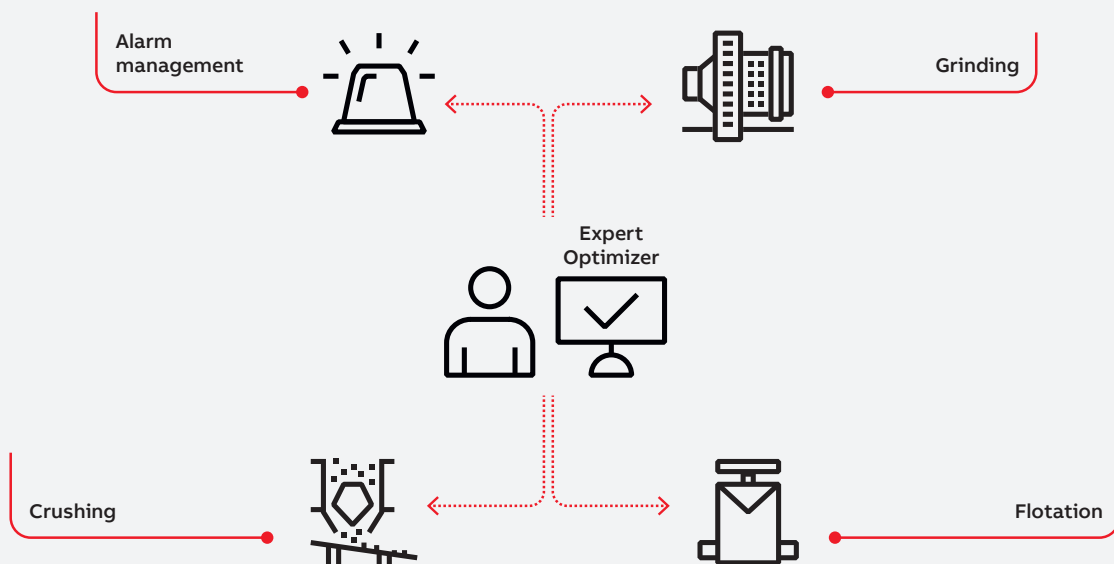


ABB Ability™ Expert Optimizer for mining

Increasing productivity, improving sustainability and maximizing profitability



- Up to 5% output improvement
- Fuel consumption reduced by up to 5%
- Electricity use reduced by up to 5%

An advanced process control application that controls, stabilizes and optimizes various mining processes, is helping plant managers achieve profitability and sustainability targets, often with payback in less than four months.

ABB Ability™ Expert Optimizer (EO) is an advanced process control application that uses model predictive control, fuzzy logic and data driven analytics such as neural networks. By coordinating the setpoints of the different process stages and immediately detecting deviations within the operations, EO delivers accurate and consistent system decisions. It avoids the inevitable variations incurred when performance is controlled manually, thereby minimizing shift-to-shift variations and human workload. This releases operators to focus on other tasks.

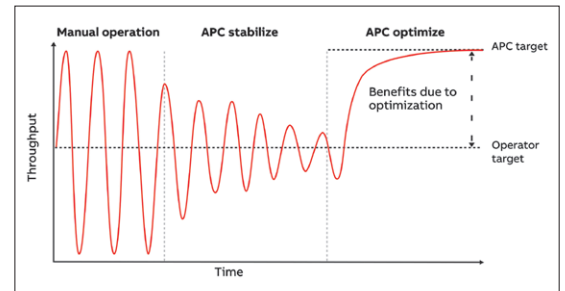


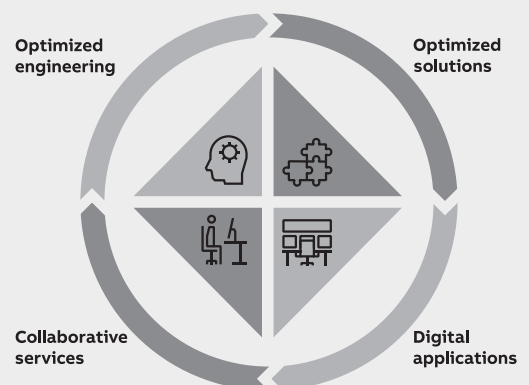
ABB Ability™ Expert Optimizer is an advanced process control application that stabilizes and optimizes mining processes.

