

FUTURE- PROOFING MINING OPERATIONS



Alireza Oladzadeh,
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reviews the role of
long-term service
agreements in gearless
mill drive operation
and maintenance.

The mining and minerals processing industry is currently navigating a landscape fraught with challenges. Rising exploration costs, volatile market prices, and increasingly remote environments are pushing the industry to evolve. These challenges must be met while protecting the health and safety of workers and adhering to increasingly stringent environmental regulations. Solutions that tackle these issues need to ensure equipment operates efficiently and reliably, with minimal intervention from the operators.

In this context, the upkeep of critical equipment, such as gearless mill drives (GMDs), becomes paramount. GMDs are a foundation for grinding operations at scale in mining, offering enhanced reliability and efficiency. The upkeep of these systems is essential for their longevity and continued productivity. However, maintaining these complex systems requires more than just regular check-ups; it demands a proactive and comprehensive approach to maintenance. This is where long-term service agreements (LTSAs) come into play. Through corrective, preventative, predictive, and prescriptive maintenance strategies, supported by the latest in remote diagnostic services, LTSAs offer a robust framework for tackling industry challenges, while improving health and safety, achieving environmental goals, and reducing costs.

Getting to know gearless mill drives

GMDs are the workhorse of grinding operations within the mining industry. In a GMD, rotor poles are mounted directly onto the mill, meaning the mill itself becomes the rotor of the gearless motor. This eliminates the need for additional mechanical components such as ring-gears, pinions, gearboxes, couplings, and motor shaft bearings, enhancing the reliability and efficiency of the system.

GMDs offer several advantages over alternative mill drives. For example, they can reach higher power levels while reducing overall energy consumption. Furthermore, their overall mechanical infrastructure and the need for fewer components, coupled with greater power, reduce a mine's footprint by eliminating the need for larger or multiple smaller mills. This reduction in physical footprint translates into a more efficient use of space, particularly in remote areas, and is advantageous for operations in environmentally sensitive areas where minimising land disturbance is crucial.

Unlocking greater performance and reliability

Implementing LTSAs for GMD maintenance offers numerous benefits that enhance reliability and uptime. These agreements provide regular maintenance schedules and predictive maintenance strategies, which help to avoid unplanned downtime. In mining operations, every second counts, and the ability to rapidly address and prevent any unscheduled shut-downs can make a significant difference in productivity and profitability.

Solutions like ABB's multi-year service agreements embed advanced services that help plan maintenance activities over the long term, extending the lifecycle of equipment and increasing overall equipment effectiveness (OEE). These agreements cover all levels of maintenance strategy, ensuring equipment like GMDs remain operational and efficient.

Streamlining the overall maintenance process, LTSAs ensure that all necessary checks and repairs are conducted in a timely and efficient manner. This not only extends the lifespan of the equipment, but also maintains optimal performance levels. Continuous technical support and access to specialised knowledge further enhance operational efficiency. With experts on hand to manage and troubleshoot complex GMD systems, mining operations can maintain a high level of performance with minimal disruption.

Remote diagnostic services allow engineers to log onto the system regardless of physical location, access cloud-based data, and investigate problems and provide recommendations or immediate resolutions. For example,



Figure 1. ABB service staff.



Figure 2. ABB collaboration Operation Center (CoC).



Figure 3. ABB GMD running in Boliden's Aitik mine.

if there is an issue on the machine, engineers are able to quickly diagnose the problem and guide operators on how to resolve it. From support lines (24/7) and remote troubleshooting, to predictive maintenance and condition monitoring, these services are designed to support fundamental, complex systems like GMDs and allow experts to suggest solutions from anywhere in the world.

To further prevent downtime and keep the GMDs running, LTSAs allow for service experts to monitor the system on a regular basis without having to be on site. This minimises the risk of costly, unscheduled breakdowns and optimises process performance. Software is able to predict potential failures based on detailed analysis of historical and current data on the electrical, mechanical, and thermal parameters of the GMD. For instance, the ABB Ability™ Predictive Maintenance for Grinding (Figure 4) monitors the health of crucial assets against pre-defined thresholds utilising this data, and is able to notify operators if an anomaly is detected by the system. Ongoing health assessments allow operators to take action before failure occurs. Combining these services with the integration of a mobile application, like ABB's Grinding Connect (Figure 5), allows operators to access status updates and an overview of the equipment from anywhere, at any time.

To provide a full range of maintenance, it is important to provide consistent, detailed condition checks. As such, ABB experts create a number of maintenance reports each year. During structured GMD system assessments, ABB technical experts analyse and evaluate data collected via a secure internet connection. They perform an analysis and deliver these reports which include a summary of findings and recommended preventative and corrective maintenance tasks.

Data is key to corrective, preventive, predictive, and prescriptive maintenance concepts. The ability to collect and analyse data provides accurate visibility into the health of a GMD system. This visibility offers clear advantages to GMD operators, such as the ability to plan maintenance tasks ahead of time or postpone them with confidence based on condition reports and evolving priorities. This targeted decision-making is gaining traction as the advantages become more apparent to mining companies.

The overarching goal of LTSAs aims to help mining companies achieve the most from their investment in critical equipment and ensure that they can predict and plan the resources they need to spend on service. Going beyond short-term success, these maintenance strategies target long-term value creation, helping to identify risks, make qualified decisions, and manage available data to increase the longevity of the systems.

Addressing flexibility and customisation

Flexibility and customisation are key components of effective LTSAs. Mining operations vary greatly in their individual needs and challenges, and a one-size-fits-all approach is rarely feasible. Customised solutions allow for targeted maintenance strategies that maximise efficiency

and cost-effectiveness. It is also vital that these services evolve with the technology. Continuous adaptation of service requirements to meet the needs of the system helps to extend the lifecycle of the equipment while reducing associated costs.

