

International
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**Advanced process
control at the push
of a button**

Power and productivity
for a better world™



Advanced process control with cpmPlus Expert Optimizer

The cement industry today is facing many challenges: Producing high-quality cement, sustainably improving production while keeping costs low and environmental responsibility high. To perform these tasks successfully you need professional support. In ABB you find your preferred partner; with our innovative technology and solutions we help you achieve industry-leading productivity. cpmPlus Expert Optimizer is ABB's advanced process control application which has been applied successfully to more than 200 cement production lines worldwide.

State-of-the-art plant optimization

cpmPlus Expert Optimizer is a computer-based system for controlling, stabilizing and optimizing industrial processes. Due to its optimization technologies the software helps you take the best operational decisions accurately and consistently at all times.

The software operates cement plants more stably and efficiently by coordinating actions on the process such as rotational speed, fuels or chemical additives. It maximizes overall plant efficiency by looking at the interactions between variables and makes decisions according to the plant goals. It collects real-time data, processes it with mathematical algorithms, and coordinates the plant actuators for optimal performance.

Customer-oriented delivery

As you know best how you would like to apply advanced process control to your plant, we provide the flexibility to choose the most appropriate offering. Thus, you only pay for what you really need.

- Software only: If you prefer to build your own application, you can buy cpmPlus Expert Optimizer software licenses.
- Turnkey solution: Get cpmPlus Expert Optimizer 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 you can purchase a single license or sign up for software license subscription with which you automatically benefit from the latest functionalities and software improvements at a fixed annual fee.

Always up-to-date and never far away – our life cycle support

In today's complex environment it is impossible for anyone to be an expert on all products and processes. Therefore, ABB offers a number of support packages to provide maximum long-term performance of your installation. This includes ABB SupportLine with fast and efficient technical and engineering support (24 hours/day, 365 days/year) or maintenance of cpmPlus Expert Optimizer applications – including an on-site visit and remote support.

For more information, install QR code reader on your mobile device and scan the code.



Expert Optimizer for cement industry



Generic Expert Optimizer brochure



ABB's solutions for the cement industry



Increased productivity at a push of a button?

Naturally.

ABB's cpmPlus Expert Optimizer helps plant operators meet production, operational and quality objectives. To profitably run a cement plant, the users have to take complex decisions in real time to meet business targets and process constraints. Every decision made has an immediate effect on the whole production process. Thus it is essential to monitor the processes continuously and consider all data before making a decision. cpmPlus Expert Optimizer is ABB's advanced process control platform that assists you in achieving industry-leading productivity. For more information, visit us at www.abb.com/cement

Meeting Turkish challenges

by Thomas Marx, ABB, Switzerland

Turkey is Europe's single largest cement market and domestic demand expected to continue growing at around 4-5 per cent annually due to the country's housing and infrastructure needs. Over the next decade local output is expected to reach 100Mta, of which 80Mt will serve domestic requirements. Meanwhile, Turkey is also expected to maintain its position as Europe's largest cement exporter.

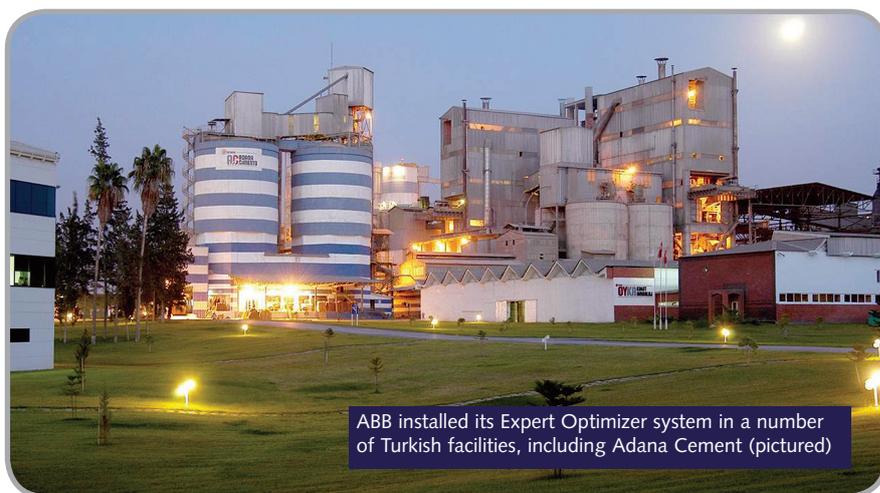
All Turkish cement companies manufacture their products in accordance with EU norms to comply with quality, environmental, and health and safety standards. To meet these requirements, producers have been undergoing a number of extensive modernisation programmes over the past 10 years.