ABB Ability™ MineOptimize

ABB Ability™ MineOptimize is a four-pillar framework that takes a deep dive into all aspects of the plant to identify ways in which to fine-tune and optimize every process, every sensor and device, every application and every service. The four-pillars include optimized solutions, optimized engineering, digital applications and collaborative services.

With digitalization at its heart, ABB Ability™ MineOptimize relies on advanced application libraries, software solutions and digital platforms to reduce process complexity while promoting safe and secure production. By ensuring that the right people have the right information at the right time, the plant maximizes reliability, productivity and energy efficiency while optimizing planning and visibility across operations and the entire enterprise.

Within the digital applications pillar sits ABB Ability™ Expert Optimizer for mining: an advanced process control technology that helps the mining industry reduce costs and increase yields.





Applications

EO combines advanced process control technologies with ABB's extensive mining expertise to stabilize processes and maximize profitability. This is achieved by optimizing all key applications including grinding circuits, flotation and pyro processing.

In mining, the software modules within EO can be applied to practically any process including:



Crushing

Optimizing the crushing process maximizes feed while stabilizing power, choke feed, bin and crusher levels. EO minimizes variability in mill feed allowing for a more efficient and productive comminution circuit.



Expert Optimizer for Grinding

Grinding circuits present multivariable control challenges, whereby several inputs directly impact on various outputs. Ore variability means operators constantly need to strike a balance between required throughput and stable grinding. Grinding circuits are energy intensive which is a critical factor in determining a plant's efficiency. EO's grinding optimization consistently maximizes throughput against process constraints such as grind size, cascade angles, liner wear, mill load, density and power draw.



Flotation

Varying feed grade and mineralogy hinders achieving a consistent concentrate grade. Operators need to constantly intervene to achieve a high recovery at the target grade. EO's flotation optimization minimizes reagent overdosing whilst maximizing valuable metals recovery.



Thickeners

Standard thickener control suffers from long delays and slow process dynamics, making it difficult to maintain desirable targets. Large swings in underflow density, bed mass and high torque are common. EO, with its moving horizon estimation, exploits the long delays and interactions to predict and drive the thickener toward the optimum achievable constraints.

EO's thickener optimization minimizes additives such as flocculent whilst stabilizing bed mass, underflow density and rake torque.



Pyro

Pyro optimization increases overall efficiency and production of valuable metals by stabilizing temperatures, matte and slag levels whilst minimizing fuel usage and environmental emissions.

Summary of features

Features	Stabilization						Optimization					Enhancements			
	Level control	Particle/Ore Size control	Surge control	Density control	Product grade	Toe angle control	Maximized throughput	Minimized specific energy	Minimized liner wear	Maximized metal recovery	Minimized reagent consumption	Integration with image analysis	Soft sensor analytics	KPI Monitoring	Autopilot for operators
Application															
Crushing	●	●	●				●					●	●	●	●
Grinding	●	●	●	●		●	●	●	●	●		●	●	●	●
Flotation	●		●		●				●	●		●	●	●	●
Thickeners	●			●						●			●	●	●
Pyro					●		●	●	●			●	●	●	●



