

EFFICIENCY

Cementing a competitive edge

Gansu Qilianshan Cement Group Co., Ltd, Zhangxian, China

Digital transformation in the cement industry
with EcoStruxure™

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Introduction

Gansu Qilianshan Cement Group Co., Ltd. is a subsidiary of China Building Materials Group, the world's largest manufacturer of building materials. Qilianshan's cement production is based in northwest China where it is the leading producer in the Gansu, Qinghai, and Tibet regions. The company has 16 cement manufacturing and marketing facilities and nine commercial bases, with a total annual output of 30 million tons of cement. Qilianshan cement has been used in major national projects, including the Chairman Mao Memorial Hall, Beijing Asian Games Village, Jiuquan satellite launch base, and the Qinghai-Tibet Railway among others.

Turning the corner with the right partner

After years of rapid growth, China's cement production reached its highest levels in history. However, a resulting oversupply began putting tremendous cost pressure on the industry. Low levels of automation and intelligence kept manufacturing costs high while increasingly strict environmental regulations meant companies had to cut their energy usage and reduce emissions.

The challenge faced by Qilianshan – and the rest of its industry – was how to produce better quality cement products more efficiently, using less energy and at a lower cost. For years, the company had already been innovating using information technology – or “informatization” –



*The Schneider Electric industrial software business and AVEVA have merged to trade as AVEVA Group Plc, a UK listed company. The Schneider Electric and Life is On trademarks are owned by Schneider Electric and are being licensed to AVEVA by Schneider Electric.

Goal

Reduce energy consumption, save costs, optimize production, and generally improve their core competitiveness through digital means.

Story

To realize their smart manufacturing ambitions, Qilianshan enlisted Schneider Electric to implement a comprehensive EcoStruxure upgrade of their technology that would optimize their energy usage, beginning with pilot projects at two plants – Zhangxian & Hongda Building Material.

Solution

- Energy Management System (EMS)
- AVEVA's* Advanced Process Control (APC)
- Altivar Process drives
- LV products

Results

- Almost €600,000 in electricity costs saved in 2019 at Hongda Building Material
- Standard coal consumption reduced to less than 100kg/ton at Hongda plant
- 99% online rate of APC system
- Improved production stability and efficiency
- Reduced labor requirements

earning it a number of titles and awards along the way. They soon realized, though, that real progress in the cement industry would only be possible if it fully embraced digitization.

To that end, Qilianshan sought a reliable partner to help them plan and execute a comprehensive digital transformation across the entire group. They elected to partner with Schneider Electric to leverage our extensive industry experience and technical expertise.

“We chose to cooperate with Schneider Electric, which is very experienced in the industry and has mature digital and intelligent technologies,” said Zhang Qihao, Deputy General Manager of Zhangxian Qilianshan Cement Co., Ltd., a daughter

company of the Gansu Qilianshan Cement Group. “Relying on EcoStruxure, their advanced IoT-enabled architecture and platform, Schneider Electric has provided us with an advanced process control system and other smart solutions that integrate with our cement production to deliver seamless management,” he continued.

The EcoStruxure solution delivered by Schneider Electric for Qilianshan’s pilot digital factories included integrated software, hardware, and consulting services. We implemented AVEVA’s Advanced Process Control (APC) solution at the Zhangxian plant and our Energy Management System (EMS) at the Hongda Building Material plant.

€600K

in costs saved



Stable operation at the “heart” of the plant with APC

Clinker calcination is an important part of the cement production process, so the cement rotary kiln has always been considered the “heart” of any cement factory. Ensuring the stable and safe operation of the kiln is not easy, though.

At Qilianshan’s plant in Zhangxian County, kiln operators often needed to observe the dynamic changes in hundreds of process parameters simultaneously, not only to make quick assessments, but also to give the right commands to adjust the system. Since the parameters were all linked to each other, one small change could affect the entire process. The challenge was to effectively and accurately coordinate all the various process and equipment parameters, such as air, coal, material, kiln speed, etc., and be able to predict the impact any adjustment may have on the rest of the system. This method relied too heavily on the accumulated knowledge and experience of individual operations which, in turn, meant that Qilianshan could not continuously operate the cement kiln at optimal levels (low consumption and high output).

Now, the APC system, which is based on Model Predictive Control (MPC), can solve these problems. It can facilitate optimal operation of the kiln, preheater, grate cooler and mill system, and ensure their safety and reliability, while freeing up operators and stabilizing product quality. “By implementing AVEVA’s Advanced Process Control solution, Schneider Electric has helped us to optimize the operational parameters of our cement kiln,” says Cheng Junsheng, Chief Engineer at Zhangxian Qilianshan Cement Co. “We can now analyze the data to establish a predictive model for unmanned operations.”

