Reprint from World Cement, March 2012

Cementing Relationships

ABB improves production process at Podilsky Cement plant

"We were delighted to renew the partnership with ABB for the installation of integrated electrical, control and automation systems for our new production line. From the first steps of the detailed project design through to the intensive commissioning phase, ABB provided professional and dedicated support. It was a pleasure to work with ABB and we look forward to future collaborations."
Nigel Reape, Podilsky Cement's Production Director

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Alex Kaufmann, ABB Switzerland Ltd, discusses the new cement production line no.7 project at Podilsky Cement.

Podilsky cement plant overview.

Introduction

JSC Podilsky Cement, part of the Irish building materials group CRH, is located in Kamyanets-Podilsky, approximately 420 km southwest of Ukraine's capital Kiev. The site was originally commissioned in the 1970s. ABB's success story with CRH's Podilsky Cement started seven years ago, in 2005, when ABB signed a contract for the supply of an automation package for a new vertical coal mill to be installed at the plant. During the execution phase of this project an engineer from Podilsky Cement and an engineer from ABB in Ukraine joined the ABB project team in Switzerland's main technology centre for electrical, control and instrumentation systems to jointly elaborate the design and the control application. The commissioning of this project was successfully completed in spring 2007. In 2008, a similar setup was applied for the new coal feeder of kiln line no. 5. Podilsky and ABB established a strong relationship during the execution stages of these two projects.

Line no. 7 project

In June 2009, ABB signed a contract for the supply of systems, solutions and products for the new Podilsky Cement production line no. 7 project. Among the various ABB systems, products and services included in the overall project scope of supply were medium-voltage (MV) switchgears, intelligent low-voltage (LV) motor control centres (MNSiS MCC), LV variable-speed drives (VSD), a

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New central control room (CCR).

Kiln line no. 7 at Podilsky Cement.

plant-wide process control system, MES, instrumentation, gas analysers, engineering services, technical site services, as well as on- and off-shore training. Also part of ABB's overall solution is the design, procurement, support and coordination of third-party equipment, including uninterruptable power supplies (UPS) and additional instrumentation.

The production line no. 7 project was successfully commissioned in August 2011. With its production capacity of 7500 tpd, Podilsky Cement now operates the biggest cement production line in Ukraine. The project also constitutes the largest single investment in the Ukrainian cement industry since independence was achieved in 1991. This was one of the reasons why the new line was officially inaugurated by the president of Ukraine in October 2011. The new line is important for CRH, with significant improvements in operational efficiency, product quality and environmental performance. The old cement plant used the wet process for clinker production and ball mills for cement grinding. The modern equipment produces cement more efficiently, with kilns such as the Polysius-supplied dry process clinker production line and the FLSmidth-supplied vertical mill for cement grinding.

Modern instrumentation, such as cross-belt analysers, provide better control of the processes involved in making cement and thereby improve product quality. The new cement production line is fitted with high-efficiency filtration equipment at all emission points, helping to significantly reduce particulate and CO_2 emissions. The project is the world's first Track 2 'joint implementation' project registered with the UNFCCC (United Framework Convention on Climate Change).

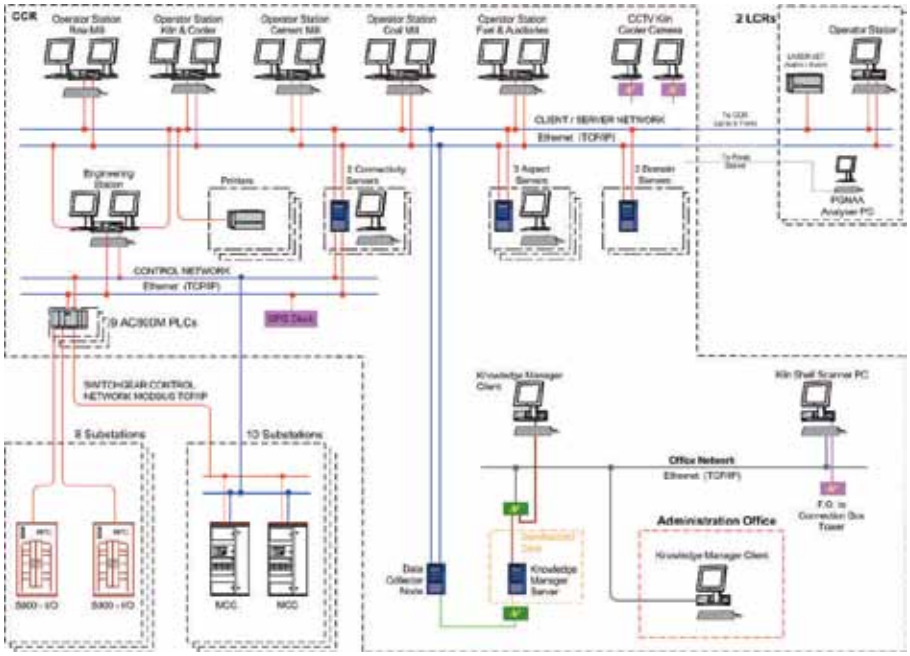
Before Podilsky Cement decided to modernise its installations and build the new cement production line, the plant consisted of six cement production lines using a wet production process and achieving a total production of 3 million tpa of cement. After the start-up of the new line, the existing wet production process lines will be mothballed, since the new dry production process line alone achieves almost the same capacity as the old lines together. "The initial performance of the new plant shows fuel consumption to be less than 50% of the wet process. Power consumption to make clinker shows a reduction of over 15%, and the optimisation of the new line will improve performance further," says CRH Europe Material's Technical Director Eamon Geraghty.