Maintaining competitiveness

A significant number of Turkish cement manufacturers have adopted ABB's plant-wide automation strategies, taking advantage of the company's search for optimising operations while maximising output and quality, and minimising energy consumption and environmental impact. However, the modernisation of instrumentation, electrical installations and process-related hardware has its cost-saving limits.

Significant cement production costs include raw and auxiliary materials, energy and fuel. Electrical energy and fuel costs, in particular, affect the Turkish cement sector's competitiveness and frequent variations mean its producers can be at a cost disadvantage compared with manufacturers in other countries. Therefore, Turkey has highest number of installed Waste Heat Recovery (WHR) systems in the Western world, offering significant savings in terms of power consumption and CO₂ emissions.

Faced with an increasingly-competitive market, Turkish cement producers continue to streamline their operations to cut costs and improve plant efficiency. ABB has a long history of delivering plant optimisation packages to the local production base and its most recent project is for the new Medcem greenfield cement plant which employs the automation specialist's holistic solution to customised process strategies.



However, to maintain competitiveness, investments in additional energy saving programmes have been made.

Expert control

Despite their potential to reduce overall fuel costs, alternative fuels only account for 2.4 per cent of the Turkish fuel mix. This is mainly due to the lack of established infrastructure to collect, sort and distribute burnable fractions. However, another key factor lies in their operational issues as the introduction of highly-variable alternative fuels can impact calciner and kiln operations, resulting in large variations in clinker quality.

To maintain clinker quality and stabilise the production process, kiln operators have to be supported by an expert system and ABB's Expert Optimizer has achieved considerable results in terms of alternative fuels applications. Coal-free precalciner operation using 70 per cent alternative fuels has been achieved and several customers have been able to run in fully-automated mode with system availability of 95-99 per cent. As a result, a 'negative energy bill' has been achieved as some plants are paid to burn specific alternative

fuels. Even with no or lower alternative fuel usage, the Expert Optimizer provides automatic control of the precalciner and kiln/cooler process, cutting specific energy usage by 1-3 per cent.

The wider scope

ABB's Expert Optimizer can in fact assist operators across the entire cement process from the quarry to finished cement and encompasses more than 20 years of advanced process optimisation know-how, providing ready-to-use, customised process strategies. Given its ability to offer solutions for the complete cement production process, ABB believes the Expert Optimizer should be viewed as a holistic solution rather than being area-specific.

Starting with mixed-bed blending, by incorporating alternative carbon-neutral materials via raw-mix blending (using minimal correction materials and increased alternative materials), combined with comprehensive raw mill optimisation, costs can be reduced by 5-10 per cent and energy savings of approximately eight per cent can also be achieved.

