Overland conveyor drives
Geared or gearless
Conveying is a significant part of mining and material handling. Selection of the drive solution has a direct impact on the performance, flexibility, total efficiency, reliability, the life of the conveyor system and the mining operation.

As the length of conveyors increases so do the demands for soft, controlled starting and stable operation, optimized process control and increased efficiency.

ABB’s conveyor drive solutions incorporate state-of-the-art technology and are designed for reliability, longevity and low maintenance operation. Our many years of experience in conveying and materials handling coupled with our inherent drive system design ability, enables us to develop customized solutions for your specific plant requirements.

Different configurations can be designed for geared or gearless conveyor drives depending on your needs. ABB’s high speed solution can significantly reduce the mechanical stress on the complete drive train. In comparison the low speed solution eliminates the need for maintenance intensive gearboxes.

When it comes to designing power supplies and controls, with ABB you have the choice of
- integrating the power, control and ancillaries into your existing E-rooms, or
- have a self-contained, pre-commissioned solution.

The containerized E-house is fully air conditioned and includes the power supply and control of all the conveyor auxiliaries, such as motor control center, belt rip and drift switches, PLC and HMI system.
The ABB Conveyor Drives solution

ABB conveyor drive solutions offer all the advantages of a frequency converter using voltage source inverter technology, combined with high flexibility and additional functionality specifically developed and customized for overland conveyor applications.

The solution is a modular concept, based on ABB's drive technology, and provides a common drive control platform, which is used for induction and synchronous motors for geared or gearless conveyor configurations.

These solutions are ideally suited for all types of conveyors such as long and short overland, down and up hill as well as troughed and tube conveyor applications. These conveyor solutions cover a wide range of loads and include all the required mechanical and electrical protections.

As the ABB solution includes a frequency converter, this provides additional possibilities and inherent benefits to the overall system. These include variable speed with fast and precise control for the network and mechanically-friendly operation. In addition, the functionality required for conveyor applications can be implemented in the conveyor Process Controller.

This offers operational features such as a smooth starting sequence, controlled braking, as in down hill conveying, thus avoiding torque peaks.

ABB's fast direct torque control (DTC) ensures an accurate torque control. DTC is the ABB advanced motor control method for drives that allows precise control of the motor torque and speed. The drives show a very smooth starting behavior with low starting currents. For this reason they are well suited for weak networks. Furthermore, the power factor to the network is greater than 0.95 under all conditions and speeds. If an “active front end” is included, then the drive system can also be used for braking and operate at unity or even leading power factor to the network.

ABB's geared and gearless drive solutions protect the mechanics during normal operation and starting by limiting the torque. This helped keep the mechanical stress on the belt within its limits. The precise torque control during all operating states of the conveyor avoids torque pulsations and limits backlash in the gear-boxes.
Why choose ABB?

With our renewed comprehensive product portfolio for industrial applications together with over 40 years experience in supplying integrated conveyor systems to the mining, minerals processing and cement industry, ABB ranks on top of the list as a key supplier.

Our strengths
- We combine drives with application and process know how
- We offer complete and customized solutions
- We integrate our solutions in the plant environment, considering electrical, mechanical and civil interfaces
- We offer full service and equipment support

Competence in conveying
At the Business Unit Minerals and Mining Centres of Excellence (CoE) we have a combined team of over 250 engineers who available to assist with the electrification and automation design, installation and commissioning of your conveyor system.

- We are able to provide:
  - Development
  - Design
  - Engineering
  - Studies (e.g. torsional analysis, filter and network studies)
  - Project management
  - Erection supervision
  - Commissioning
  - Trouble shooting, maintenance and service
  - Spare parts specialists

Conveyor drives control
Each conveyor drive can be operated locally with a local control box or remotely by the overriding plant control system. The communication between the drives, rope and drift switches is realized via serial bus using optical cables for long distances, for example between head and tail end.

ABB has developed a Mining Conveyor Control Program (MCCP) which provides the conveyor main drives control. A sophisticated control loop is superior to traditional control methods (such as a basic master – follower) in control accuracy and flexibility.
The ABB MCCP provides adjustable speed for conveyors and offers the opportunity to tune a soft start profile (e.g. dwell function) and soft operation at the speed set point for optimal conveying with the maximum transport volume. Special attention is given to the load shared starting and operation between the motors on the head and tail end drive stations in order to mitigate high torque peaks and longitudinal oscillation in the belt.