At the beginning of the execution phase of the project, two engineers from Podilsky Cement joined the ABB core project team, consisting of engineering experts from ABB Ukraine and ABB Switzerland. They started the detailed engineering and the software application programming in Switzerland before moving back to Ukraine to complete this part of the engineering. The factory acceptance test (FAT) of the control system application was executed in ABB Ukraine's facilities in Kharkov. The involvement of Podilsky engineers during the engineering and subsequent commissioning ensures that they have detailed knowledge about the ABB systems and solutions installed at the site, resulting in professional operation, maintenance and troubleshooting of the plant.

Integrated solutions for process control

ABB supplied the 800xA control system, which extends the reach of traditional automation systems beyond control of the process to achieve the productivity gains necessary to succeed in today's business markets. This function is accessible from a single user interface that is configured to present information and provide interaction in a context appropriate to all user disciplines, e.g. every electrical loop diagram is directly linked to its corresponding object in the control system, independent of whether it is a simple instrument or a complex MV motor. With this integrated information, plant operators can make qualified decisions quickly and based on relevant and reliable data.

"Due to the clear structure of the ABB control system and the well-arranged process graphics and faceplates,



Configuration of the control system.

The preheater tower.

our operators easily and efficiently learnt to operate our new plant. They can reach all the necessary information to take their decisions with only a few mouse clicks. The easy navigation with dynamic hyperlinks between objects is one of the many features that help operators to find the root cause of abnormal situations. For us, the new ABB control system is a perfect combination of most modern design and ultimate functionality," says Podilsky's Control System Manager Aleksey Lavrenyuk.

Extended automation objects created within the engineering environment provide a foundation for the efficient development, deployment, reuse and continuous improvement of production and safety applications, with great predictability.

ABB's System 800xA Minerals Library is especially developed for the cement industry and suitable for greenfield projects and control system upgrades. It is a suite of object-oriented software control modules that make it possible to design process control and power applications in an efficient and fully-parameterised fashion. Successfully operating at more than 300 cement and mineral processing sites worldwide, the technology increases the standardisation, functionality and quality of process control software over the complete life cycle of the production facility.

ABB also installed its Knowledge Manager system at Podilsky Cement, which offers industry-specific process data management solutions for cement production and minerals processing. Goal-oriented decisions can be made by accessing the information needed at the right time, place and format. The system provides analytical insights to identify deviations in the process and best practices to keep the production on target.

Providing solutions suited to the cement industry, the Knowledge Manager system supports Podilsky Cement with monitoring manufacturing performance indicators, process operations and energy reporting, as well as downtime management.

Integration of subsystems

As can be seen in Table 1, many subsystems were delivered by a variety of suppliers. The seamless integration of these systems into the control system is proof of the flexibility of the 800xA control system. "ABB delivered a full turnkey package and was technically competent with all delivery dates achieved. Their understanding of the cement process was evident in their development of the consumer circuits and MCC designs. Commissioning of the application software was smooth with no major omissions or errors," states CRH's Technical Electrical Advisor Pat Fullen.

During the commissioning of the new line, ABB also integrated the existing coal mill application into the new plant control system. Due to the detailed preparation of this task, the modification could be completed during an ordinary scheduled shutdown of the coal mill, avoiding any additional downtime.