Integration with ABB Ability™ System 800xA

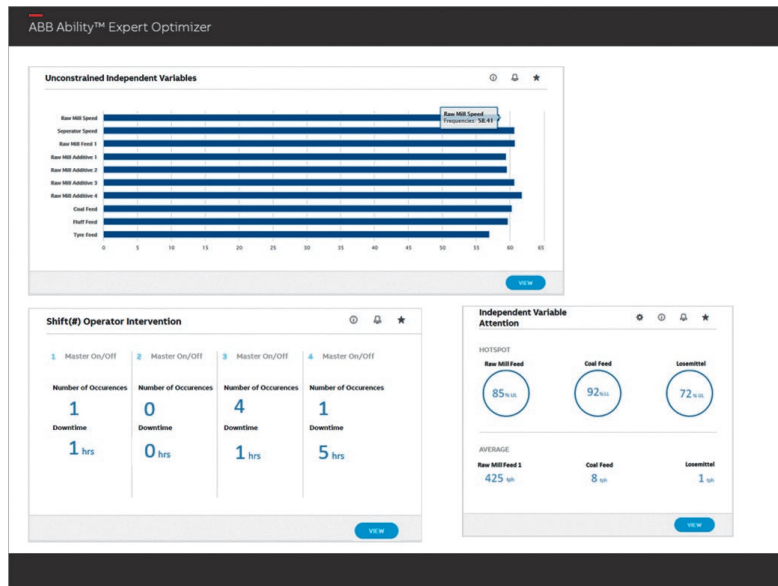
EO can be integrated into ABB Ability™ System 800xA distributed control system (DCS) or as standalone application, connecting to any other third-party PLC or DCS. Integrating directly into System 800xA provides the same usability and interface as the rest of the control system. Cyber security is strengthened while ensuring less hardware to maintain and introducing a common historian and information management system.

The major tools and technologies used are contained in ABB's advanced process control analytics model builder.

Model builder functionality

- Neural networks
- Analytics
- Model predictive control
- Open/close loop simulation
- Controller diagnostics
- Fuzzy logic
- Soft sensors
- First principle model construction

Controller KPI monitoring



Other ABB technologies, such as the secure remote access platform (RAP) and KPI monitoring, enhances the collaboration between the user and ABB, making it easier to maintain applications during process and optimization strategy alterations.

Customer-oriented delivery

Every plant's advanced process control system needs to be tailored to that facility's specific production needs. EO brings the flexibility to adapt to each plant. As such, an end-user only pays for what they really need.

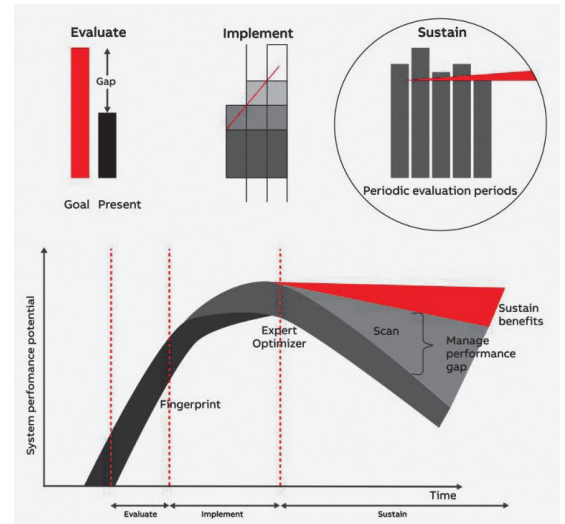
- **Software only:** EO software licenses can be purchased by those that prefer to build their own application

- **Turnkey solution:** Get EO with your selected applications from the ABB portfolio including engineering and commissioning and benefit from ABB's proven applications for the mining industry.

In either case, users can purchase a single license or sign up for software license subscription which automatically benefits from the latest functionalities and software improvements at a fixed annual fee.

A road map for successful installation

- **Mine performance fingerprint:** ABB collects various information on-site to ensure smooth engineering and implementation. Potential applications are identified based on current performance, base level health and plant economics. A baseline and road map for digital applications is then defined. This forms the business case for implementation where applications with the fastest return on investment are scheduled first.
- **Implementation:** ABB engineers model the process using plant knowledge, historical and step test data to construct the multivariable controller. The controller is then tuned to exploit the plants' constraints to maximize profit and minimize cost. Commissioning is performed on site together with operators and process engineers to ensure a successful change management.