With variable speed drives operation at any speed is possible. This means, for example, that the filling level of the conveyed material on the belt can be kept constant and so matched to the upstream volume and process requirements. This saves energy and increases mechanical life.

The availability of service speed allows easy maintenance.

Service mode
The MCCP has operating modes for conveyor service that can run at low speed therefore these drives do not need additional equipment for performing conveyor maintenance work. Service speed can also be used to slowly move the belt to perform visual inspections.

Worsley
(Aluminium), Australia
Total length 51 km
Power 15 MW
Operational speed range 800–1000 rpm
Overload during starting 140 %
Power factor > 0.95
Extension with MCCP in 2011

Ujina-Rosario Transition
Compania Minera Dona Ines de Collahuasi (Crusher), Chile
Altitude: 4000 m.a.s.l.
4 x Up and down hill conveyor
Power 24 MW
Operational speed range 800–1000 rpm
Overload during starting 150 %
Power factor > 0.95

Aitik 36
Boliden, Sweden
Low ambient temperature
6 x Conveyor
Power 21 MW
Operational speed range 500–1000 rpm
Overload during starting 120 %
Power factor > 0.95

Aitik 36, Sweden
To support your existing installation ABB provides a range of services from phone support to complete service agreements.

**Conveyor Scan**
Remote diagnostics can be done through a secure internet connection. This allows fast access from any place in the world to actual and historic drive data to check the status and to support the operator during service and trouble-shooting. It helps to minimize downtime and production losses.

**Remote services**
- SupportLine (emergency telephone support, 24 hours x 365 days per year): provides quick and reliable access to the technical know-how of ABB product, application and process experts
- Remote diagnostics / Trouble shooting: Support by remote access can be provided through a secure internet connection
- Periodic maintenance: scheduled asset audits

**Commissioning and maintenance**
**Predictive, preventive and corrective maintenance**
- ABB provides services from commissioning, regular system inspections and component replacements according to a products pre-planned maintenance schedule, to long term on-site support
- An internal certification process qualifies the know-how and follows up the performance of ABB on-site resources on a regular basis
- A high availability of on-site resources is guaranteed by ABB’s worldwide network of field service engineers

**Spare parts**
System specific spare parts lists and regular inventory audits allow to optimize your spare parts holdings.

**Customer training**
ABB’s product and process training courses are offered to provide users with the knowledge required to safely and effectively operate and maintain their drive equipment. Both theoretical and practical training is included in each session and is based on ABB University approved methods. The aims are to support clients, to contribute to operational excellence and enable the sustainable development of a skilled workforce.

**Service agreement**
Service products can be combined to one comprehensive service agreement to meet your specific needs.
Operational advantages
- Smooth starting with low stress on the feeding network and belt. Oscillations in the belt can be avoided
- Torque limitation
- Service mode for maintenance
- Process optimization lead to a much more efficient use of conveying power and thus to significant energy savings
- The conveyor can be easily operated in both directions
- Remote supervision and diagnostics option enable fast and easy monitoring
- ABB’s dedicated conveyor control system features critical monitoring during the starting period, protecting the belt against mechanical damage by torque peaks

Mechanical and electrical benefits
- The drive system configuration is flexible and allows the use of induction and synchronous motors geared high-speed and gearless low-speed configuration
- High starting torque availability even at zero speed allows the start of the synchronous machine directly coupled to the conveyor
- The mechanical stress on the belt and the gear is reduced. The mechanics and the gearbox can be protected by the drive control during normal operation
- ABB’s variable speed conveyor drives deliver precise and strong torque control due to DTC technology and show a very smooth starting behavior

Benefits
- In a geared and gearless configuration the load sharing between the drives is actively and accurately controlled
- These drives are well suited for weak networks. Low starting current and the power factor to the network bigger than 0.95 under all conditions make the solution very network-friendly
- The capacitance and momentum in the system allow ride through of voltage dips, which can be common in remote mine sites. Fewer restarts are required and more conveying time is available
ABB's Minerals business unit, with headquarters in USA (Houston, Texas), is represented in the following countries: Australia, Brazil, Canada, Chile, China, Egypt, Estonia, Germany, Greece, India, Indonesia, Kazakhstan, Latvia, Lithuania, Malaysia, Mexico, Norway, Oman, Peru, Poland, Saudi Arabia, South Africa, Spain, Sweden, Switzerland, Thailand, USA and Vietnam.

For contact details, please visit our website:

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