

Drive system for high pressure grinding rolls Increased roller life and productivity

High pressure grinding rolls in mineral processing

Moving from cement to hard rock

High pressure grinding rolls (HPGRs), also known as roller presses, are rapidly gaining acceptance in hard-rock processing, primarily due to their energy efficiency when applied in comminution.

Application challenges

Today's highly competitive mining industry calls for continuously operating high throughput equipment, such as the HPGR, to be designed for maximum availability and reliability. In case of the HPGR the optimum point of operation is widely influenced by ore properties like feed size, hardness and the rate of feed.

Energy cost and water savings, smaller plant footprint and extended availability are some of the main reasons why we see more and more HPGRs within crushing and grinding circuits.

Optimizing your HPGR to maximum capacity

To ensure maximum optimization of your HPGR, a variety of critical factors have to be taken into consideration when selecting the drive solution. A 'fit for purpose' drive system should:

- Maximize throughput
- Minimize roller wear
- Provide highest degree of operational flexibility
- Maintain high availability
- Ensure lowest operation and capital costs

ABB's smart solution for HPGRs is designed to deliver on all those key factors, making it the optimal system to enhance grinding productivity of your HPGRS.



Picture courtesy of Polysius and Boddington gold mine

Variable-speed drive system for HPGRs

Engineering expertise translates to optimal grinding results

ABB's state-of-the-art HPGR drive technology for use in comminution is a variable-speed drive system. Decades of engineering expertise translates to an optimized drive solution specially engineered to fit your specific site and HPGR requirements.

Standard system components

While the complete system is tailored based on your specifications, the following components are typically part of the standard package:

- Converter (voltage source inverter topology)
- Transformer
- Motor

When evaluating whether to go with a medium or low voltage system, our engineering experts not only consider the HPGR motor power, but also how to optimize cost without compromising performance and reliability.

Your power supply and control center options

We offer two options for power supply and control center design: Integrate the power, control and ancillaries into your existing E-rooms, or choose a self-contained, pre-commissioned solution.

Optional system services

- Torsional analysis of total drive train to validate design.
- System commissioning by dedicated application experts to ensure flawless operation.

HPGR drive system with RollXtend™ technology

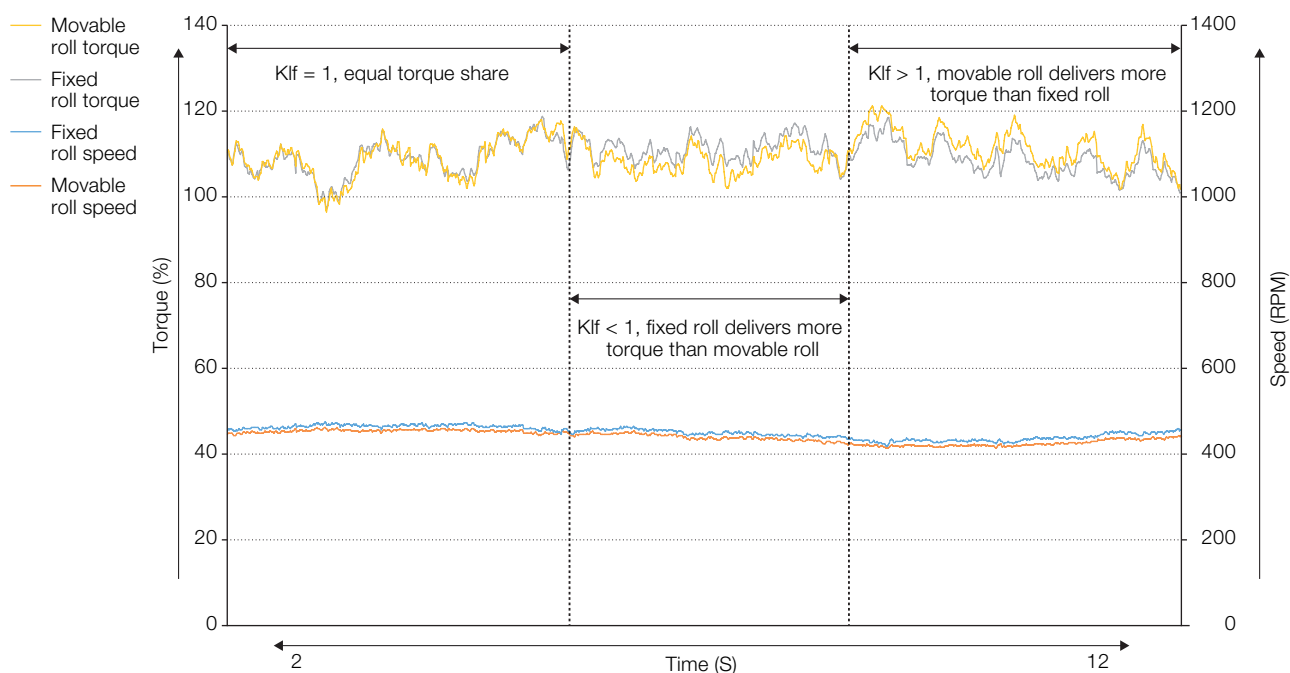
ABB's HPGR drive system with RollXtend technology provides accurate control of torque (load) and speed.

