

Advantages of accurate measurement control

China's carbon action pledges are seeing domestic cement companies actively exploring moves towards green and intelligent cement production technologies. Accurate measurement control is one of the key links in the chain and can lay a solid foundation for carbon reduction and energy saving goals.

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China's cement industry is developing rapidly and is the largest cement producer in the world, accounting for 55.95 per cent of global cement production. In 2021 domestic cement output amounted to ~2.36bnt, a YoY decrease of 1.7 per cent.

In October 2021 the country's five ministries and commissions jointly issued several opinions on strict energy efficiency constraints and the promotion of energy conservation and carbon reduction in key areas under the Development and reform industry (2021) No 1464. The action plan for strict energy efficiency constraints in the key industries of metallurgy and building materials to promote energy conservation and carbon reduction (2021-25) requires that by 2025 – through the implementation of energy conservation and carbon reduction actions – more than 30 per cent of key industries (including cement) and data centres will reach the benchmark level, the overall energy efficiency level of the industry will be significantly improved and carbon emissions intensity will be significantly reduced. Therefore, the capacity for green and low-carbon development has been significantly enhanced.

In this regard, technological developments within the cement industry can be divided into high energy consumption and high emissions projects. The cement sector is considered a key industry in terms of saving energy and carbon reduction to achieve China's peak carbon targets. At the same time, the domestic cement industry is also an important industry for supply side structural reform. It is estimated that in 2022, against the backdrop of 'double-carbon' efforts (ie, achieving peak carbon by 2030 and carbon neutrality by 2060) and the country's policy of capacity reduction

and replacement, China's cement industry will continue to be limited.

Moreover, with the double-digit decline in the growth rate of China's housing and infrastructure construction, the domestic cement demand may fall further. Therefore, in some regions cement plants with clinker capacities of <2500tpd will be gradually shut down and replaced, while grinding stations will also gradually be closed or integrated. In short, staggered peak production, environmental protection, restricting production, replacing or reducing capacity, and mergers and industry restructuring will continue to be the main themes in the Chinese cement sector.

In light of double-carbon efforts and capacity replacements, Chinese cement companies are also accelerating scientific and technological innovations, and are actively exploring the transformation to green and intelligent development. Improving accurate measurement control is one of the important links as accurate measurement can be considered precondition for intelligent cement production and energy reduction efforts. This is particularly the case in terms of process control and product quality improvement – accurate measurement data can lay the solid foundation for intelligent technical and energy saving transformations.

CO₂ emissions from the cement industry

mainly come from the production of clinker as a result of coal combustion and CO₂ decomposed by calcium carbonate. Both carbon reduction areas are closely related to accurate measurement.

The importance of accurate measurement

As a key building material, there is no substitute for cement. The manufacture of cement is inseparable from cement mineral resources, which means that the amount of CO₂ produced by calcium carbonate decomposition is fixed to some extent, and it is difficult to reduce this share of carbon emissions through technology. Therefore, in the short-term, cement companies rely more on in-depth knowledge of



Henan Fengbo Automation discusses the positive impact of accurate measurement on cement plant operations

the sintering process to reduce carbon emissions. The most direct way to reduce carbon and save coal is to start with metering. During the cement production process the inaccurate measurement of pulverised coal can lead to issues such as an unstable kiln temperature, which will greatly increase coal and power consumption and affect product quality.

