



Mine hoist systems

Safe and reliable for all needs

ABB – the sole supplier of complete mine hoist systems

ABB has the unique capability to design, supply, install and provide long-term service and support of entire mine hoist mechanical and electrical systems. We supply friction hoists as well as drum hoists of various types. We also supply the shaft equipment necessary for productive hoisting processes.

ABB mine hoist solutions provide the lowest possible life cycle cost, the highest reliability and system availability, short project execution time and a single source of supply for the complete system, including service and spare parts. With our global presence, we are always close to our customers. Our world-renowned engineering resources are always available for feasibility studies and conceptual solutions.

Hoist machinery

ABB employs powerful finite element analysis (FEA) and 3D tools in the design of the mine hoist and their components. Pulleys and drums are available in split or unsplit design.

Brake discs are welded or bolted on to the shell plates. Spherical roller bearings or white metal (sleeve) bearings are selected to meet customer requirements and secure long service life. Full quality assurance is assured throughout the hoist design and manufacturing process.

The hoists delivered by ABB are powered by ABB's drive systems that represent the leading-edge drive technology for hoists.

Hoist control, operating and monitoring systems

ABB's hoist control is based on System 800xA technology. ABB systems comply with the highest safety standards and reliability requirements for mine hoist systems. We offer:

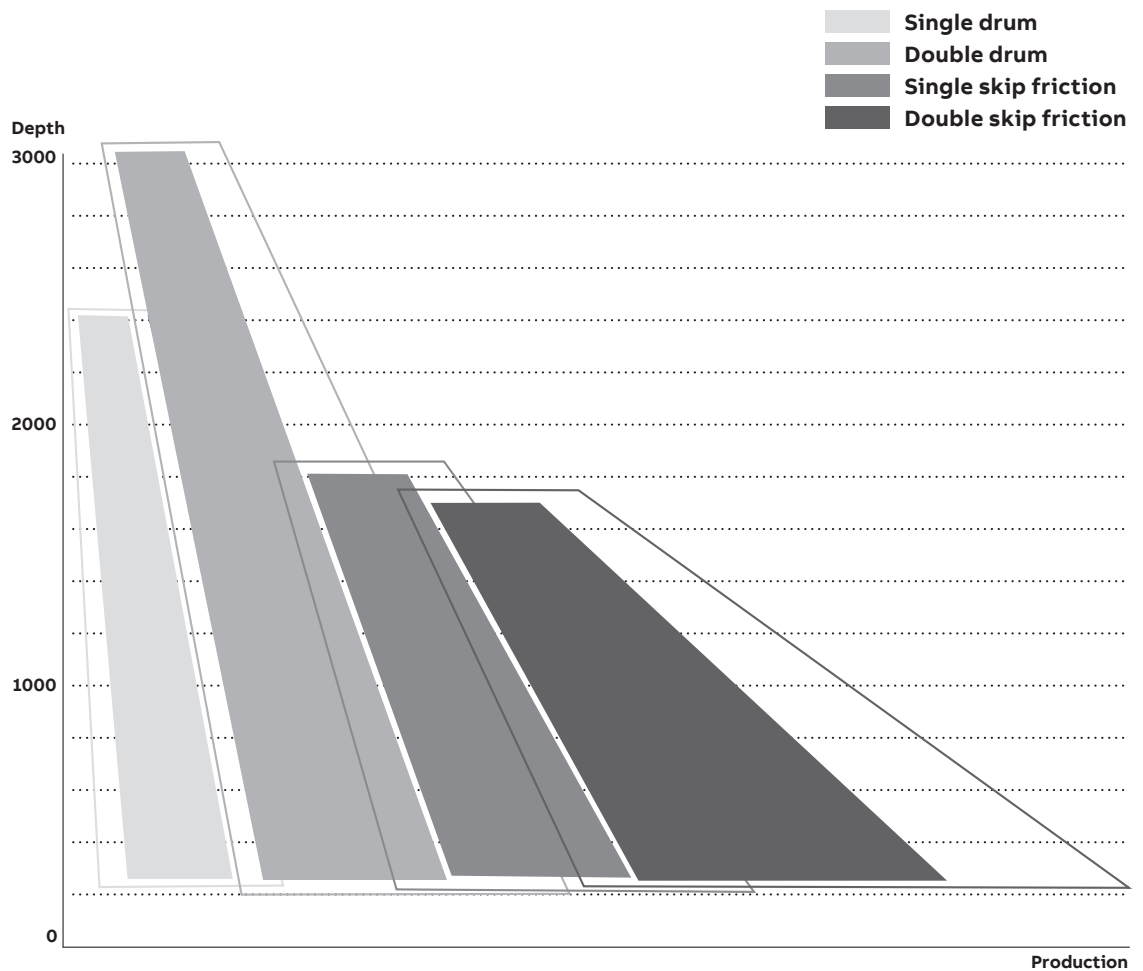
- Maximum hoist availability
- Safe and reliable control of mine hoists
- Semiautomatic testing of important safety functions
- Comprehensive production and performance reports

The ABB system includes control of skip loading, skip dumping as well as local control of multi-level man/material hoists.

