![ABB logo]

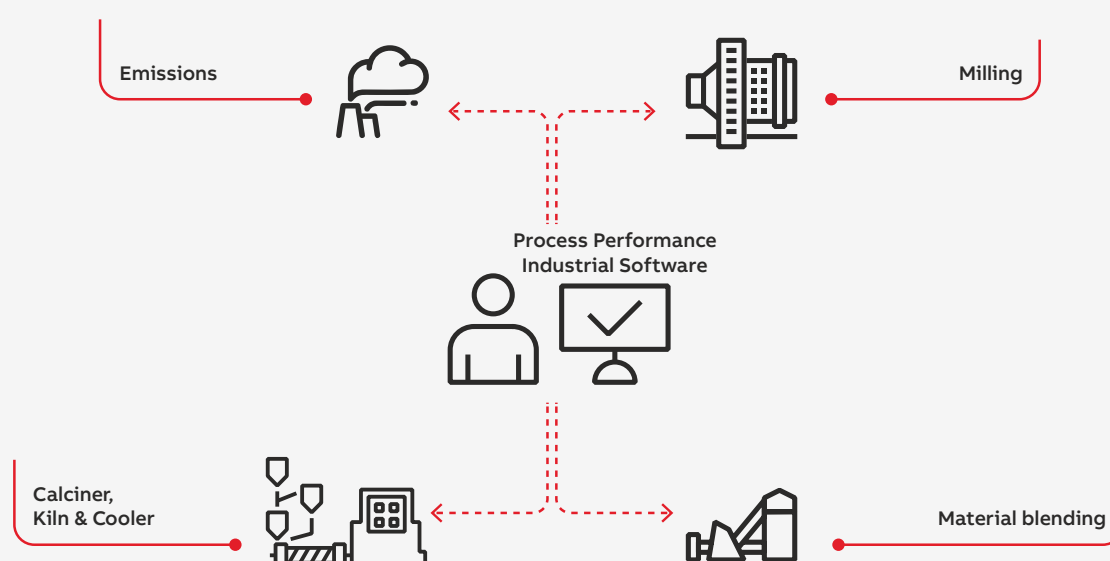# Process Performance for Cement
Increasing productivity, improving sustainability and maximizing profitability

- **Increased clinker yield by 1 - 2%**
- **Maximized Alternative Fuels**
- **Electricity and Fuel consumption reduced by up to 5%**

Process Performance Industrial Software that controls, stabilizes and optimizes various cement processes, is helping plant managers achieve profitability and sustainability targets, often with payback in less than six months.

ABB Industrial Software that incorporates advanced process control, AI/ML based inferential modeling, loop performance monitoring and integration with LIMS to optimize your cement plant.

Expert Optimizer facilitates advanced process control to coordinate the setpoints of the different process stages and immediately detects deviations within the operations, thereby making accurate and consistent system decisions, pushing the plant closer to an economic optimum. 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.

AI/ML based inferential modeling through ABB's IMP Platform allows for soft sensor creation for difficult to measure states such as blaine or NOx and sensor validation faulty analyzers.

ABB's Loop Performance Monitoring allows for improved maintenance of the base level control system, ensuring PIDs are correctly tuned for improved process stability.

Integration with LIMs for RMP and ABB's Knowledge Manager enables any required lab values to be ingested inside Expert Optimizer for closed loop control.
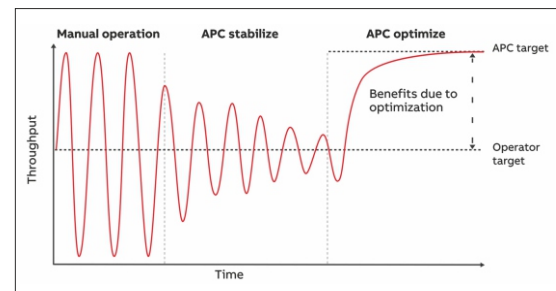

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ABB Ability™ Expert Optimizer is an advanced process control application that stabilizes and optimizes various cement processes.

