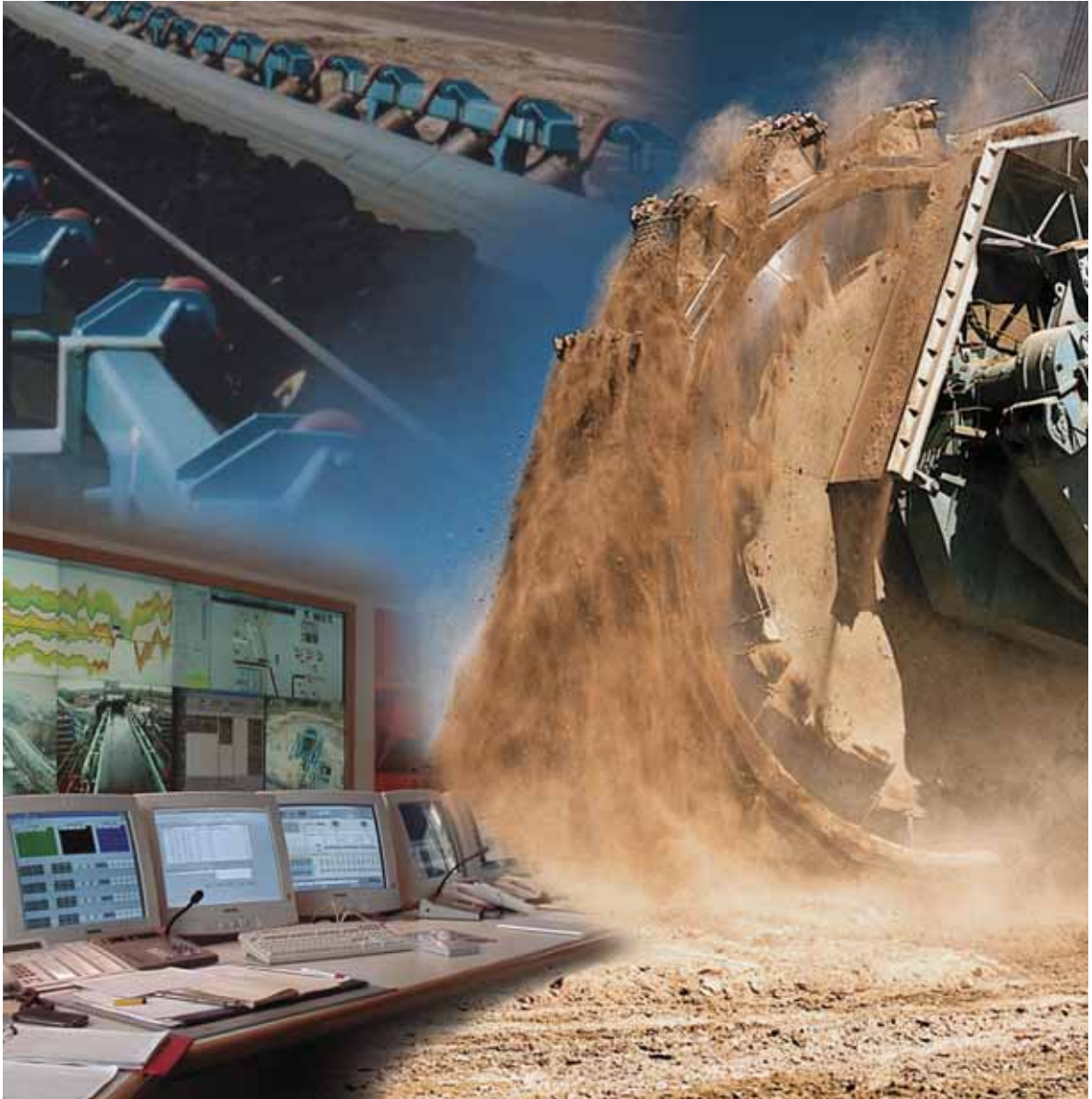


**We set your business in motion:
Automation solutions and electrical equipment
for open-pit mining and bulk-material handling**



ABB

Perfectly equipped for the future - with ABB

Whatever your business is handling - from coal to copper ore, from iron ore to overburden - to be successful in the fields of open-pit mining and bulk-material handling you need a strong partner. You need to be in the position to react economically and flexibly, to maintain high safety standards for personnel and equipment, to make investments with short amortization periods, to avoid downtime even under extreme conditions, to fulfill numerous environmental requirements, to precisely plan the handling of both volumes and qualities, as well as being able to react to suddenly changing parameters. Only those who can satisfy all these demands will remain successful over the mid and long-term - in a business that is driven by the global market's dynamic prices for raw materials.

