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This issue's front cover...

Wikov Gear: Wikov's **Side Drive** gearbox is a new generation of a drive applicable to horizontal ball mills. The design of the Side Drive includes separated lubrication, which ensures the highest possible purity of the system in the dusty environment of a cement plant. It contributes to reduced maintenance costs, extended life-time of the main components of the gearbox and higher reliability. The drive can be supplied with the WiGuard remote condition monitoring system.

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Global Cement Conferences: Global CemFuels, Global Slag, Global CemCoal, Global CemPower, Global EnviroCem, Global Boards, Global Well Cem, Global CemProcess.

Dear readers,

Welcome to the October 2015 issue of *Global Cement Magazine* - the world's most widely-read cement magazine. In the global cement news in this issue, we see a raft of recently completed and newly announced projects in Asia. As well as the completion of the Senj Sant plant in Mongolia and the Tuban plant by Holcim Indonesia, there have been signals of intent from many others, often in smaller markets like those in Central Asia. Myanmar's Ait Thit Man group has announced an extension to double its capacity from 5000t/day to 10,000t/day and, in India, Shree Cement wants to build another new facility. Turkmenistan also looks likely to build a 1Mt/yr plant as part of a massive government industrial stimulus package. As well as these, this issue also carries news about three new Chinese projects from the past month - albeit ones not actually in China. In Pakistan, China's Yantai Baoqiao Jinhong group has announced its intention to build a new plant in Salt Range. Jilong Group wants to build a 0.8Mt/yr plant in Issyk Kul, Krygyzstan. Meanwhile, Georgia will shortly see the construction of a 1.2Mt/yr plant by Xinjiang Tianshan. These projects are the continuation of a trend already seen in Africa, as Chinese cement producers and cement plant manufacturers look to maintain business. China's cement industry is contracting fast and foreign markets are increasingly important.

As well as the latest global cement news we also include a wealth of technical reports and analysis. Read about lime plant automation in Brazil (Page 20), the development of dry sorbents for the removal of acidic gases from the stack (Page 16), the use of accelerometers to maximise efficiency (Page 10) and how to mitigate explosion risks when preparing alternative fuels (Page 12) as well as articles covering gears (Page 8) and chains (Page 26). Our country focus in this issue turns to Austria, the host country for the forthcoming *8th European Slag Conference* in Linz on 21-23 October 2015 (Page 38).

This issue also includes a candid and in-depth visit report from the Akmenes Cementas plant in Naujoji Akmenė, Lithuania. Established by the Soviet government in the 1950s, the plant remains Lithuania's only cement plant to this day. It supplies the domestic market and also exports to Russia, Belarus and Scandinavia. The plant has recently completed a year of operation with its new 4500t/day KHD dry process line, which replaced several former wet lines. Akmenes' Production Manager Edmundas Montvila offers valuable insights into the plant's history and the decision to upgrade to a dry line as well as the current production process, dispatch and markets, from Page 46 onwards.

We hope you enjoy this issue of *Global Cement Magazine* - the world's most widely-read cement magazine!

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ISSN: 1753-6812

Published by Pro Global Media Ltd
First Floor, Adelphi Court 1 East Street,
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Fax: +44 (0)1372 743838



Cement Industry Suppliers' Forum



Printed on Forest Stewardship Council (FSC®) certified papers by Pensord, a company with ISO 14001:2004 environmental certification.



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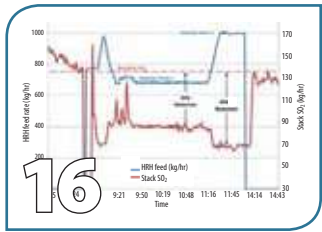
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THE NEW COPE DRIVE IS ON THE MARKET

The increasing performance requirements of cement producers led to rethink the further developments in drive technology for vertical roller mills. Particularly for larger mill outputs, LOESCHE favours a drive system with multiple motors and gearboxes with milling force decoupling.

In order to meet these demands, LOESCHE will use for future projects with high and medium grinding capacity the COPE gearbox developed in cooperation with Renk, which offers a redundancy of up to 8 motors at the motor end. Only 4 models of the COPE gearbox, equipped with 6 to 8 motors, allow for a classification in a range of capacities from 3 up to 14 MW and thus an application within up to 17 different mill types.

For a constant output speed the COPE drive does not require any variable speed drive for the maintenance-free drive motors and moreover can be operated with a reduced number of motors. This new type of drive concept allows for an operation with for example 7, 6 or simply 4 of the 8 existing motors. Even in operation with only 7 motors, 100% mill output can be attained by activating the design reserves installed. The compact design of COPE gearbox is also of advantage as it does not require any additional modification of the mill foundation.

As this drive train can be put into operation with the common gearbox dimensions, this system can as well be considered for any retrofit at existing Loesche Mills.



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Lukas Steiner, Wikov Industry

Spassk Cement - Higher efficiency with a Wikov Side Drive

Mechanical gearboxes and gears have been manufactured by Wikov Gear in Pilsen, Czech Republic for almost 100 years. The brand is the successor to the globally-recognized Škoda brand, which has a rich gearbox installation base all around the world. Wikov Gear's history is bound to the demanding oil and gas and power-generation sectors but most importantly the cement sector, to which it provides equipment and services for ball mills, vertical roller mills and belt conveyors, among other parts. Here, the company describes a recent project to replace a ball mill drive for OAO Spassk-Cement, the largest project that it has ever undertaken.

In the autumn of 2013 Wikov Gear received an order for a 120t drive for a horizontal ball mill from Russia's OAO Spassk-Cement, part of the private Vostok cement group. Spassk-Cement is located in Spassk-Dalny in Russia's Far Eastern Federal District. The 3.4Mt/yr plant has three production lines that send 95% of their output to the domestic market.

The new drive to be supplied by Wikov was set to replace an original Aerofol-2 drive that was manufactured by Volgocemmach almost 40 years ago. The Aerofol-2 was designed as an experimental project and was the only drive of its type in the world. It had been supplied with numerous replacement parts for consumption during its lifetime. However, eventually there were no remaining spares and the most recent

companies but none of the solutions met the technical requirements. We almost gave up and thought we could not find a resolution for the problem. Finally, help came from Wikov. It submitted a unique project for a new gearbox for Aerofol-2."

The Wikov drive for Spassk-Cement consists of two Side Drive gearboxes, each with nominal power of 2000kW. The Side Drive gearboxes belong to a new generation of ball mill drives. A major focus of the project lay in the elimination of contamination of the lubrication system. The extremely dusty environment of cement plants is often a cause of early wear for gears, bearings and other key components of the gearbox.

The size of the smallest dust particles is only 3µm, which explains why it is a demanding task for the designers to ensure perfect protection for the gearbox mechanism. The most critical areas are the gearbox input pinion, the connection of the girth gear of the ball mill with the gearbox and the sealing of the girth gear and its cover.

Wikov therefore developed a solution of a separated lubrication system that protects these main components from dust contamination. This feature is the key factor when it comes to upgrading



Above: The Wikov brand succeeded the historic Škoda brand in 2004 after almost 90 years of operation.

Right: The horizontal ball mill drive with two side drive gearboxes after assembly at Wikov Gear factory in the Czech Republic.

breakdown was 'fatal' to one of the plant's production lines.

The original manufacturer was not able to support the plant, and so Spassk-Cement's specialists sought the help of specialised companies. "There was no company in Russia that was eligible for such a task," explains Alexander Alverov, chief engineer at Spassk-Cement. "There were proposals from renowned





existing conventional drives that are prone to early wear due to dust contamination. The design of the Wikov Side Drive gearbox protects the drive components of the gearbox such as gears and bearings from dust and dirt pollution. It extends the gearbox life and oil exchange intervals, resulting in reduced maintenance costs and downtime. The lubrication pipe system is located outside the gearbox housing, which makes the work for maintenance and service staff much faster and easier. There is no need to dismantle the whole gearbox in case of regular service. The design has been extensively used in cement plants around the world, mainly in Turkey.

“The assembly of the complete drive took almost 10 months and first start-up test took place in October 2014,” said Tomas Zrostlik, managing director of Wikov Gear. “The gearbox was dismantled and transported to another part of the world in some 25 boxes. The heaviest part weighed around 45t.”

Convulated route

Complete logistics from truck loading at the Wikov plant in Pilsen via sea transport from Hamburg to Vladivostok and final unloading in the premises of the Spassk cement plant took 55 days.

Transport took place during winter, with delivery at the plant in Spassk-Dalny, Russia in March 2015. The temperatures at the destination vary from -40°C in winter to 40°C in summer. The installation of the drive was agreed for spring due to better climate conditions that facilitated preparation of the worksite.

The installation of the drive for the ball mill started on 8 April 2015, when factory service engineers arrived in Vladivostok. The live operation started on 28 April 2015 after just 20 days of assembly, testing and modifications. This included the lubrication and cooling systems as per the customer’s additional requests. The mill was filled to 50% of its total capacity, which equates to 48t of material and balls. “Our ‘baby’ was running so smoothly and quietly that we could not help but notice the bystanding staff of Spassk Cement being positively surprised,” said Pavel Sulc, service manager of Wikov Gear.

All Wikov gearboxes can be fitted with WiGuard, a remote condition monitoring system developed by Wikov. The system was designed using the servicing experience of Wikov engineers from a variety of industrial applications. WiGuard provides real-time information about the performance of the gearbox during its operation, gathering data about vibrations, temperature, speed, pressure, oil quality and other parameters. It is accessed by Wikov service via a web interface for on-line analysis. Apart from its diagnostic capability, it serves as a safety tool by sending warning and error messages.

The WiGuard system at Spassk-Cement processes data from 35 sensors fitted on the gearbox. This gives Spassk the security of continuous operation of the ball mill and ensures efficiency of production at the cement plant, which is over 10,000km away from Pilsen. “At Spassk, WiGuard does not just serve as a performance and service tool, it also helps to control the operation efficiency of the mill,” said Alexey Nikolajevich Sisoyev, executive director of Spassk-Cement.

Above: From the Czech Republic to Russia’s Far Eastern Federal District. Wikov Gear’s largest ever gearbox was transported in 25 boxes by Agility.

Below left: A screen-shot from the WiGuard remote conditioning system, which allows Wikov’s engineers to see a raft of key parameters remotely. In the case of Spassk-Cement, Wikov’s engineers are 10,000km away.



Below: The gearbox is 8m long, 5m high and 2.5m wide. Since it started operation, Spassk-Cement confirms that the drive has run without problems for 1776hr. It has ground an average 264t/hr of cement. This means that it has ground over 468,864t of cement.





Chris Hansford, Hansford Sensors Ltd

Vibration sensing to boost cement production

With global cement production growing by around 5%/yr, it is vital that cement manufacturers ensure production machinery is in optimal condition to maximise productivity as well as to maintain their operating margins. Here Chris Hansford, Managing Director at Hansford Sensors, explains how vibration monitoring can help to ensure that production is free of costly unscheduled downtime.

Cement manufacturing is one of the most aggressive of all production processes. High levels of fine and abrasive particles can cause significant problems for rotating components such as motors, pumps and fans found in production and handling equipment. The risk is that eventually components will fail, resulting in unscheduled machine downtime.

Given the competitive nature of the cement industry and the tight profit margins, the objective of cement manufacturers is to operate production systems at maximum capacity during operation. To do this, they must have effective maintenance regimes in place, and in many cases this includes advanced predictive maintenance programmes that enable maintenance teams to identify faults and resolve problems prior to failure. An important part of such a strategy is the use of vibration sensors, otherwise known as accelerometers.

Vibration sensors contain a piezoelectric crystal bound to a mass. When subjected to an accelerating force such as vibration, the mass compresses the crystal, producing an electrical signal proportional to the force. This is amplified and conditioned to produce a measurable signal that is collected and/or analysed by higher level control systems. In recent years accelerometers have been redesigned to make them suitable for use in applications where previously they may have not delivered the level of reliability required. As a result, accelerometers can now be used in the most demanding environments, including cement production. Today's accelerometers function reliably across wide ranges of temperature to exceptional levels of accuracy. Robust designs and stainless steel sensor housings, which are sealed to IP67 or IP68 standards, ensure the prevention of ingress of even the most aggressive particles.

Due to the harsh operating conditions in cement plants, careful specification of the correct accelerometer is essential. Vibration levels and the frequency range that needs to be measured are two key considerations, as are environmental factors. If these are overlooked then the data collected by an accelerometer will be unreliable and its life could be reduced. The environmental factors to take into

account when specifying vibration sensors include the operating temperature window, the presence of corrosive chemicals, liquids or dust and whether an atmosphere is hazardous or potentially explosive.

Once these factors have been accounted for, the final consideration is the location in which the accelerometer will be installed. This will decide whether a side entry or top entry accelerometer is required. Top entry accelerometers, where connecting cables are mounted at the top of the sensor, are effective in many applications, but dust and particles can settle on exposed surfaces and may affect long term performance. In areas with high levels of dust, as is often found in the cement industry, the preferred option is to use an accelerometer with a side entry, which fully protects the cable connectors.

Correct specification is also critical to ensure accurate and consistent results. To install an accelerometer correctly, engineers should mount it directly onto the machine on a flat, smooth, unpainted surface that is larger than the base of the accelerometer. The surface of the machine must be free of grease and oil. For best results the accelerometer should be as close as possible to the source of vibration and perpendicular to the axis of rotation. Effective mounting can be achieved using a spot facing kit that includes a tapping drill, taps, tap wrench and spot facing tool.

Cement manufacturing applications typically implement offline vibration monitoring, which is normally performed using portable data collectors. A maintenance engineer gathers data manually using a single, temporarily-mounted sensor and handheld instrument, or a handheld monitoring device that connects to the outputs from permanently mounted sensors located strategically throughout the plant. Collected data can then be analysed, with action taken where necessary to prevent component failure and machine downtime to boost plant efficiency.

While vibration sensors have proven to be a reliable tool in the toolkit of plant and maintenance engineers, they are only effective when specified and installed correctly. If this is achieved, then accelerometers will play an important role in helping cement producers to meet growing demands by ensuring optimum machine availability, productivity and profitability.



Images: Hansford HS 4225 Series (above) and HS-4205 Series (below) accelerometers, both of which have applications in the cement industry.





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Christian Lanner, UNTHA shredding technology

Tackling alternative fuel production fires

The frequency of fires in waste or alternative fuel production plants cannot be denied, with the industry's headlines seemingly scattered with news of one devastating blaze after another. But what more can be done to mitigate the risks and prevent such incidents from occurring? Christian Lanner, technical director at UNTHA, offers his thoughts.

The risk of fire or explosion within the inherently hazardous alternative fuel production industry is widely noted. In fact, it is a commonly quoted statistic in Austria that one in five plants will be struck by a fire in its lifetime.

The 'costs' associated with such incidents, even on a small scale, can be potentially devastating. Disruption to productivity, loss of contracts and escalating insurance premiums can make it difficult for some plants to remain commercially viable and, of course, operational consequences aside, there is the danger of jeopardising the well-being and safety of employees, something which should be prevented above everything else.

Causes of fires in alternative fuel production sites

So why do so many fires occur in these facilities? The storage of readily-combustible, mixed input waste materials is often part of the problem, hence why the installation of sprinkling systems is a necessity throughout the plant. However, the actual alternative fuel production process itself presents further potential risk.

Output material, such as a 30-80mm solid recovered fuel (SRF), is also typically stored in a mound before being shipped to the cement kiln. If a particle becomes hot during the shredding process, and drops into that mound from the exit conveyor, eve-

rything may seem fine for 8-12hr. Yet, with oxygen, the fraction may start to smoulder and burn, which could have a devastating outcome, especially if this happens overnight with no-one present to identify the problem. This underpins the need for specially-designed technological solutions – tailored to the plant concerned – that can suppress the fire before it takes hold.

Solutions

Carefully positioned UV, infrared, heat and spark detectors on a shredder's inlet hopper and discharge conveyor, for example, can sense when a fire is likely to begin. In the event of a significant temperature increase, extinguishing nozzles, positioned in the same place as the sensors and thus pointing directly at the fire risk, can automatically spray water onto the targeted area. This means that, if the risk is within the shredder, the materials can be cooled and/or the fire put out before anything is discharged from the machine. If the problem is on the conveyor, the nozzles prevent hot, glowing fractions from entering the pile of output material, where a fire could otherwise break out. An alarm can even be activated to enable an operator to start a manual extinguishing process, and/or alert the fire brigade.

With such systems, the operator can configure the temperature trigger point to suit the plant's requirements and thus dictate how hot the materials must

get before the extinguishers are activated. But surely it is better to err on the side of caution and spray two or three times too much water over the course of the day, than not enough. This is why water is a practical extinguishing solution. It is, in most cases, the cheapest product to use – much more so than comparatively expensive foam or powder that needs to be continually replenished. Of course no-one wants to waste water, but, if connected to the mains supply or an



Right: Shredded, solid fuels derived from waste are used throughout the cement industry.

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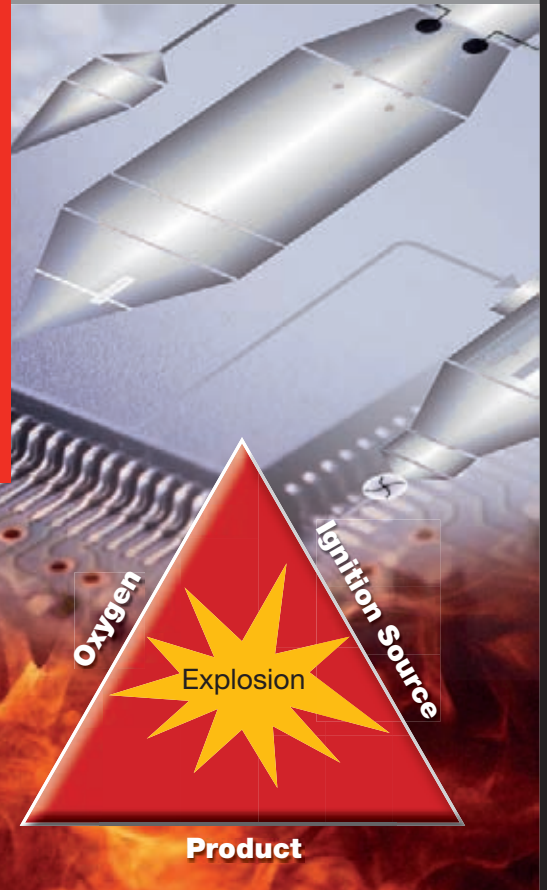
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Right: Carefully positioned extinguishing nozzles are activated by the shredder's in-built sensors, a key fire prevention mechanism.



auxiliary 200L tank, the machinery will be constantly protected. Furthermore, if the extinguishing nozzles open on the basis of water pressure alone, rather than being reliant on electrical valves that have the potential to fail in a crisis, there is added peace of mind over the fire suppression system's robustness.

Explosions are different

Explosions are somewhat different, of course. These can be caused if an aerosol is ignited due to heat or compression, or if a small electrical spark ignites high volumes of dust, if present. To prevent such scenarios, more responsible equipment manufacturers are further reducing risk 'by design.' Some refuse-derived fuel (RDF) and SRF shredders, for example, are now purposefully engineered to have a slower rotor speed, without compromising throughputs. As a result, they don't generate as much dust and the lower tip speed means the potential for a spark is also lessened. Anti-explosive Atex-specification motors and electronics can also be installed.


If the machinery contains such in-built fire and explosion prevention mechanisms, the alternative fuel producer has greater peace of mind that the plant and operators are continually in safe hands, manufacturing can continue as normal and insurance premiums should fall as a result.

Looking ahead

People would be forgiven for thinking that, as technology becomes increasingly advanced, fires and explosions should be

entirely preventable. After all, pioneering innovations within this field are being continually developed to address the notorious problem. However, there needs to be a more widespread acknowledgement of the dangers posed in these plants, if such incidents are to be wholly averted.

Yes, fundamentally operators need to do their utmost to keep their plants tidy and dust-free. For example, a thorough clean of the machinery and floor is advised at the end of each day. However, of the utmost importance, regardless of fuel producers' cleaning regimes, is an appreciation for the need to invest in fire suppression technology, tailored to the process at hand.

As the role of alternative fuel production grows in stature, fire and explosion prevention will become ever-more important. Now is the time to ensure all stakeholders realise the role that they have to play. 

