

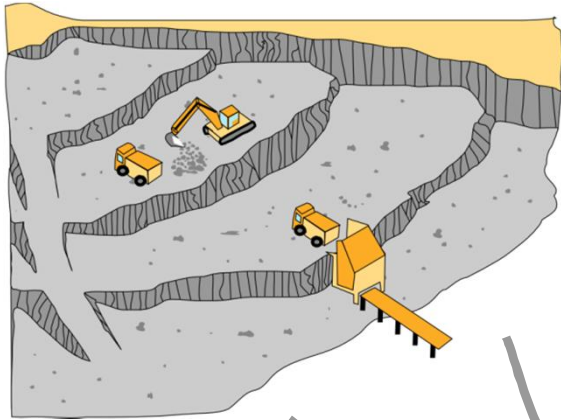
BU Mining, Main Technology Service Center

Periodic Maintenance Reports (PMRs) for Gearless Mill Drives (GMDs)

Periodic Maintenance Reports for Gearless Mill Drives From corrective to predictive maintenance

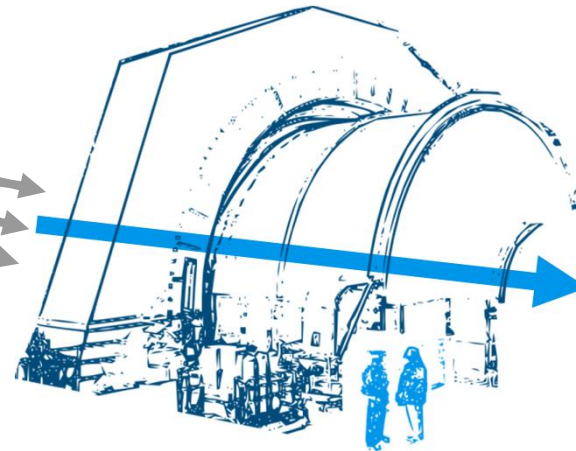
Gearless Mill Drive (GMD) – the bottleneck in mineral processing:

- High-efficiency and low-maintenance drive technology for large grinding mills
- Bottleneck in the mineral concentration process



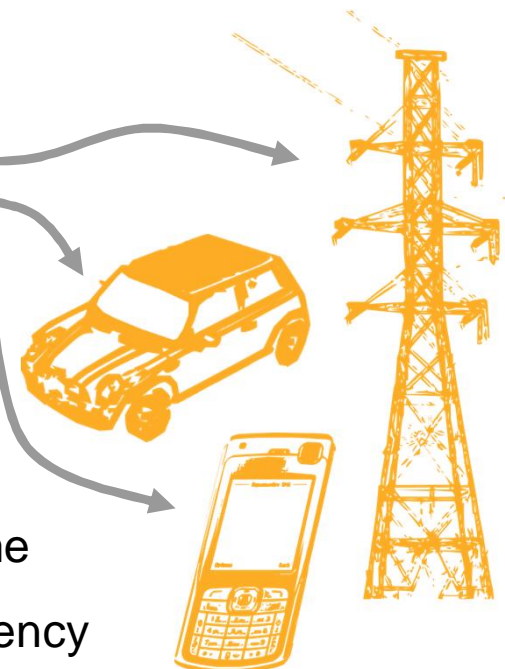
Remote diagnostic services:

- Troubleshooting
- Periodic maintenance reports
- Condition monitoring



Customer value:

- Reduction of unplanned downtime
- Optimization of operational efficiency



Periodic Maintenance Reports for Gearless Mill Drives

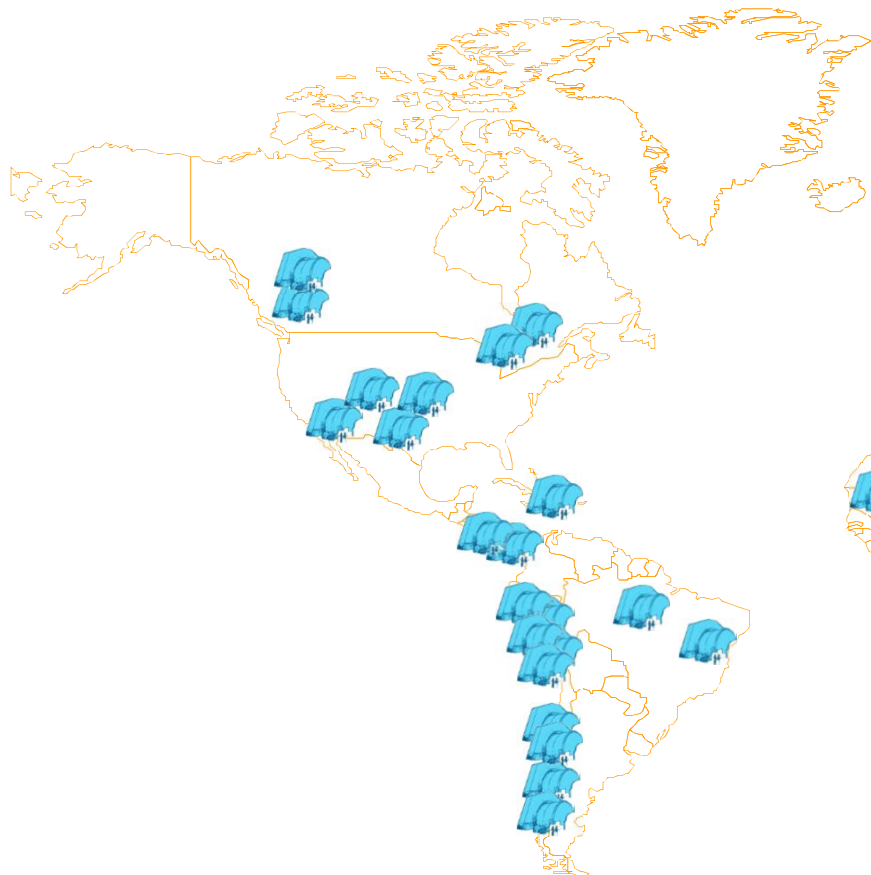
How ABB technology changes the landscape

ABB DriveMonitor (DM):

- Monitors and analyzes GMD in real time
- Determines current health status and sends notifications in case of system irregularities

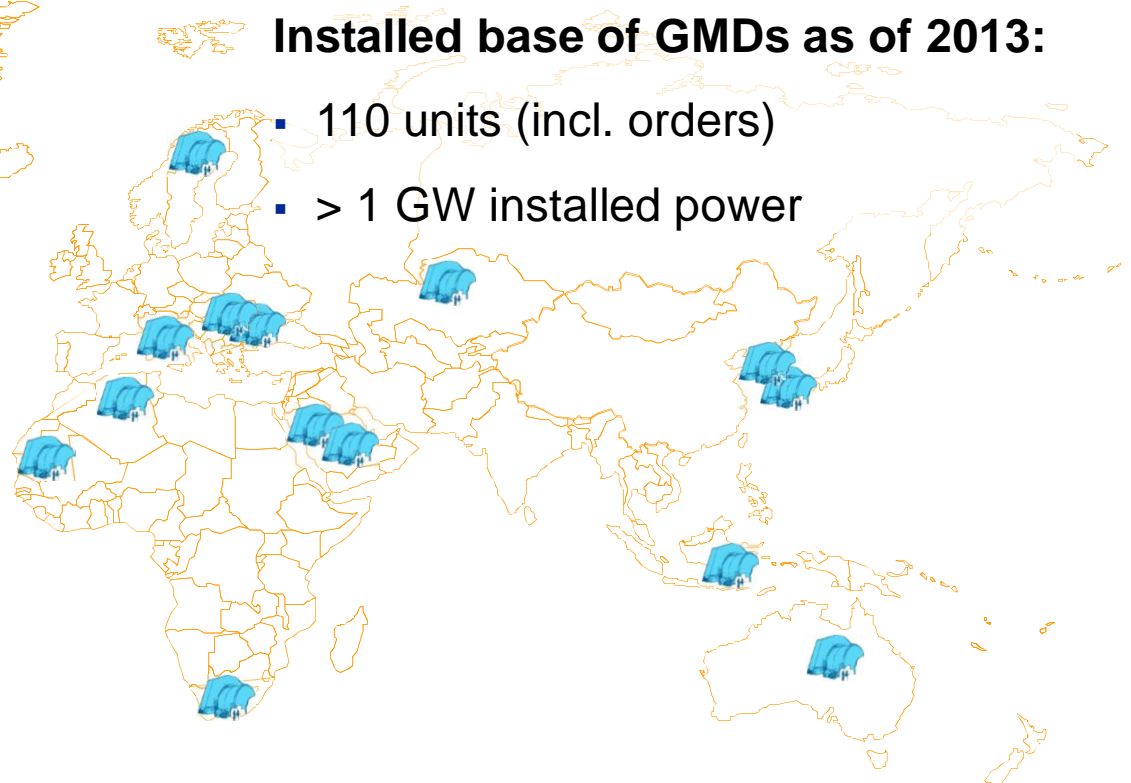
ABB Remote Access Platform (RAP):