ABB is the right partner for your success

We can offer you over 50 years of experience in delivering electrical equipment for open-pit mining and high-volume bulk-material handling. By using the know-how of the entire ABB corporate network, combined with the competence to execute and implement major projects - we ensure that even the most challenging requirements are fulfilled, irrespective of how large your projects are. In addition, ABB also offers you the advantages of our long standing partnership with many of the most renowned international mining and construction companies.

Be it the reconstruction of your existing machines or the installation of new equipment: ABB develops and implements individually tailored solutions to suit your specific needs.

Solutions that perfectly match your requirements and that work - with the highest reliability.

In order to ensure optimal conditions for the productivity of your equipment, both today as well as tomorrow - each of our solutions are based on advanced ABB Industrial^{IT}, robust information technologies engineered for industrial applications.

Naturally, as a strong partner committed to your success we provide you with a wide range of services for all of your needs during and after final delivery: around the globe and around the clock, we're there to assure you of uninterrupted operations and the rapid delivery of any spare parts.



ABB projects - worldwide

Central control stations for open-pit mining

Control stations perform the centralized functions of monitoring, operating and controlling an open-pit mine and its equipment. That involves the recording and analysis of up to several 1000 processing variables, which are often relayed from locations several kilometers away. With a consolidated and user-friendly workstation, this information can now be visually displayed and



streamlined - helping operators to make faster, more effective decisions. This data can be presented in the form of graphics, diagrams as well as status/event listings and tables. And aside from the controlling, monitoring and recording of data, numerous other options can also be integrated e.g. quality management systems, SAP interfaces or a remote communications interface.

Reconstruction of an electric shovel

Although the mechanical components of open-pit mining equipment often remain in good shape after 15 years, the life-span of their associated electrical components is usually exhausted by that time. Therefore in many cases, the optimal concept from the economic point of view is an electrical reconstruction which incorporates the usable mechanical components of the machine.



ABB has conducted many reconstruction projects, among others: an electric shovel in an iron ore mine in Mexico. In this case, all the main drives were replaced by a variable-speed solution based on the ABB ACS600 Multidrive. This solution set new standards in terms of controllability, reliability, operating safety as well as improved maintenance. It has also been implemented on other shovels around the globe and is also applicable for draglines.

Unmanned coal screening and blending yards

For the optimal operation of a power plant with a brown coal mine, the supply of coal with constant quality parameters (e.g. sulphur and ash content) is often necessary. In many cases large screening and blending yards are used for this task. ABB developed an automation concept for the unmanned, fully automated operation of a 400,000 ton stocking yard with one stacker and two



reclaimers. All three pieces of equipment operate completely unmanned. The problem of achieving a 100% collision protection and some other difficult tasks were solved. The final result is a fully automatic stacking and reclaiming stockyard which ensures that the quality criteria for the coal mixtures are precisely maintained.

Programmed excavator control

Bucket-wheel excavators usually function at their best when they can rapidly extract high volumes of material, without however exceeding their mechanical stress limits. The objectives are: an even loading of the conveyor belt, a minimum of idle operation, the forming of stable slopes and an even subgrade.

Only experienced operators are capable of precisely fulfilling these processing goals.

ABB has succeeded in automating the whole process of digging. Process parameters need to be entered by the operator only at the beginning. Then a computer model directs the bucket-wheel to follow the optimal track, thereby helping the operator to increase his productivity.