Right: UNTHA shredders at an SRF production facility.





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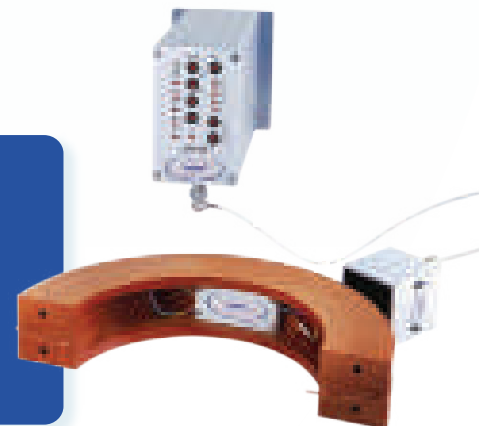
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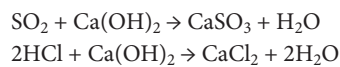
Pat Mongoven, Business Development Manager (FGT) and Mark DeGenova, Chief Chemist, Mississippi Lime Company

Using dry sorbent injection (DSI) to replace lime slurry for acid gas control

Many cement plants utilise a spray tower for temperature control and the removal of acid gases such as SO₂ and HCl. Mississippi Lime has developed a high reactivity hydrated lime that allows cement plants to inject the hydrate as a dry sorbent (dry sorbent injection - DSI) into the flue gas instead of making a hydrate slurry and feeding to the spray tower as a liquid. Avoiding the slurry make-down minimises plugging and erosion of the spray nozzles while simplifying operation of the feed system in freezing environments.

Introduction

Cement plants have had to control SO₂ for many years, typically with a rolling average. The most common control method is the use of spray towers that incorporate a slurry of hydrated lime. Future environmental regulations may also require cement plants to control HCl in the flue gas. When added to the flue gas in the spray tower, hydrated lime reacts with acidic components such as SO₂ and HCl in the gas to form calcium sulphite and calcium chloride:



For slurry systems, hydrated lime is delivered in pneumatic trucks and off-loaded into a silo at the plant site. The hydrated lime is then added to a slurry tank and mixed with water to make hydrated lime slurry. This mixture is pumped to the top of a spray tower and injected into the flue gas through small atomising nozzles. The nozzles can plug, significantly reducing the distribution and efficacy of the neu-

tralsing sorbent being added. Nozzles can also erode, resulting in the wrong size droplet being formed, reducing the effectiveness of the tower. Because the hydrate is applied as a slurry, all of the transport lines and storage tanks must be heat traced and insulated so that they do not freeze in the winter months. All of these challenges can reduce the amount of SO₂ removal that a plant can achieve and make it difficult to maintain compliance.

Case studies

Two cement plants in midwestern USA wanted to explore switching from their slurry feed systems to DSI feed systems. Plant A used hydrate made into a slurry at the plant site and then pumped it through the spray tower. Plant B used a liquid slurry made in a highly-controlled process at a local hydrated lime manufacturer. Both plants struggled with the slurry application of the hydrated lime. They had plugging and erosion in the spray tower nozzles, which resulted in significant maintenance costs and less efficient SO₂ removal. During cold periods in the winter, freezing slurry lines also presented challenges. When slurry transfer lines would freeze, the plants couldn't get the liquid hydrate into the spray tower and couldn't maintain environmental compliance.

Both plants requested that Mississippi Lime work with them to evaluate dry sorbent injection (DSI) as a means of improving SO₂ capture while eliminating the challenges associated with operating their respective slurry systems. The plants also wanted to compare the performance of different grades of hydrated lime. Mississippi Lime's flue gas treatment (FGT) grade and the new high reactivity hydrate (HRH) were both used in the testing. HRH was evaluated extensively during its development and found to offer 25-50% performance improvement over FGT hydrate.

Mississippi Lime utilised its temporary feed system consisting of a silo, rotary air lock, blower trailer and associated control equipment (Figure 1). The system was installed at the plant sites for several weeks to evaluate the performance of different hydrates under different conditions.

Plant A

Plant A had an on-site hydrated lime silo and fed its hydrate from the bottom of the silo into a water mixing tank. Here, it is mixed into a slurry and then pumped to the nozzles in the slurry tower. Plant A is required to maintain a rolling 30-day SO₂ average. To accomplish this, it feeds hydrate slurry on a continuous basis. With the raw mill off and resulting higher

Below - Figure 1: A temporary DSI injection system.

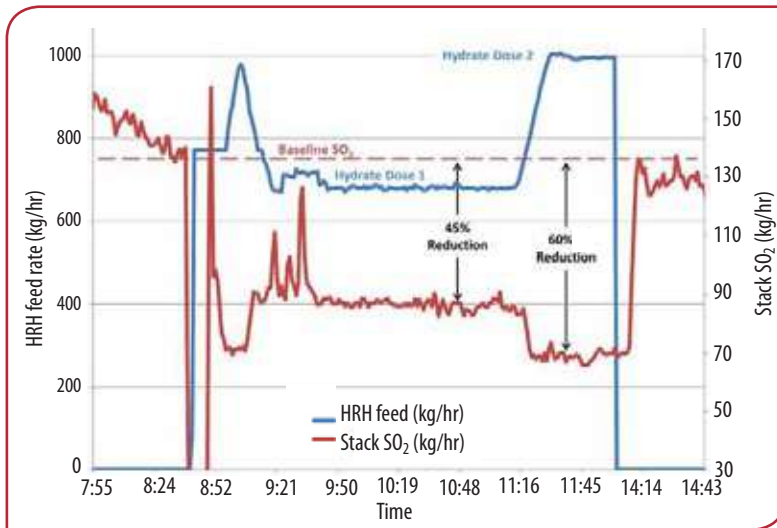


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Above - Figure 2: Stack SO₂ emissions with HRH DSI dosing.

SO₂ levels, the scrubber tower struggled to keep the SO₂ below the targeted threshold.

Feed rate (kg/hr)	SO ₂ removal (%)	
	FGT	HRH
680	11	30
1000	25	42

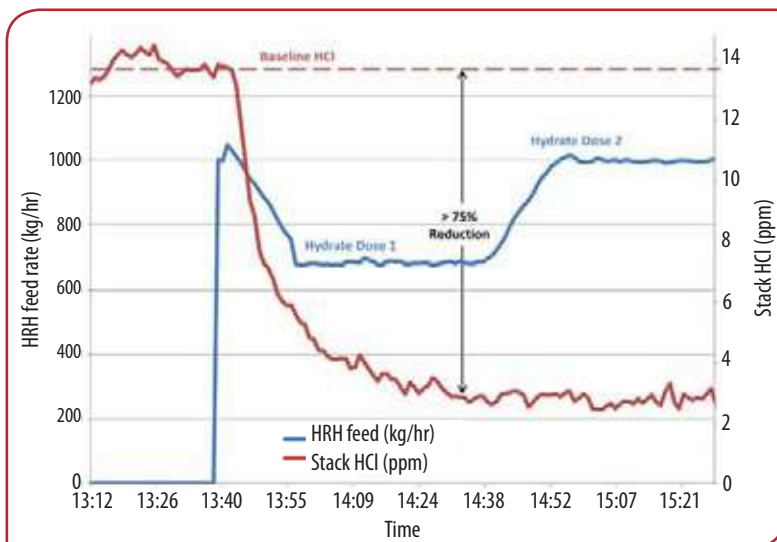
Above - Table 1: SO₂ removal of different grades of FGT and HRH at different feed rates.

Because the slurry feed system was the limiting factor in how much SO₂ the plant could remove, supplementing the slurry system with DSI when the raw mill was off allowed the plant to maintain compliance during raw mill outages. The other advantage of the DSI 'overlay' of the slurry system is that the plant can feed more or less hydrate at its convenience. This allows it to stay within the 30-day target at all times and gives it much greater flexibility in operating its system while maintaining regulatory limits.

Plant B

Plant B utilised a finely-mixed hydrated lime slurry that was delivered as a liquid slurry. This material was manufactured under exacting standards by a local lime hydrate producer and stored at the plant in a large liquid bulk storage tank. The slurry was then transferred to a day tank where it was pumped up to the spray nozzles in the scrubber tower. The plant experienced regular erosion and pluggage issues with

Below - Figure 3: Stack HCl emissions with HRH DSI dosing.



the spray nozzles. Additionally, the slurry feed system was a challenge to run during cold weather periods due to freezing of the process lines. Plant B expressed a desire to evaluate DSI as an alternative.

With the raw mill off and the slurry to the tower locked out, hydrated lime was fed through the temporary DSI system for SO₂ control. After start up, the hydrate was fed at two dosages to see the effect on SO₂ reduction (Figure 2). At the first dosage, a 45% reduction of SO₂ was achieved. With an increase in the sorbent dosage, a 60% reduction of SO₂ was achieved.

After verifying that the DSI would provide the additional SO₂ control needed, two different grades of DSI hydrate were compared at two different dosages. The HRH demonstrated a significant improvement in SO₂ capture compared to the traditional FGT grade (Table 1). The improved performance of HRH allowed Plant B the option to feed less hydrate, reducing its annual reagent costs or to achieve lower SO₂ levels with roughly the same amount of feed.

In anticipation of future HCl limitations, both the FGT and HRH grades were evaluated for HCl removal. The plant observed greater than 75% reduction in HCl from the baseline (Figure 3). The HCl sensor takes some time to reach equilibrium, which is why the figure shows a gradual decline in HCl instead of an instantaneous reduction. As the feed of hydrate continues, the detection limit of the sensor is approached.

Conclusion

In both of the case study plants, the use of DSI provided an alternative to the existing hydrate slurry systems. Even if the plant was using a slurry manufactured specifically for the scrubbing towers, DSI application of FGT grade or higher quality hydrated lime could achieve the same acid gas removal rate. In some cases, the DSI feed approach allowed the plant to feed more hydrate without plugging the nozzles, so that even greater acid gas removal could be achieved.

Eliminating the use of the slurry drastically reduces the plugging and erosion of the tower nozzles. This not only reduces the maintenance and operational costs associated with the plugging, but also provides more consistent sorbent distribution in the system. By feeding the sorbent in a consistent fashion, better acid gas removal can be maintained. Transitioning to DSI also prevents the freezing challenges that the case study plants historically faced in the winter months.

The use of Mississippi Lime's HRH showed a significant improvement in the acid gas capture of the hydrate. In both of plants described here, a 20% greater capture with the HRH compared to the FGT grade of hydrate was observed. This allowed the plants to either feed the same amount of hydrate and achieve greater acid gas capture or to meet the current regulations using significantly less sorbent. 🌐



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Carlos Rodolfo de Freitas, Automaton Integração de Sistemas, Brazil

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Automation of a Chinese lime plant in Brazil

Imports of industrial equipment into Brazil from China have increased in recent years. According to the guide of Foreign Trade and Investment - Invest & Export Brazil, US\$34.9bn worth of goods was imported into Brazil from China in 2014. Of this, a proportion of electrical machines and mechanical machinery are directed to new cement and lime projects. Here Carlos Rodolfo de Freitas of Automaton Integração de Sistemas, discusses a case in which an entire lime plant, including process equipment, electrical systems, control systems and instrumentation and automation systems, was imported from China.

In this type of acquisition, the vendor is responsible for guarantees of both productivity and product quality. Some level of adjustment is usually necessary in order to match the requirements of specific Brazilian standards and legislation. Additionally, it is desirable to adhere to local cultural operational requirements. This process is called 'project tropicalisation.'

Project challenge

After hiring a Chinese turnkey package supply to build a lime factory, the Brazilian customer found that adjustments to various aspects of the automation and control systems would be necessary in order to meet the requirements and standards used in Brazil.

The 600t/day plant consists of the following areas: Limestone crushing; Coke grinding; Rotary kiln; Lime hydration; Dispatch. Figure 2 shows an overview of the plant during the commissioning phase.

With this goal, Automaton was hired to provide adequate instrumentation and control design, as well as develop complete automation software in terms of both the programmable logical controller (PLC) and the human-machine interface (HMI) for the plant.

The biggest challenge was to maintain the confidence of the original supplier so that it could be sure that the plant would continue to meet its performance guarantees after the modifications.

Development of services

Services were developed in four stages, which are described below.

Stage 1 - Review of the automation and control project documents: Revisions were made in the process and instrument (P&I) flow sheets, interconnection diagrams, list of inputs and outputs and PLC panel drawings initially issued by the supplier, aiming at the standardisation of equipment identification tags, symbology, translation as well as to meet the specific standards adopted by Brazilian legislation.

The whole review was performed, maintaining the same hardware and automation equipment provided by the supplier of the plant, among them motor

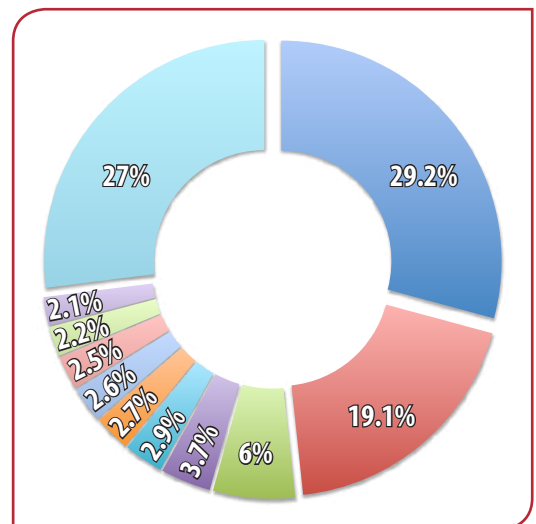
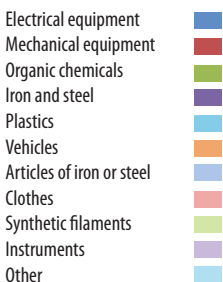
control centres (MCCs), PLCs and field instruments.

Stage 2 - Automation software development: New PLC software was developed using best practices for programming in order to achieve modular structure and fully translated into Portuguese to make it easily understandable for plant maintenance professionals. New automation sequences were added in order to reduce operational tasks.

An important remark: It is not common that the equipment supplier issues a functional description that details the operation of the manufacturing process. The programming of interlocks as well as the automation on the lime manufacturing process was carried out using the expertise of Automaton's team.

New supervisory software, where detailed synoptic screens were designed to show the status of the process status, was also developed. Equipment status and interlocks are easily displayed via pop up windows. Trend graphics that combine strategic process variable were added to allow real-time tracking of operations. Detailed alarm logs inform operators of malfunctions in order to maintain the production rate. Figure 3 shows a synoptic display of the kiln area.

Right - Figure 1: Composition of Chinese imports to Brazil.





Left - Figure 2: Overview of the lime plant during the commissioning phase

Stage 3 - Platform test: This step is intended to carry out the functional tests and was held at Automaton's office. A virtual environment was created to simulate the operation of all plant equipment and instruments shown in the P&I flowcharts, from limestone crushing to dispatch. Representatives of the end customer and the supplier of the plant attended platform tests, which lasted for three days.

All control functions and interlocks between devices were simulated, with the accompaniment of proper status through synoptic screens. All alarms and trips were tested.

Operational sequences were tested both on automatic and manual modes. All graphic trends were set up to store simulated process information. The completion of testing is essential to ensure project quality, equipment safety and operational functionality. Additionally, this step provided preliminary training for plant operators that were attending the test.

After completion of the platform test, we hit an important goal, which was to have the project approved not only by the end customer, but also by the supplier of the plant, which has expressed its consent with the result and therefore kept the performance guarantee.

Stage 4 - Start-up: During the start-up stage, five Automaton staff carried out the software and hardware settings, field tests, a cold start and a hot start. This took longer than expected due to the fact that part of the supplied equipment and instruments had different interconnections and features from those reported during

the project. This led to changes in the field wiring as well as changes and adjustments in the software being developed. Maintenance and operation training for the end customer team were carried out using specific manuals written for this purpose.

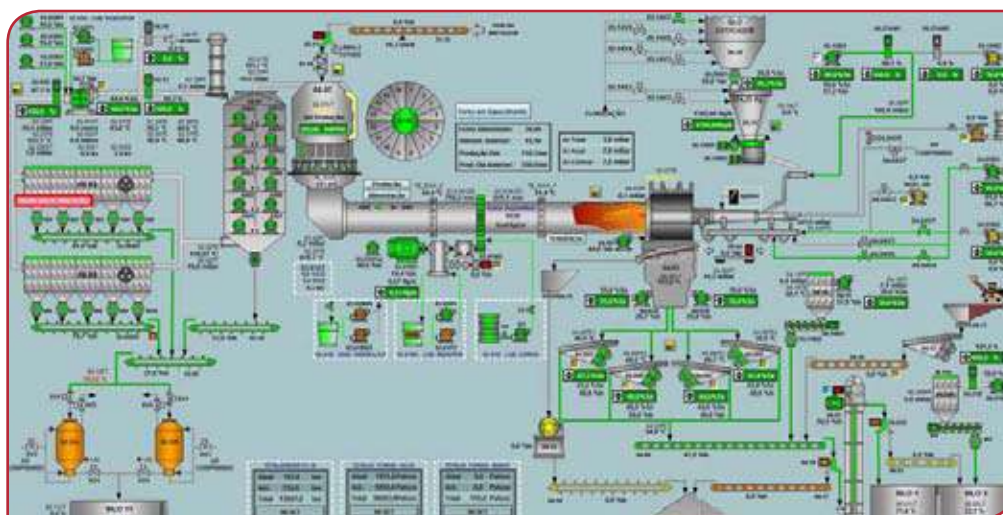
Part of the Automaton team remained on site for a further two weeks in order to provide assisted operation to the end customer. This extra time on plant was also used to develop 'As Built' documentation. The plant supplier reiterated its approval and consent with respect to the automation system developed by Automaton.

Conclusions

The application of good automation engineering practice associated with expertise in plant process made it possible to adhere to the requirements, standards and legislation of Brazil as well as to local cultural aspects in terms of plant operation and maintenance of the automation system.



Below - Figure 3: Synoptic screen of the kiln area.



Roberto Binago, CTP Team Srl - Bedeschi Group

Simultaneous cleaning of many long filter bags

CTP Team Srl, part of the Bedeschi Group, is an engineering and manufacturing company that specialises in gas filtration technology, mainly in the cement sector. In 2015 it is celebrating 45 years of activity. In the cement industry, bag filters equipped with long bags are increasingly used for kiln, raw mill, clinker cooler, coal and cement grinding applications. This article deals with newly-commissioned plants and outlines the functioning principle and the advantages of CTP Team's low pressure bag cleaning technology.

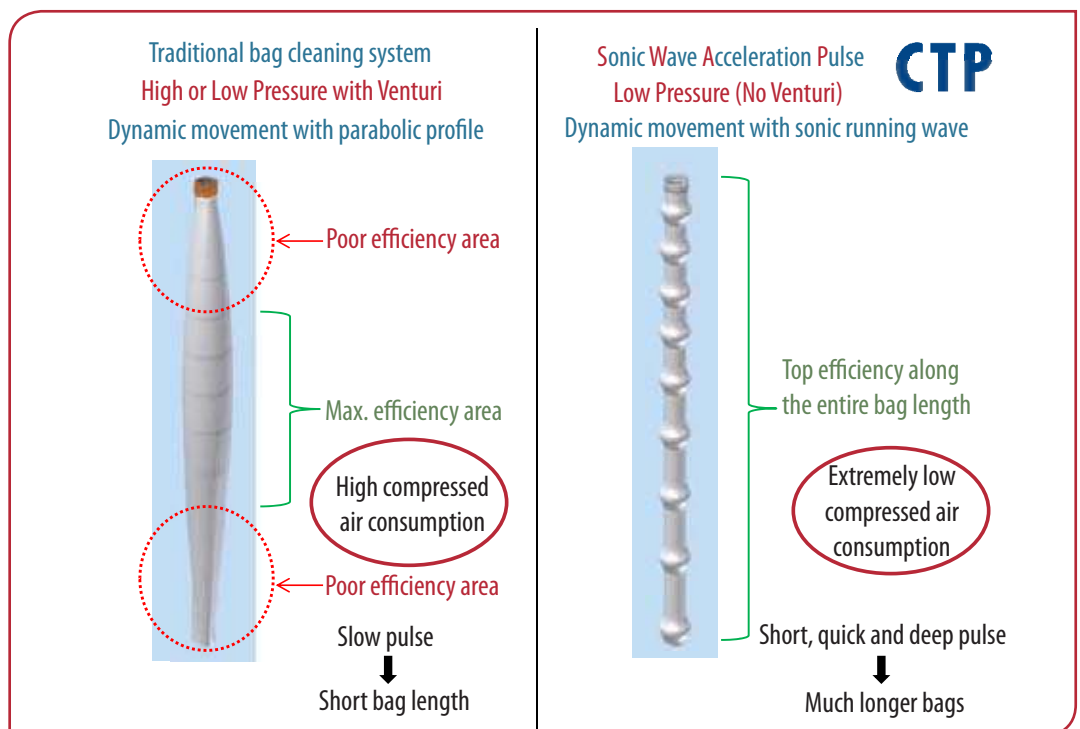
SWAP bag cleaning technology

The ECO E3 Advanced Sonic Wave Acceleration Pulse (SWAP) technology developed by CTP Team is a unique bag cleaning system that operates at low air pressure. It is designed to remove dust from several long bags at the same time, with one single shot of compressed air with high efficiency and yet with minimum stress to the filtering elements.