In addition to the aforementioned

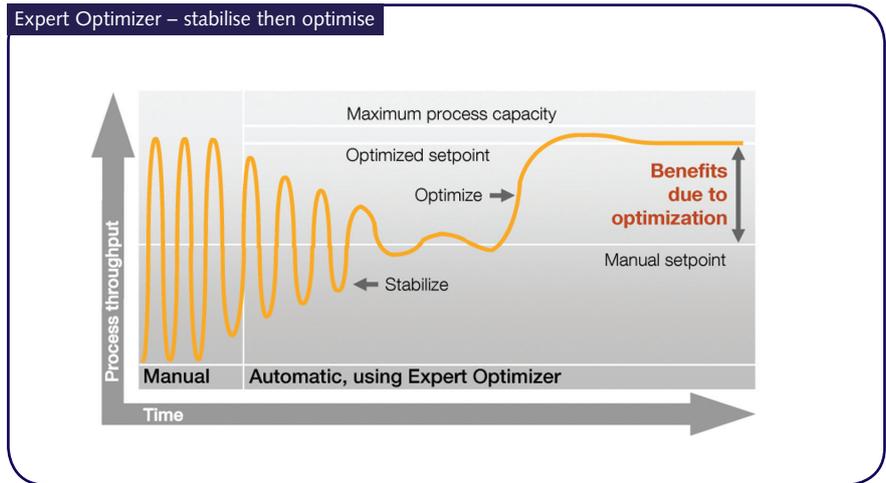
savings in the precalciner, kiln/cooler area, the optimisation of cement mill operations can provide additional specific energy consumption savings of up to five per cent. In plants where vertical roller mills are used, operators can often find it difficult to control the fast-changing parameters. In such cases, the Expert Optimizer provides a sophisticated automatic solution.

Plant-wide process audits

To determine the real savings potential for individual plants, ABB offers plant-wide process audits. During the audit all plant process parameters are collected and specific issues are discussed with the operators. Data is then entered into a mathematical plant model and the plant operation is simulated and optimised. The audit then produces a full report showing thermal and electrical energy savings potential by using the Expert Optimizer and offers advice on additional process modifications to reduce existing bottlenecks.

Performance enhancements stated in the audit report are understood as performance guarantees and allow plant management to immediately calculate return on investment (ROI).

ROI time depends on the baseline situation. However, having analysed more than 200 kiln and 400 mill installations across the world, on average ABB has seen ROI times of 6-12 months for the kiln and 8-14 months for the mills – based solely on electrical and thermal energy savings. Additional benefits such as increased quality, reduced maintenance and less



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downtime will scale back these timeframes even further.

Keeping on top of dynamic operations

Cement plants are dynamic operations where processes change and improvements are implemented on a continuous basis. To oversee the plant's performance, a management execution system (MES) is necessary to automatically monitor all relevant key performance

indicators (KPI) of the plant and provide standardised reports to its management.

MESs are not currently implemented in the Turkish cement industry and each plant has its own reporting system. This can create problems for cement groups operating a number of facilities as reporting data for individual plants is time consuming and, in most cases, the reported values are not directly comparable.

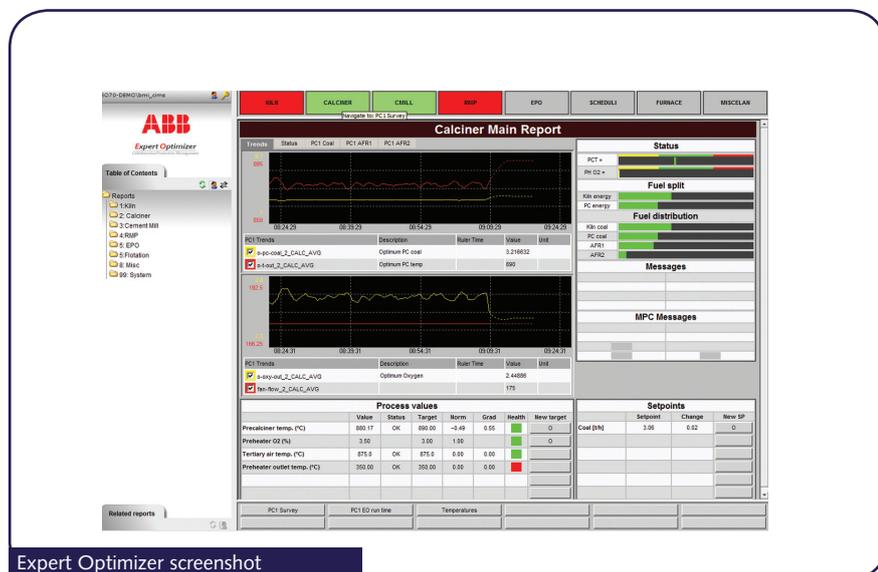
In addition, as an automatic data exchange to an installed ERP system is not possible, values have to be validated and entered manually, resulting in significant time lags when reporting financial performance data.