Over the past three years, the online rate of the APC system has reached over 99%, with no out-of-control states caused by improper operation. The standard coal consumption of Qilianshan’s clinker has decreased by more than one kilo; the clinker’s power consumption has dropped by 0.7c/t; the qualified rate of free calcium oxide of clinker out of the kiln now exceeds 85%; the standard deviation has decreased by more than 10%; and the strength of the clinker has steadily increased.



Making the invisible visible with EMS

Cement production is the largest energy consumer in the building materials industry and accounts for about 2% of overall energy consumption globally. Its carbon dioxide emissions make up 5% of global carbon emissions, and more than 60% of the total production cost of cement is related to energy usage. Consequently, addressing the amount of energy used in the production process was a clear priority for Qilianshan, as well as a major concern for the cement industry, as a whole.

The key lies in identifying the areas where improvements are possible. For Hongda Building Materials, one of the biggest obstacles to efficiently managing its energy use was the lack of transparency. Schneider Electric's Energy Management System made the invisible visible. Helping them to visualize their energy management served as the basis for improvements.

An EMS not only helps plant managers monitor the real-time consumption of water, electricity, coal, steam, and other energy

sources, but also enables them to master the use of raw materials and equipment operation related to energy consumption at any given time. This, in turn, can help them identify and tap into any energy savings opportunities in the production process.

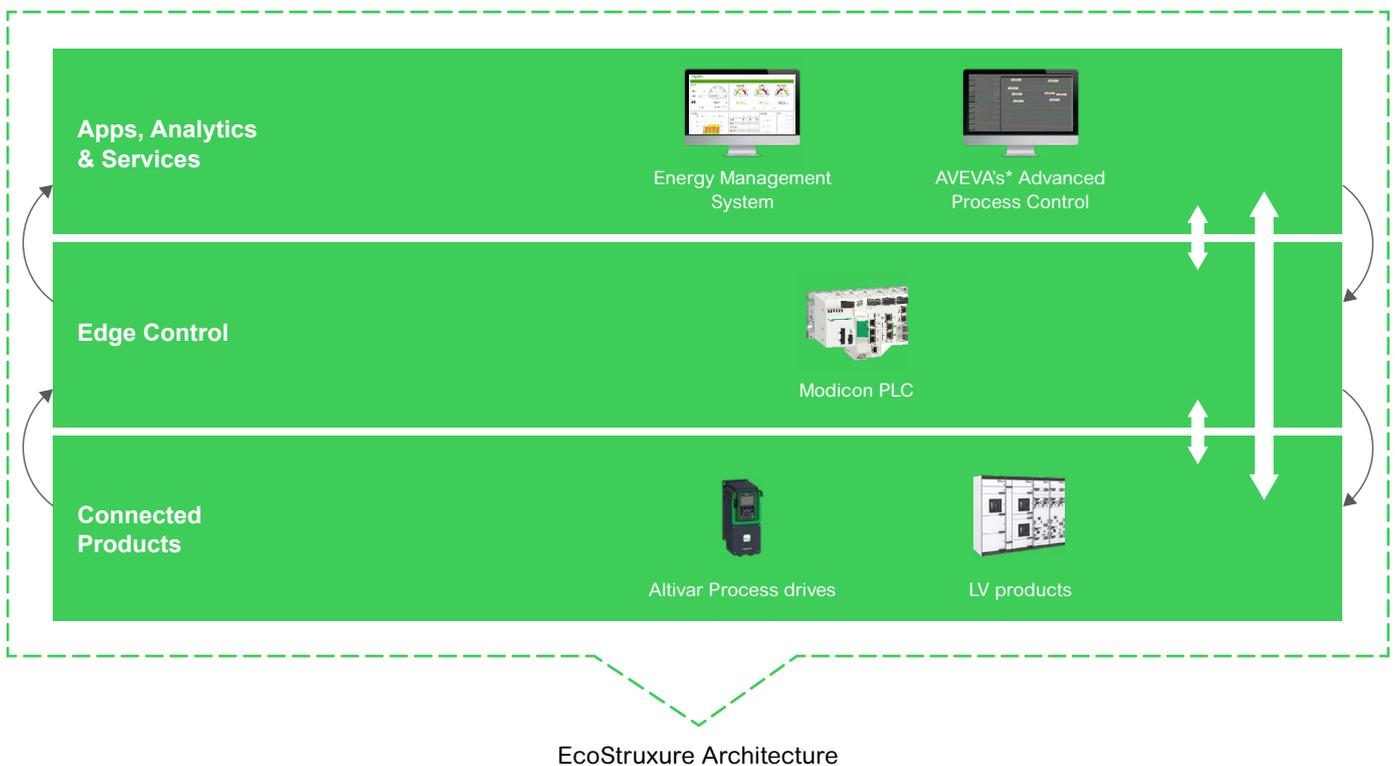
The EMS from Schneider Electric provides an enterprise with real-time visibility of their energy data and lays the foundation for comprehensively improving their energy efficiency levels. Since implementing the solution at Hongda, the best single month standard coal consumption of the clinker in their plant dropped to less than 100 kg/ton, and their electricity costs in 2019 were cut by 4.536 million yuan (€600,000).