In comparison to traditional bag cleaning methods, with SWAP technology the bag is not blown with both primary air (from the tank) and the addition of much more secondary air (from filter plenum) due to the Venturi effect. Specially-designed powerful piston type valves that are installed directly onto the pulse header tank, the very high speed and fast response of the valve and the elimination of Venturi,

normally located at the mouth of the bag, create a short and very fast pulse acting as a wave. This starts at the top of the bag and travels down to the bottom at sonic velocity with the same profile and efficiency regardless of its length. The comparison of the working principle of the SWAP cleaning technique versus the traditional cleaning method is shown in Figure 1.

The innovation, in comparison with traditional systems, is related to a much shorter valve opening time (40ms rather than >100ms) and reduced inertia of the valve elements. This leads to significant improvements in terms of cleaning efficiency, energy consumption and long-term reliability thanks to a lower compressed air pressure of 2.5bar rather than 4-6bar) but enhanced pressure induced inside the bag down to the bottom-most areas.



Right - Figure 1: Comparison of traditional bag cleaning system (left) and CTP SWAP system (right).



Far left - Figure 2: Raw mill bag filter at Southern Province Cement.



Left - Figure 3: Filter bag installation for the clinker cooler at Southern Province Cement.

The final result is a shape of the pulse, which is such that the required acceleration of the filter fabric is achieved over a much greater length and number of filter bags than with any other cleaning system. The low amount of compressed air required from the compressor is capable of cleaning an increased quantity of long bags at the same time with one single valve. This extends the expected lifetime even more due to reduced stress on the filtering medium.

Recent references

SWAP technology has been a well proven bag cleaning system since 2007, when the first SWAP filter was put in operation at the Lafarge Hoghiz plant in Romania. As of 2015, 39 plants have been commissioned, while another 14 projects are under erection or during the engineering phase, a total of 53 projects. Some of the latest projects are described below.

Southern Province Cement: Southern Province Cement Company, one of the largest cement producers in Saudi Arabia, selected CTP as the supplier for the process dedusting equipment of its new 5000t/

day kiln line three in Tahamah. The supply consists of the bag filter for kiln and raw mill exhaust gas dedusting at a rated capacity of 1,260,000m³/hr at 180°C. The filter is equipped with 5040 fibreglass/PTFE membrane bags, 9m long, arranged in 21 bags per row; the filter design with 10 compartments permits on-line inspection of the internal components without stopping the kiln (See Figure 2).

In addition, a new bag filter for clinker cooler dust control was put into service. The six-compartment filter consists of 2160 m-Aramydic bags, 9m in length, arranged in rows of 20. The bag filter handles a gas volume intake of 620,000m³/hr at a temperature of 190°C (See Figure 3). At the same time, upstream of the clinker cooler filter, a new air/air heat exchanger is able to receive 880,000m³/hr of hot gas at 400°C and cool it down to 180°C before entering the filter (See Figure 4).

The cleaning of many long bags at a time with one valve, the low operating pressure and the very short opening-closing time of the piston valve, drastically reduce the overall energy consumption of this installation. For instance, the kiln/raw mill unit is

Left - Figure 4: Heat exchanger at Southern Province Cement.

Below - Figure 5: Filter bag for cement grinding at Xuan Thanh Cement.





Right - Figure 6: Cement mill filter bag house for Göltaş Çimento in Turkey.



equipped with the SWAP cleaning system, which gives a very high-performance at low air pressure, for a simultaneous cleaning of 21 bags on a single row. As a result, in this bag house each row of bags means 89m² of filtration area is cleaned at the same time by means of one single shot of compressed air at low pressure lasting just a few milliseconds.


Xuan Thanh Group: In June 2015 a new bag filter for cement grinding was commissioned by CTP for the Vietnamese Xuan Thanh Group (See Figure 5). The new filtration unit, positioned downstream from a 300t/hr Loesche vertical roller mill, is fitted with 10m long bags and 19 bags per row (91m² of filtered area per valve). It is designed to perform both online and offline cleaning methods.

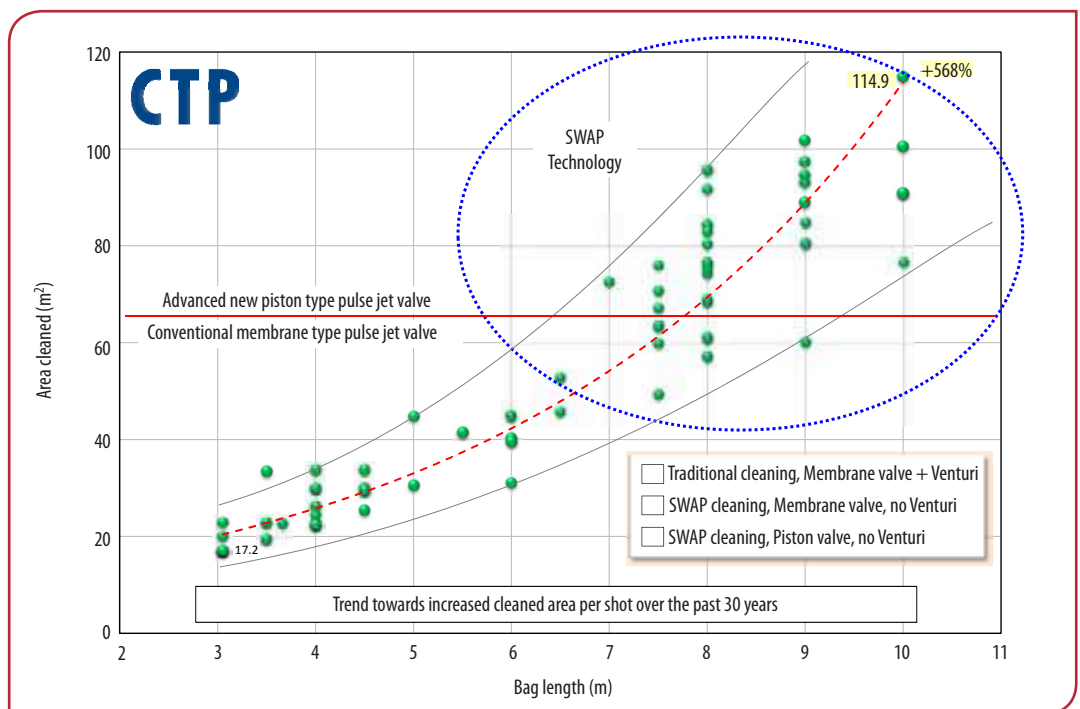
Göltaş Çimento: Another cement mill filter, as in the Vietnamese case-study, has been put in operation in Turkey for Göltaş Çimento (Figure 6). The online cleaning mode is particularly appreciated for this application as the negligible fluctuations of pressure drop in comparison with offline method grants very high stability of the mill ensuring the best quality of the final product.

Figure 7 shows the trend of SWAP capability in cleaning a continuously increased filtration area in CTP Bag Filters during the past 30 years. Each point represents a cumulative number of plants designed by CTP with bags that are 3-10m long. While the bag length is progressively increased by more than three times, much more impressive is the cleaned area per single shot, which, thanks to the SWAP system efficiency, has also increased more than six times.

New bag filters will be commissioned in the next months with SWAP system and bag length up to 10m in Iran, Italy, Turkey, Indonesia, Korea, the USA and Saudi Arabia.

Conclusion

The SWAP technology developed by CTP Team is a unique bag cleaning system at low air pressure, designed to remove dust from several bags of extended length at the same time, with one single shot of compressed air. It performs efficiently with a minimum of stress imparted to the filtering medium. The goal of 115m² of filtering area cleaned in one single row has been reached already. The cleaning of an increased number of long bags currently in development and even more compact filters' size shall be in operation in the near future, equipped with ECO E3 Advanced SWAP technology. 



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Global Cement staff

A review of major global chain companies

Chains play an integral part to the smooth operation of cement plants, as well as many other bulk handling industries. Here, *Global Cement Magazine* provides an overview of a selection of chains and related products suppliers to the cement industry.

Chain & Conveyor

Chain & Conveyor is one of the newer chains producers active in the cement industry. It was established in Cheshire, UK and now has 23 years of experience. The company claims to be the largest chain supplier in the UK and holds at least 18,200m of chain at all times. Chain & Conveyor produces standard chains, bespoke chains, sprockets, slat chains, attachments and spares for the cement and recycling industries, among others. Its chains come in imperial, metric DIN FV, metric DIN M, carrier type and drive chain variations. Chain & Conveyor has been ISO 9001 accredited since 2000.

CICSA

CICSA was launched in 1941 in Lombardia, Italy. It serves the bulk handling and marine sectors, among others, in more than 50 countries around the world.

CISCA claims to be 'the sole chain manufacturer producing the complete range of steel chains, including round link chains, roller chains and forged link steel chains, along with the corresponding fittings, such as wheels, sprockets, shafts, couplings, shackles and various types of brackets.' Its products are deep case hardened to minimise wear and achieve maximum chain life under the most severe service.

CICSA produces chains up to 42mm diameter and is ISO 9001-2008 certified.

GEFA

GEFA produces continuous chain conveyor systems and spare parts from its base in Konstanz, Baden-Württemberg, Germany.

Its spare parts include forked chain links (drop forged and case hardened), chain bolts and locking rings, drive chain wheels, tooth segments and deflector rollers, high-strength manganese steel wearing rails, shearing bolt wheels, shearing crowns, shearing hubs, racks and roller chains. It supplies the cement, chemical, waste incineration and timber industries, among others. In addition to continuous chain conveyors, GEFA also produces screw conveyors, bucket belt conveyors, disk sieves and spare parts.

HEKO Ketten GmbH

HEKO was established in 1917 in Wickede, North Rhine-Westphalia, Germany. In 2004, the company

acquired a second production plant, which doubled its production capacity. It also opened a new export office in Beijing, China in 2005.

HEKO produces round steel chains, bucket and scraper attachments, chain wheels, buckets and shafts, complete return and tensioning units for bucket elevators, as well as chain conveyors and heat resistant ring kiln chains for rotary kilns. Its products are used by the cement, sugar, mining and quarrying industries, among others. HEKO uses case hardening and heat treatments to enhance its products, all of which are tested thoroughly. The company is ISO 9001-2000 certified.

John King Chains

John King Chains has manufactured cement industry chains for over half a century. It originally constructed mechanical handling equipment, which allowed the company a unique insight into the special demands of cement industry and material transport. John King is well placed to offer the majority of chains encountered, commencing in the quarry with heavy duty plate feeder chains, stockpiling and reclaiming of raw materials including limestone, shale, coal and gypsum, as well as hot clinker transport, elevators, ancillary equipment in precipitator dust handling, packaging and alternative fuel conveying.

The company made its mark manufacturing cast link chain produced from iron and steels, later specialising in manganese or Hadfield steel, which is typically found in clinker drag conveyors where it is well suited to the harsh environment. The company has particular strengths in mill duty elevator chain designs, drawn from its long experience, notably in single strand centrifugal discharge elevators and in its Crusader welded steel drag link, which has been well received in both retrofit and new applications.

As part of the company's ongoing investment, 2015 has seen the installation of a new 5KW Fibre laser. This is considered to be the best equipment of its type available on the market. With the additional acquisition of a welding robot, principally for forged fork link chain flight fixing, John King Chains is committed to best manufacturing. Recognition that it is fulfilling this objective was confirmed in a recent BSI ISO9000 quality audit where its internal systems were found to be to 'a first class standard.'

Below - Figure 1: CICSA's toothed and pocket wheel.



Ketten Branscheid

Ketten Branscheid was founded in 1938 in Ennepetal, North Rhine-Westphalia, Germany. In 2007, it bought forging business Köllmann & Vorländer to ensure vertically-integrated, flexible production. Its products are supplied to bulk handling industries, including the cement sector.

Ketten Branscheid produces forge linked chains, sprockets, wear rails, slat chains, link chains, forged chains, block link chains, trough conveyor chains, full stud conveyor chains, plug-in chains, round steel chain systems, chain shackles, special chains and parts. Its products are tested in an on-site laboratory and it complies with ISO 9001-2008 standards.

KettenWulf

KettenWulf was established in 1925 in the Sauerland, North Rhine-Westphalia, Germany. The company has continuously cooperated with equipment manufacturers and end users to optimise chain designs for the cement and bulk material handling industries.

KettenWulf's products include apron conveyors, hinged conveyors, pan conveyors, drag chain conveyors, scraper reclaimers and bucket elevators. Most of its business is in customised product solutions. The KettenWulf Centre of Competence in Kückelheim, North Rhine-Westphalia ensures that its products meet international standards. KettenWulf is also ISO 9001-2008 certified.

Renold

Renold was launched in 1864 as James Slater, which later became Hans Renold Co, and much later after a series of mergers and acquisitions, simply Renold. Its head office is located in Manchester, UK, but the company has operations in almost 20 countries. In 2008, Renold acquired a controlling interest in India's chain manufacturing company L G Balakrishnan and in 2007 it bought China's Hangzhou Shanshui Chain Company to establish a manufacturing base in a low cost economy.

Renold produces chains, gearboxes and couplings for the power transmission, lifting, conveying and processing sectors. For the cement industry, it manufactures bucket elevator chains, sealed joint chains, apron conveyors, hard face drag chains and super capacity elevator chains, among others. Renold is ISO 9001 certified.

SEDIS

France's SEDIS can trace its history back to 1895 when it produced chains as Chains Peugeot, making it the oldest chains company discussed here. In 1946, the merging of Chains Peugeot with two other production facilities formed SEDIS. It currently produces from the Troyes plant in Aube and the Verrières plant in Essonne, both in France.

SEDIS produces leaf chains, roller chains, conveyor chains, agricultural chains, sprockets and

wheels. It has been ISO 9001-certified since 1989. The company's products are supplied to many of the bulk handling industries, including the cement sector. SEDIS' research and development department focuses on producing innovative products that require minimal lubrication and maintenance.

Thiele

Thiele was established in 1935 in Iserlohn, North Rhine-Westphalia, Germany. The company has expanded over the years via a series of takeovers, including chains producers Schlieper and Nordland. Today, it serves 72 countries and claims to have produced the longest and the heaviest anchor chains in the world, at 915m and 100t respectively.

Thiele produces 5000 varieties of round steel chains and forged parts. For the cement industry, its products include plate link chains, bucket elevators, forged link chains, round link chains and sprocket wheels. Thiele has been ISO 9001 certified since 1994. The company is also ISO 14001 certified for its environmental management system, while it is working towards ISO 50001 certification for its energy management system.



Below - Figure 2: KettenWulf's pan conveyor chain with non-black bending device.

Webster Industries Inc

Webster Industries Inc was established in 1876 in Chicago, Illinois, US, although today it operates from Tiffin, Ohio, US. Its customers include the cement, grain, forest and other bulk handling industries. In 2014, Webster announced a three-year, US\$8.3m expansion project that will see an extra 38,000ft² of factory space, 65 new jobs and a US\$4.5m investment into new machinery.

Webster produces a range of chain products, including cast chains, steel bushed roller (SBR) chains, combination chains, steel belt conveyors, PORTALLOY® mill chains, PORTALLOY® drag chains, top plate chains, sprockets, elevator buckets and vibrating conveyors. The company is ISO 9001-1998 certified. It claims that it was 'the first engineered class chain manufacturer to become certified to the ISO 9001 quality standard.'

Yapaş Chain and Forging Co Ltd

Yapaş Chain and Forging is based in Ankara, Turkey, where it has a 12,000m² plant that houses more than 15 different manufacturing machines. The company has over 30 years of experience.

Yapaş Group provides complete elevator systems, conveyors, central type forged elevator chains, central type hot rolled plate chains for elevators and conveyors and link chains for the cement, mining and steel industries, among others. Production is fully-monitored to ensure quality, while every product is tested on-site in one of its laboratories. Yapaş is also ISO 9001-2008 accredited.



Below - Figure 3: SEDIS' hollow shaft chain.

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UK: Greens Environmental launches new high vacuum tank trailer for hire

UK liquid waste and industrial services tanker specialist Greens Environmental has launched a new high vacuum air conveying plant called the iVac.

The iVac is believed to be the only British-made deep vacuum and pressure discharge unit on the market. It was designed to uplift heavy wet and dry industrial materials, including cement. It is particularly suitable for product recovery. The iVac has a 16.5m³ capacity tank and can operate with airflow up to 8000cfm (cubic feet per minute) with a vacuum level in excess of 90%. It also features an automatic filter media cleansing unit to maximise operating time.

Additionally, for the first time, Greens Environmental has made its range of vehicles and equipment available to hire for short, medium and long-term projects.

"The iVac is the result of an ambitious year's investment of Euro280,000 in design and development, culminating in the release of the iVac Series," said Paul Cutter, director of the iVAC project. The tanker will be manufactured in-house so that the iVAC team can retain full technical control.

India: CMI commissions India's first petcoke-fired Twin-D lime kiln

Chemical & Mineral Industries (CMI), based in Jodhpur, Rajasthan recently commissioned India's first petcoke-fired Twin-D lime kiln, manufactured by Italy's MNC M/s Cimprogetti. The 300t/day kiln provides high-quality quicklime to the currently under-supplied paper, pulp, iron and steel sectors.

CMI director Rahul Singhvi said that the kiln was installed in 2014 and currently operates at 70% of its installed capacity. He added that the twin shaft regenerative kiln is highly fuel-efficient, with very low emissions. The quicklime produced is of high reactivity, high brightness, high purity and consistent quality.

The construction of the kiln was prompted, in part, by India's 'Make in India' policy. CMI currently imports 10% of the quicklime entering India. It anticipates that the new kiln will reduce the need for these imports.



CMI has launched India's first petcoke-fired Twin-D lime kiln.

Austria: BSW Machinery launches nanoTex Cyclo

BSW Machinery, the Austrian subsidiary of Windmüller & Hölscher, has launched new technology that allows the reduction of bag weight through indexed micro perforation. The new nanoTex cyclo allows producers to reduce the weight per bag without losing strength. Areas of the bag that are more vulnerable are exempted from perforation.

To enable automated bag filling, the bags are perforated with small holes to allow air to exit the bag when the cement fills the volume. This perforation can be facilitated on tailored equipment, which produces an endless tube from flat fabric or paper material. It is also possible to do the perforation directly on the bag making machine.

Micro perforation has been the industry standard for woven polypropylene bags for some time. This process has

been integrated in the converTex bag conversion machine series for many years. What is new is the replacement of the micro perforation by nano perforation. The nanoTex cyclo creates more and smaller holes than micro perforation. The benefit is a significant reduction of dust escaping through the vent holes. The more vent holes the better for ventilation. However, each hole weakens the tapes that define the strength of the bag.

The feather edges are vulnerable when handling or dropping the bags. However, the nanoTex cyclo strengthens the edges and other crucial areas by indexed nano perforation. The perforation is disengaged whenever crucial sections of bag material are passed through. Synchronisation ensures that the unperforated areas match the print on the bag and are placed in a way that the critical zones of the bag are made from un-perforated material.

The new technology will allow producers of cement bags to reduce their material usage. Additionally, the overall thickness and weight of the bag can be reduced while maintaining strength.



BSW Machinery has launched the nanoTex cyclo to reduce bag weight while maintaining strength.



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Reaction to the post-2020 EU Emissions Trading Scheme proposal...