Complex belt-conveyor drives

The creation of a drive system for several successive conveyor-belts requires exceptional know-how. The starting sequence, massflow separations, ascent and descent angles, bulk weights and distribution, changing operating conditions (particularly difficult to define are belt tensions and longitudinal oscillations) as well as emergency and repair modes and other critical factors must be taken into consideration.

Using modern simulation techniques combined with the latest drive and motor technology, such as frequency-converter driven AC motors - we provide you with solutions to satisfy the highest expectations in terms of minimized wear, energy efficiency and maximized control. Worldwide, over 600 kilometers of beltconveyors are in operation and demonstrate our competence in this field.



Whatever drives you, we can speed up your success - wherever you are, we will take you further

With scalability and the latest technology

In the electrical modernization and automation of mining systems, we have mastered the art of integrating new components with existing equipment. That goes for the field operations level as well as the management control level, because our Industrial^{IT} solutions are designed for easy installation within your existing infrastructure - including the integration of third party systems. Moreover, our products and solutions offer you the highest reliability, even under extreme temperatures, strong vibrations and heavy dust condi-

German specialists and experienced project managers. ABB's central "brain" for open-pit mining technology is located in Cottbus, Germany. From there our flexible network extends worldwide, to ensure you of getting maximized local support combined with exceptional know-how. Our proven abilities have already lead to the successful completion of a range of international projects.

We assure you of maintaining maximum system availability. By exploiting reliable technologies and combining them with extensive know-how, we develop solutions for even the most difficult technical problems. Then that's

With the control platform of the future, Industrial^{IT}

ABB recognizes optimization potentials and exploits them to meet even the highest demands. For example, with data management and quality control systems that are just as productive as they are flexible in supporting future needs.

With Industrial^{IT}, we raise both your short-term as well as your long-term productivity. Because when the right information is available - at the right place, at the right time - all of your processes can be optimized at each level of your organization:



tions. As a result, you can take advantage of minimized downtime due to reduced maintenance and repairs.

With experience and competence

We offer you competence based on 50 years of experience in supplying electrical equipment. By choosing ABB as your partner, you can count on the professionalism of our local business units in your country combined with the proven expertise of

how we've become one of the worldwide leaders in automation technology for the mining industry.

With a strong partnership

Working together with ABB provides you with plenty of advantages: whatever you may require in terms of consulting, design, engineering, installation, commissioning, training, after-sales-service or financing - we advise and support you from the very beginning. Worldwide and reliable.

- Processes become more transparent
- Decision-making becomes easier
- Additional information becomes immediately available

And with us!

We understand your business. Let's talk - and let us equip you for the future.

Our services in overview

Electrical engineering and automation for reconstructions and new systems



Automation solutions

- Partial and full automation
- Safety management
- Individual machines and complex systems
- Central control stations
- Operator displays
- Unmanned operation of mining machinery (including anti-collision system)
- Radio datalinks
- Laser scanning (stockyard profiles, belt load)
- GPS positioning of mobile machines

Monitoring and controlling

- Realtime processing of up to several 1000 I/O
- Status and event listings
- Statistics
- 2D and 3D visualization of mass flows (including quality management)
- Operator cabin equipment
- Video camera supervision
- On-site and remote operation/diagnosis
- Remote service

Data management

- Quality management systems
- System status diagnosis
- Shift reports, daily protocols etc.
- SAP interface
- Communication with mobile equipment via wireless LAN
- Transportation models, stockyard models and bunker models

Drive concepts

- AC and DC drives
- Resistor starters and frequency converters
- Variable-speed drives
- Direct Torque Control
- Simulations/modelling and measuring of dynamic data
- Power supply network analysis

Individual components

- Transformers, power supply
- Switchgears (MV and LV)
- Containers and cabins
- Motors
- Transmitters, sensors
- Communications and lighting systems
- Emergency power supply and uninterruptible power supply

Complete electrical equipment for

- Electric mining shovels/walking draglines
- Bucket-wheel excavators
- Bucket-chain excavators
- Conveyor drive stations
- Spreaders (with or without tripper car)
- Stackers and reclaimers
- Ship loaders
- Bunker management systems

Project management and service

- Consulting
- Financing
- Design, engineering, installation
- Commissioning
- Training
- After-sales-service
- Full service



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