Hoist technology for all needs

ABB's range of mine hoists covers all mine hoist applications. For high capacity mines operating at depths in excess of 1600 meters, multi-rope friction hoists are a common mine hoist solution.

For deeper mines, drum hoists of various designs are a common solution. Drum hoists are also often used in shallow mines and for transporting personnel and equipment.

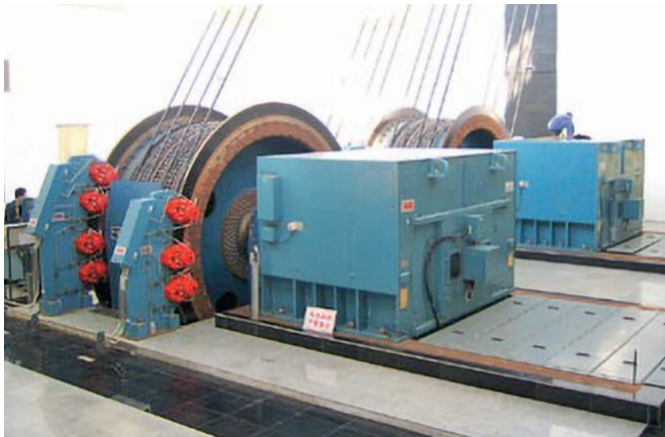




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01 Tower mounted friction hoist with low voltage motor

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02 Single drum hoist

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03 Ground mounted friction hoist

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04 Double drum hoist

Friction hoists require motor power only for the weight of the ore payload

The use of balance or tail ropes means that in skip/skip configurations, it's only the weight of the ore payload itself that requires motor power as the rest of the system is in balance.

As the friction hoist pulley does not have to store the entire rope or ropes on the pulley, the pulley diameter can be smaller for a friction hoist. Smaller pulley diameters mean lighter hoists with lower inertias – allowing for smaller motors and drive systems and less hazardous emergency braking efforts.

Friction hoists normally the most economical solution

Since multi-rope friction hoists use more ropes to share the payload, the hoist mechanical, electrical and brake system equipment can be made smaller relative to a drum hoist (with the same payload). Generally, the cost of a friction hoist can be as low as 60% of the cost of a double drum hoist with the same payload capacity. Friction hoists with skip/skip configurations are best suited for single level mines, with only one loading point, while friction hoists with skip/counterweight or cage/counterweight configurations are well suited for multilevel mines. The counterweight solution is also preferable when hoisting distances are short. Friction hoists are normally the most economical solution for permanent mine hoist installations at hoisting distances between 250 meters and in excess of 1600 meters.

Single drum hoists

For shallow shafts with depths of less than 250 meters, a single drum hoist is often a preferred alternative. Normally one conveyance is used, allowing for a smaller, more optimal shaft diameter. Single drum Blair multi-rope (BMR) hoists can be used, where two ropes are used with a single conveyance.

Personnel and equipment transport and shaft sinking are other common applications for single drum hoists with one conveyance.

Double drum hoists

Double drum hoists can be used for all shaft depths ranging from about 100 meters to ultra deep down to 3000 meters. The twin drums of double drum hoists can be rotated independently of one another. This makes the drum hoists well suited for multiple level mines where rope stretch can become a problem. In deep shafts, double drum hoists are preferred over single drum hoists because of the greater flexibility as well as their lower unbalanced load.

Blair multi-rope hoists

Blair multi-rope hoists, or BMR hoists, use two ropes for each conveyance. This arrangement allows for correspondingly higher payloads to be hoisted from deep shaft depths. BMR hoists require the use of hydraulically connected compensating sheaves in order to ensure equal rope tension at the conveyance. BMR hoists allow for the highest payloads at the deepest shaft depths.

ABB – more than just hoists!

Drive systems

ABB is the global leader in drive system technology. Our drive technology is based on ABB's leading-edge Direct Torque Control (DTC). ABB's drive systems are the most widely used mine hoist drive systems in the world. Synchronous motors are used for direct coupled mine hoists and induction motors are used for gearbox coupled mine hoists.

What ABB's AC drive system offers

- Superior control performance
- Power factor 1.0
- Minimal voltage flicker and voltage drop in the electrical supply network
- Low harmonic distortion
- Low energy consumption
- Smaller supply transformers compared with cycloconverters and DC solutions

Multi-channel disc brake system

Multi-caliper disc brakes are used for emergency stops and holding at standstills. The hydraulic control unit is equipped with dual systems to meet the highest safety requirements. For maximum safety a four-channel system is available

- Four independent channels
- Redundancy of critical signals
- Accurate and rapid control
- Fast apply of brakes

Advant Hoist Monitor

The Advant Hoist Monitor, known as AHM, is an independent mine hoist safety system that ensures protection against overspeed and over- or under-winding.

Hydraulic control unit with caliper



Rope Oscillation Control

For mine hoists operating in very deep shafts, ABB has developed ROC, Rope Oscillation Control. ROC is integrated into the electric drive system and is used to reduce longitudinal rope oscillations that may sometimes occur. ROC helps to increase rope life and provides a more comfortable riding environment for personnel in the elevator cages. ROC permits a reduction in the static rope safety factor.