Koen Coppenholle Chief Executive of CEMBUREAU, the European Cement Association



Contents

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The long awaited post-2020 EU Emissions Trading Scheme (EU-ETS) proposal has now been published by the European Commission. Leaked drafts have been frantically circulating around the 'Brussels bubble' over the past few weeks, but it was only on 15 July 2015 that we finally saw what the Commission is really thinking. In the build up, stakeholders have been running left, right and centre to get their voice heard. But how does the proposal really measure up compared to our expectations? Has our voice really been heard?

Cement is at the start of a supply chain that offers a durable, energy-efficient and fully recyclable product: concrete, the material of choice if we wish to achieve the objectives of sustainable construction. The cement industry does, however, face limited technological potential in order to further reduce its CO₂ emissions.

As outlined in our roadmap to 2050, significant further reductions will require breakthrough technologies such as CO₂ capture. In order to further research and invest in such technologies we need a sound, competitive and financially viable environment. This is why full free allowances for best performers are needed to compensate for direct and indirect costs. As many other energy intensive industries, we have been calling for a proposal that guarantees our competitiveness and which learns from past mistakes. So what is it we really want, and have our expectations been met?

Let's take a look at what CEMBUREAU has been advocating for on behalf of the cement industry. As an overarching objective, it is clear that the post-2020 EU-ETS must create a predictable legal framework and ensure a stable long term globally-equalised carbon price to foster investments in low carbon technologies and eliminate carbon leakage risk. We have been supportive of a much closer alignment between performance-based free allocation for direct emissions and recent production with a periodically updated benchmark. Within any system, however, it is essential that the best performer receives full free allocation for both direct and indirect costs as this will provide industry with the necessary incentives to invest in further improvements while maintaining growth and jobs in Europe. Regarding the list of sectors exposed to carbon leakage, we have advocated in favour of a list that is determined on the basis of the cumulative direct and indirect CO₂ cost burden and be applicable for both free allocation and compensation for indirect costs. It should be fixed for the whole phase,

in the same way as the benchmark. Fixing the list will give capital intensive businesses with long investment cycles increased certainty and predictability about EU investments. We have also made it clear that the most efficient installations in exposed sectors should not face undue carbon costs. We are not in favour of maintaining the cross sectoral correction factor. The benchmarks themselves should also continue to be based on the top 10% of best performing installations.

So what about the proposal as published? Regarding the cross sectoral correction factor, this has regrettably been maintained. In addition, based on the concept of a linear benchmark reduction and the figures included in the proposal, this could mean that the benchmark for the post-2020 trading period will be 8.5% lower than today. As result, the most carbon-efficient companies will still face significant carbon costs, which may in turn hinder investment in further improvements and subsequently have an impact on growth and jobs in Europe.

With the aim of bringing free allocation more closely aligned to recent production, the notion of dynamic allocation has been incorporated in relation to historical activity levels (HAL). Although the proposal does not currently provide any guidance on how the HAL will be calculated, it is promising to see that some of the unallocated allowances pre-2020 will be set aside for new entrants and, in particular, increases in production.

Finally, and on the issue of compensation for indirect costs arising as a result of the EU-ETS, this has been left open to the Member States, in the sense that it encourages rather than calls on them to adopt financial measures in this regard.

This is of course just the starting point of the discussions on the important legislation and we will, of course, continue constructive dialogue with the Commission, European Parliament and Member States. In this debate the most important point to remember is that we are not just 'industry' - we are an industry that manufactures in Europe. We provide growth and jobs that support the EU economy. We offer the essential products that meet the demands of European citizens. Therefore, what we want is an open debate on identifying solutions that balance environmental, economic and societal considerations. The ultimate goal should be to ensure that we can continue to manufacture our energy and resource efficient products in an environmentally and economically beneficial way - *within Europe's borders.*



Europe: LafargeHolcim distributes an exceptional scrip dividend and offers Euro60/share in Lafarge squeeze-out

Following the completion of the LafargeHolcim merger, an exceptional scrip dividend of one new LafargeHolcim share for every 20 existing LafargeHolcim shares has been distributed to all LafargeHolcim shareholders. The last date to trade LafargeHolcim shares 'cum' scrip dividend was 7 September 2015. As of 8 September 2015, LafargeHolcim shares have traded 'ex' scrip dividend.

The settlement and delivery of the newly-issued shares occurred from 10 September 2015. No fractional LafargeHolcim shares were issued. As a consequence, shareholders entitled to receive a number of LafargeHolcim shares not corresponding to a whole number received the rounded-down whole number of LafargeHolcim shares and the balance was paid in cash on 16 September 2015. For the purpose of the scrip dividend, 28,870,252 new LafargeHolcim shares, representing 5% of the LafargeHolcim share capital and voting rights as of 3 September 2015, were issued.

In the middle of September 2015, LafargeHolcim said that it would pay Lafarge minority shareholders Euro60/share in a squeeze-out. The minority shareholders also have the option to receive 9.45 new LafargeHolcim shares per 10 Lafarge shares. The transaction still needs to be approved by France's Financial Markets Authority (AMF). Provided that the regulator approves, the squeeze-out will take place in October 2015. Lafarge shares are expected to be delisted from Euronext Paris on 23 October 2015.

Germany: HeidelbergCement disposes of German lime businesses to Lhoist Group

HeidelbergCement has completed the disposal of its lime business in Germany to the Belgian Lhoist Group. Both companies agreed not to disclose any details about the transaction. The HeidelbergCement assets comprised two lime plants in Germany; the Walhalla Kalkwerk in Regensburg, Bavaria and Kalkwerk Istein in Istein, Baden-Württemberg. Both lime plants were modernised in recent years with new kiln technology. They generated a turnover of about Euro45m in 2014 and employed approximately 180 people.

Italy: Buzzi makes binding bid for Sacci units

Buzzi Unicem has presented a binding offer to buy Sacci's cement and ready-mix concrete units as it pushes ahead with plans to play an active role in the consolidation of the construction materials sector in Italy. In a statement, Buzzi said that it had offered a provisional price of Euro74m to be financed through liquidity on hand and/or existing credit facilities. A further variable outlay is expected on top of the original commitment, which will be worth no less than Euro25m. This variable outlay is connected to certain future events, most importantly the core earnings, earnings before interest, taxes, depreciation and amortisation (EBITDA), posted in Italy in the next four years.

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UK: Suez launches new solid recovered fuel plant with Cemex Rugby

International recycling and waste management company Suez opened a new solid recovered fuels (SRF) plant in Rugby, UK on 18 September 2015. It will supply the Cemex Rugby cement plant with SRF for the next 25 years.

Suez's SRF plant will convert waste from across Warwickshire, Northamptonshire and the wider Midlands area into Climafuel®. Suez will supply Cemex with 240,000t/yr of Climafuel; 200,000t/yr from its SRF plant in Rugby and 40,000t/yr from its SRF plant in Birmingham.

The Rugby SRF plant was built as part of a 25-year deal between Suez and Cemex that was signed in 2012. Suez leased land opposite Cemex Rugby from Cemex in 2013 and construction of the Euro25m SRF facility began in 2014. The commissioning of the equipment took place earlier in 2015.

The SRF facility can process up to 300,000t/yr of waste. Around 70% of the input material comes from businesses in the region, while the remaining 30% is household waste, much of it originating from Northamptonshire County

Council. The majority of the waste would otherwise be destined for landfill, but the SRF process enables Suez to extract recyclable materials, which, processed any other way, would be too contaminated to viably recycle.

"We are very pleased to officially open the Rugby SRF facility and formally mark the start of this long-term partnership between Suez and Cemex," said Jean-Marc Boursier, senior executive vice president of Suez in charge of the recycling and waste recovery division for Europe. "Suez is investing considerably in infrastructure to produce sustainable industrial fuels in the UK. The group now supplies 1.1Mt/yr of SRF worldwide. This solution gives us the ability to extract recyclable materials that would otherwise have been lost. It provides Cemex with a sustainable, long-term alternative to fossil fuels. This inauguration is a symbol of our commitment to the production of renewable energy fuels. Energy derived from SRF offers numerous advantages, because it is renewable, transportable, abundant and economically attractive."

The Netherlands: Van Beek develops new Sample Screw for in-line sampling

Screw conveyor specialist Van Beek has developed the Sample Screw in order to allow a representative sample to be taken without halting the production process.

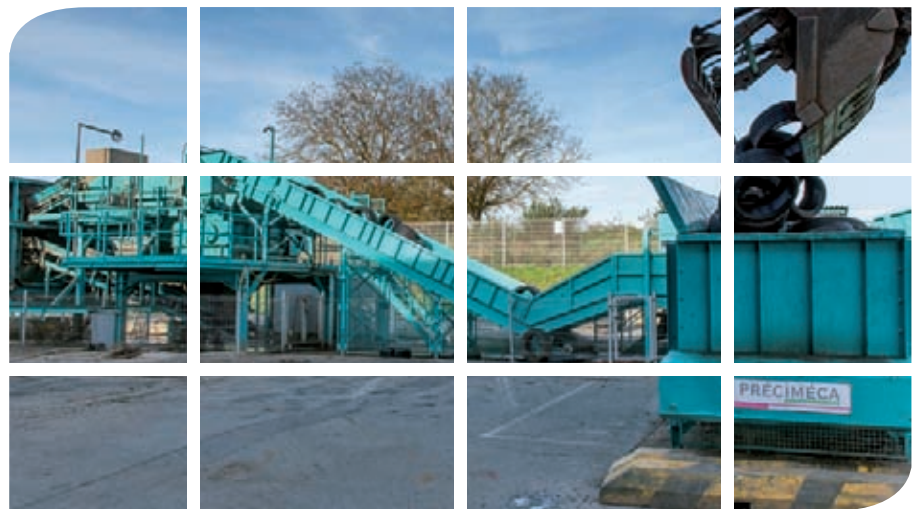
According to Van Beek, the machine is ideal for taking representative product samples from containers, hoppers or in-line (for example, after an outlet or in a discharge pipe). Using a small screw conveyor, a sample of the material is taken safely from the product stream without disrupting the process. Even materials with poor running qualities can be controlled in this way because a screw is used.

The Sample Screw is easy to dismantle for quick and complete cleaning. It can be used in the chemical, food and pharmaceutical industries. Samples can be taken of powders, flocks, granules, flakes, pellets and slurries. The sample size and frequency is adjustable.

Cyprus: Correction

In the September 2015 issue of Global Cement Magazine: 'Global CemFuels focus: Southern Europe,' on page 52-58, we mistakenly stated that Cyprus had two active cement plants. In fact, The Cyprus Cement Company dismantled its cement plant in 2014, leaving Vassiliko Cement as the sole cement producer in Cyprus.

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News in brief

Italy/Germany: Italcementi acquisition to close in 2016

Italcementi's CEO Carlo Pesenti said that the acquisition of Italcementi by HeidelbergCement is expected to be completed in the first half of 2016. Pesenti will join HeidelbergCement's supervisory board and will keep an active role in the company.

Ireland: CRH announces Senan Murphy as finance director

Senan Murphy, currently COO at the Bank of Ireland, has been appointed as CRH's finance director. Murphy will take up his new role and join the CRH board in January 2016. He will succeed Maeve Carton in the finance director role. Carton will become group transformation director, a new position.

Russia: New Kavkazcement CEO named as Igor Nikolenko

Igor Nikolenko has been appointed as the new general director of EuroCement's CJSC Kavkazcement, one of the largest cement plants in southern Russia with a production capacity of 3.1Mt/yr. The company became part of EuroCement in 2004.

Poland: Cement production down by 2.3% in August 2015

Cement production in Poland fell by 2.3% year-on-year to 1.47Mt in August 2015, while sales increased by 0.7% to 1.47Mt, according to Poland's Cement Producer Association. In the first eight months of the year, cement production grew by 1.4% to 10.3Mt, while sales grew by 2.1% to 10.5Mt.

Italy: Italcementi targets 10% innovative product sales

Italcementi aims for 10% of its sales to be covered by innovative products by 2020, compared with 6.5% in 2014 and 1.5% in 2005, according to CEO Carlo Pesenti.

Denmark: Vortex announces Mespo as new representative

Vortex has appointed Mespo ApS as its agent in Denmark. Mespo sells high quality components, machines and customised solutions for powder handling manufacturers.

Ireland: CRH reports 3% profit growth in 2015

CRH's sales increased by 13% year-on-year to Euro9.4bn over its global operations in the first half of 2015. Although its sales fell by 1% in Europe, they rose by 32% in the Americas. Earnings before interest, tax, depreciation and amortisation (EBITDA) from continuing operations were up by 29% globally, by 4% in Europe and by 57% in the Americas. CRH's pre-tax profit grew by 3% to Euro63m.

CRH said that the Euro6.5bn acquisition of LafargeHolcim's assets is now complete. In September 2015 it concluded the final part of the transaction with the purchase of operations in the Philippines. CRH has also announced a further Euro1.15bn acquisition of US-based glass manufacturer C R Laurence.

"We are on track to deliver another year of growth in 2015," said Albert Manifold, CEO of CRH. "Trading in the Americas has been good and, against a mixed macro-economic backdrop, underlying trading in Europe is broadly in line. We have made good progress towards achieving our goal of restoring margins and returns to peak over the cycle, with further margin improvement in each operating division. We are now applying CRH rigour to our new businesses to integrate them efficiently and to drive performance."

According to Manifold, CRH will now take a break from large-scale acquisitions. The CEO said that significant acquisitions going forward are 'unlikely,' and that the company will focus on integrating its two big acquisitions over the next 12-18 months. CRH had previously been linked with two other large-scale cement industry acquisitions. In India, it was in the running to acquire 5Mt/yr of Lafarge assets that have since been sold to Birla Group. Meanwhile, in South Korea, CRH had been linked with the acquisition of Tongyang Cement & Energy.

UK: Simon Vivian appointed as new Mineral Products Association chairman

Simon Vivian, chief executive of Breedon Aggregates Limited, has been appointed as chairman of the UK's Mineral Products Association (MPA) for the next two years. He succeeded Bill Brett on 1 September 2015. Vivian is the third chairman of the MPA to date to serve from an independent company.

"We are delighted that Simon has agreed to pick up the baton from Bill Brett. His wide industry knowledge and experience will be invaluable to the association as we look to set the agenda for the industry for the next 10 years and respond to the challenges ahead," said MPA chief executive Nigel Jackson.



Simon Vivian was appointed as the new chairman of the Mineral Products Association.

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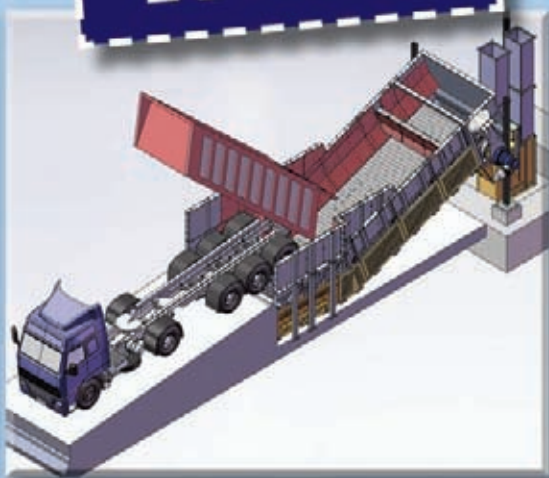
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Denmark/India: FLSmidth sells Haryana plant to cable manufacturer CMI

Specialty cable manufacturer CMI Ltd has acquired one of Denmark-based FLSmidth's manufacturing plants in Bawal, Haryana to cater to the growing demand of its products.

CMI plans to invest US\$3.02m on the acquisition, which is expected to significantly augment the company's production capacity. CMI intends to start production in the new facility within the current financial year. The former FLSmidth production plant possesses all of the necessary clearances and equipment required for industrial production. CMI's net profit rose by 168% year-on-year to US\$429,133 in the quarter that ended on 30 June 2015 and its revenues were US\$20.7m.

CMI, which was formerly known as Choudhari Metal Industries, was incorporated in 1967. The company was initially engaged in copper metal trade and copper melting and rod casting and later diversified to the cables business. It currently makes different types of cables to meet the demand of core infrastructure sectors in India like telecommunication, railways, shipbuilding and petrochemicals.

Turkey: Fosroc invests in Idea Kimya

Fosroc, an international construction chemicals group, has agreed to acquire a substantial majority shareholding in the Turkish market leader for cement additives, Idea Kimya. The transaction is subject to regulatory approval.

Andre Ladurelli, CEO of Fosroc, said that the acquisition signals a highly ambitious phase of growth. "Our strategy is to continue achieving double-digit organic growth in existing businesses and enter new territories through the formation of new ventures and through acquisitions. The acquisition of Idea Kimya is an excellent example of this strategy, demonstrating our commitment to growth while providing a substantial platform for further development in Turkey and its neighbouring countries. Our attitude is that we want to seize the day, lead the market and out-class our rivals on product, expertise and service," said Ladurelli.

Having recently completed new ventures in Myanmar, Vietnam and Iraq and, with a host of other projects currently being developed, Ladurelli cited the example of Kenya as one of Fosroc's key future strategic ventures, through which it aims to open up the East African market.

Fosroc's sales in the first half of 2015 increased in line with expectations. Its earnings before interest, taxes, depreciation and amortisation (EBITDA) grew by 18% year-on-year.

"The integration of Idea Kimya into the Fosroc Group will create new high-growth opportunities. Fosroc will provide a thorough range of construction chemicals products and solutions, with the support of their global organisation," said Hakan Gulseren, managing director and one of the founders of Idea Kimya.

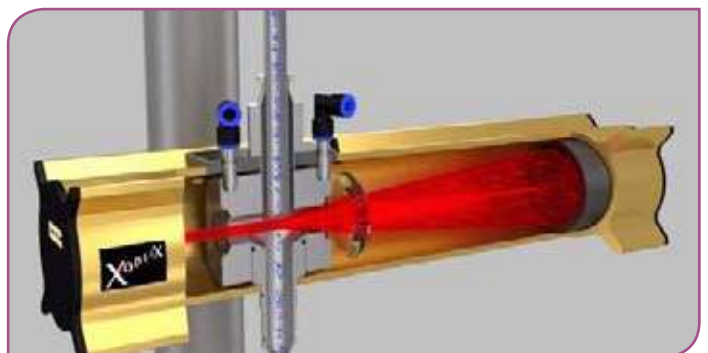
UK: Xoptix launches CementSizer for real-time particle analysis

Xoptix Ltd, which in 2015 is celebrating its 10th year in business from its base in Malvern, Worcestershire has launched the CementSizer, which was specifically designed for in-process particle sizing in the cement industry.

The CementSizer has unique sampling probe options that ensure that sampling directly from the process line is representative. It has two specialist sampling units that have no moving parts and can 'dilute' powders in a conveyed cement process to the levels required to provide the correct amount of material needed by the online instrument. Sampling 2000 samples per second in real-time, the CementSizer can increase throughput in a cement mill by up to 5%. Laboratory workload can be decreased, a lower response time when changing grades and significantly lower standard deviation in cement fineness can be achieved.

The patented Interstitial Iso-Kinetic Probe (IIP) is suitable for cement production output up to 120t/hr. It is quickly and easily installed and provides control over sample extraction. It is low maintenance, with abrasion-resistant parts that ensure maximum throughput and greater output. For cement output in excess of 300t/hr, Xoptix has developed the patented Passive Multistage Dilution Sampler (PMDS). With no moving parts, it dilutes the powder flow

in the cement process to a level that is compatible with in-process analysers. It decreases the complexity and the cost and increases the reliability of the installation.



The CementSizer was designed by Xoptix specifically for in-process particle sizing in the cement sector.

"Through many years of working with cement mills to optimise their processes, we recognised the need for a specialised particle sizer for the cement industry, as many other analysers just didn't give that level of accuracy, ease of integration and durability," said Stuart Barton. "With our newly-patented sampling probes to give representative particle size distribution in real-time, we can increase throughput and product quality for our customers, with an easy to use in-line monitoring device."

Italy/China: Italcementi sells minority stake in West China Cement for Euro39m

Italcementi has sold its 5.24% stake in West China Cement for Euro39m. The price is subject to further adjustment. Italcementi has sold the stake through its CimFra Limited subsidiary in China and said that the transaction would have no impact on earnings before interest, tax, depreciation and amortisation (EBITDA) generation capacity at group level.

