

Building Foundations for the Future in the Cement Market

***An Insight into Alternative Raw Material
Process Solutions***

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Market Analysis > Cement and its Environment

By the end of this year, the industry is expected to have produced over 2 billion tonnes of cement, with analysts predicting future annual, global production to rise over the next decade.

This current trend is coupled with ever-increasing demand for the commodity, with many commentators believing that growth will continue at a rate of 8% year-on-year for the foreseeable future.

There are several factors that have converged to create a widening gap in supply and demand, but predominately it is a result of cement being used as a key ingredient in concrete, which is used in nearly every type of construction project.

The greatest growth of production and consumption has emanated from Asia, where 70% of the world's cement supplies are consumed – this is predominately driven by China and India, the world's first and second largest markets for cement. According to respected sources, Asia is set to consume 90% of the commodity by 2020.

As a result, many of the world's leading producers are investing in expanding current operations or building new production facilities that will enable them to cope with the increasing demand for cement. Substantial investment in new plants is taking place in China, India, Saudi Arabia and the United Arab Emirates.

In addition, the landscape of the cement market has changed in recent years through numerous mergers and acquisitions, which has allowed significant players to consolidate their position as leaders, whilst creating platforms for diversification into other specialist cement and aggregate products.

More critically, the growing demand for cement is placing escalating pressure on the environment, with carbon emissions and pollutant levels at significant highs. The industry has reacted, certainly across Europe and North America, through the implementation of stringent legislation and environmental-focused initiatives, which has been established to help reduce emission levels and bring some control back to the environment.

Organisations such as the Cement Sustainability Initiative, which comprise of some of the leading producers and associations in the world, have led the cement industry in addressing the challenges of sustainable development.

At Clyde Materials Handling, we are resolutely focused on developing sustainable solutions for the markets we serve, of which cement is key, and do so through the use of our knowledge, expertise and technologies.

It is clear that cement producers are seeking to develop systems that are able to utilise extenders, additives and alternative fuels, such as waste, pulverised fly ash (PFA) and blast furnace slag.

Burning alternative fuels in a cement kiln as a substitute for coal, a non-renewable raw material, can generate savings through resource conservation and associated

carbon emission reduction. The cement kiln also makes more efficient use of the intrinsic energy of the waste material.

Addressing the Needs of the Industry through Technology

The rising demand and cost of energy is placing significant strain on our environment, with global warming and climate change dominating international social and political agendas.

As a result, there is now a massive global environmental drive to reduce the amount of energy and power that is being consumed by citizens and businesses alike. In particular, the cement industry consumes a great deal of power throughout its production processes and many operators are now proactively seeking ways to reduce their energy needs and find alternative ways of fuelling production.

Over the past year, energy costs have risen 25% and are set to grow by similar factors in the year ahead. The goal of creating 'greener' operations by cleansing and optimising processes is of critical importance to the cement industry.

Furthermore, cement operators are also eager to identify technologies and solutions that can help police and control emissions, reduce health and safety, reduce maintenance and system ownership costs, reduce the cost of production per tonne, reduce wear on systems and their respective components and also use more extenders, such as PFA.

Clyde Materials Handling has been able to support cement producers by utilising their pneumatic conveying and injection solutions and process expertise to help meet the goals set out in the paragraph above.

Traditionally, the cement industry has purchased mechanical technologies and applications to support the movement and transportation of raw materials used in their production processes. This type of technology has been associated with the cement industry for many years, with operators not wanting to seek alternative solutions due to the fear of failure.

The similarly traditional screw pump technology, has also remained intact, despite the fact that it requires a great deal of power and significant maintenance to operate effectively.

The new needs of the market are forcing the industry to alter its way of thinking, and it is now more focused on implementing technologies that requires less energy, less maintenance and can help power productivity.

As a result, dense phase pneumatic conveying solutions, which are provided by Clyde Materials Handling, are now being viewed as viable alternatives to traditional screw pump applications. Dense phase pneumatic conveying provides organisations with the ability to transport material in an unrestricted, controlled and continuous manner at low velocity, consuming low volumes of compressed air. The result is the creation of solutions that absorb a minimal amount of power, cause less wear on system components and pipelines, and therefore, reduces maintenance costs and increases system availability.