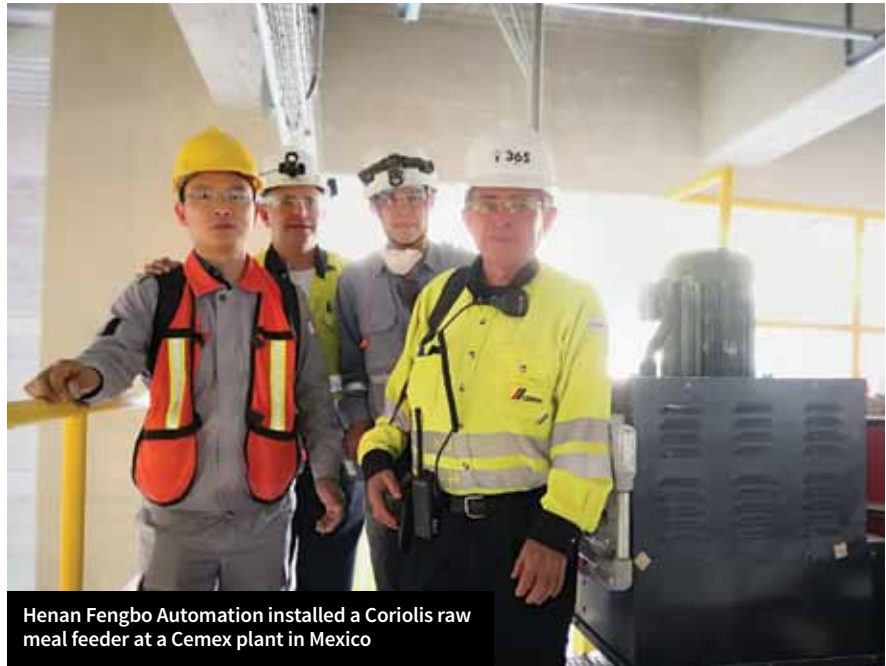
Cement industry case studies

Henan Fengbo Automation Co has been committed to the R&D, production, marketing and service of precision metering equipment for many years. The company focusses on metering products across the entire cement production line and has supplied Chinese producers such as Nanfang Cement, Zoomlion Cement, Tianshan Cement, Conch Cement, Huaxin Cement, Hongshi Cement, Gezhouba Cement and Yaobai Cement with long-term products and technical services.

Carbon reduction goals for many Chinese cement companies begin with the upgrade of the pulverised coal feeder at the kiln head and kiln end. This proved to be the case for a cement plant owned by China Tower Corp that has a 5000tpd dry-process clinker line which was completed in September 2003. The rotor feeder equipment used at the kiln head and kiln end had operated for more than 10 years with a low net residual value, large equipment maintenance workload and power consumption in the later stage of its life. In addition, it was difficult to control the reduction of the coal consumption index.

After many investigations, the plant selected Henan Fengbo Automation to

Application of a Coriolis pulverised coal feeder



Henan Fengbo Automation installed a Coriolis raw meal feeder at a Cemex plant in Mexico

replace the Coriolis pulverised coal feeder (measuring scale) to achieve a better performance, and to carry out the upgrade of the original rotor scale at the kiln head and kiln end to save and reduce energy consumption.

Since the Coriolis pulverised coal feeder upgrade, coal conveying air pressure has been reduced by approximately 5kPa, the current of the Roots fan has been reduced by around 10A, and the reduction of air volume has lowered the power consumption of the Roots fan itself and the coal consumption generated by the primary air volume. Therefore, this example shows how accurate measurement is important for carbon reduction at a cement plant.

Moreover, reducing clinker output to help meet both China's double-carbon targets and its policy of capacity reduction requires cement plants to improve the utilisation rate of raw materials and product quality with accurate measurement. For example, if raw meal proportioning is not measured accurately, the clinker calcination temperature will inevitably fluctuate, which will not only lead to incomplete combustion of coal but also lead to unstable cement quality. If the metering control for adding fly ash during cement grinding is accurate, the feeding amount can be increased by 2-5 per cent. Accurate measuring has a direct impact on the consumption of coal and clinker, and proper measurement results in direct benefits to the cement plant. Another example of the benefits of accurate measurement can be

“During the cement production process the inaccurate measurement of pulverised coal can lead to problems such as an unstable kiln temperature, which will greatly increase coal and power consumption and affect product quality.”

found in a cement plant belonging to Cemex, which also encountered such issues. At first the plant's raw meal batching equipment was inaccurate. After a number of investigations, Henan Fengbo Automation's Coriolis raw meal quantitative feeding scale was selected. Following the upgrade, operations showed that there were no faults, and accurate metering and stable operations were achieved with an accuracy of ± 0.5 per cent. Thus, stability of the firing system and kiln conditions were ensured. Through statistical data analysis, clinker strength and standard coal consumption have improved in varying degrees after the installation. Subsequently, Cemex's Zapotiltic cement plant in Mexico and Cemento Bayano's Calzada Larga cement plant in Panama purchased the same series of the Coriolis powder quantitative batching scale to measure its cement batching process. ■