Russia: Sengileevsky Cement sends first cement batch by barge

Eurocement's Sengileevsky Cement plant began cement shipments by barge in August 2015, when it sent its first 1700t batch to a distribution centre in Cheboksary.

"Our company is developing further opportunities to ship, not only cement in bulk, but also bagged cement by water," said Mikhail Skorokhod, president of Eurocement.

The Sengileevsky Cement plant is situated on the bank of the Volga River, making it easy to transport cement to Ulyanovsk and surrounding areas, as well as further afield. Shipping by barge is relatively low cost, which should help to stabilise cement prices.

UK: Cement plant chimney to be demolished

The Westbury cement plant in Wiltshire, which was constructed in the early 1960s and mothballed in 2009, is now set to be partly demolished. In a bid to attract investors, non-operational parts of the site, including the 122m-high chimney, will be cleared. The structure will be brought down with a series of controlled explosions, according to site owner Tarmac, now part of CRH.

Earlier in September 2015, Tarmac said that it had submitted a prior notice to Wiltshire Council to demolish part of the complex. At present, the site is an 'attraction to trespassers' and 'a security and maintenance liability.' According to Tarmac management, the demolition will result in reduced trespass and a reduced need for maintenance.



The Westbury cement plant in Wiltshire, UK, will be partly demolished.



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Amy Saunders, *Global Cement Magazine*

A review of Austria's static cement industry

The central European federal Republic of Austria has 8.67m inhabitants in 2015 and spans 83,855km² of land.¹ The country is characterised by high living standards and had a GDP/capita of US\$43,400 in 2014, making it one of the richest in the world. However, its economy has stagnated in recent years, which is reflected in its muted construction and cement industries. Here, *Global Cement Magazine* provides an overview of the Austrian cement sector, recent trends and an industry outlook.

Economy

The Austrian economy has traditionally been closely linked to that of other European countries, especially Germany, although in recent years a divergence from Germany has been observed.

Austria's GDP grew by 0.3% in 2014 to US\$437bn (US official exchange rate) and its GDP/capita grew to US\$43,400.¹ In contrast with much of Europe, Austria experienced only a brief but sharp recession from the 2008 crisis and its recovery was initially strong. However, the economy has been 'unstable' since 2012, despite an austerity package of expenditure cuts and new revenues. The country is now faced with external risks from Austrian banks' continued exposure to Central and Eastern Europe, repercussions from Austria's Hypo Alpe Adria national bank collapse, political and economic uncertainties caused by the European sovereign debt crisis, the crisis in Russia/Ukraine, the appreciation of the Swiss Franc and political developments in Hungary.

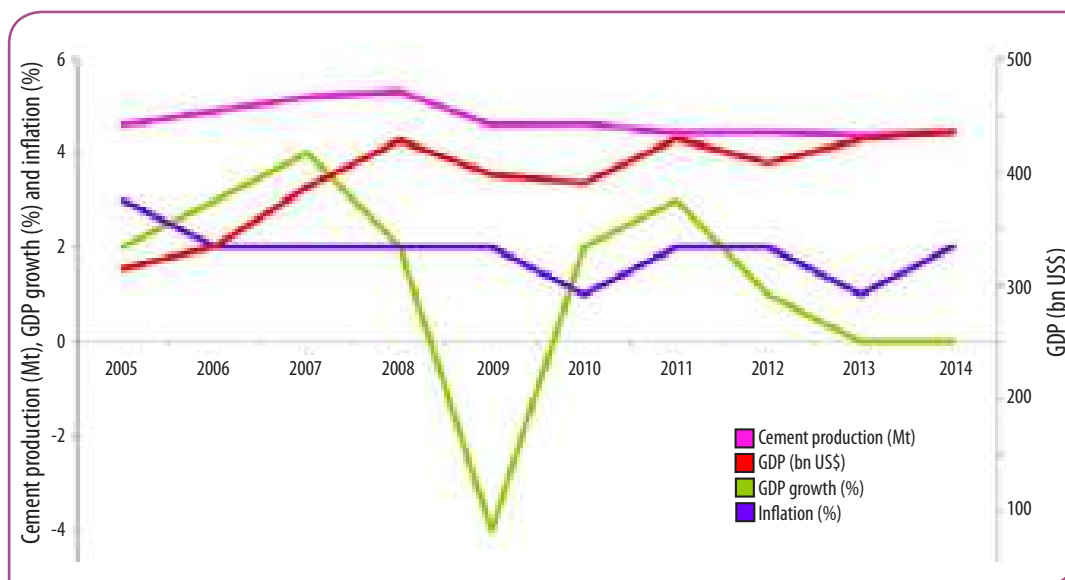
Austria's weak economic growth coincides with a steady rise in unemployment levels, which although low by European averages, reached a record high of 5.6% in 2014. This is in spite of a government-

subsidised scheme that enabled companies to reduce working hours and retain employees. The rate of inflation peaked at 3.6% in 2007, almost immediately after the onset of the recession. It has since fluctuated widely and in 2014 was 1.6%.

In 2014, the majority of the 3.86m-strong Austrian labour force worked in the service sector (68.5%), while 26% worked in industry and the remaining 5.5% worked in agriculture. Austria's industrial production grew by 1.8% in 2014. The country is a marginal net importer of goods. In 2014, it imported US\$173bn of equipment, vehicles, chemicals and oil products, among others, down from US\$174bn in 2013. In 2014 it exported US\$170bn of machinery, paper and paperboard, metals and textiles, up from US\$167bn in 2013.

Cement industry overview

The Austrian cement industry is fairly small, with nine integrated cement plants and three grinding plants (Figure 3), one of which has been decommissioned. The industry is overseen by the Association of the Austrian Cement Industry (Vereinigung der Österreichischen Zementindustrie - VÖZ). Every



Right - Figure 1: Austrian cement production (Mt), GDP (bn US\$), GDP growth rate (%) and inflation rate (%) in 2005-2014. Sources: <https://www.cia.gov/library/publications/the-world-factbook/geos/au.html>, the VÖZ.



cement company in Austria is a registered member of the association.

In May 2015, the VÖZ produced its annual review of the Austrian cement industry.² It said categorically that, despite the overall recovery of the European economy, Austria's cement industry had stagnated due to domestic factors. "The implementation of the current energy-efficiency law, emissions trading and expensive environmental taxes leads to exuberant bureaucracy. This and the ongoing political reform backlog are the reason for the significant reduction in investments in the cement industry," said Rudolf Zrost, CEO of the VÖZ.

In 2014, Austrian cement production grew by 1.1% year-on-year to 4.44Mt (Figure 1), however, cement production has been on an overall decline since its peak of 5.3Mt in 2008. Cement industry turnover in 2014 was Euro372m, up from Euro365m in 2013, but down from Euro375m in 2012.

Cement producers

The majority of Austrian cement plants are privately-owned. The only multinational corporations present are Lafarge Zement (now part of Switzerland's LafargeHolcim) and Germany's Rohrdorfer Group, both of which acquired pre-existing cement plants.

Lafarge Zement (LafargeHolcim) has a joint venture with Austria's STRABAG, in which Lafarge Zement owns a 70% stake. The venture operates the 1.1Mt/yr Mannersdorf plant and the 0.5Mt/yr Retznei plant. With a combined capacity of 1.6Mt/yr, Lafarge Zement is Austria's largest cement producer.

Privately-owned **Wiiertersdorfer & Peggauer Zement**, part of Wiiertersdorfer (formerly known as the Wiiertersdorfer Group), owns two integrated cement plants in Austria. The plant at Wiiertersdorf, Carinthia, has a cement production capacity of 0.75Mt/yr, while the Peggau plant in Styria has 0.4Mt/yr of production capacity. As such, Wiiertersdorfer & Peggauer is the second-largest cement company in the country. It also owns an additional cement plant in San Vito, Italy, concrete plants in Austria and two resource companies in Austria. In addition to Ordinary Portland Cement (OPC), Wiiertersdorfer & Peggauer produces white cement and a variety of special cements and binders.

Rohrdorfer Group is active in Austria via **Gmundner Zement** and **SPZ Zementwerk Eiberg**. Gmundner Zement's Hatschek plant has a production capacity of 0.8Mt/yr and was purchased by Rohrdorfer Group in 2004. Located in Gmunden, Upper Austria, the plant has been operational since 1907. SPZ Zementwerk Eiberg, acquired by Rohrdorfer Group in 1995, operates a grinding plant in Tyrol. The Eiberg plant produces OPC and concrete additives. In August 2015, Rohrdorfer Group completed the acquisition of Cemex's operations in Austria and Hungary;³ in Austria, this included 24 sand and gravel pits, 34 ready-mix concrete plants and one admixtures plant.

Leube Baustoffe is a privately-owned Austrian producer of cement, lime, sand, gravel and ready-mix concrete. The company operates a 0.77Mt/yr cement plant in Salzburg, from which it produced 486,000t of cement and binders in 2014, down from 514,000t in 2013. Turnover fell from Euro82m in 2013 to Euro78m in 2014, while employee numbers fell from 255 to 249. Notably, the company is one of the few global producers of white cement. It also runs lime plants and quarries throughout the country.

Privately-owned **Kirchdorfer Group** owns one cement plant in Kirchdorf, Upper Austria, with a capacity of 0.5Mt/yr. The company also supplies raw materials, finished parts and pre-fabricated homes to over 15 countries around the world.

Far left - Figure 2: The Republic of Austria, situated in central Europe, is famous for its stunning mountain views.

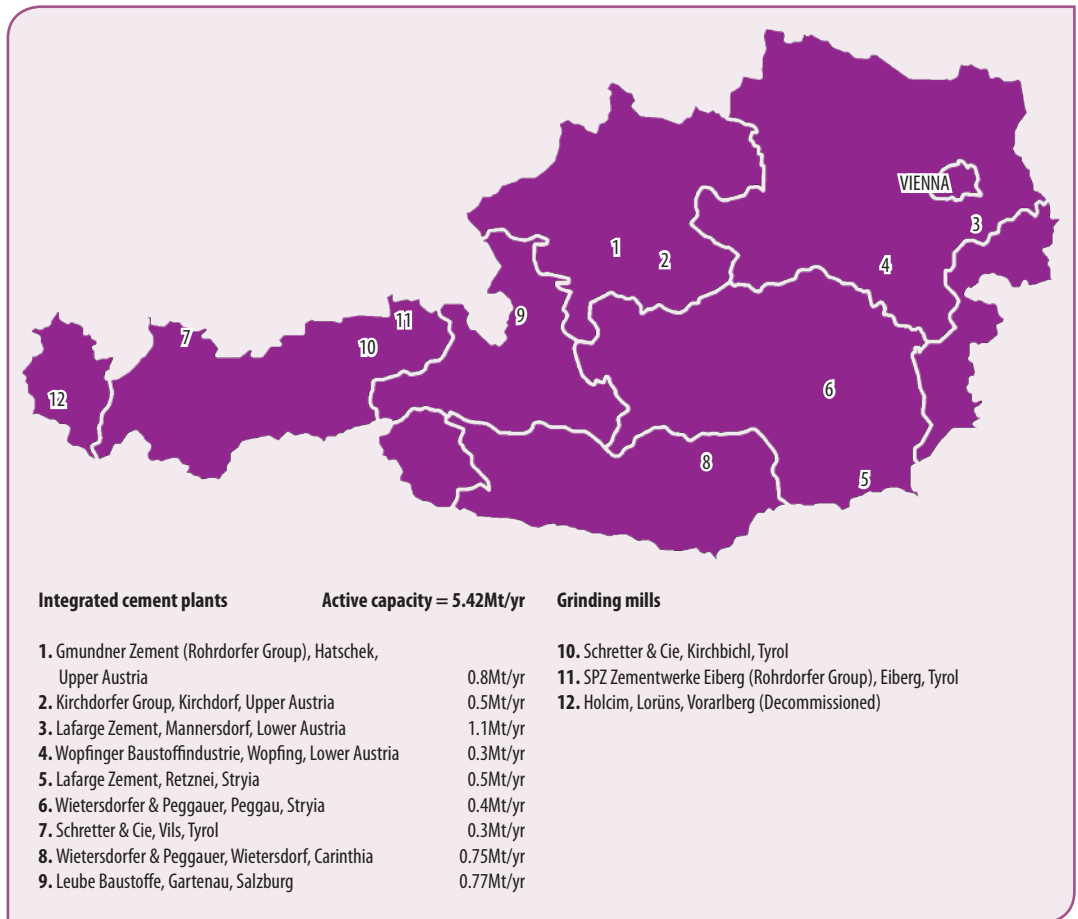


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Right - Figure 3: Integrated cement plants and grinding mills in Austria in 2015.
Source: The *Global Cement Directory 2015*.

Schretter & Cie owns the 0.3Mt/yr capacity Vils integrated cement plant in Tyrol and a grinding plant in Kirchbichl, Tyrol. It is a privately-owned mineral company that was founded in 1899 and today produces cement, gypsum, special binders and lime.

Wopfinger Baustoffindustrie operates a 0.3Mt/yr cement plant in Wopfing, Lower Austria. Wopfing is a family-owned subsidiary of Schmid Industrie Holding. In addition to cement, Wopfing also produces lime, dry plasters, screeds and façade plasters at the same location. While the Wopfing site has been in existence since 1911, commissioning of the cement plant did not occur until 1988, eight years after construction began. Wopfing had a turnover of Euro157m in 2014.

An additional Austrian grinding plant in Lorüns, Vorarlberg that is owned by Holcim (now part of LafargeHolcim), was closed in the summer of 2011 due to rising production costs.⁴ Holcim said that increasing financial pressures, which showed no sign of abatement, rendered the cost of maintaining the transportation network to the plant commercially unviable, resulting in the plant being decommissioned.

Environmental policies

The VÖZ is a full member of the European Cement Association (CEMBUREAU) and the Cement Sustainability Initiative (CSI). As such, its Austrian

cement producer members operate some of the most environmentally-benign cement plants in the world. The VÖZ produced an environmental plan for the Austrian cement industry in 2008,⁵ which has since been updated and includes the following key aims:⁶

- Continued investment in energy-efficiency;
- Reduced emissions of dust, CO₂ and NO_x;
- Prevention of accidental emissions;
- Increased use of alternative raw materials;
- Development of low-carbon, low-emission and energy-efficient materials;
- Increased use of alternative fuels;
- Recycling of calcium, silicon, aluminium and iron oxide for clinker production.

The Energy Efficiency Act (EEA)

On 1 January 2015, the new Energy Efficiency Act (EEA - Bundes-Energieeffizienzgesetz) came into effect, which replaced the 2012 EU Energy Efficiency Directive to meet the European Union's 2020 target of reducing energy usage by 20%.⁷

Energy suppliers are now obliged to initiate and prove energy-efficiency measures equivalent to at least 0.6% of their total energy supply in the preceding year. At least 40% of the required efficiency measures must be implemented at the household level. In the new law, the responsibility was placed on energy suppliers for payment, irrespective of their



Year	Dust (g/t)	NO _x (g/t)	SO _x (g/t)	Cl (g/t)	F (g/t)	TOC (g/t)	Metals (g/t)	CO ₂ (Mt)	Specific CO ₂ (kg/t)	ARM + AF (kg/t)	Thermal substitution (%)	Specific energy consumption (MJ/t)
2010	11.6	912	64.4	3.30	0.207	97.1	0.095	2.442	574	397	62.8	2771
2011	8.7	890	50.1	3.32	0.198	81.2	0.094	2.467	557	412	65.3	2621
2012	6.8	810	57.8	3.95	0.227	73.6	0.122	2.494	560	446	68.4	2661
2013	8.6	835	76.7	4.07	0.250	85.2	0.114	2.456	560	479	72.4	2698
2014	6.9	776	101.3	5.71	0.252	71.6	0.180	2.462	555	485	75.5	2737

place of incorporation, which means that foreign energy companies also have to comply with the new law. As most international energy suppliers are active in the industrial sector rather than the household sector, they are expected to struggle to achieve 40% of their 0.6% savings obligation at this level.

Compensation payments of Euro20/ kWh are due if energy suppliers fail to provide proof of the required energy-efficiency measures. The EEA also provides for administrative fines of Euro10,000-100,000. Larger fines may be imposed on suppliers that fail to fulfil their individual energy-saving obligations or fail to make compensation payments in time.

Compliance with the new law is expected to trigger additional costs for energy suppliers, which will be passed on to end users. As a highly energy-intensive industry that is also world-leading in terms of energy-efficiency, the Austrian cement sector is expecting rising energy costs in the near future. Sebastian Spaun, the VÖZ's managing director, said that Austrian cement producers, which have made large investments in energy-efficiency and have no further significant energy savings potential, are at a disadvantage.² "While Germany's energy-intensive industries have been exempted from such costs, the most energy-efficient plants in Austria will lose out around Euro4m/yr," said Spaun.

Industry-wide emissions and fuels data

Austrian cement companies have made the harmful emissions produced by cement plants a priority for many years. The industry has hosted several pilot studies and is one of the top countries in the world for environmentally-friendly cement plant technology.

The VÖZ has compiled industry-wide sustainability reports with annual plant emissions for many years.⁸ Dust, NO_x, total organic carbon (TOC) and specific CO₂ emissions have all fallen steadily since 2010 (Table 1), although SO_x, Cl, CO₂ and total metal emissions have grown during the same five-year period.

A voluntary commitment to reduce NO_x emissions to 395mg/Nm³, significantly lower than the statutory level of 500mg/Nm³, was announced in 2012.⁹ This followed analysis of the results of long-term research projects at the Wopfung and

Fuel	2010	2011	2012	2013	2014
Coal (t)	124,17	101,02	98,980	83,848	77,043
Fuel oil (t)	8709	3188	1352	2835	1613
Petcoke (t)	20,969	35,845	30,325	31,465	29,543
Natural gas (m ³)	4179	4473	4543	2619	1873
Alternative fuels (t)	377,081	397,470	456,259	483,694	493,609
Electricity (MWhr)	486,59	507,73	510,72	513,56	497,92

Alternative fuel	2010	2011	2012	2013	2014
Waste tyres (t)	27,088	33,967	37,305	40,245	47,903
Waste plastics (t)	203,211	233,317	273,733	277,909	293,502
Waste oil (t)	11,446	9625	6670	5935	7574
Waste solvents (t)	11,351	14,959	16,420	17,370	16,696
Agricultural wastes (t)	4598	4466	5654	3548	1492
Waste paper (t)	37,872	34,604	36,800	46,967	38,778
Other (t)	81,514	66,532	79,676	91,720	87,664

Left - Table 1: Austrian cement industry emissions /t of clinker produced, total CO₂ emissions, specific CO₂ emissions /t of cement, alternative raw materials (ARM) and alternative fuels (AF) consumption /t of cement, thermal substitution and specific energy consumption /t of cement for 2010-2014.
Source: http://www.zement.at/downloads/nachhaltigkeitsbericht__2014.pdf.

Left - Table 2: Fuel consumption by Austrian cement plants in 2010-2014.
Source: http://www.zement.at/downloads/nachhaltigkeitsbericht__2014.pdf.

Left - Table 3: Alternative fuel consumption by Austrian cement plants in 2010-2014.
Source: http://www.zement.at/downloads/nachhaltigkeitsbericht__2014.pdf.



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Kirchdorf cement plants, where NO_x emissions were reduced to 389mg/Nm³ through the use of pilot selective catalytic reduction (SCR) systems. A larger scale SCR project was later installed at the Mannersdorf cement plant where the increase in resource efficiency and other environmental protection measures afforded emissions reductions of 24.8% of dust, 2.9% of CO₂, 2.3% of NO_x and 22.2% of SO₂ in 2010.

The fuels consumed by Austrian cement plants have changed significantly in the past five years (Table 2). Coal consumption has fallen by almost a half in during the period, while fuel oil use fell from 8709t in 2010 to 1613t in 2014. Natural gas use and electricity consumption also declined. In contrast, alternative fuel use rose from 377,081t in 2010 to 493,609t in 2014. By mass, waste plastics are by far the largest type of alternative fuel used in Austria, comprising 293,502t in 2014 (Table 3). This was followed by waste tyres (47,903t) and waste paper (38,778t). Alternative raw materials and alternative fuels consumption grew to a peak of 485kg/t of cement in 2014, while the industry's thermal substitution rate reached a peak of 75.5% (Table 1). Specific energy consumption rose to 2737MJ/t of cement in 2014, the highest in the previous five years.

