



Mining and mineral processing industries

Solutions from mine to market

Achieving more with less

Rising costs of exploration and development in remote areas, volatile market prices, health and safety of workers, stringent environmental regulations and 100 % availability – ABB helps you to overcome these major challenges that you face today.

Energy efficiency

Mining companies are adapting their strategy to address energy costs and regulations requiring a quota of renewable sources from energy generators. Energy use in mining and mineral processing is strongly dependent on the ore quality and ore composition. The energy requirements for open-pit mining are different to underground mining. ABB offers AC electrical solutions in both mining types. They have tremendous advantages over DC solutions for draglines, shovels and hoists, giving specific energy savings of more than 5 %. In mineral processing, milling is a large consumer of electrical energy. ABB offers energy efficient drives solutions for all mill configurations with the gearless motor, providing continual energy savings through lower specific energy. Electrical power quality compensation ensures greater efficiency through harmonic distortion filtering and power factor correction.

Efforts to reduce energy demands by using more efficient equipment are important to reduce production costs. These changes introduce constraints that must be managed to secure the required quality and productivity of the plant. ABB's plant wide automation strategy searches for the optimal operation point while maximizing product quality and productivity, at the lowest energy consumption and least environmental impact.

Increasing productivity and reliability

Mining and mineral processing plants need integrated process control systems that make use of process measurements, drive and power distribution information, to increase plant-wide efficiency, productivity and reliability. Plants must also manage vital process and business information if management objectives are to be met. Accurate and timely information is critical for achieving greater productivity. ABB is a leader

in providing you with immediate access to essential information – including business, financial, production, environmental, technical and quality management information. With complete access to bundled plant and operating data you can deploy personnel and resources decisively and effectively to achieve a reliable operation.

Health, safety and environment (HSE)

HSE regulations for the mining and minerals industries get tougher each year. Particularly environmental protection requirements become more and more stringent. The more stringent they become, the more money is spent on waste processing, disposal and supervision. ABB applies the highest standards for occupational health and safety and is committed to achieving continuous improvements and excellence. Our technologies for environmental measurements and monitoring, process control and optimization, will allow you to increase operational efficiency as well as environmental and occupational safety.

Take each step of your way with ABB

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01 Electrification
and automation
solutions for
complete mine
hoist systems



Underground mining

ABB supplies mine electrification and automation solutions, such as substations, power distribution, modular electrical houses, ventilation on demand, electrical systems for mine trucks and instrumentation as well as various complete mine hoist systems, such as mechanical systems, hydraulic disc brake systems, electrical systems as well as state-of-the-art drive and control systems.

The latest technology for drive systems including Direct Torque Control (DTC) is now well-proven for hoist applications. It offers high efficiency, superior control performance, low voltage drop in the supply network, low harmonic distortion and very low flicker. ABB's powerful and user-friendly

control system is based on ABB Ability™ System 800xA that includes control of feeders, conveyors and measuring flasks at the loading level as well as push-button control of multi-level man/material hoists. Multi-caliper disc brakes are used for emergency stops and holding at standstill. The hydraulic control unit is equipped with dual systems to meet the highest safety requirements. Controlled retardation maintains the set retardation rate independent from the actual payload and direction of movement. The ABB/Atlas Copco Kiruna Electric trucks are a good alternative to diesel trucks. They reduce fuel emission and ventilation requirements while increasing production, as they are faster than conventional diesel trucks.

Open-pit (cast) mining and bulk material handling

Large open-cast mining operations throughout the world have used ABB control and drive systems for decades. ABB is one of the leading suppliers for electrification, automation, control and drive systems for the full range of mining equipment. This includes bucket-wheel and bucket-chain excavators, spreaders, stackers, reclaimers, crushers, shovels, draglines, belt-conveyor systems, belt wagons and stockpiles. Our equipment has proven to withstand the extreme conditions of open-cast mining – with dust, severe vibrations and temperatures ranging from $-50\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ – in over 1000 large mining machines during the past 50 years.

Standard AC multi-drive installations have been mechanically reinforced to make them suitable for the mining sector. Furthermore, our experts developed a special drives control library for all mining equipment that allows you to manage load-sharing of multi-drive applications and ensures safe operation in all modes. Other highlights developed include fully autonomous stockyard operation with material tracking and quality management as well as advanced GPS-based automation of mobile equipment.

Ore concentration

When it comes to driving grinding performance to higher levels, ABB offers a wide range of solutions.

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02 Gearless mill drives



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03 Electrification, automation, control and drive systems for the full range of mining equipment

Gearless mill drives

Gearless mill drives (GMD) for semiautogenous (SAG), ball and autogenous (AG) mills eliminate the typical mechanical components of the drive train (shaft, gearbox, pinion and ring gear). In 1969, ABB delivered the first GMD ever, which is still in operation today. The upper limit of the power range today is about 35 MW. Some of the largest GMDs worldwide have been supplied by ABB: a 28 MW GMD for a 40' SAG mill and two 22 MW GMDs for 28' ball mills, to be installed at the highest altitude ever of 4600 meters above sea level. In addition, ABB has also delivered a 28 MW GMD for the world's first 42' SAG mill and is well positioned to continue the push for larger and more powerful mills.

Dual and single pinion drive systems

With dual and single pinion drive systems ABB can offer an alternative for mill drive solutions up to a power of around 17 MW where, for the dual pinion solution, the load sharing is handled very accurately within the frequency converter system.

