

GE Power



Products & Solutions for the Mining Industry

GE's Power Conversion Business

gepowerconversion.com

Challenge & GE Value

Mines today can cover an area of many square kilometers and require working in ever deeper and more remote locations. These challenging environments demand increasingly large and more powerful equipment across the entire mining process. As the drive for power and scale increases, so the need for efficiency and reliability grows with it.

From Pit to Port – GE Makes Mines Work

Improving reliability, power density and efficiency, our advanced technology is integrated throughout the mining process from extraction through to grinding and crushing, mineral processing, refining and handling. It's all supported by over 100 years of application know-how and our proven track record.



We've Equipped, Powered and Automated 500+ Hoists/Winders Globally



Powering 400+ Mills in Ore Grinding, Crushing and Benefication



Driving and Controlling 100+ Conveyor Systems from Pit to Port

The GE Advantage

We build highly efficient motors, drives and integrated system electrification solutions for the mining industry.

Combining electrification technology with project life cycle services and digital capability, we provide connected, responsive and predictive solutions to help you maximize operational efficiency and productivity.

FROM PIT TO PORT, WITH OUR ELECTRIFICATION AND AUTOMATION SOLUTIONS YOU CAN ACHIEVE HIGHER THROUGHPUT AND RECOVERY WITH LOWER MAINTENANCE AND ENERGY COSTS

Mining Solutions



Extraction – Hoist/Winder

GE's Power Conversion business offers a complete range of hoist/winder systems for the underground mining industry. We use our overhung, low-speed and high-performance induction and VSI technology for greater reliability and productivity.

Our engineering experience enables us to perform winder rating calculations, feasibility studies, control system updates, compliance tests and site inspections. All this supports you to make informed decisions around productivity and safety requirements:

- One of the World leaders in the application of reliable induction motor and VFD technology
- Strong expertise of hoist functionality, control and safety
- 25+ years of global references in AC hoists
- Comprehensive electrical solution capability
- Integrated and split stator hoist motor options
- Mine fan ventilation solutions (MV and LV)



Mineral Processing – Grinding Mills

GE provides flexible and innovative mill solutions across all types of grinding, from single and dual pinion AG, SAG and ball to HPGR. This helps you to meet high-capacity demands with less equipment. We supply both low-speed pinion drive and high-speed geared mill solutions offering greater flexibility and system efficiency plus:

- Strong global reference list
- Deep domain expertise of grinding electrical systems
- Advanced control features that reduce mechanical parts
- Low-speed synchronous and induction motor options
- GE's unique Quadramatic Dual Pinion Mill solution for the highest-efficiency fixed-speed applications



Materials Handling – Conveyors

To meet the requirements for reduced loading and unloading times, GE supplies complete electrical systems. These include fully integrated, pre-packaged e-house power and automation solutions, and a comprehensive range of drives for material handling systems.

We're driving the use of direct-drive technology with medium and large power, high-torque conveyors using high-performance, low-speed motors. We provide significant reductions in service and maintenance costs, and higher efficiency levels than geared solutions.

Our medium-power solutions also lend themselves well to conventional conveyor designs for both new and upgrade markets:

- Numerous references for conventional conveyors including stockyard management
- Advanced, medium-large power gearless conveyor drive solutions
- Increased system efficiency and MTBF enabling lower CAPEX and OPEX
- Standardized pre-packaged solutions
- Modular e-House designs
- Detailed analysis for monitoring and evaluating solutions

Mining Solutions

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Material Handling

For large-scale, long-distance overland conveyors, GE's direct-drive, low-speed induction motor (and permanent magnet motor) technology helps provide significant reductions in service and maintenance costs. It also delivers higher efficiency levels than geared solutions.

GE powertrains comprise an optimized high-performance motor/drive system, incorporating specially designed, complex dynamic modeling application software. This is used for smooth starts and stopping using regeneration, and for high closed loop stability despite potential belt transients and traveling wave reflections. All of these features are standard in similar GE solutions and have a significant impact on improving power quality, productivity and OPEX. Furthermore, our digital capabilities provide many more benefits – ultimately increasing the belt and structural lifecycles through monitoring alignment, tension, vibration, early break detection and more.

Mineral Processing

Increasing capacity demands, plus deeper mining in more remote locations, are leading to tougher ore grades and the need for larger power comminution plants. Additional CAPEX constraints mean the industry is also moving towards challenging times when it will require innovative solutions and technology.

For low-speed mill applications, GE offers highly efficient, synchronous and highly robust induction motor technology. These optimized powertrains provide improved power quality (due to our PWM drive and IEGT technology) and faster ROI. For high-speed, geared mill applications, we offer a variety of innovative and differentiating technology to suit the budget, including drives for slip energy recovery systems. These enable speed and process adjustment for mills using WRIM technology.

Our mill Master Sequence Control (MSC) has many automation embedded software features such as solidified load detection/prevention/recovery and mill inch/angle control.

Digital Mine

Digital Mine, the platform for the industrial internet, connects all mining assets to reduce unplanned downtime, optimize operations and enable proactive processes.

Our all-in-one, real-time, comprehensive 24/7 digital solution portfolio is fueled by the outcomes our customers are striving for every day. This enables timely and accurate decisions that balance process performance with equipment health – increasing operational visibility, availability, reliability and performance optimization.