Industrial Software - Process Performance
If you are looking to capture additional throughput, yield and consistent quality while reducing energy and consumables:

• Push your process closer to constraints with Advanced Process Control and related technologies

• Benchmark your current process performance and then evaluate potential benefit improvements through ABB Plant Fingerprints

• Identify process models from data, capturing the intricate relations between various parameters

• Foster continuous improvement based on monitoring and fine tuning with ABB's remote collaborative operation center.

Optimized engineering

Optimized solutions

Collaborative services

Digital applications
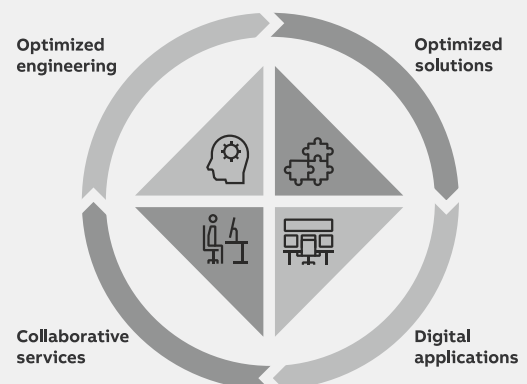
Applications

The software modules cover kiln optimization, alternative fuel management, mill optimization and material blending.

Kiln optimization
The kiln process is intrinsically unstable and influenced by long time delays and large perturbations. Expert Optimizer stabilizes the process before driving the key controlled variables to the process limits. EO controls the kiln around the clock, 365 days a year, as effectively as the company's best operator. Depending on the kiln type, EO provides:
• Kiln control module
• Calciner control module
• Cooler control module

	EO off	EO on
Throughput [t/h]	152.0	155.8 (+2.5%)
Specific energy consumption [kcal/kg]	870–880	850–860
EO utilization	–	> 95%

Expert Optimizer applied to a kiln unit in Turkey

Features
• Burning zone temperature optimization
• Combustion optimization
• Alternative fuel maximization

Benefits
• Reduced number of kiln stops
• Increased yield
• Reduced specific thermal energy consumption
• Reduced quality variability

	Unit	EO on
Reduction in temperature variation	Pre-Calciner	31%
Reduction in coal over alternative fuels	Pre-Calciner	58%
Reduction in litric variation	Kiln	41%
Reduction in UGP1 variation	Cooler	43%
Reduction in UGP2 variation	Cooler	30%

Expert Optimizer applied to a pre-calciner, kiln & cooler in Italy

Alternative fuel management

Burning alternative fuels can lead to instability in the clinker manufacturing process. EO controls, mixes and monitors rates of several alternative fuel types to achieve consistent burning, whilst ensuring the kiln does not become unstable due to changes in fuel calorific value.

Features
- Handling of numerous and complex alternative fuel lines
- Uncontrolled and controlled fuels
- Ratio or maximize functionality

Benefits
- Maximum utilization of alternative fuels
- Steady energy input

Material blending

Stable and correctly proportioned raw meal is essential for energy efficient clinker production. Correctly blended cement is critical to ensure customers receive a quality end-product. EO helps control raw material and cement blending.

Features
- Mix control with laboratory samples and/or online analyzers
- Additives control

Benefits
- Reduced fluctuations in blended material consumption
- Optimized material costs
- Improved kiln operation due to more homogeneous raw material

Mill optimization

Grinding is an energy intensive process and optimizing its efficiency has a significant impact on a plant's energy bill. EO optimizes coal, raw material and finished cement grinding by increasing throughput and securing consistent output quality while lowering energy consumption.