Performance optimization for mining



Collaborative service offering

ABB has a proven track record in sustaining the benefits over the lifecycle of the plant. In today's complex mining environment, it is impossible for anyone to be an expert on all products and processes. Therefore, ABB offers several support packages to provide maximum long-term performance of your EO installation.

- **System support:** Assistance in case of hardware faults to minimize shutdown frequency.
- **Strategy support:** Maintenance of EO applications to meet optimal performance. Includes an onsite visit and remote support.
- **Subscription services (SaaS):** With subscription services, the initial capital expenditure is minimized, and benefits sustained via ongoing controller maintenance. This ensures a rapid return on investment for the end user with sustained benefits.

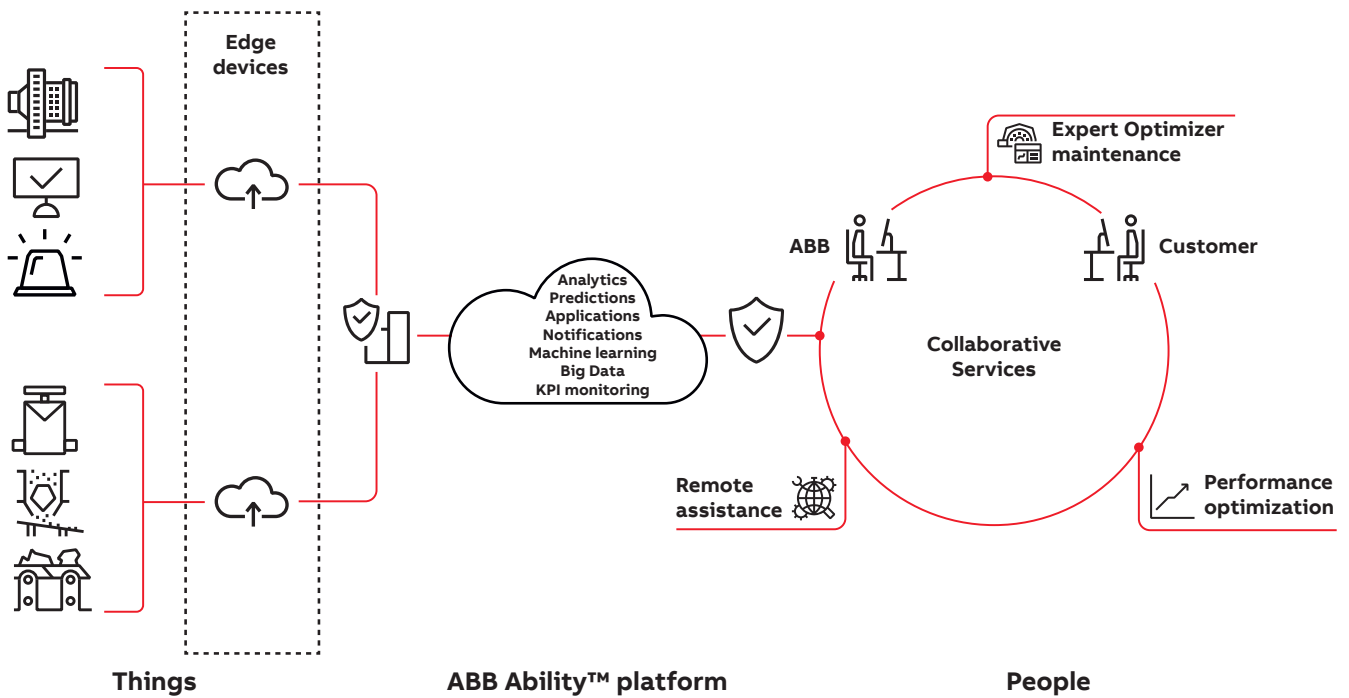




ABB Switzerland Ltd
Local business line Process Industries
Segelhofstrasse 1K
5405 Baden-Dättwil
Switzerland
Phone: +41 58 586 84 44
E-Mail: minerals@ch.abb.com

For contact details, please visit our website:
www.abb.com/mining