ABB's mine hoist Power Swing Reduction system

The mine hoist Power Swing Reduction (PSR) system is used to reduce the peak power that the mine hoist draws from the electrical network during acceleration. The required peak power drawn from the network can typically be reduced by 40%. This is an important reduction, especially if local diesel generator plants supply the mine hoists, or for mines using very large Blair multi-rope hoists where the peak power can be in excess of 20 MW. ABB's PSR system works on the concept of inertial energy. The inertial energy of a decelerating mine hoist is captured, stored and reused to limit the peak power of the accelerating mine hoist.

Auxiliary hoisting equipment and shaft furnishings

As well as the hoist machinery itself, ABB also supplies the auxiliary components of mine hoisting systems including head sheaves, deflection sheaves and rope tread grooving tools. ABB also designs and supplies complete shaft furnishing equipment including skips, cages, counterweights, conveyance guiding systems, head and tail rope attachments and measuring flasks.

Argus advanced diagnostic tool

Argus is a powerful diagnostic tool integrated into the hoist control and drive system offering:

- High speed condition and performance monitoring of the hoist
- Modular design for different needs
- Local or remote functionality

Using the remote function, ABB mine hoist specialists at ABB service centers can assist in troubleshooting and maintenance of mine hoist systems.

ACS 6000

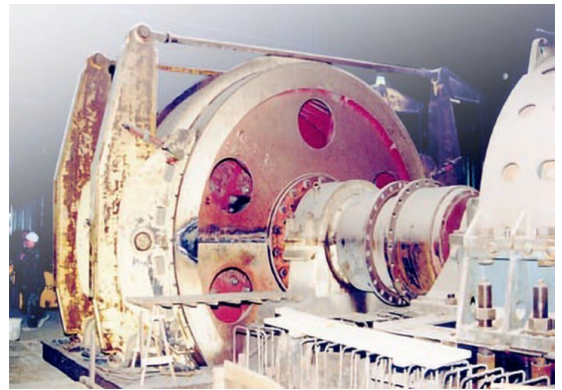


Modernizations and upgrades

ABB has also performed numerous upgrades and modernizations of existing mine hoists including electrical and mechanical upgrades with hoists manufactured by either ABB or other manufacturers.

Typical upgrades and modernizations include:

- Mechanical brake systems including hydraulic disc brakes, spring nest brake systems, etc.
- Balance of mechanical equipment
- Control system with modern PLC-based systems
- Electrical powertrain (such as Ward Leonard MG couple to modern AC motors and drives)
- Large revamps of complete hoisting plants such as the one at LKAB's mine in Kiruna, Sweden



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01 Pulley modernization in Poland

02 One of twelve skip hoists at LKAB's mine in Kiruna, Sweden

03 Before modernization

04 After modernization

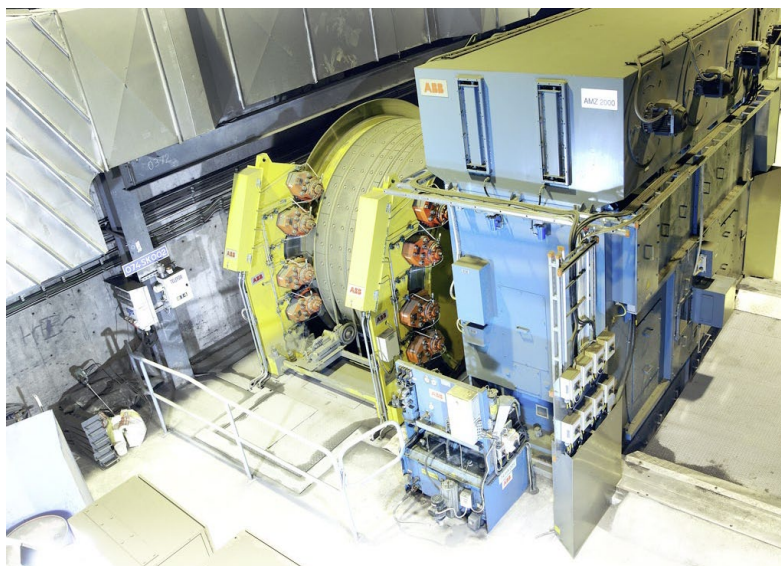
05 New brake system in China



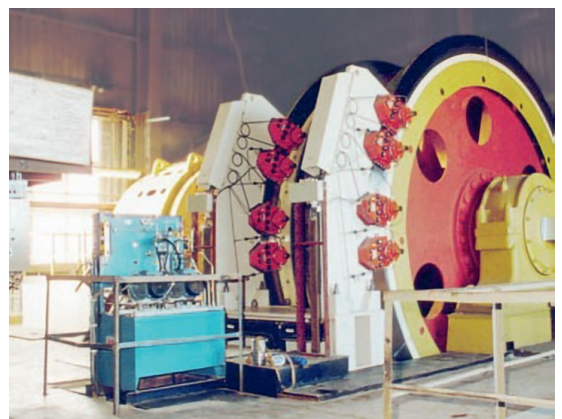
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