An HPGR with a brand new set of rollers starts operation with identical torque and speed. Over time and based on various operating factors (e.g. ore characteristics, operating pressure, feed etc.), the rollers experience different wear rates. With RollXtend the load provided by both rollers can be fine-tuned by the operator based on the wear rate measured.

The roller torques are managed by the load share factor (K_{lf}). If K_{lf} = 1, identical torque is delivered by both rollers. For values of K_{lf} < 1 the fixed roller delivers more torque than the movable roller. For values of K_{lf} > 1 the movable roller delivers more torque than the fixed roller. K_{lf} can be varied in fine steps. Irrespective of the K_{lf} value, the speeds of both rollers will be matched, keeping slip to a minimum.

As a consequence of suitably adjusting K_{lf}, the HPGR rollers will wear equally, extending the overall life time of the roller pair.

Load share control performance



Intelligent operation and protection features

Ensuring increased roller life and productivity

To leverage the benefits of using HPGRs in comminution and reach optimal productivity, a reliable and flexible drive system is a must. With its advanced smart operation and protection features, our drive system ensures optimal productivity, operational efficiency and increased roller life for your grinding operations.

1. RollXtend™

The RollXtend technology gives full flexibility to vary the torque delivered by each roller, while maintaining identical circumferential speed.

2. Maintenance mode

Roller creeping for inspection and maintenance activities is achieved with our dedicated maintenance mode function combined with the easy-to-use drive system HMI. This eliminates the need for an auxiliary drive.

3. Upstream breaker management

The drive system controls the upstream medium voltage breaker, guaranteeing co-ordination with the total system operation, ensuring operator and equipment safety.

To further enhance HPGR productivity we also offer optional drive system components and features such as specially engineered motors, vibration monitoring and a surge protection feature.

Specially engineered motors

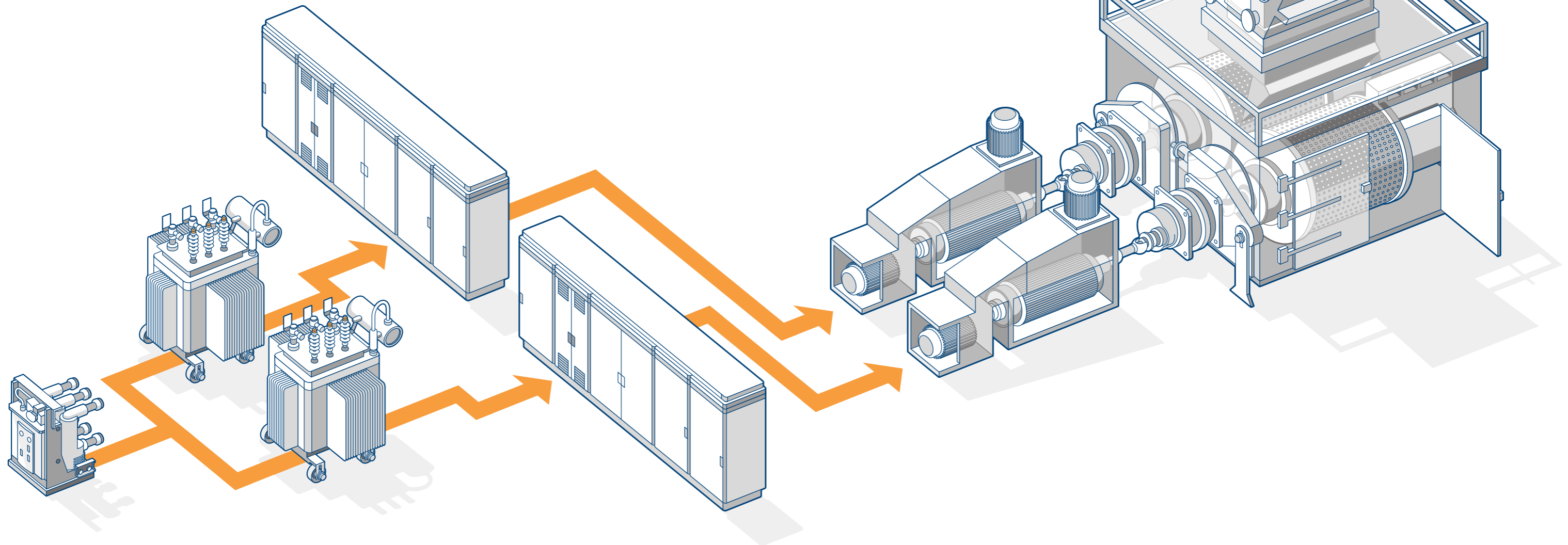
To withstand axial and radial forces caused by the floating roller and transmitted to the motor shaft via the Cardan shaft, we design and deliver specially engineered motors that fit your individual HPGR specifications.