Furthermore, having experts with GMD Field Service Certification on hand who are familiar with the intricacies of critical equipment ensures that any issues can be addressed promptly and effectively. Whether remote or on-site, LTSAs help to maximise the availability of service for proactive and reactive assistance contributing to asset performance.

The LTSA, lasting three to five years and including a comprehensive lifecycle management programme, aligns focus on long-term reliable maintenance strategies which will support customer operations and maximise operational equipment effectiveness.

Technology made for tomorrow

The future of mining maintenance is increasingly tied to technological advancements in corrective, preventive, predictive, and prescriptive maintenance. Digitalisation and the integration of the Internet of Things (IoT) are

revolutionising how maintenance is conducted.

ABB's advanced services use data analytics and machine learning to anticipate failures and issues with equipment before they occur or escalate, allowing for proactive interventions that prevent downtime and extend equipment life.

Digital tools and IoT devices enable the real-time monitoring and diagnostics of GMD systems, providing valuable insights into equipment performance and health. This allows for more precise and effective maintenance strategies that can adapt to changing conditions and requirements.

Sustainability and energy efficiency are also becoming increasingly important in maintenance practices. As the mining industry seeks to reduce its environmental impact, strategies that enhance energy efficiency and minimise waste are crucial. LTSAs that incorporate these principles not only contribute to environmental goals, but also offer cost savings through reduced energy consumption and improved operational efficiency.

ABB is currently developing its 'Meet the Expert' campaign to further support customer operations with its service solutions, as well as raising awareness of the

benefits associated with LTSAs. This involves immersion sessions between experts and mine operators designed to cultivate collaboration and ignite innovation for the future of mining technology.

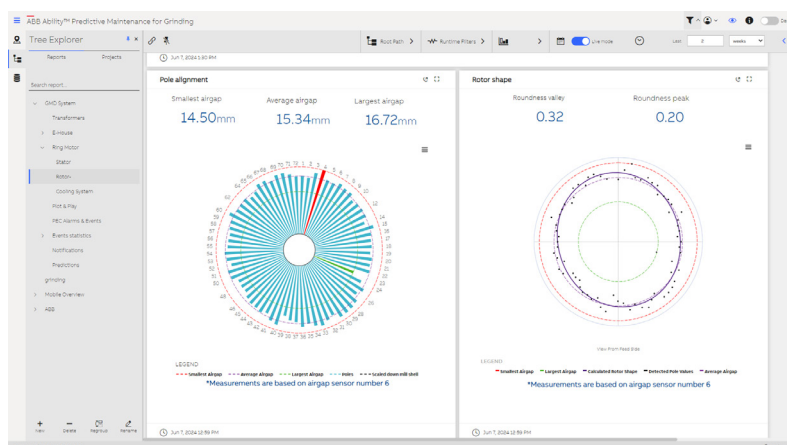


Figure 4. ABB Ability Predictive Maintenance for Grinding application.

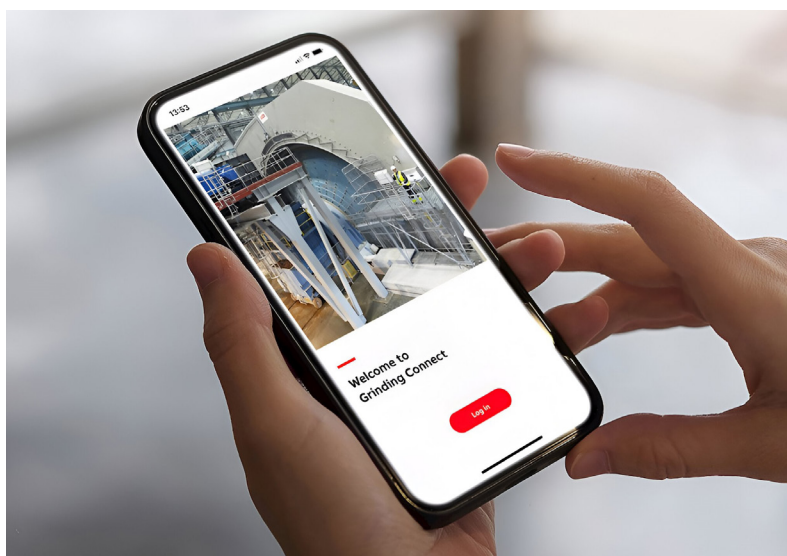


Figure 5. Grinding Connect mobile app.

The path to sustainable success

LTSAs play a pivotal role in future-proofing mining operations, particularly in the maintenance of GMDs. The key benefits of LTSAs include enhanced reliability and uptime, streamlined maintenance processes, continuous technical support, and adherence to environmental and safety standards.

Technological advancements in corrective, preventive, predictive, and prescriptive maintenance, driven by digitalisation and IoT integration, are set to further enhance the effectiveness of LTSAs. These advancements, coupled with a growing emphasis on sustainability and energy efficiency, position LTSAs as a strategic imperative for the mining industry.

In summary, the strategic importance of long-term service agreements in the mining industry cannot be overstated. By ensuring the longevity and efficiency of GMDs through a comprehensive service portfolio including maintenance strategies, LTSAs offer a path to overcoming industry challenges while promoting safety, environmental responsibility, and cost-efficiency. As the mining industry continues to evolve, the role of LTSAs in maintaining critical equipment and driving operational excellence will only become more vital. **GMR**