Individual cement plant initiatives

Most of the Austrian cement companies also adhere to their own environmental programmes.

Lafarge Zement first used alternative fuels at the Mannersdorf plant in 1996. The installation of a NO_x emissions reductions facility in 2003 was followed in 2012 by the installation of an SCR system. Similar initiatives were put into place at the Retznei plant, including the opening of the ThermoTeam treatment

plant for alternative fuels in 2003, the installation of a solvent system for biogenic combustion to reduce CO₂ emissions in 2007 and a collaboration to divert 5000MWh/yr of waste heat from the cement plant to the local heat supply network, which is 33% of the region's energy consumption. The WHR system avoids 1500t/yr of CO₂ emissions and in November 2014, it celebrated the heating of its 250th home.¹⁰ "We can now provide year-round cover for space and hot water in the cement plant with organic heat, even if production is at a standstill. We therefore substitute our previous consumption of heating oil. This alone saves 160,000kg/yr of CO₂," said Peter Fürhapter, plant manager at Lafarge Retznei. The project cost Euro1.1m.

Wietersdorfer & Peggauer invests in plastics recycling, energy-efficiency upgrades and research projects that provide further energy savings and emissions reductions. The company's most recent advance came in 2006, when it concluded a four-year upgrade that included the installation of a new heat exchange tower and alternative fuel processing plant at the Wietersdorf plant. Wietersdorfer & Peggauer has pledged continued investment in emissions reductions, in addition to an increase in the rate of alternative fuels used.

Rohrdorfer Group has installed a state-of-the-art SYSTEMAX brand UTP copper cabling technology¹¹ and Scheuch IMPULS compact air filter units to improve efficiency and reduce dust emissions.¹²

Leube Baustoffe has a heavy focus on environmentally-friendly cement production and boasted an 83% alternative fuels substitution rate in 2014, which corresponds to around 52,926t of fuels.¹³ Its 2014 fuel mix consisted of:

Right - Figure 4: The Lafarge Mannersdorf plant in Lower Austria was initially considered as one of the asset divestments for the LafargeHolcim merger. However, the decision was later reversed and Lafarge Zement retained the Mannersdorf plant following the creation of LafargeHolcim.





- 'Fuel': 472t (1.7%);
- Coal: 8302t (15.4%);
- Plastics: 47,961t (72%);
- Tyres: 4965t (10.9%);
- Natural gas: 14,980m³ (~0%).

Leube Baustoffe's NO_x emissions rose from 292mg/m³ in 2013 to 298mg/m³ in 2014. However, its dust emissions fell slightly to 2mg/m³, while its SO_x levels fell from 37mg/m³ to 34mg/m³. TOC emissions declined from 35mg/m³ to 26mg/m³ and CO emissions fell from 1147mg/m³ to 777mg/m³.

Like Lafarge Zement, **Kirchdorfer Group** uses a WHR system to supply the local district with heating, while the use of its kiln control system allows combustion that reduces NO_x emissions. Through sustainable raw material quarrying and alternative fuels supplied by subsidiary Alfuma, Kirchdorfer Group has produced an eco-friendly cement 'ÖKO Universalzement' that generates 20% less CO₂ than OPC. Kirchdorfer Group claims to have the world's greenest cement plant following Euro23m of investments in 2000-2015.¹⁴ In December 2013, it established a joint venture company with Upper Austria's Asamer called KIAS Recycling. KIAS, which commenced operations in March 2014, recycles 30,000t/yr of waste tyres for a variety of purposes, including the production of alternative fuels. In 2013, the Kirchdorf plant's alternative raw materials and alternative fuels consumption grew by 7.3% year-on-year to 479kg/t.¹⁵ Its alternative fuels substitution rate grew by 5.8% to 72.4%, while its specific thermal energy consumption grew by 1.4% to 2,698MJ/t of cement. With the exception of its CO₂ emissions, which remained stable at 560kg/t, all of its other emissions levels grew; dust levels grew by 26.6% to 8.6g/t clinker, NO_x emissions grew by 3.1% to 835g/t and SO_x levels grew by 32.7% to 76.7g/t.

Wopfinger Baustoffindustrie's Wopfing cement plant is more self-sufficient than most and claims that it is the 'cleanest cement plant in the world,' after more than Euro50m of investments. The plant sources most of its raw materials from its on-site lime plant and plaster plant. This reduces landfill waste, transport costs and saves energy. Waste heat from the cement plant is recycled to other parts of the site. A selective non-catalytic reduction (SNCR) system was installed in 2006 to reduce NO_x emissions, a 30% more energy-efficient mill for low CO₂-producing Ökozement was commissioned in 2009 and a new fabric filter was installed in 2011. Most notable was the 2011 installation of the world's first regenerative thermal oxidiser in the cement sector in partnership with CTP, an Austrian environmental technology company. The oxidiser purifies the exhaust gas of the cement plant through an entirely new process that eliminates pollutants. In May-October 2014, Wopfinger's average PM₁₀ emission was 15.9µg/m³ and all of its emissions were within the legal limits.¹⁶

Events from 2014-2015

The LafargeHolcim merger

The merger of France's Lafarge and Switzerland's Holcim, both of which have interests in Austria, was first announced on 7 April 2014. The combined company will benefit from reduced costs and improved profitability, however, due to the large amount of overlap in operating regions, including much of Europe, significant asset divestments were necessary to maintain competition in several regions.

At the time, Lafarge was present in Austria via its 70% stake in the 1.2Mt/yr Mannersdorf plant (Figure 4) and the 0.5Mt/yr Retznei plant. This gave it an effective cement production capacity of 1.2Mt/yr in Austria, or 21.7% of Austria's 5.52Mt/yr total integrated cement production capacity. Holcim's only stake in the country was a decommissioned grinding plant. Initially, the Mannersdorf plant was earmarked for sale,¹⁷ however, later the decision was reversed and no changes were deemed necessary in Austria for the merger to be approved.

Accordingly, in February 2015 CRH agreed to pay Euro6.5bn for many of Lafarge and Holcim's assets, mainly in Europe and the Philippines. The assets included 36Mt/yr of cement production capacity from 24 cement plants and included all of Lafarge's assets in Germany. The merger was ultimately closed on 15 July 2015. LafargeHolcim was created and CRH bought the agreed-upon assets following approval



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Right - Table 4: GDP growth rate of Austria, Germany and Europe in 2014 and predictions for 2015 and 2016.

Source: IMF World Economic Outlook Database April 2015.

Right - Figure 6: Sebastian Spaun was appointed as the new managing director of the VÖZ in February 2015.

from various competition commissions.

In other news, a dispute with the European Commission (EC), which began in November 2008, still blights Lafarge Zement. The EC officially alleged anti-competitive practices in seven of Lafarge's countries of operation, including Austria, in November 2010. The investigation is ongoing and no date has been announced for expected completion.

Yara International buys STRABAG

In June 2014, Norway's Yara International announced plans to acquire the flue gas cleaning division of Austria's STRABAG to consolidate its position as a global, full-service emissions-to-air control company. STRABAG said that it is selling its flue gas cleaning division to focus on its core construction business. The deal was completed in August 2014.

"Our acquisition of STRABAG's flue gas cleaning division will increase our capacities in and beyond NO_x control systems. It will also give us access to great teams in key growth markets like Asia and Eastern Europe, where we can help customers meet increasingly-stringent environmental regulations," said Yves Bonte, senior vice president and head of Yara's industrial segment. Yara can now provide an end-to-end service that includes the production of SCR and SNCR systems to reduce NO_x emissions, along with the reagents needed to operate them.

Staff changes

In February 2015 Lafarge added a new position, that of building systems manager for Austria, to its marketing and innovation team.¹⁸ The position was filled by Harald Sommer, who was previously a technical sales consultant. Sommer will focus on the increasing demand for 100% mineral wall solutions.

Also in February 2015, Sebastian Spaun was

Region	2014 (%)	2015 (%)	2016 (%)
Austria	0.3	1.9	1.6
Germany	1.6	1.6	1.7
Europe	1.5	1.9	2.1



appointed as the new managing director of the VÖZ.¹⁹ In 1998-2004 he was head of the VÖZ's environment and technology sector and in 2004-2015 he acted as deputy general manager active.

In June 2015, Lafarge appointed Antoine Duclaux as its CEO of Central Europe, encompassing Austria, the Czech Republic, Hungary, Slovenia and Slovakia (Figure 5).²⁰ He succeeded Thomas Spannagl, who left Lafarge. Duclaux was formerly senior vice president of strategy at Lafarge headquarters and prior to that, he was managing director at Lafarge Cement Emirates in Dubai and at Lafarge Cementos in Honduras.

Outlook

The IMF has predicted that Austria's GDP will grow by 1.9% in 2015 and 1.6% in 2016, similar to Germany's forecast, but below the European average (Table 4).²¹ The VÖZ expects the Austrian construction industry to grow by a similar amount to its GDP, by

UNTHA launches new XR pre-shredder for RDF and SRF production

In July 2014, Austria's UNTHA Shredding Technology launched its new XR ripper and cutter series of pre-shredders for the production of refuse-derived fuel (RDF) and solid recovered fuel (SRF).


The new XR shredders offer flexibility to the final particle size by the use of two distinct cutting methods that can be configured and re-configured by the end user. The tearing motion achieves a rough shred of untreated waste, with a homogeneous, pre-determined particle size between 100-400mm, while the final fraction size is regulated by adjustable screen bars. Load-dependent speed controls adjust the XR shredder's RPM and torque to maximise throughputs of up to 70t/hr.

Far right - Figure 5: In June 2015, Lafarge appointed Antoine Duclaux as CEO of Central Europe encompassing Austria, the Czech Republic, Hungary, Slovenia and Slovakia.





1% in 2015 and by 1.3% in 2016, again significantly lower than the European average.² Rupert Zrost, CEO of the VÖZ, does not expect any positive changes in the cement industry given the stagnation of the political and budgetary situation.

“We have unfortunately disconnected from Germany’s economic development,” said Zrost, who added that the small growth in cement production in 2014 was mainly due to investment in urban areas like Vienna, Styria and Salzburg. Indeed, investments in cement plant technology have declined significantly since 2011. Only environmental investments have increased, by around 16%. 

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Left - Figure 7: Linz, Upper Austria, is Austria’s third-largest city. It encompasses both sides of the Danube River and is a major urban centre in the country.

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Interview by Peter Edwards, Global Cement Magazine

Akmenes Cementas: A new dry line for an independent cement producer

Akmenes Cementas has been making cement at the same site in Naujoji Akmenė in Lithuania since 1952. During the Soviet era, the plant was run as a wet process facility, with up to eight kilns that supplied cement to all over the USSR. After Lithuania regained its independence in 1990, the plant underwent a period of rationalisation to adjust to market demands and was progressively upgraded to modern standards. Since 2014 a new 4500t/day dry process line from Germany's KHD Humboldt Wedag has been in operation. *Global Cement's* Peter Edwards recently visited the plant and spoke with Production Manager Edmundas Montvila.

History and Introduction

Global Cement (GC): Can you outline the history of cement production at this site?

Edmundas Montvila (EM): The idea for a cement plant at Naujoji Akmenė first arose during the Second World War and the Soviet government decided to build a plant here in 1946. Before the war it was clear that there was significant limestone here that was suitable for cement production.

The first and second kilns were 'from' Poly-sius but they were absolutely free of charge. This is because they were dismantled by the USSR from a plant in East Germany! They were transported to Lithuania and then reassembled here. The first kiln was installed in 1951 and made its 'first' cement in 1952.

Over the next 20 years the USSR added another two wet process lines to the plant to reach a capacity of around 0.5Mt/yr. Each of the kilns was different at that point.

In the 1970s a second plant was designed and built adjacent to the first, which also had



Right: The new KHD preheater with calciner and partial view of the kiln at Akmenes Cementas.

Plant profile: Akmenes Cementas

Location: Naujoji Akmenė, Šiauliai County Lithuania

Founded: 1946

First cement: 1952

Kiln: KHD PYROCLON®-R LowNO_x with PYROTOP (2014) 4500t/day (~1.2Mt/yr)

Employees: 480 (in high season)

Ownership: ~53% Lithuanian investors
~38% Cemex, ~9% HeidelbergCement



Right: Summary information about the plant.



Left: View of the Kalcitas-run limestone and clay quarry that supplies Akmenes Cementas. The separation of the companies that run the quarry and plant was a Soviet decision in the 1980s that was carried through during privatisation in the 1990s.

four wet kilns. It was a real Soviet ‘copy-paste’ design that was used all over the USSR, in Russia, Belarus, Poland and elsewhere. By the end of the 1980s, the plant operated all eight lines at the same time, with a total capacity of 3M/yr.

During the Soviet time the production of cement in Lithuania was around 1000kg/capita. That’s production of 3Mt/yr of cement and a population of around three million. It was very high and shows just how different the Soviet system was to the market we have today. Under the USSR, the cement made here could have been sent to Vladivostok! We also sent a lot of cement to Kaliningrad, which was a major centre for the Russian military.

A decision to upgrade to dry production

EM: After the restoration of Lithuania’s independence, the adjustment to the market system meant that we didn’t need to make as much cement. The plant used just one line from the first plant and two from the second plant in the 1990s.

This was an inefficient set-up and so in 2007 we decided to install a new dry process cement line. This

was to reduce fuel consumption and increase capacity. The new line was designed to be installed within the footprint of Kilns 5 and 6 at the second plant. This was to allow us to keep using Kilns 7 and 8 during construction and to re-use the existing limestone crushing and cement grinding infrastructure. We decided to name it ‘Kiln 5,’ as it was an ‘upgrade’ of Kiln 5. This was crucial for the work to classify as a brown-field development and not a greenfield development.

The limestone crushing section is from the Soviet era. It can handle around 4Mt/yr of limestone and is therefore more than capable of crushing enough material for the new line. The cement grinding equipment dates from 1997, which was only 10 years earlier than the decision to upgrade.

In 2007 we began contract negotiations and, in 2008, the contracts were implemented. Of course, in 2006-2007 we had a market in Lithuania that was consuming 1.0-1.1Mt/yr of cement. However, due to the economic downturn it halved to around 0.5Mt/yr in 2009.

We had to freeze the dry process project for around two years because the market collapsed! We had actually received all of the equipment in 2008 and, of course, we had to honour the contracts. However, everything was kept in storage until 2010. At this point we had been able to carve out export markets in Russia (Kaliningrad), Belarus and Scandinavia and there were signs of improvement in the domestic market.

.....

“We had to ‘freeze’ the dry process project for two years because the market collapsed!”

.....

Profile: Edmondas Montvila, Production Manager

Edmondas Montvila has worked at Akmenes Cementas since he left University in 1993. He first worked in the grinding and pyroprocessing departments, before being made production manager in 2003. “The cement grinding department and pyroprocessing department are the two main areas you need to work in to learn what cement production really is,” he says. “I gained a lot of experience in projects and upgrades during this time, which helped me develop my processing knowledge rapidly.”





Production and process

GC: Can you describe the production process as used at the plant today?

EM: The process starts with the quarry, which is around 3km away from the plant. It is actually owned and operated by a separate company called Kalcitas. We have to buy the limestone and clay from the quarry and are responsible for the transportation of the material from the quarry to the plant. We operate a range of dumper trucks. In the past few years we purchased three BELAZ-7555B dumper trucks to complement our Soviet era BELAZ dumpers.

Our trucks take the limestone to our limestone crushing department, which dates from the Soviet era. There are two lines, each of 500t/hr, giving a total of 1000t/hr. Each line has a jaw crusher and a rotary crusher. This is more than enough for the dry process line. Despite being old, the machinery is reliable and it was certainly built-to-last. We had looked at installing a new crushing system, but the calculation shows that there is only a very small payback available. Clay is prepared using a new Bedeschi clay crusher, which came online with the dry process line.

Right: One of Akmenes Cementas' fleet of BELAZ haulage trucks for limestone and clay.



Right: Peering down into the top of one of the plant's two limestone jaw crushers.

The clay and the crushed limestone are mixed into three stockpiles; two 20,000t piles for clay and limestone and one 4000t stockpile for limestone. The limestone pile is for correcting the chemistry of the raw meal. The three piles are managed using a Bedeschi ceiling-mounted stacker and a separate Bedeschi reclaimer.

A system of conveyors delivers the material from the storage building to the raw meal grinding section, which is where KHD's area starts. The raw material is ground using a Tandem system, which comprises a 720t/hr dryer/crusher and 360t/hr ball mill.

The use of the dryer/crusher is quite unusual but it was decided that this would offer the best stability in raw meal fineness. The characteristics of our raw material mean that adding slightly different amounts of ingredients, for example sand, would make big changes to our fineness if we had gone with another system. An inconsistency like that is bad for the stability of the process. The raw meal department receives waste heat from the preheater, which is a big increase in efficiency over the wet process from before. After it has been ground in the roller mill, the raw material is sent to a new 12,000t homogenisation silo, which was built by IBAU Hamburg from Germany.

After the silo comes the kiln, a three-pier design from KHD, which is rated at 4500t/day. It is 66m long and 4.8m in diameter. This is around 10m longer than KHD's standard designs. When we designed the



Right: Views of the Bedeschi stacker (left) and reclaimer (right) in the plant's linear stockpile building. Its combined storage capacity is 44,000t of a mixture of limestone and clay.





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Right: The KHD raw meal grinding section is an unusual Tandem design. It comprises a 720t/hr dryer/crusher (left) and 360t/hr ball mill (right).



project, we wanted to allow flexibility for the addition of alternative fuels to the line at a future date.

The four-stage preheater is equipped with a calciner. Formally it is a PYROCLON®-R LowNO_x with a PYROTOP. The design is good for environmental performance and was also suitable for the introduction of as yet unidentified alternative fuels. We had to allow for future flexibility.

The clinker cooler is a KHD PYROFLOOR PFC 6H3AH. It is a walking floor design with six hydraulically-controlled lanes that slowly shuffle the material. When we installed it, I was really surprised how well it performed. It was a very good selection by the company. In the old process the cooler was unstable and a total nightmare. However, the PYROFLOOR can easily handle variations from earlier on in the process. If the kiln delivers too much material, too little material or material that is hotter than normal, it still performs really well.

From the cooler, a number of new AUMUND conveyors take the material to the clinker silos, which date from the Soviet time. Their capacity is only 25,000t, but we also have overflow storage for the winter maintenance period. We currently have to truck the clinker to these, which are over 2km away. This is not an ideal solution but we are evaluating a potential investment in extra

clinker silos on this site. Will we ever use Kilns 7 and 8 again? If not, we could dismantle them and build new silos where those kilns are currently located.

The cement grinding department has four mills, all from Volgochemash, a Russian producer. Internally they have all been upgraded with new linings and balls; two by Maggoteaux and two by Estanda. We installed two separators, one from FLSmidth and one from Polysius. All of these upgrades were carried out in 1997, which was one of the first sections to be upgraded by the newly-privatised company.

In contrast to our clinker silos, we have a large cement silo capacity of around 50,000t. In reality the useable capacity is more like 38,000-42,000t, across 16 different silos. There were supposed to be another four cement silos but these were only partially constructed during the Soviet era. 30 years later it still looks like the work is going on!

Close to the cement silos we find the packing and palletising departments. The packing line comprises a Haver & Boecker ROTOPACKER with 10 spouts. The palletising system comes from BEUMER, which operated as Haver & Boecker's sub-contractor during the project. The systems both date from 2005.

Right: The IBAU Hamburg homogenisation silo can handle 12,000t of raw meal.



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Fuels, additives and emissions

GC: What fuels are used at the plant?

EM: We use 100% Russian coal from Siberia. For us it is the best quality and Russia offers very low railway rates for coal transport so the price is also very good. Our rail link brings it all the way to our front door.

The coal is ground in two FLSmidth ATOX 17.5 mills, which have a capacity of 24t/hr each. The mills date from 2001 when we converted from using fuel oil to using coal.