High pressure grinding rolls

ABB simplifies the twin-drive system for the high pressure grinding rolls (HPGR). Among the deliveries was one supplied for the world's largest HPGR installed in Australia, with a power rating of $2 \times 2800\text{ kW}$.

Processing and refining

From agglomeration processes such as pelletizing, grinding and flotation or direct reduction (DRI / HBI) of iron ore to the SX-EW, smelting and refining processes of non-ferrous metals, ABB provides the following systems and solutions

- High power converters
- Variable-speed drives
- Intelligent power distribution
- Process control
- Instrumentation and process optimization

Linked by process control solutions and combined with proven integration and project management expertise they ensure end-to-end plant connectivity and operational efficiency.

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03 Processing
and refining



Integrated solutions that work smoothly and efficiently

Our approach covers the complete value-added chain, from your mine to the product you market. We excel at merging equipment, skills and services to develop a complete customized solution that strengthens your entire operation regardless of project size. ABB's capabilities combined with its global and local resources offer integrated power, control and information solutions. You specify the requirements just once and we take the responsibility for creating an integrated solution that works smoothly and efficiently.

Electrification and plant engineering

The efficiency of an industrial plant is influenced by its major mechanical and electrical installations, appropriate planning and engineering. We ensure the selection of the right technologies and products, their correct dimensioning, compliance with environmental conditions as well as the implementation of industry-dedicated smart solutions. All of this leads to substantial savings in investment and energy consumption adding up to a significant enhancement in a plant's economy over its life cycle. Viewed as an integrated entity, the plant's infrastructure includes items like optimized substation and electrical room layouts, cable engineering, grounding systems, fire detection and protection, air-conditioning and ventilation systems, communication systems and much more. ABB's electrification solutions are engineered for safety, flexibility, security and the highest operational availability to keep your plant running.

Power distribution

When you need efficient and reliable power distribution in your plant, turn to ABB. We offer the broadest range of high, medium and low voltage equipment for switching and distributing electrical power. Solutions are engineered for safety, flexibility and security to keep operations running day and night. This includes emergency power generation and UPS, prefabricated substations, power factor compensation and harmonic filtering equipment, switchgear and

transformers. ABB provides you with state-of-the-art technology to exceed today's rigorous demands.

Drives applications

Selecting the right drive system for a particular application requires knowledge and experience within the process environment. ABB manufactures motors and drive systems from sub-kilowatt to the megawatt ratings of gearless drives for the largest SAG and ball mill applications. ABB combines its extensive industry knowledge with its application expertise to select the most economical drive solution for your particular, often unique circumstances. From single/dual pinion and high pressure grinding rolls to material handling, pumping and conveying systems, we continually strive for the highest availability, productivity and energy efficiency your operations can achieve.

Process control and instrumentation

Mines and processing plants need integrated process control systems that can improve plant-wide efficiency and productivity. Our process control solutions provide easy access to the process, production, quality and business information – from the most remote locations to corporate headquarters. Whether you are building a greenfield plant, extending or modernizing an existing plant, ABB provides tailored automation solutions that use real-time data – enabling constant monitoring and analysis of your process combined with improved asset

availability. ABB also provides a wide range of instrumentation products for mining and mineral processing.

Integrated mine operations and remote control rooms

Mining enterprises continually strive to increase production, improve profitability and reduce operational risks. To do this they need to optimize operations across the organization. Unfortunately, complex value chains, geographically dispersed operations and organizational silos can impede the identification of opportunities for business improvement. To unlock organizational value, companies require an operations management software platform which improves information flow and visibility across organizational silos and optimize business processes from mine to market.

ABB is uniquely positioned to bring together industrial enterprise software spanning process control, production management, operational planning and optimization, work and asset management and backoffice corporate functions. As one of the leading providers of software to mining and mineral processing worldwide, ABB is on the forefront of technologies across the mining life cycle that can help drive significant business value.

Services

Any equipment failure can seriously affect your plants productivity and profitability. To ensure that your investment is protected and to optimize asset performance, ABB has developed a concept based on the need to minimize operational risk and increase system availability. Our integrated long-term service agreement combines one or

more service products in a simple customized agreement. You can choose the services that meet your site-specific requirements for preventive, predictive and corrective maintenance:

- Field services
- Spare parts services
- Remote services
- Training services
- Special services

Revamping

The modernization of an existing plant to the latest standards, production and efficiency levels while it is still in operation, demands a completely different set of skills and competencies than building a greenfield plant. The challenges faced by plant operators make each revamping project unique in its complexity. It can only be successful when the customer's partner and contractor fully understands the complexity of mineral processing and mining processes, and has the experience necessary to implement these unique solutions within a strictly planned downtime schedule. This is where ABB excels as the world leader in the field.

Thanks to ABB's vast global resources, combined with a strong local presence, you benefit from many advantages. While getting the best technology anywhere in the world, you also profit from complete support through the life cycle of your installation – every day of the year. We help you achieve industrial and energy efficiency and environmental compliance while ensuring product quality and reducing costs.



Contact us

ABB's Mining business is represented in the following countries: Australia, Brazil, Chile, China, Germany, North America, Peru, South Africa, Sweden and Switzerland. For contact details, please visit our website:

www.abb.com/mining