For grinding mill circuit optimization, the mine performance solution calculates the optimal setpoints to stabilize the circuit. It simultaneously provides real-time predictive anomaly detection and diagnostics – all of which can reduce the amount of re-circulation and energy consumption, improving grind quality and throughput.

Mining Product Portfolio

Power Electronics

GE's MV drive portfolio can help increase operating efficiency, power quality and availability, plant throughput, operational precision and process yield.

Its products form core components of electrical Variable-Speed Drive (VSD) trains, featuring voltage Source Inverter (VSI) IEGT-based and Load Commutated Inverter (LCI) thyristor-based technologies.

Models

- MV6 Series
- MV7 Series

Technical Capabilities

- Output power: 0.25–120 MW
- Output voltage: Up to 13.8 kV
- Output frequency: Up to 300 Hz
- Input frequency: 50 or 60 Hz $\pm 5\%$

The MV7000 PWM drive gives simpler power system topologies, and the AFE technology is more tolerant of supply variations, generates lower harmonics and assists in power quality control.



Rotating Machines

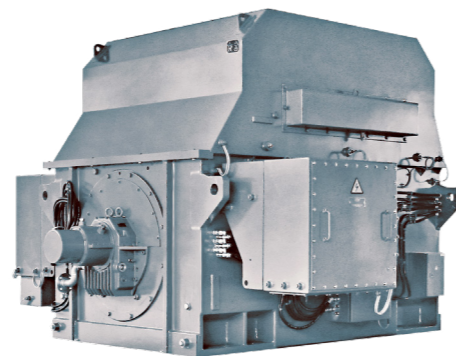
These include low- to high-voltage rotating machine technology with rugged and efficient motors from 100 kW to 100 MW. Engineered to perform and built to last, GE's durable motors continue to set the standard for reliability in grinding, hoist, conveyor and process applications.

Models

- Induction motors
- Synchronous motors
- Permanent magnet motors

Technical Capabilities

- Output speed: 40–20,00 rpm
- Output power: 100 kW–100 MW
- Output voltage: up to 13.8 kV
- Hazardous area: Zone 1 or 2, Div 1 or 2



Automation and Control

We build the controls across our automation and drive systems platform using a mature suite of reliable and secure automation components. These are then assembled into modular, flexible and scalable automation solutions. We use modern interfaces like OPC-UA, IEC 61850 and web technologies to facilitate integration with customers' existing OT/IT infrastructures.

Key Components

- HPCI: High-performance system controller for process control and automation
- PECe/PECeLite: Drive controllers with associated power interfaces (PIbs) and specialist control libraries
- P80-Pilot: Engineering toolbox and its associated system engineering tools
- Visor: Remote monitoring and diagnostics system to provide secure remote service capability and connection to Predix for remote asset performance monitoring and advanced process analytics

Digital

GE's Digital Mine solution helps you make timely and accurate decisions to balance process performance with equipment health. The solution increases:

- **Operational Viability** – to help you get the most out of your available resources and meet production targets safely and in compliance.
- **Availability and Reliability** – to maximize the time that equipment is available to produce RDA. The solution allows for quick planned repairs but only when needed.
- **Performance Optimization** – to improve operating results through better asset and process performance, utilization and planning.



e-House

GE has the in-house expertise to supply comprehensive electrical systems, including fully integrated containerized e-House power and automation solutions.

GE offers a wide range of e-Houses from standard ISO containers to custom multi-story designs, compliant to IEC and NEMA specifications. Fitted with a comprehensive GE portfolio of equipment and complete system integration and testing, enabling simpler, plug & play installation.



Mining Services Offering

Meeting the Needs of Your Operational Model

GE services cover site audits for installed base equipment health checks and surveys, including obsolescence, energy saving and preventive maintenance checks. We also offer three- or five-year LTSA with a dedicated customer service manager and 24/7 remote support.

For mines with obsolete equipment, our service team will provide upgrade advice – replacing DC with AC equipment, or LCI/Cycloconverter with PWM technology – complete with all the replacement system integration undertaking. If the mine's ore grade has changed and there's a need for process variation, GE can provide upgrade solutions that convert fixed to variable speed.

Asset Performance Management

Striving for Zero Unplanned Downtime at the Lowest Cost

Get a unified, accurate view of your assets and their current state and health. Then, accurately predict and diagnose issues before they can negatively impact operations. All while balancing availability, performance, and costs against risk to maximize asset value.

Get More Out Of Your Data

A well-implemented Asset Performance Management (APM) strategy can transform mining operations by increasing efficiency, reducing costs, and getting the most out of the "Big Data" that the machine sensors on your plant and equipment can now provide. GE Digital's APM offering combines connectivity, data capture, integration, visualization, and analytics for the explicit purpose of remote monitoring, predictive maintenance, and real-time operator intelligence.

Differentiating Features

- Consolidate all asset data
- Connect all your assets from all vendors
- Prevent incidents before they occur using GE's broad analytics catalog
- Capture best-practices and tap into GE's experience in building, monitoring, and servicing industrial assets

Optimized Outcomes

- Increased production throughput
- Improved plant and equipment reliability and availability
- Reduced maintenance costs





For more information on GE Power Conversion's Mining Solutions, please contact your local sales representative.

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