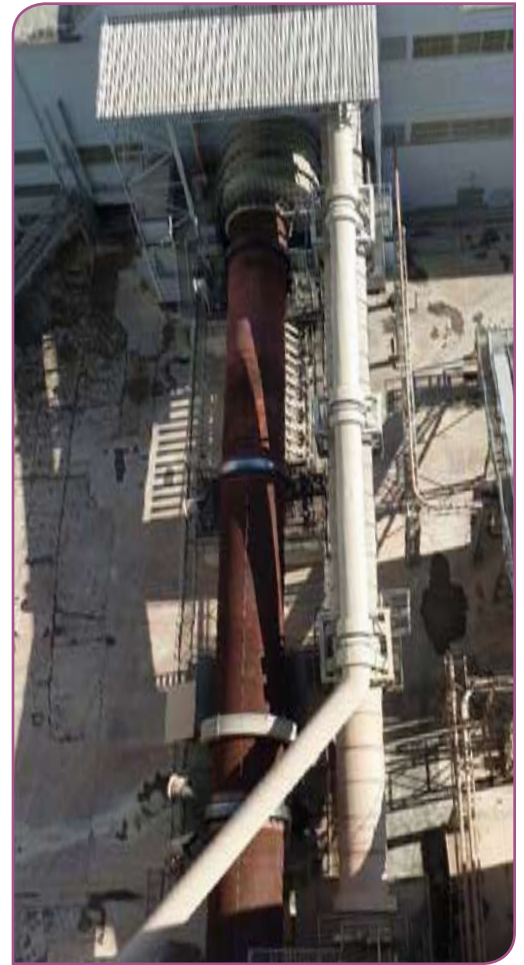
GC: Do you have plans to introduce alternative fuels to the plant?

EM: We would like to introduce alternative fuels, indeed we used to run tyres at 12-13% thermal substitution on one of the wet lines. However, our waste handling infrastructure in Lithuania is only a few months old. We are only starting to learn what kinds of wastes are out there.

On top of this the government has decided that only government enterprises can use refuse-derived fuels (RDF). We think this is a really bizarre decision and we are in conversation regarding a possible U-turn on this. We are also not allowed to import RDF, unlike our neighbours at Cemex Latvia just over the border, so that is not an option. I think that this is a government-led decision based on our historic reliance on Russian gas. However, I think it will be only a matter of time before this decision is reversed.

Used tyres, on the other hand, are not considered to be a waste. Following the installation of some revised emission monitoring equipment we will be able to start with tyres again, perhaps at 3-4% to start

Right: The new dry process Kiln 5 is installed where the wet Kilns 5 and 6 were previously located.



“We are about 80-85% of the way towards ‘finishing’...”

Right: The Haver & Boecker ROTOPACKER was undergoing maintenance during Global Cement’s visit.



Far right: A Beumer palletiser stacks and wraps the bags for dispatch.



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Right Tyres all around. Akmenes Cementas was able to use waste tyres in one of the wet kilns. It now hopes to start using them on the new line too.

with. We are consulting with KHD regarding how high we can go without major changes. Theoretically we could install a combustion chamber and go to 30% tyres on the line, but where would we get so many tyres in Lithuania? The reality will depend on a combination of supply and the ability of the line to accommodate the new fuel.

GC: You mentioned that the plant uses slag. Where does this come from and where does it get other additives?



Right: The plant has 16 cement silos, serving rail and road. In a strange quirk of Soviet planning, four of the 20 cement silos that were planned were never actually built. The foundations were completed (see bottom left in image) but the work was halted more than 30 years ago.

EM: The slag is from Ukraine and our sand is sourced locally. The gypsum that we use comes from Knauf, a wallboard producer that mines natural gypsum. We buy it from its mines in Latvia and western Ukraine.

GC: What are your current emissions limits for the common stack emissions?

EM: For NO_x the limit is 500mg/Nm³, SO₂ is 400mg/Nm³, dust is 10mg/Nm³ and CO is 200mg/Nm³. As I mentioned, we are installing some new emissions monitoring systems and have contracted ABB to do this. It also installed the current equipment. When we first set up the plant we made a mistake in this area that meant we could not convert to standard condition measurements in real time. It was an oversight due to the seven year delay between design and construction. The regulations for reporting emissions are stricter than they were in 2007.

I should also mention at this point that the wider electrical and automation system for the plant was supplied by Siemens.

Building and commissioning the new line

GC: What were the most important factors that led to the new line being constructed?

EM: As I alluded to earlier the two most important factors were a decrease in specific fuel consumption per tonne of clinker and an increase in capacity. The wet lines, on average used 1380kCal/kg of clinker and the dry line uses just 850kCal/kg in compound operation. This is a 38% reduction in the amount of fuel needed, so it is a massive cost benefit. At the same



time, we wanted to expand the capacity of the plant, which had been around 3600t/day when we had three wet kilns running. It is now 4500t/day.

GC: What led to the selection of KHD?

EM: When we started the project we commissioned the Swiss consulting company PEG to conduct a feasibility study. At that time Dr Hans Wilhelm Meyer was working there. He had very in-depth knowledge of pyroprocessing and recommended three suppliers: Polysius, FLSmidth and KHD.

With all due respect to Polysius we were not able to sign a deal because its order backlog was four years. It was 2007 and Polysius was completely booked up. It was very clear on this and it understood that we couldn't wait that long.

The selection between KHD and FLSmidth was close but in the end we were attracted to some aspects of the guarantees given by KHD. The equipment from Bedeschi was tied in with the KHD contract and we are very happy indeed with how the new system works together. Bedeschi's clay crushing contribution was also included in FLSmidth's proposal, such is the high regard that the company is held in by both main suppliers.

GC: What were the main challenges of the construction and commissioning?

EM: Of course the economic downturn that led to a two year delay was the single most problematic factor from a time perspective. However, from a construction perspective, we started the civil works in 2011. Of course, there were some small mistakes in design and a few corrections here and there that we had to change as we went along. Our main construction partners and civil design partners SWECO and PST were always able to solve these.

Overall commissioning was not too bad. It was difficult because we were learning about the dry process first hand for the first time. I have visited many other dry process lines but nothing could prepare us for dealing with our own. There were lots of small things that we had no experience in. Some incorrectly located sensors, some software bugs, some small mistakes we made with installation and more. The first couple of months after the hot commissioning started in July 2014 was a very busy time for me and everyone here.

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Right: One of Akmenes Cementas' five wholly-owned locomotives.



GC: So how was the first 'birthday' in July 2015?

EM: It wasn't really a 'celebration' as such but we made a lot of progress over the first year. I want to optimise the plant for many parameters, chemical composition, grindability, throughput, etc. I would say that we are about 80-85% of the way towards 'finishing' but, of course the best plants never stop looking for ways to improve. I can see the 'end' of the task now though.

GC: More widely, how does Akmenes Cementas know that it is doing 'well'? You don't have a network of sister plants to draw from, for example.

EM: Ultimately we know from our customers, who are happy with our products and return to us. Beyond that, we make sure that we meet and exceed the requirements for mortar strength tests at two, seven and 28 days. We analyse the products for a large number of properties.

Products and customers

GC: What kinds of cement are produced here?

EM: Akmenes Cementas makes 12 types of cement, based on two different types of clinker: Normal clinker and lower-alkali clinker. We make about 50% of each. The lower alkali content is needed due to the chemistry of the local aggregates.

From each clinker we produce CEM I 42.5 N, CEM I 42.5 R and a higher grade CEM I 52.5 R.

We also make two CEM II products; one containing up to 20% slag and one containing limestone. Each of these is available in normal alkali and lower alkali versions.

Finally we have a CEM III B, which is a sulphate-resistant cement that is used in water treatment plants. We manufacture it on a campaign basis according to customer requests. We make perhaps 25,000t of this per year.

When we get special requests, a customer can order a non-standard cement in the morning, we can start production the same evening and dispatch the cement the following day. Transport is the only limiting factor. This flexibility is an advantage when we talk with new and existing customers.

GC: What is the ratio of bulk to bagged cement?

EM: We sell around 20% bagged cement and 80% in bulk. We sell in 25kg, 35kg and 40kg bags depending on the market and the customer in question.

GC: How is cement dispatched?

EM: Around 80% of cement goes out by train. We actually have our own railway department, which is very unusual for a cement producer. The department has five locomotives and 170 wagons, which can travel all over the country and sometimes abroad. It's a big logistical challenge. Locomotives always need money for maintenance but they are cheaper for the customer. In ex-Soviet areas, if you have wagons, you have customers.

The other 20% goes out by truck. Obviously the local market is the main user of our trucked cement, since it is more expensive to use trucks than rail. We sell directly to the customer and have no trucks of our own.

GC: You hinted at exports. What markets are served aside from Lithuania?

EM: We produce around 1.0-1.1Mt/yr of cement and Lithuania takes about 50-55%. Most goes to Vilnius and Kaunas. Of the rest, we export to Russia, mostly Kaliningrad, which probably takes around 25% of

Below: DeltaBlower compressed air units from Aerzener Maschinenfabrik (left) and air cannons from Standard Industrie (right) keep things moving around the plant.



our output. The other is split between smaller export markets like Poland, Belarus, Latvia, mainland Russia and some Scandinavian markets.

GC: How is your plant influenced by Cemex Latvia?

EM: There is clearly room for both plants in the market because its plant is much closer to Riga. In Latvia, Riga is by far the biggest city and so a lot of Cemex's cement goes there. Conversely, we are much closer to Kaliningrad. Of course, in the Soviet time the plants were not competing for markets. There was only one owner and one customer - the state.

I think it's also important to note that the companies have different philosophies. At Cemex Latvia many of the top managers are international staff and that brings in a lot of western European and North American cultural influences. Our stance is that we don't need to always take every cue from the west. Managing local staff and speaking with local customers certainly requires local knowledge. We are smaller and more flexible and can adapt to specific needs.

Markets and the future

GC: Is cement demand strong in the local market at present?

EM: In a word, 'No!' Lithuania still only needs 0.5Mt/yr at the moment but, around half the level we saw 10 years ago. In per-capita terms it is around 250kg/yr. On the other hand demand is very much influenced by incoming EU money for upgrading our infrastructure. Cement consumption can vary quite a bit with new projects, for example water treatment works.

GC: How seasonal is the market here?

EM: It's quite seasonal. The market picks up in late March until the end of November. In July or August we sell around 12-13% of our annual output, versus just 4-6% in each of December, January and February. Typically we would stop the kiln in early January for around 40-45 days.

GC: What's your best estimate for the plant's capacity utilisation over the first year of operation?

EM: It's around 80% because we are still experiencing some small teething problems. It's rising though.

GC: What do you think will happen to cement demand in your markets in the coming 12 months?

EM: The local market will be stable. Perhaps there will be a 3-4% improvement in demand, but we shall have to wait and see. In some of our export markets, like Russia, demand could be influenced by political factors. Belarus, for example has become difficult to export to as its producers are working with very



Left: A close shot of a hot kiln.

cheap gas. Two years ago we were able to export quite a lot of cement there but Belarus became self-reliant and suddenly the import rules all changed for material coming from the EU. That's the kind of political problems we can face. The depreciation of the Russian Ruble is another problem we are facing at the moment regarding exports to Kaliningrad.

GC: What about local and regional prospects over the next five to 10 years?

EM: I hope that we will see stability in the local market over the next couple of years so that we can optimise the new line and start to develop our alternative fuels programme. Overall demand it might increase by 5-10% over a five year period. I'd like to say 5% *per year*, but that isn't a real possibility these days. It is not 2005 any more!

GC: What is your biggest concern regarding the future, either about the market, the plant, regulations or other issues?

EM: I think our main problem is that we are independent. We can only learn from our own experiences and don't have a wide network of sister plants, as you say, from which we can learn. For instance we cannot send process engineers overseas to develop new skills and then bring them back into the plant with that knowledge. If there is anything we can do to introduce new information to the company, we must always do that.

Independence is flexibility. It's okay, but it is a double-edged sword. We have to strive to remain up-to-date with the latest developments in the industry and the market in order to minimise the disadvantages and maximise the advantages that our independence brings. In Lithuania, we say that in order to see improvement, you have to start with yourself. We continue to strive for that improvement.

GC: Thank you very much indeed for your time and interesting insights.

EM: You are very welcome!



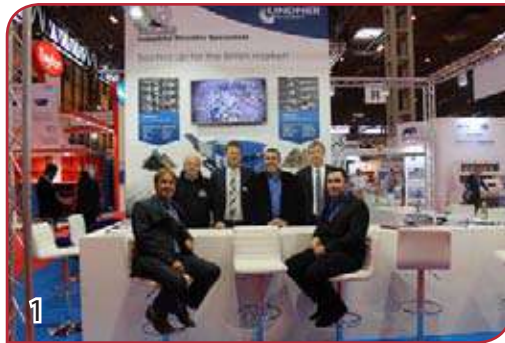


Global Cement staff

RWM 2015 - In pictures

On 15-17 September 2015 over 13,000 visitors attended RWM 2015 at the National Exhibition Centre in Birmingham, UK. The recycling and waste management event featured over 700 exhibitors across six show sectors, with 70 seminars on resource efficiency and waste reduction over the three days. *Global Cement* exhibited with a focus on the use of wastes as fuels in the cement and lime sectors and presents a photographic summary below.

1: All smiles on the joint Lindner recyclingtech / Mach Tech stand.



2: Doppstadt had a massive shredder 'on sale.'



3: An Avant 420, a compact, multi-purpose loader.



4: The busy UNTHA shredding technology stand featured a range of shredding and processing options for waste to fuel applications.



5: The impressive JCB Wastemaster stand.



6: Staff from waste and alternative fuel handling experts Vecoplan deal with enquiries on the company stand.



7: The Liebherr stand included this LH40M mobile loader.



8: Finland's BMH Technology Oy produces the Tyrannosaurus® range of solid recovered fuel (SRF) production plants and fuel and ash handling systems for the cement sector.





9



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9: Family-owned Grindermax manufactures blades and knives for a wide range of shredders, including those of Weima, Vecoplan, UNTHA, Lindner and more.

10: The outdoor stand of John Moore Tractor Parts Ltd, a UK-based supplier of bucket cutting edge, wear bar, steel plate and general wear parts.

11: Willibald UK, part of Germany's J Willibald GmbH, showed off the Willibald Shark II and Willibald Shark EP 5500.

12: The world-famous Caterpillar showed off a range of equipment outside.

13: Cross Wrap Oy is a leader in the waste baling, wrapping and unwrapping sector. Its unwrapping machines are often found in cement plants that receive SRF or other solid waste in bales.

14: GreCon provides spark detection systems that are applicable to conveying and shredding applications, crucial in the handling of combustible waste-derived fuels.

15 + 16: Views from above one of the two indoor halls.

17: P&L Software Systems is a waste management software provider, training specialist and IT consultancy with extensive knowledge and experience in the waste management industry.

18: Discussions on the Fireward stand. The company specialises in mitigating the risk of fires in the waste management sector, with a range of automatic fire suppression systems.



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Peru: Cementos Pacasmayo starts commercial cement production from Piura

Cementos Pacasmayo has begun commercial production from its new Piura cement plant. According to the company, it will be the most modern cement plant in Latin America and features a multi-fuel kiln. Its final capacity will be 1.6Mt/yr of cement and 1Mt/yr of clinker.



Cementos Pacasmayo's cement plant in Piura during the construction phase.

"I am delighted to announce the start of commercial operations at the Piura plant, an important milestone for Cementos Pacasmayo and the Peruvian cement industry," said Humberto Nadal, CEO of Cementos Pacasmayo. "Piura will offer its clients high-quality cement, with improved logistics, while simultaneously lowering its production cost. We continue to execute this project on time and under budget, demonstrating our expertise in large-scale, advanced facilities. We look forward to moving the plant along its production curve, creating value for all stakeholders."

Ecuador: Cement sales fall by 7.04% in the first seven months of 2015

Cement sales fell by 7.04% to 3.38Mt in January-July 2015 compared to 3.64Mt in the same period of 2014, according to data from the Ecuadorian Institute of Cement and Concrete (INECYC). Cement sales are expected to drop by 10-15% in 2015 compared to 2014, when sales of 6.47Mt were recorded. Consumption is currently high in Guayas, Azuay, Manabí and Pichincha.

Holcim holds 60.5% of the local market, followed by Unacem (formerly Lafarge) with 22.5% and Union Cementera Nacional (UCEM) with 17%. Recent developments include a US\$400m modernisation project at Holcim's Guayaquil plant and a US\$230m

expansion by Cementera Nacional with Cementos Yura to expand the Riobamba plant.



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Mexico: Cement companies to invest in Mexico's new international airport

A group of 20 Mexican cement companies included in the Association of Independent Concrete Companies (AMCI) plans to invest US\$18m in the installation of a sector cluster to supply concrete for the construction of Mexico City's new international airport (NAICM).

The companies seek to provide 48% of the concrete required for the project and are currently negotiating with the Mexican construction industry chamber (CMIC) in order to obtain the association's support. The cluster would encompass the installation of 20 concrete plants with around 384,000m³/yr of production capacity. The plants would be operative while the construction of the NAICM lasts, between three and four years.

Independent concrete companies seek to reach a market participation of 80% in Mexico, as big companies like Cementos Cruz Azul, Corporacion Moctezuma and Holcim Mexico sell their non-profitable assets to small and medium sized-enterprises. A total of 50 concrete plants have been taken over by independent companies in 2014-2015.

The Americas: Grupo Cementos de Chihuahua seeks acquisitions

Mexico's Grupo Cementos de Chihuahua (GCC) is ready to grow its operations in the US and make an acquisition in Central or South America after refinancing its debt and improving its earnings margins via an extensive cost cutting programme.

Luis Carlos Arias, director of corporate treasury, explained that GCC has only one syndicated bank loan of US\$194m, which has been refinanced. As such, it has a more flexible credit structure, which allows it to explore different growth opportunities.

In the US, GCC will invest US\$90m in 2015-2018 to boost production capacity at its plant in South Dakota by 60% to 1.2Mt/yr. GCC is also looking to expand to Central and South America to earn alternative revenues during the harsh winter in North America, which limits production during the coldest months. GCC has not decided where it will make an acquisition as the market is highly concentrated in a few big companies.

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Colombia: Cementos Argos included in the DJSI for the third consecutive year

The Dow Jones Sustainability Index (DJSI) has selected Cementos Argos as one of the three most sustainable cement companies in the world. For the third consecutive year, the company was included in the World and Emerging Markets Indices.

For the economic dimension, Argos obtained the highest score in the industry. It was also the best-placed for transparency, compliance and conduct, risk management and supply chain. For the social dimension, it got the best score for human capital development and social reporting. For the environment, it scored best in biodiversity, water risks and international production standards.

"This recognition reflects Argos' spirit. We do work that is carried out comprehensively and delicately in order to find a balance between social, economic and environmental aspects and take the lead in building a better society," said Jorge Mario Velásquez, Cementos Argos' CEO.



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News in brief

US: FLSmidth wins filter order

FLSmidth has secured an order for the engineering, supply and installation of a new CataMax catalytic solution for a US cement plant. The order includes a new filter installation with catalytic elements, ID fan, flue gas ducts and dust equipment.

Ecuador: New grinding mill at Hormicroto cement plant

Gebr. Pfeiffer Inc will supply a complete grinding unit to replace aging ball mills at the Hormicroto clinker plant in Ecuador. The new unit will reduce energy consumption and improve overall grinding efficiency, allowing the plant to increase production. Delivery is expected in December 2015.

Mexico: Holcim Fuerte launch

Grupo de Oro and LafargeHolcim Mexico have launched Holcim Fuerte brand cement. Product development commenced in 2012. The product was tested in different projects prior to its commercialisation. It is targeted at builders laying foundations and reinforcing walls and beams.

Chile/Peru: Volcan may sell Polpaico

Peru's Volcan could sell its share in Chile's cement producer Polpaico if metal prices continue to fall, according to Volcan's CFO Jorge Murillo. Volcan could receive around US\$27m for its 20% stake. Holcim, part of LafargeHolcim, owns 54.3% of Polpaico, which has 2.7Mt/yr of cement capacity.

US: Holcim plants win Energy Star

Five Holcim (US) plants have earned the US Environmental Protection Agency's (EPA) Energy Star award. This marks the fourth time Holcim's Portland plant in Florence, Colorado and the Midlothian plant in Midlothian, Texas have received the award, while the Devil's Slide plant in Morgan, Utah has been honoured for its eighth consecutive year. The Holly Hill plant in Holly Hill, South Carolina and the Ste. Genevieve plant in Bloomsdale, Missouri are both receiving the award for the sixth time.