Vibration monitoring

On request, the motors can be equipped with vibration sensors. The drive system can be set to raise alarms upon recording abnormal vibration levels in the motor, which may be caused by excessive forces being transferred from the HPGR due to process abnormalities (e.g. irregular or oversized feed).

Surge protection feature

With our site-specific surge protection, equipment damage, resulting from long cables between breaker and transformers or other devices, can be prevented.



Operational advantages and benefits

Maximize availability and HPGR performance

Investing in grinding assets is a significant decision for any company and directly impacts production capacity and profitability of operations. ABB's intelligent HPGR solution provides operational advantages and benefits to support your productivity targets.

Cost benefits

- Maximized total roller life due to equal roller wear with RollXtend technology.
- CAPEX and OPEX savings (time lost in engaging and dis-engaging auxiliary drive), as need for auxiliary drive is eliminated for maintenance operations.

Operator and equipment safety benefits

- Increased operator safety with maintenance mode. Inspection and maintenance activities can be performed without auxiliary drive.
- Converter control of upstream circuit breakers avoids equipment damage resulting from transformer in-rush currents

– Coupling supervision

Monitors deviations in torque. In case of a coupling failure, the drive detects it and trips.

– Stand still detection (optional)

To protect mechanical and electrical drive system components, the motors should not restart if the rolls are still turning after a stop command. This function detects if the rolls are standing still and then releases the start command for the operator.

– Over-duty cycle mode (optional)

The over-duty cycle mode permits additional torque for a certain amount of time to overcome overload situations (e.g. improper feed rates), allowing operators to implement corrections and avoid machine stoppage.

Electrical benefits

- Network friendly operation
- Current and voltage harmonic within IEEE 519 limits eliminates need for additional filtering equipment.

Process and operational benefits

- Instant roller reaction to change in ore characteristics and hopper feed rate by setting of appropriate speed.
- Quick reaction to frequent load changes (e.g. irregular feed size) possible with direct torque control (DTC) used in convertor.
- Lower pressure spikes and reduced stud breakage due to maintained small zero and operating gap.

Mechanical benefits

- Reduced mechanical stress on gearbox and reduced roller damage due to smooth starts at high torque.
- Fatigue failure protection of drive train and gearbox via torque limits in the drive.
- Prevention of high intensity vibration caused by variations in feed due to use of variable speed drive.



Your optimal partner for reliable operations

Protect and optimize your drive system

Partnering with a supplier who supports your needs with ever changing site requirements, is the answer to minimize risks and increase overall performance of your grinding equipment. Our experts are by your side starting at the planning stage and throughout the lifetime of your equipment.

With a comprehensive service portfolio we ensure that your drive systems and HPGRs operate at peak productivity and cost efficiency. With an ABB service agreement you minimize the risk of costly unscheduled breakdowns, extend the life cycle of the drive system, optimize process performance and receive operational excellence from a global leader in drive systems for grinding applications.

Our objective is to ensure that you get the most out of the money you spend on service. Make ABB your first call for service: We help you to protect and optimize your drive systems and grinding assets. The portfolio covers:

- Consultancy and engineering
- Installation and commissioning
- Remote services, including SupportLine 24 hours x 365 days per year
- Periodic maintenance with scheduled asset audits
- Predictive, preventive and corrective services
- Spare parts management
- Customer training based on ABB University approved methods



Contact us

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