In Mining for the Long Haul

Celebrating 45 years of electric drive systems excellence

GE – Transportation invented electric drive systems for mining trucks in 1963 and has been leading the industry ever since.

With more than 20 million hours of operation worldwide and more than 5,000 electric drive systems operating at mines in more than 35 countries, our track record stands alone.

GE's innovations in mining drive systems did not stop with inventing them. In 1984, GE developed the first mining trolley technology, enabling the industry to use overhead electric power. GE marked yet another milestone in 1996 by inventing AC drive systems for use in mining trucks. Today the company offers a comprehensive array of AC drive system technology.

By the late 1990s, GE had introduced air-cooled IGBT semiconductors that offer a simpler, more reliable design and lower life-cycle costs. But GE never stops innovating and in 2008 demonstrated the world's first hybrid mining drive system.

GE's electric drive systems offer many advantages when compared to mechanical drive systems:

- Improved cycle time due to higher speed and gradeability
- Fewer components delivering lower maintenance and higher availability
- Reduced wear on the primary braking system due to electrical retarding

GE – Transportation, Mining is one piece of the GE mining technology portfolio organized to provide solutions to the mining industry. This portfolio includes Energy Services, Electric Motors & Controls, Enterprise Solutions, Stationary Power, Water, and Commercial Finance.

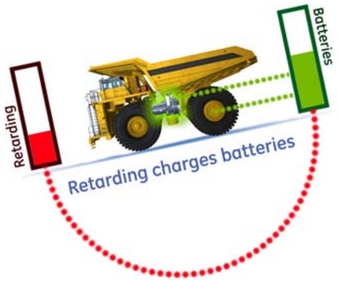
GE's AC Drive Systems — Worldwide

Mining Technology for Tomorrow

In the future, GE – Transportation's technology will continue to reduce operating costs, fuel consumption and downtime. Examples of GE's forward thinking include:

Hybrid Drive Systems

GE's Hybrid Vehicle Team has applied advanced hybrid technology to off-highway vehicles. The result? Fuel savings and increased productivity. GE has teamed with Komatsu and the U.S. Department of Energy to demonstrate the world's first and only hybrid drive system that captures retarding energy for fuel savings or provides an on-demand energy boost to increase speed on grade.



Interior Permanent Magnet Motors

GE's technological advances also include an interior permanent magnet motor in its next-generation traction motor that provides a higher power density resulting in increased fuel efficiency or improved speed on grade.

Next-Generation Diagnostic Information Display

The next-generation diagnostic information display is a single-point diagnostics tool that consolidates truck diagnostic information to speed troubleshooting and reduce downtime. This innovative tool is capable of displaying diagnostics information from GE's propulsion system and engine and truck subsystems -- including payload, tires and cooling.

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AC Motorized Wheel Drive Systems

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GE's AC Drive Systems Advance Productivity

In 1996, GE introduced AC drive systems, offering lower operating costs and higher haul productivity than mechanical drives. AC drive systems eliminate wearing components such as torque converters, drive shafts, transmissions and differentials, reducing maintenance, thus improving truck availability and lowering life-cycle cost.

The AC drive system eliminates brushes, commutators and other maintenance-intensive components and drastically reduces the number of contactors. Fewer serviced components and higher reliability parts reduce life-cycle costs.

- Fewer components – Lower maintenance, higher availability
- Higher gradeability – Steeper hauls, reduced cycle time
- Higher speed – Reduced cycle time
- Broader retarding envelope – Reduced cycle time, less brake wear

Today, GE has the largest fleet of rugged, field-proven AC drive systems in the world.

GE's Invertex™ AC Control Software System

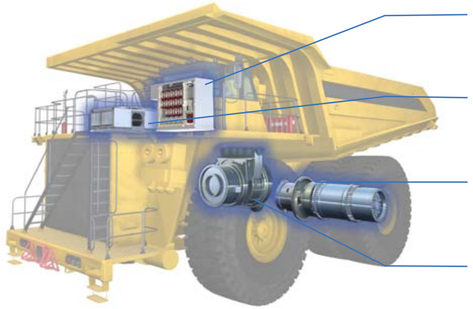
GE's Invertex™ AC control software system offers independent wheel-motor control, thermal self-protection and advanced spin-slide, hill-start for optimum traction control, increased safety and reduced tire wear.

GE's patented high-power, air-cooled IGBT inverter controls offer fewer parts, higher reliability and less maintenance. Simpler and lighter components offer better serviceability and easier maintenance.

Windows®-based wPTU Toolbox applications simplify managing truck data and provide graphic plotting in real time. Statistical data uploads via wPTU are available for transfer to laptop or handheld computers.

	150-Ton	200-Ton	240-Ton	320-Ton	360-Ton
GE's Drive System	GE150AC™	GE200AC™	GE240AC™	GE320AC™ *available for oil sands applications	GE360AC™ *available for oil sands applications
General Truck Specifications					
Gross Vehicle Weight Capacity	550,000 lbs (249,482 kg)	740,000 lbs (335,664 kg)	865,000 lbs (392,364 kg)	1,112,000 lbs (504,403 kg)	1,250,000 lbs (567,000 kg)
Payload	300,000 lbs (136,082 kg)	400,000 lbs (181,440 kg)	480,000 lbs (217,728kg)	640,000 lbs (290,304 kg)	720,000 lbs (326,592 kg)
Horsepower	Up to 1,800 gross hp (1345 kw)	Up to 2,500 gross hp (1864 kw)	Up to 2,700 gross hp (2013 kw)	Up to 3,500 gross hp (2610 kw)	Up to 3,500 gross hp (2610 kw)
Retarding Horsepower	2,700	3,880	Up to 4,300	5,400	6,000
Tire Size	33.00 R51 or 36.00 R51	40.00 R57	40.00 R57, 46/90R57, 50/80R57	53/80R63	56/80R63
Max Truck Speed	40 mph (64 km/hr)	40 mph (64 km/hr)	40 mph (64 km/hr)	40 mph (64 km/hr)	40 mph (64 km/hr)
Applications Parameters					
Continuous Motoring	12% equiv. grade			12% equiv. grade	
Altitude (above sea level)	12,000 feet @ 33C with no deration			12,000 feet @ 33C with no deration	
Maximum Ambient Temperature	55C @ 750 feet			55C @ 750 feet	
General System Configuration					
Alternator	5GTA22	5GTA41	5GTA41	5GTA41/5GTA39	5GTA39
Motorized Wheels	5GEB23	5GEB25D	5GEB25A,B & C	5GDY106A	5GDY108B
AC Control Group	17KG527	17KG537	17KG535/17KG537	17KG535	17KG535
Dynamic Retarding Assembly	17EM137	17EM147	17EM145/17EM146/17EM155	17EM136	17EM140

GE's Optimized Integrated Drive Systems
The Power is Inside



AC Control Group
Controls engine load and power flow

Dynamic Retarding Assembly
Dissipates retarding energy

Motorized Wheels
Deliver tractive effort

Alternator
Generates electrical power

Integral Motor Design

- 150T (GEB23)
- 200T (GEB25)
- 240T (GEB25)

Exterior Motor Design

- 320T Oil Sands (GDY85E)
- 320T (GDY106)
- 360T (GDY108)

20 million total hours of operation