer the highest power density with maximum torque, as well as robustness, even under the most adverse climatic conditions and high dirt loads. Rineer motors are frequently used in the mining and construction sectors, on drilling and winch applications.

boschrexroth.com/en/us/hagglunds/

Dana Launches Driveline Solutions for Telehandlers

Dana Incorporated recently announced the launch of a hydrostatic driveline for telehandlers in North America. The system's modular architecture enables customers to easily transition to a hydrogen or battery-electric vehicle design.

Developed for telehandler applications lifting up to 12,000 pounds, Dana's new driveline comes equipped with a compact Spicer 312 dropbox for high-power hydrostatic motors. This new hydrostatic dropbox functions as a continuously variable transmission without torque interruption and delivers enhanced performance with precise movements at low speeds, reduced fuel consumption, and an integrated spring applied hydraulic release parking brake.

The transmission is designed to be coupled with the field-proven Spicer 222 front and rear heavy-duty axles, which each feature a limited-slip differential and provide the customer with maintenance-free brakes. The complete driveline system is optimized for efficiency as well as noise, vibration, and harshness.

"Dana has more than 40 years of expertise designing and implementing hydrostatic transmission solutions for diverse applications across the off-highway market," said Jeroen Decleer, senior vice president of Dana Off-Highway Drive and Motion Systems. "Our new hydrostatic driveline offers operators an easy-to-use solution with increased performance and efficiency at low speeds. This makes it an ideal fit for use in the North American telehandler market and its modular approach gives customers the flexibility to make the transition to a zero-emissions solution."

In order to support the industry's transition to zero-emission vehicles, Dana optimized the axles and driveline system for efficiency to support a variety of architectures, allowing customers to retain the same driveline solution while choosing between implementing a hydrostatic dropbox or electrically driven design.

From single-and two-speed dropboxes to shift-on-fly and powersplit transmissions, Dana offers a complete range of hydrostatic transmissions that enable customers to leverage the best solution for their specific vehicle's duty-cycle requirements.

In addition, Dana is investing in updated drive and motion technologies for traditional and electrified construction machinery, including mini excavators, mobile elevating work platforms (MEWPs), and crawler cranes.

dana.com

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