Table 1. Control system details	
Process controllers	9
Integration of Profibus interfaces	138 (55 from ABB scope of supply)
Integration of Modbus interfaces	141 (33 from ABB scope of supply)
Field inputs/outputs (digital)	3616
Field inputs/outputs (analog)	1072
Intelligent MCC starter	358
PID control loops	32
Third party PLC* interfaces	7
Third party OPC** interfaces	4
Aspect servers	3
Connectivity servers	2
Domain servers	2
Knowledge Manager (KM)	1
Data collector node (DCN)	1
Engineering station	1
Operators station	5 in CCR***, 1 in LCR**** for clay, 1 in limestone LCR approximately 3.5 km from plant
800xA version	SV5.0 SP2, Rev.C, Minerals Lib 5.1/2
Major OEM interfaces	Polysius, FLSmidth, Beumer, Schenck Process, Hasler, FLSmidth Pfister, Bedeschi, Auma, Saacke
Intelligent MCCs with ABB latest MNSiS technology providing reliable motor protection and control, communicating with the 800xA system throughout the complete plant, including the nine substations through ModBus@TCPIP protocol	
*PLC - Programmable logic controller **OPC - Object linking and embedding (OLE) for process control ***CCR - Central control room ****LCR - Local control room	

LV distribution system, emergency power system, UPS system

All LV distribution panels are of modular MNS type and have front-side operated withdrawable feeders, whereas the incomer circuit breakers are motor controlled. The intelligent motor control centre (MNSiS) is fully integrated into ABB's 800xA control system. Through a complex but efficient fibre optic network, all intelligent motor starter detail information is accessible from any of the nine electrical rooms and from any of the plant's three control rooms. The availability of essential information in the whole plant enables the central control room (CCR) operators and the electrical maintenance staff to make the most efficient decisions in the shortest possible time.

For the safety of the equipment and for the emergency operation during power network shutdowns, the various emergency consumers are fed by a diesel generator unit. These consumers are connected to different motor control centre groups, which contain an incomer circuit breaker for the distribution transformer, as well as an incomer circuit breaker for the emergency power. Both incomers are feeding the same LV busbar and are therefore interlocked in order to use only either one of the two power supplies.

UPS systems with an output of 220 V are installed in the CCR building and in the various substations to maintain power for servers, the central control system, remote I/O panels, instrumentation and the essential lighting.

Acceleration programmes

Due to overall project requirements during the execution phase of the line no. 7 project, Podilsky Cement asked ABB to plan and implement two acceleration programmes in order to significantly shorten the delivery time of the equipment included in ABB's scope of supply.

"On two separate occasions ABB was able to meet our requests for acceleration of their engineering and delivery programmes," says Podilsky Cement's Production Director Nigel Reape.

After a detailed investigation, ABB presented the revised schedule, resulting in a reduced engineering and manufacturing time of approximately three months. This reduction of the delivery time could be reached due to the company's ability to access its global expert resources in engineering ad hoc, as well as by increasing the resources working on the manufacturing side of the project. Despite the challenging schedule, the project team reached all the new milestones and delivered all the equipment and engineering documents on time while keeping ABB's high quality standards. Reape continued: "This flexibility in meeting tight deadlines coupled with the ability to provide truly professional installation and commissioning engineers were critical in achieving our project deadlines. It was a pleasure to work with ABB on this project and we look forward to future collaborations."

Excellent cooperation during the complete project

Building on the existing relationship from previous successful common projects, the cooperation between Podilsky Cement, CRH and ABB resulted in an efficient and smooth project execution.

Reape concludes: "After the successful collaboration between Podilsky Cement and ABB on our coal mill installation project in 2006, Podilsky Cement was delighted to renew our partnership with ABB for the installation of our new cement production line. From the first steps of the detailed project design through to the intensive commissioning phase, the ABB project team provided professional and dedicated support to Podilsky Cement. Through open and honest communications our two teams developed a close working relationship, which was a key element in the successful completion of the project."

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ABB's Minerals business unit, with headquarters in USA (Houston, Texas), is represented in the following countries: Argentina, Australia, Brazil, Canada, Chile, China, Egypt, Estonia, Germany, Greece, India, Indonesia, Kazakhstan, Latvia, Lithuania, Malaysia, Mexico, North America, Norway, Oman, Peru, Poland, Saudi Arabia, Serbia, South Africa, Spain, Sweden, Switzerland, Thailand and Vietnam.

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