- Establishes & manages remote connection between remote service center and sites
- Provides reliable and secure connectivity



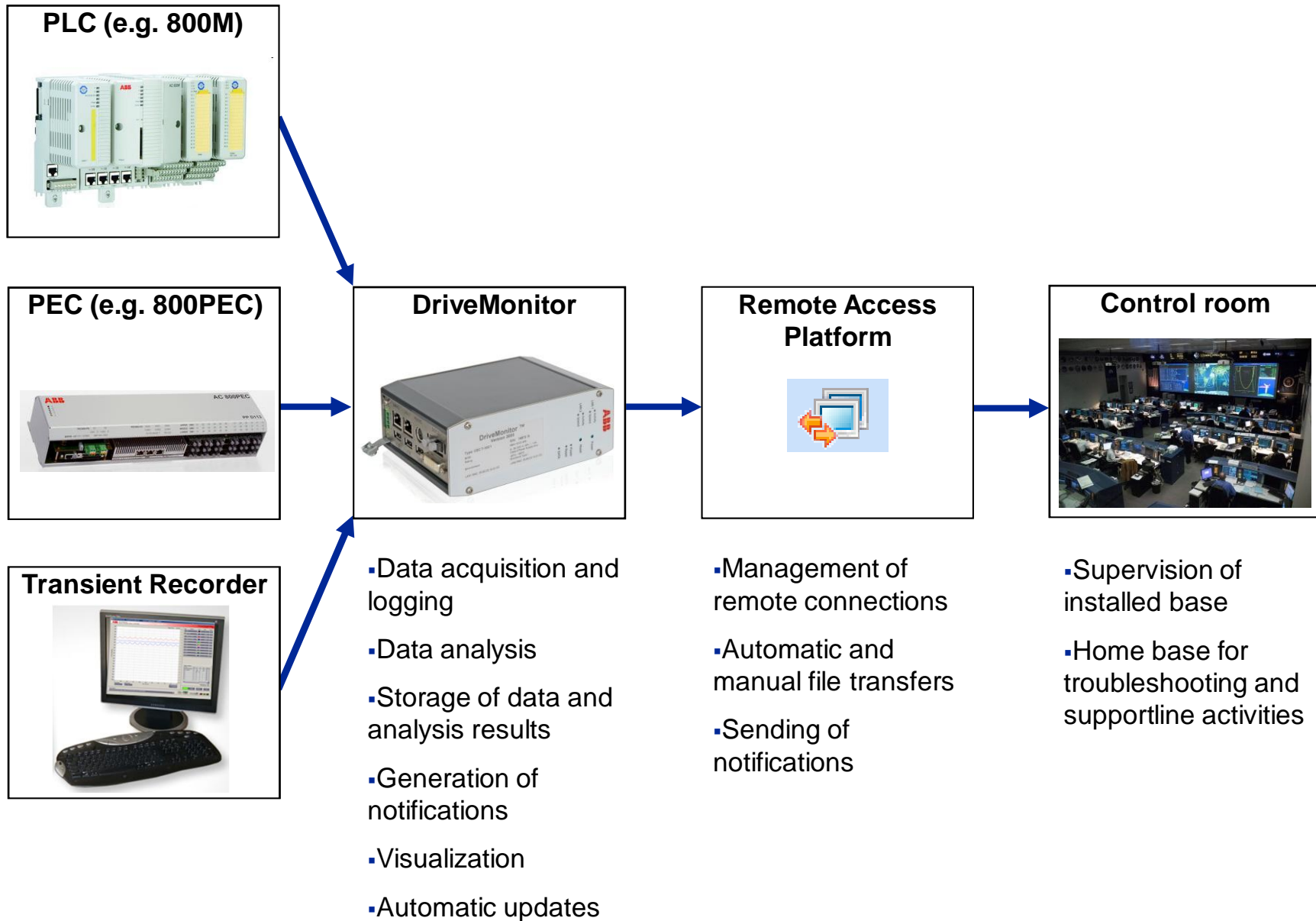
Installed base of GMDs as of 2013:

- 110 units (incl. orders)
- > 1 GW installed power



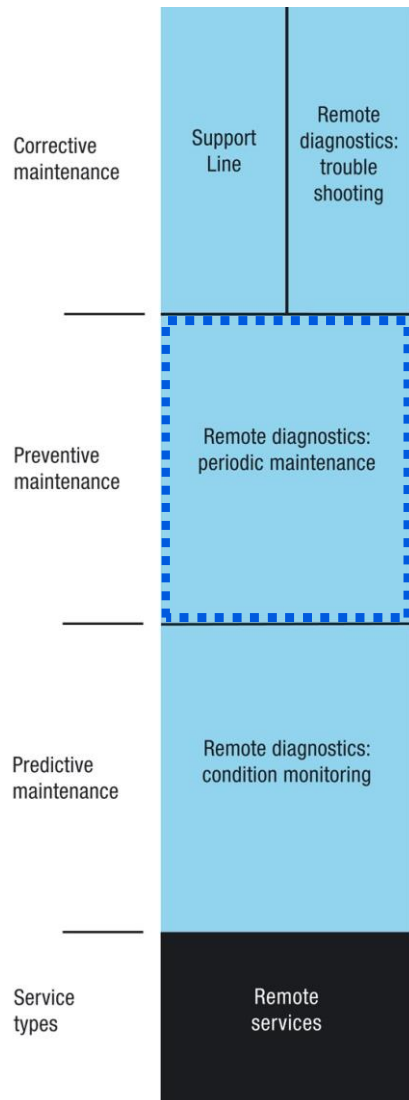
Periodic Maintenance Reports for Gearless Mill Drives

Overall architecture



Periodic Maintenance Reports for Gearless Mill Drives

The Report



Periodic maintenance reports:

- Health of the drive system and operational status delivered periodically

Features:

- Preventive and predictive maintenance
- Comprehensive reports delivered periodically
- Detailed analyses of the electrical, mechanical, and thermal aspects of the drive system




Benefits:

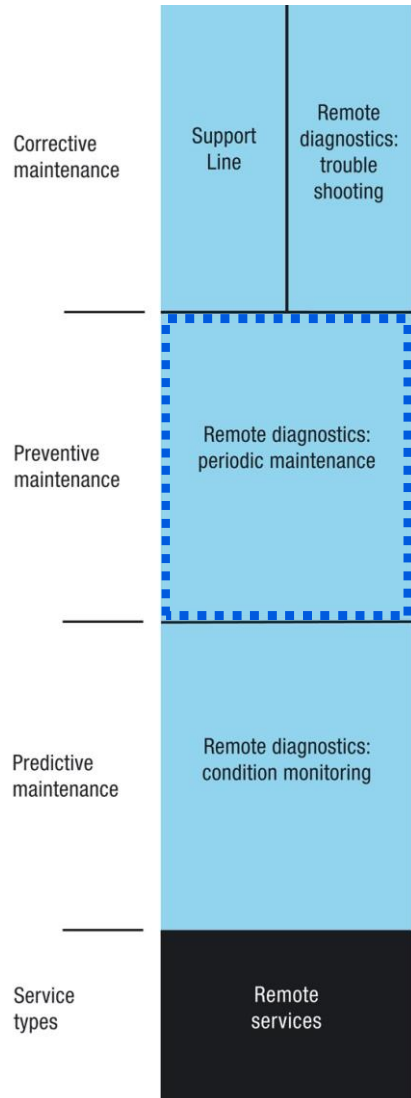
- Summary with most important findings
- List of recommended maintenance actions
- Follow-up telephone conference
- Reduction of unplanned stops, alignment of required maintenance actions with planned stops

Periodic Maintenance Reports for Gearless Mill Drives

The Report

Summary of a periodic maintenance report:

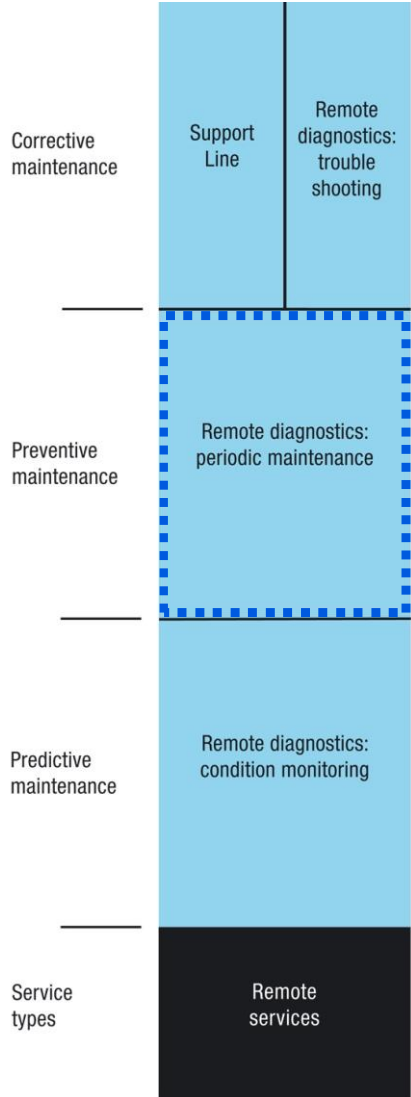
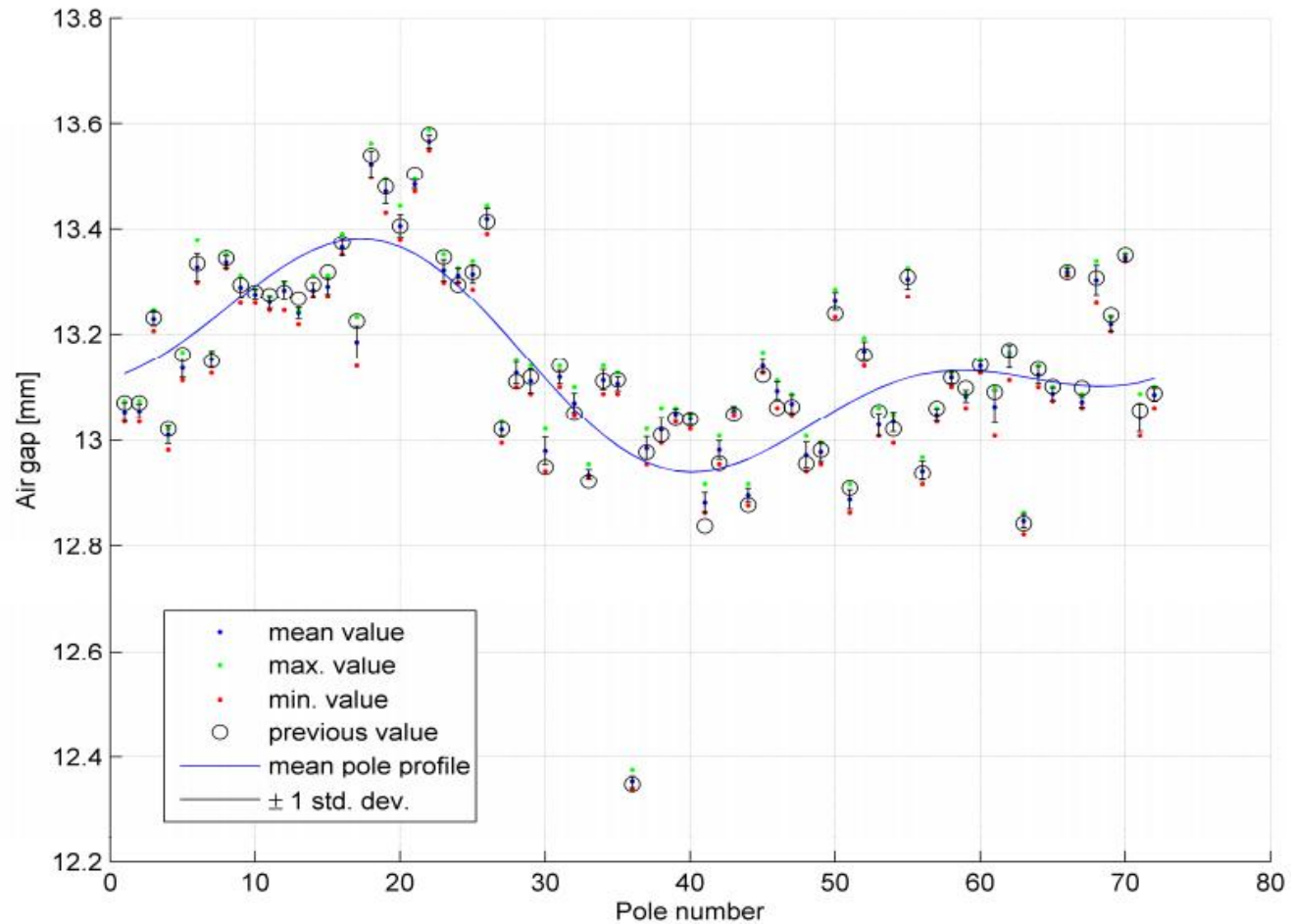
1	Summary of findings
Operation report	
	All values appear acceptable. If the shutdown (beginning of May) is not taken into account, the mill was utilized for more than 99.5% of the remaining time.
Data availability (Snapshot comparison and long term observation)	
	All values appear within expected ranges. The availability of data was almost perfect over the reporting period. There was no alarm or event data available.
Ring motor air gaps	
	It appears that air gap sensor 6 is not working as expected (air gap 6 is the only air gap in the 12'clock position): - It appears that a different scaling is used in the TR (refer to 5.1 "Trend - air gap measurements") - It appears that a significant offset may be set for air gap 6.