Features
- Mill load and throughput optimization
- Fineness control
- Temperature control
- Handling of mill start-up
- Automatic product type switching

Benefits
- Reduced number of mill stops
- Increased output
- Reduced specific power consumption
- Reduced quality variability

Emission Control

Tight control on emission release such as SO2 is a manually intensive task.It is critical to maintain emission levels below regulatory limits. Expert Optimizer and IMP ensures tight control over emission levels such as SO_2 whilst minimizing hydrate consumption, raw material and cement blending.

Features
- Optimize short-term emission targets, such as SO2
- Control multiple chemical feeder points

Benefits
- Run closer with more confidence toward emission limits
- Reduced chemical consumption such as hydrate
- Reduced operator workload

Integration with ABB Ability™ System 800xA

Expert Optimizer can be integrated directly 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 con-tained in ABB's Process Performance Portfolio

- Fuzzy Logic
- Model Predictive Control
- AI / ML driven Inferential Modelling Platform / Soft Sensors
- Performance Optimization for Control Loops
- RMP LIMS Integration Module

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Controller KPI monitoring
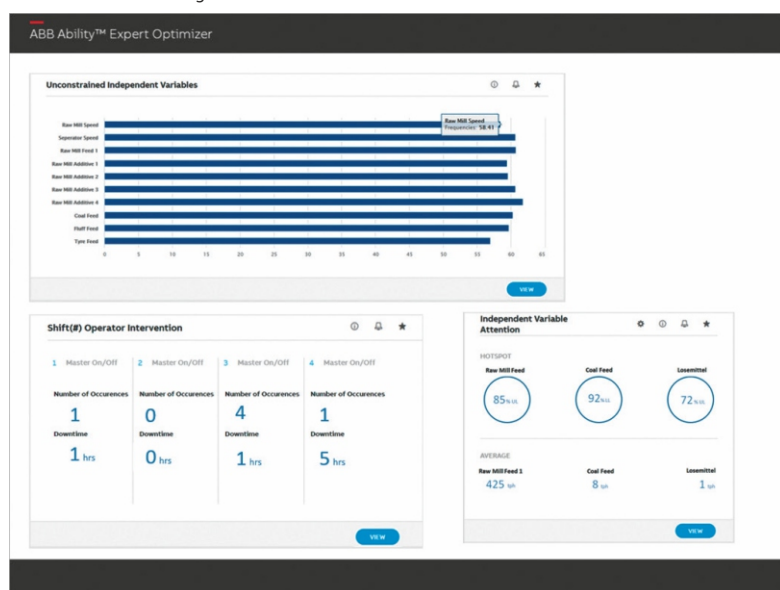
Other ABB technologies, such as the secure re mote access platform (RAP) and KPI monitoring enhances the collaboration between user and ABB, making it easier to maintain applications during process and optimization strategy alter-ations.

Customer-oriented delivery

Every plant's advanced process control system needs to be tailored to that facility's specific pro duction 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 pur chased 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 cement 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

- **Cement 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.
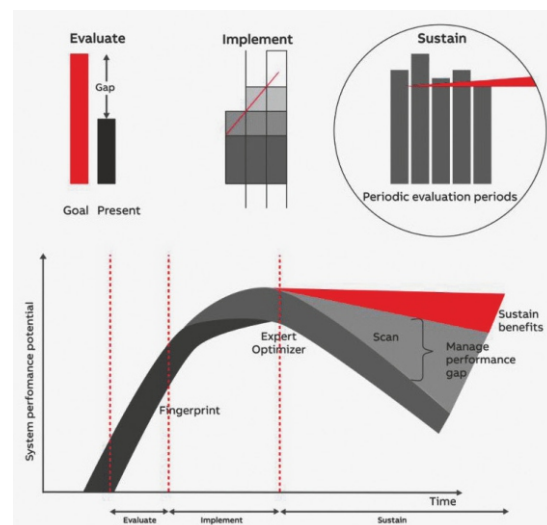
Performance optimization for cement

For contact details, please visit our website:
new.abb.com/cement