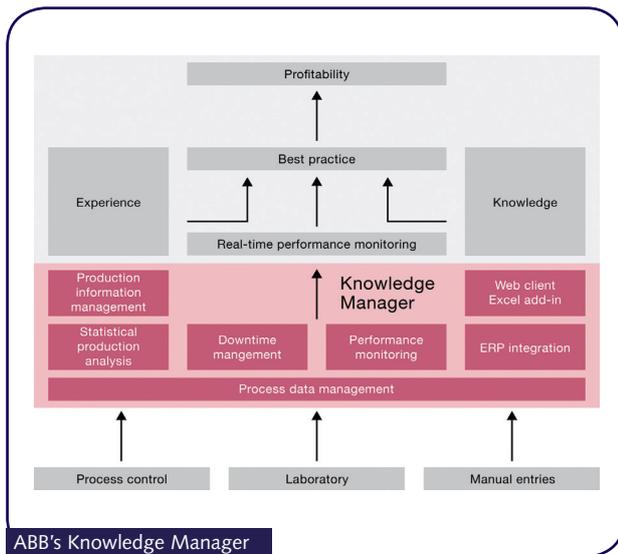
ABB's Knowledge Manager offers a comprehensive manufacturing execution system for cement plants. Real-time reports on each section of production, a plant overview, production reports on a daily, weekly, monthly and an annual basis, as well as detailed KPI analysis allow management to make prompt decisions on critical process and production issues. In real-time, updated production accounting reduces reporting cycles and the automatic ERP connectivity of validated data allows for the immediate financial analysis of each plant and group performance.

ABB has noticed a growing awareness by Turkish cement producers regarding this issue and, as such, offers consultancy services for the implementation of tailor-made MES solutions with ERP connectivity.

Case study: Medcem Cement

A good example of a holistic solution provided by ABB is for newly-established cement manufacturing company Medcem Cement. Owned by Eren Holding, Medcem's new plant will be located in





Mersin, on the Mediterranean coast. With an estimated clinker capacity of 10,000tpd, the plant is expected to operate the country's largest production line by March 2014.

In July 2012, ABB won the contract to provide an electrification, automation, process optimisation and drives solutions package for Medcem's greenfield cement plant project in Turkey. Its well-established relationship with the Eren Group, ability to provide complete solutions as a single supplier and knowledge of local electrical regulations, were major factors behind ABB being awarded this project.

Its scope of supply for the greenfield project includes:

- state-of-the-art 800xA control system
- Expert Optimizer process optimisation software
- Knowledge Manager MES system
- medium- and low-voltage electrical motors
- ACS800 series low-voltage drives
- ACS1000 and ACS6000 series medium-voltage drives
- ZS1 series medium-voltage cubicles
- MNS series low-voltage cubicles
- site erection, installation, commissioning and services.

The equipment will increase efficiency through high-quality production with low energy consumption. By the end of 2014 the first results of the increased overall performance at the Medcem works will be available, underlining the benefits of a holistic approach towards energy optimisation and IT management tools.

ABB is therefore confident that the Medcem project will be a shining example of how applying state-of-the-art, integrated hardware and software solutions can enable other Turkish cement manufacturers to remain competitive on the global market.

References

- ¹ KOLANCI, B (2013) 'Cement Market in Turkey: A Growing Market Demands Technology' in: *WC*, May.
- ³ EDWARDS, P (2013) 'Turkish Cement Focus' in: *GCM*, March.
- ³ SELEKOGLU, M (2012) 'Optimization For Process Control of Kiln Line in Adana Cimento', *Cemtech Europe*, Geneva, 23-26 September 2012.