According to Chang Zhanxin, Deputy General Manager of Hongda Building Materials, "The benefits of Schneider Electric's Energy Management System at Hongda have been so significant that the Qilianshan Cement Group has decided to deploy this solution across the entire group."

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— Chang Zhanxin,
Deputy General Manager
of Hongda Building
Materials

EcoStruxure™ for Cement Innovation At Every Level



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Innovation At Every Level

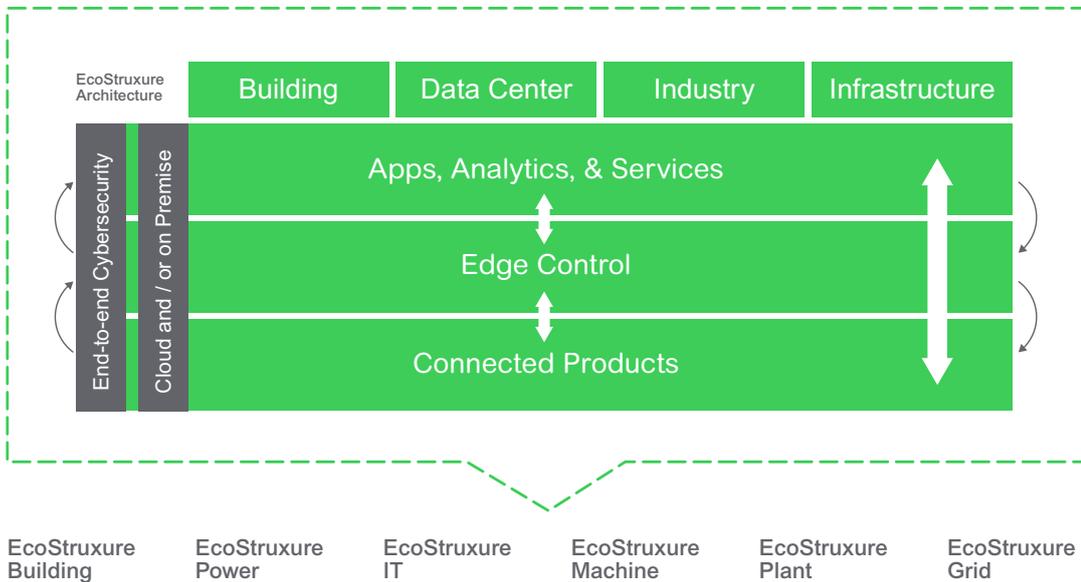
IoT-enabled solutions that drive operational and energy efficiency

EcoStruxure is Schneider Electric’s open, interoperable, IoT-enabled system architecture and platform.

EcoStruxure delivers enhanced value around safety, reliability, efficiency, sustainability, and connectivity for our customers.

EcoStruxure leverages advancements in IoT, mobility, sensing, cloud, analytics, and cybersecurity to deliver Innovation at Every Level including Connected Products, Edge Control, and Apps, Analytics & Services. EcoStruxure™ has been deployed in 480,000+ sites, with the support of 20,000+ system integrators and developers, connecting over 1.6 million assets under management through 40+ digital services.

One EcoStruxure architecture, serving 4 End Markets with 6 Domains of Expertise



Connected Products

The Internet of Things starts with the best things. Our IoT-enabled best-in-class connected products include breakers, drives, UPSs, relays, sensors, and more. Devices with embedded intelligence drive better decision-making throughout operations.

Edge Control

Mission-critical scenarios can be unpredictable, so control of devices at the edge of the IoT network is a must. This essential capability provides real-time solutions that enable local control at the edge, protecting safety and uptime.

Apps, Analytics & Services

Interoperability is imperative to supporting the diverse hardware and systems in building, data center, industry, and grid environments. EcoStruxure enables a breadth of agnostic Applications, Analytics, & Services for seamless enterprise integration.

Find out more about EcoStruxure

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Schneider Electric

35 rue Joseph Monier
92500 Rueil-Malmaison, France
Phone: + 33 (0)1 41 29 70 00

www.se.com

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