Periodic Maintenance Reports for Gearless Mill Drives

The Report

Pole profile and rotor shape analysis:



Periodic Maintenance Reports for Gearless Mill Drives DriveMonitor (DM)

ABB DriveMonitor is a diagnostic intelligent system:

- Industrial PC with H/W firewall and optical link
- Framework for data acquisition and processing

Features:

- Data acquisition from different signal sources
- Data storage and consolidation in dedicated database
- Intelligent signal processing and analysis algorithms
- Immediate notification about health status of drive system

Benefits:

- Mere data is transformed into valuable information that helps reduce downtime and increase performance



Periodic Maintenance Reports for Gearless Mill Drives Remote Access Platform (RAP)

ABB RAP is the standard solution for remote connectivity:

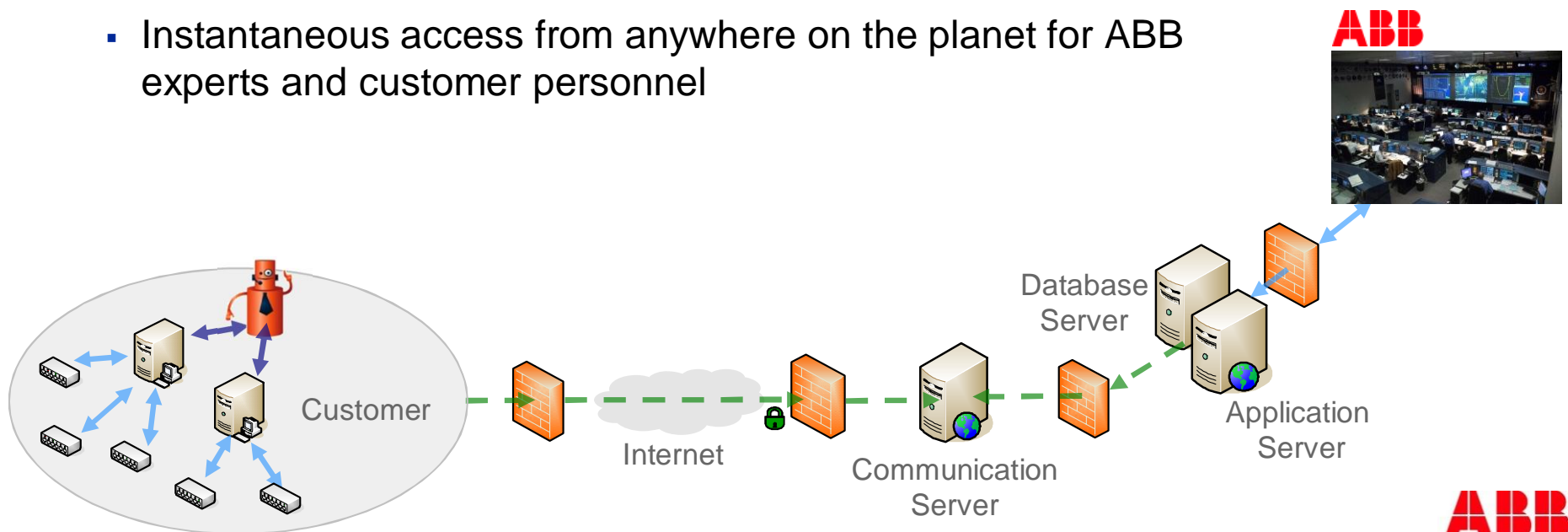
- Comprehensive remote access and audit functions
- Strong security concept and easy maintenance