According to International Cement Review's Cement Plant Operations Handbook, published at the end of 2003, the power consumption differences between screw pump and dense phase pneumatic technology is staggering.

Comparative power consumption tests showed that screw pump technology used 1.2kWh/t/100m to that of dense phase technology, which absorbed 0.59 kWh/t/100m, therefore generating a 50% saving in energy consumption.

As well as seeking to generate efficiencies from material conveying and transportation systems, operators are also looking to reduce the dependency that has been placed on using non-renewable fuels such as coal, limestone and shale.

By utilising alternative fuels, such as household waste, tyres, plastic, bone meal and blast furnace slag, fewer emissions are released into the atmosphere, less dependence is placed on diminishing and harmful fossil fuels and the cost of raw materials is greatly reduced as renewable sources are less expensive than non-renewable.

Also, there are opportunities for us due to increased health and safety needs. Either from the addition of materials to the cement to reduce health risks from contact, or due to minimisation of health risks during the cement manufacturing process, such as dust emissions.

Building Foundations for the Future

This year, Clyde Materials Handling has worked closely with leading producers in the global cement market to deliver pneumatic conveying and injection solutions that have been created to reduce energy costs, maintenance expenditure and utilise alternative raw materials in the production of cement, helping tackle the critical issue of sustainability.

- **Conveying Solutions:**

Clyde Materials Handling has worked closely with a UK-based cement producer to produce a design study which analysed the performance of their existing screw pump conveying system and made an assessment of this system's capability to meet the customers' requirement to extend the conveying distance and capacity to a new bulk loading silo.

As a result, Clyde was able to show that the total cost of ownership of the existing system could be significantly reduced by replacing it with a dense phase conveying solution.

In addition, Clyde Materials Handling is currently commissioning a solution for a Ukrainian-based producer who requires a 150 tonne per hour (tph) conveying system to convey cement from a newly installed mill to a series of silos. Clyde is implementing a dense phase pneumatic conveying system from this main cement process mill. Clyde was selected over screw pump technologies as the customer recognised the dense phase system was a low energy, low maintenance application which was simple to install and had the flexibility to be extended compared to that of the alternative mechanical option.

Clyde will also provide a dense phase conveying system that will form part of a complete plant upgrade to improve capacity at a logistics terminal, which will be used for all bagged cement production for a leading operator in Europe. The conveying system will feed three 'lines' – one for cement, one for PFA and 1 for a blended product.

- **Injection Solutions:**

Clyde Materials Handling has worked closely with a leading UK cement producer to develop a PFA injection solution. When grinding clinker to make cement, the industry generally adds PFA at various percentages to alter its properties. Traditionally, this is executed by a complex transfer and loss-in-weight feeding arrangement onto the clinker belt. Clyde's pneumatic injection solution will now make it possible to have this solution located remotely under the silo with only the conveying pipework at the mill, which will help reduce and conserve energy.

Clyde is also commissioning a solution for a sodium bicarbonate bulk intake, storage and injection system. This system is being installed to meet current new legislation targeting levels of hydrogen chloride emissions from the cement kiln stacks. Monitoring equipment on the stacks will determine the level of hydrogen chloride present on-line, and then the Clyde solution will vary the levels of sodium bicarbonate being injected accordingly.

On entering the stack and hitting high gas temperature, the sodium bicarbonate is converted to carbonate and the released carbon neutralises the hydrogen chloride. This solution is helping cleanse the cement kiln stack and the environment surrounding this specific production plant.

Summary

The global cement industry is currently experiencing an unprecedented level of growth in both production and demand. However, the challenges of ensuring the long-term future of the market and the environment in which it operates are of even greater importance.

Many producers, suppliers, associations and governmental initiatives are in place to engage in action when tackling areas such as climate protection, CO² management, responsible use of fuels and raw materials and emission monitoring, control and reporting.

We believe, at Clyde Materials Handling, that our technologies can support the industry in tackling these issues and welcome the opportunity of initiating in discussions about how we continue to support the market in meeting its objectives.

For more information, contact:

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