Features:

- Desktop sharing
- Alarms and notifications
- Web browsing
- File transfer

Benefits:

- Instantaneous access from anywhere on the planet for ABB experts and customer personnel

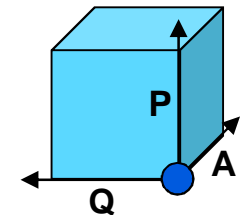


Periodic Maintenance Reports for Gearless Mill Drives

What is the benefit for the customer?

- **“Knowledge is power”** (Francis Bacon)
- Focus is shifted away from corrective to preventive and predictive maintenance
 - Reduction of unplanned downtime
 - Reduction of maintenance effort

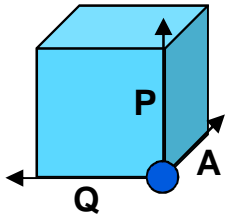
Overall equipment effectiveness (OEE)
= Availability × Performance × Quality



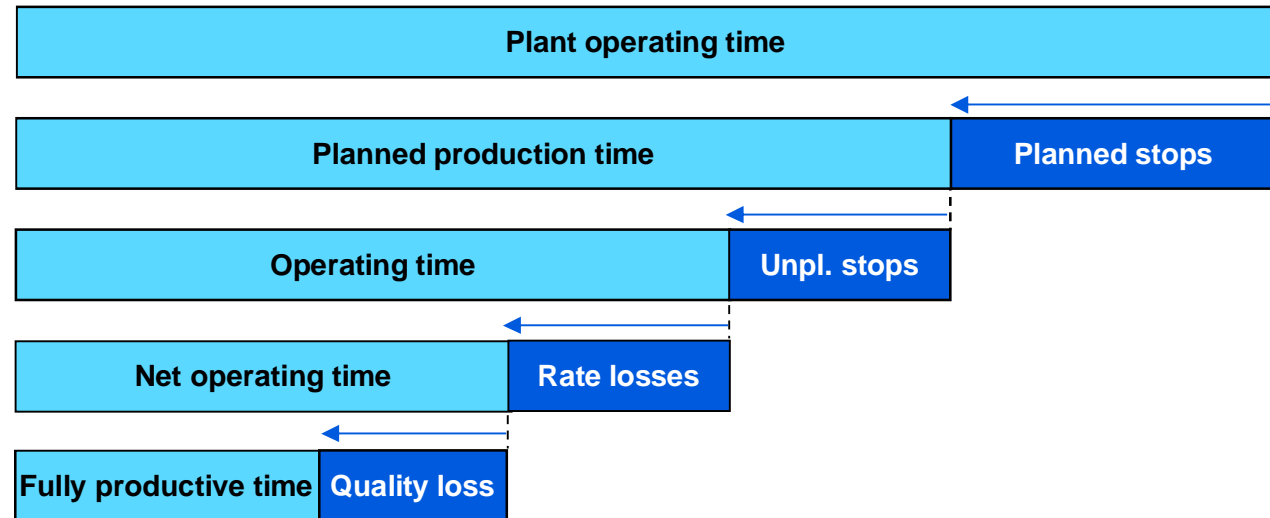
- Increase in OEE → increase in profit
- RDS maximizes OEE using two levers:
 - Reduction of unplanned downtime → availability
 - Reduction of rate losses → performance

Periodic Maintenance Reports for Gearless Mill Drives

Overall equipment effectiveness



- Overall equipment effectiveness (OEE)
= Availability × Performance × Quality
- Increase in OEE → increase in profit



- RDS maximizes OEE using two levers:
 - Reduction of unplanned downtime → availability
 - Reduction of rate losses → performance



Periodic Maintenance Reports for Gearless Mill Drives

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