Argentina: Cement shortages

Cement shortages in Mendoza in August-September 2015 have caused complications for construction works. The shortage is linked to a 2400t monthly drop in cement production by Holcim Argentina. Plants in San Juan and San Luis have also reduced their deliveries.

US: Mitsubishi Materials' reports growing profit in North American cement business

Mitsubishi Materials will likely enjoy 10% higher-than-expected profit in its North American cement operations in the year that ends in March 2016. The business accounts for nearly 20% of its consolidated operating profit.

North American cement demand has increased thanks to the construction of housing and commercial facilities, mainly in southern California. Cement demand in southern California is projected to grow by 10% in 2015 and Mitsubishi Materials expects to raise its prices. North American profit is likely to offset rising expenses for truck drivers stemming from labour shortages, beating the company's earlier forecasts.

In April-September 2015, the North American cement business will likely help group operating profit reach US\$284m. Mitsubishi Materials plans to increase its US cement capacity by 150% to 4Mt/yr in its fiscal 2016 or after.

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News in brief

India: Petron Engineering wins order from Shree Cement

Petron Engineering Construction has received a US\$1.79m order for civil construction work, reinforcement and steel work of a ball mill structure from Shree Cement in Bewar, Rajasthan.

China: Allied Cement's loss

Hong Kong's Allied Cement's revenue fell by 28.8% year-on-year to US\$259m in the first half of 2015. It reported a net loss of US\$3.61m, compared to a US\$15.2m net profit in the first half of 2014.

Pakistan: Yantai Baoqiao Jinhong to build plant

A memorandum of understanding has been signed between the Punjab Government and Chinese cement producer Yantai Baoqiao Jinhong to establish a US\$350m cement plant in Salt Range.

India: S Rajgopal leaves UltraTech Cement

UltraTech Cement has reported that the tenure of S Rajgopal, independent director of the company, ended on 28 August 2015.

Pakistan: Cherat Cement's revenue up but profit down

Cherat Cement posted a profit of US\$12.4m in the year that ended on 30 June 2015, a slight decrease from US\$12.7m a year earlier. Its turnover rose to US\$63.2m from US\$62.1m a year ago.

India: New Shree Cement plant

Shree Cement is setting up a 2.8Mt/yr cement plant at Sikandrabad in Bulandshahr, Uttar Pradesh. The plant will also include a 18MW captive power plant.

China: West China Cement's net profit falls by 99%

West China Cement's net profit plunged by 99% year-on-year to US\$375,120 in the first half of 2015 as China's economic slowdown took a toll on cement demand. West China Cement's revenue fell by 15.4% to US\$264m. As for 2014, it omitted an interim dividend.

Indonesia: Holcim Indonesia launches Tuban plant

PT Holcim Indonesia Tbk has launched its new US\$800m, 3.4Mt/yr cement plant in Tuban, East Java. Having started the construction five years ago, the plant is Holcim's first greenfield project in Indonesia. It will serve the East Java market and supply Sumatra and Kalimantan. With the new plant, Holcim Indonesia's cement production capacity has grown by 40% to 12.5Mt/yr.

"Currently, Holcim Indonesia is operating in an oversupplied market in a market slowdown. However, we believe that it is temporary as construction markets in developing countries are cyclical. The overall long-term macroeconomic fundamentals in Indonesia remain strong and the domestic economy will recover with the realisation of delayed infrastructure projects and housing," said Gary Schutz, CEO of Holcim Indonesia.

India: Prism Cement appoints new director

Prism Cement has appointed Vivek Krishan Agnihotri as a director following the resignation of the previous director. The board has also appointed Agnihotri as the executive director of cement, effective from 17 August 2015.

Australia: Adelaide Brighton to pay special dividend

Adelaide Brighton will pay a special dividend of US\$0.04/share on top of an interim dividend worth US\$0.08/share to shareholders as Australia's housing boom continues to drive demand for cement and other building material products.

It follows a record net profit of US\$82.6m in the six months that ended on 30 June 2015, up by 61% year-on-year. The company expects underlying earnings of US\$200-215m for the full fiscal year, including a US\$32m profit on property sales.

"We are very pleased to deliver another record half year result, which reflects improving construction activity across our business, an increase in lime sales, our 2014 acquisitions and several property transactions," said Adelaide Brighton chief executive Martin Brydon. "Housing activity is at healthy levels on both the east and west coasts, which has augmented demand for our products from major infrastructure and resources projects."

Australia: Boral's annual profit up by almost 50%

Boral has recorded an increase in full-year profit, buoyed by the return to profitability of its US business for the first time since 2007, a pick-up in local demand and cost-cutting initiatives.

Boral's net profit grew by 48.3% to US\$183m in the year that ended on 30 June 2015. Its underlying profit rose by 45% to US\$178m. However, its total revenue in the period fell by 15.2% to US\$3.15bn.

Boral chief executive Mike Kane said that the results reflected the benefits from the company's overhaul of its business, which reduced the size of its workforce and resulted in the closure of some unprofitable operations. "We've improved Boral's cost base, strengthened the balance sheet and we are managing our portfolio of businesses more efficiently," said Kane.

In the current 2016 fiscal year, Boral said that it would focus on maintaining its underlying earnings from construction, materials and cement, while its property earnings remain uncertain. Building products are expected to remain broadly steady, while gypsum wallboard arm USGBoral should deliver further underlying improvement.

Pakistan/Iran: Producers slam Iranian imports

Cement producers in Pakistan have again spoken out against imported cement from Iran and alleged under-invoicing across the border. Sources said that the Iranian cement, which was earlier being smuggled, is now entering Pakistan at very low rates due to under-invoicing. They have said that importing cement into Pakistan, itself a cement exporter, is 'incomprehensible.'

Taha Khan Javed, Elixir Securities Pakistan's head of research, said that the government needs to realise that this lax attitude towards under-invoicing and the 'rampant' import of Iranian cement is hurting both the government and the local cement industry. Pakistan has surplus capacity and its exports are falling due to a slowdown in exports to Afghanistan and other regions. In the case of Afghanistan, this is also partly due to Iranian imports.

Krygyzstan: Jinlong Group to build 0.8Mt/yr cement plant

Chinese cement producer Jinlong Group plans to invest US\$65m to build a 0.8Mt/yr single line cement plant in Issyk Kul, Krygyzstan. It will operate as a subsidiary called Yatai Cement. US\$15m will come from self-financing and the remaining US\$50m will be funded through project financing. Approximately 400 workers will be hired. The plant reportedly has a 30-year operation term.

India: Department of Legal Metrology raids Ambuja

The Jammu Department of Legal Metrology has registered a case against Ambuja Cement and seized a large quantity of cement bags. The minister for Consumer Affairs and Public Destruction, Choudhary Zulfkar Ali, said that the department had received complaints about Ambuja Cement's abuse of its dominant position by selling at different prices in Jammu and Kashmir.

The department said that it could not get a 'satisfactory' response from Ambuja Cement. As a result, a team of officers inspected Ambuja Cement's depot at Kunjwani and booked Ambuja Cement for gross violation of the Legal Metrology Act and Rules. It was also found to be in violation of the Competition Act of 2002 by selling its products deliberately at a predated price to sabotage local competition. Zulfkar Ali said that Ambuja Cement was found to be selling the same batch of Pozzolana Portland Cement in different coloured bags marked with different prices for Jammu and Kashmir. The bags were also found to weigh 400-600g less than the 50kg label, while mandatory declarations were not marked as per the Packaged Commodity Rules.

Myanmar: Arr Thit Man plans growth

Local cement producer Arr Thit Man plans to double its cement production capacity from 5000t/day to 10,000t/day by 2016, according to senior officials. The company makes the Double Rhinos brand of cement from its plant in Kyaukse, Mandalay. It claims to be the country's largest cement plant.

"We are a new brand but we are focused on the quality of cement and fulfilling market demand," said the company's managing director. For the time being, Arr Thit Man plans to focus on meeting growing domestic demand rather than exports.

A number of other cement manufacturers are also looking to increase their local presence. Siam Cement Group is building a 1.8Mt/yr cement plant in Mon, which it expects to be operational in 2016. Several companies also import cement to Myanmar.

China: China 22MCC to sell cement assets

China 22MCC Group Corporation Limited, a wholly-owned subsidiary of the China Metallurgical Group Corporation (MCC), plans to sell its cement assets for US\$9.05m, according to the China Beijing Equity Exchange.

China 22MCC Group plans to sell a 6.74% stake in Jidong Cement Luan County Corporation for US\$6.98m and a 9% stake in Tianjian Jidong Cement Corporation for US\$2.07m. In the first half of 2015, Jidong Cement Luan County Corporation reported an operating revenue of US\$30.9m and a net loss of US\$6.07m, while Tianjian Jidong Cement Corporation reported an operating revenue of US\$13.5m and a net profit of US\$281,168.

Statistics show that in January-July 2015, China's cement industry profits fell by 63.8% year-on-year to US\$2.31bn.

Malaysia: YTL Corporation slump

YTL Corporation saw a 15.6% year-on-year decline in net profit to US\$71.8m for the quarter that ended on 30 June 2015. Its revenue fell by 10.6% to US\$987m. The decline was blamed on lower contributions from cement manufacturing and trading, information technology and e-commerce-related business, property investment and development, hotels and utilities.

For the full year that ended on 30 June 2015, net profit fell from 31% to US\$257m, due to lower contributions from cement manufacturing and trading, property investment and development and utilities. During the year, revenue fell by 12.7% to US\$3.85bn.

Pakistan: Lucky Cement reports US\$119m net profit for 2015

Lucky Cement has reported a net profit of US\$119m for the year that ended on 30 June 2015, some 9.6% higher than in the prior year. On a consolidated basis, Lucky Cement's net profit grew by 15.7% to US\$132m.

Its net sales revenue improved by 3.9% to US\$429m. The increase in net sales revenue was attributed mainly to higher sales volumes. Local sales volumes grew by 7% to 4.42Mt, while exports fell by 4.5% to 2.37Mt.

Lucky Cement has also reported progress on its key foreign and local projects, including its integrated cement plant in the Democratic Republic of Congo, a 660MW supercritical coal-based power project, a 50MW wind farm and a waste heat recovery project at PEZU power plant.



Mongolia: Senj Sant cement plant opens

Senj Sant cement plant was opened on 13 August 2015 in Urgun Soum, Dornogov, according to the European Bank for Reconstruction and Development (EBRD). The plant will be the first greenfield cement plant in Mongolia to use the dry process, which is especially significant in the Gobi region, where water is scarce. The plant will also use a waste heat recovery plant, which will help save energy and water.

The project includes a gender action plan, which means there will be more opportunities for women. Most of the Senj Sant directors are women. The plant will be overseen by Munkhnasan Narmandakh, the female CEO of its parent holding company, Monpolymet Group, one of Mongolia's top mining operations. The holding company has an all-female board of directors.

The EBRD provided a financing package of US\$85m, which consisted of a US\$20m equity investment and a US\$65m loan to Senj Sant. The Development Bank of Mongolia lent US\$65m. The remaining US\$80m of the total project cost of US\$230m was funded by the Monpolymet Group.

"This project will be a major step towards establishing domestic cement supply and replacing imports. It is also important for the country's economic diversification," said the EBRD's senior banker in charge of the project, Azjargal Ulziitogtokh. "The EBRD is proud that the project meets EU requirements and will use the best available technology. Personally, as a Mongolian female professional, I am also very pleased to say that the company has a gender action plan to ensure equal opportunities, which goes beyond industry standards, not only in Mongolia but in the whole region where the EBRD works."

To date, the EBRD has committed over US\$1bn to Mongolia's economy. All of the Bank's projects so far have supported private sector companies.

New Zealand: Fletcher Building earnings up

Fletcher Building has reported a gain in its 2015 fiscal year earnings before one-time charges, as strong growth in New Zealand offset poor results in the rest of the world.

Operating earnings, excluding one-time items, rose by 5% to US\$653m in the year that ended on 30 June 2015. Net profit fell by 20% to US\$270m after US\$150m of one-time charges for plant closures and impairments. The one-time charges included a US\$78m impairment of goodwill relating to its Forman, Stramit, Tasman Insulation and Humes businesses. There were site closure costs of US\$65m related to the Crane Copper Tube business and Iplex Australia. Operating earnings before one-time items in New Zealand rose by 24%, accounting for 69% of the group total, while in Australia earnings fell by 30% and by 7% for the rest of the world.

The heavy building products, which includes New Zealand cement, concrete pipes and quarry products, Australian concrete and quarry products, plastic pipes and steel, Fletcher's biggest division, recorded a 6% decline in gross revenue to US\$2.1bn. Operating earnings dropped by 17% to US\$177m, as weaker trading in Australia offset gains in New Zealand. A US\$8m loss from plastic pipes reflected a drop in demand from the coal seam gas sector and increased competition in Australia.

In other news, Fletcher has conditionally agreed to sell the operations of Rocla Quarry Products to Hanson Construction Materials in a deal valued at US\$149m. The company expects a pre-tax gain of about US\$73.5m from the sale, which requires Australian regulatory approval.

Georgia: Tianshan Cement to establish joint venture

Xinjiang Tianshan Cement has recently signed an agreement with a Georgian cement company and Xinjiang Hualing Industry & Trade to establish a joint venture in Georgia.

With total investment of US\$60m, the joint venture will launch a production line with 3000t/day of clinker capacity and 1.2Mt/yr of cement capacity. Xinjiang Tianshan Cement and Xinjiang Hualing Industry & Trade will control at least 65% of the venture, while the Georgia-based cement company and Xinjiang Hualing Industry & Trade will jointly control a 35% stake at most.

China: China Resources to pay US\$237m for 40% stake in Yunnan Kunming Iron & Steel Building Materials

China Resources Holdings has agreed to pay US\$237m for a 40% stake in Yunnan Province-based cement producer Yunnan Kunming Iron & Steel Building Materials Group Co in a bid to lift production capacity. Yunnan Kunming Iron & Steel Building Materials Group Co is currently a 100%-owned unit of state-owned Kunming Iron & Steel Holding Co Ltd. China Resources plans to fund the investment via internal resources and bank borrowing.

Turkmenistan: 220 facilities to be built in 2016

Turkmenistan plans to construct 220 facilities for US\$18bn in 2016, according to president Gurbanguly Berdimukhammedov.

The construction will include a natural gas pipeline that will transverse Turkmenistan, Afghanistan, Pakistan and India and will ship 33Bnm³/yr of gas. The projects will also include a 1Mt/yr cement plant in Lebap, a gas-chemical complex designed to produce 467,000t/yr of polyethylene and polypropylene, a plant to produce 600t/yr of petrol from natural gas, as well two new airports.

"Gross domestic product has been growing rapidly in Turkmenistan. In this past year, GDP growth hit 8.3%. Capital investments rose by 8.2% and the average monthly wages increased by 10%," said Berdimukhammedov.

Pakistan: Bestway Group announces growth for Bestway Cement and Pakcem

The boards of directors of Pakistan's Bestway Cement and Pakcem have reported that net turnover increased by 5.4% year-on-year to US\$292m for Bestway Cement in the year that ended on 30 June 2015 and by 9.4% to US\$53.5m for Pakcem for the six months that ended on 30 June 2015.

In its 2015 fiscal year, Bestway Cement's revenue grew by 4.18% to US\$371m, its pre-tax profit grew by 10% to US\$121m and its sales volumes grew by 1.2% to 4.42Mt. In the six months that ended on 30 June 2015, Pakcem's revenue grew by 11.5% to US\$68.1m, its pre-tax profit grew by 11% to US\$15.7m and its sales volumes grew by 8% to 836,000t.

"We are happy to share our annual results for 2014-2015 for Bestway Cement and six-month period for Pakcem, with growth in sales of 4.18% for Bestway and 11.5% for Pakcem," said Zameer Choudrey, chief executive of Bestway Group. "This was a transformative year for us, with multiple major initiatives that will shape Bestway for years to come. We closed the year by becoming the largest cement manufacturer in Pakistan. Construction trends are favourable in Pakistan and I am confident that we are particularly well positioned to succeed and accelerate growth through innovation."

Domestic cement demand grew by 8% year-on-year to 28.2Mt. Exports, however, fell by 12% to 7.2Mt, mainly

due to sluggish demand and competitive prices. The year 2014-2015 posed fierce competition for cement producers. However, Bestway Cement increased its market share in the north zone from 17% to 21.4% and became the largest cement producer in the country with 8Mt/yr of cement production capacity. Additionally, the company continued to be one of the largest cement exporters to Afghanistan and India.

During the year, Bestway Group further reduced its reliance on the national grid by taking energy-saving initiatives. It launched two 6MW and 7.5MW waste heat recovery (WHR) power plants at its Hattar and Farooqia plants. It also plans to inaugurate another 12MW plant at Pakcem Limited.

"We are confident about 2015-2016," said Choudrey. "The outlook for Pakistan's economy is positive, but there are still macroeconomic and geopolitical risks. We will continue to benefit from the positive development trend witnessed in infrastructure projects such as Pakistan China Economic Corridor. The considerable drop in global coal prices and lower interest rates will provide us with an additional tailwind. In view of our strong positioning, our excellent product portfolio, our production sites in attractive locations and the commitment of our people, we are well-equipped to achieve our goals."

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Rwanda: Cimerwa inaugurates new cement plant

Cimerwa has inaugurated a US\$170m, 500,000t/yr capacity cement plant in Muganza, Rusizi. Its current plant produces 100,000t/yr.

The new plant will export up to 30% of its total production to other countries, such as the Democratic Republic of Congo and Burundi. This is expected to drive sustainable economic development and poverty reduction. The exports will enable Rwanda to reduce its trade deficit gap with at least an additional US\$92m/yr in foreign revenues, according to the National Bank of Rwanda (BNR). Rwanda's current cement demand is estimated at 450,000t/yr. However, demand in the Democratic Republic of Congo and Burundi exceeds 900,000t/yr.

Legodi Busisiwe, CEO of Cimerwa, said that the new plant would enhance competitiveness of the local construction sector through reduced logistical costs. "The new plant seeks to bring on board high quality products that will help boost capacity of the country's infrastructure," he said. The new plant comes at a time when the government is trying to narrow the country's trade deficit gap by boosting its exports to the tune of at least 28%/yr. The country's trade deficit improved by 6% from US\$723m in 2014 to US\$6.78bn during the first five months of 2015. There is hope that cement exports could further narrow the gap.

Market players expect that increasing cement production will reduce the high prices of cement in the country. "The cost of construction is high simply because of the high prices of raw materials, including cement. Therefore, the new cement plant offers sector players the green light in addressing the question of affordability and propelling the sector towards economic excellence," said Ephraim Karekezi, a Kigali-based engineer.

Nigeria: BUA Group to double Obu cement plant capacity

BUA Group has signed a US\$600m contract with China-based Sinoma International Engineering to double the current 3.5Mt/yr capacity at its Obu cement plant as it seeks to expand its market share. The works are expected to be completed in 2017.

Executive chairman Abdulsamad Rabi said, "BUA currently has less than 10% of the market share, but afterwards, it should be about 20%." Rabi said that BUA, like Nigeria's Dangote Cement, was planning a continent-wide expansion.

Lebanon: Holcim Liban's net profits down by 78%

Holcim Liban has reported US\$2m of unaudited net profits in the first half of 2015, a decrease of 78.3% from net earnings of US\$9.4m in the same period of 2014. The company's sales fell by 28.5% year-on-year to US\$66.7m in the first half of 2015. Its gross profit margin reached 28% compared to 30.7% in the first half of 2014. Holcim Liban's assets fell by 3% year-on-year to US\$275m at the end of June 2015.

Zambia: Lafarge Zambia records 4% profit growth in the first half of 2015

Lafarge Zambia's post-tax profit grew by 4% year-on-year to US\$36,017 in the first half of 2015 despite economic challenges in Zambia and political uncertainties in the Democratic Republic of Congo, the company's major export market. Lafarge Zambia recently merged with Holcim Construction Group, which reported a 14% increase in turnover to US\$134,577 in the first half of 2015.

Zambia: ZPC on the back foot following Dangote Cement launch

Zambezi Portland Cement (ZPC) said that it has lost US\$2.50 for every 50kg bag of cement that it has sold since Dangote Cement entered the market. Operations director Daniele Ventriglia said that, despite maintaining its market share, the competition in the cement business was stiff.

ZPC will invest US\$4m in new state-of-the-art block-making machinery, which will provide a higher proportion of value-added products. "The machines are expected to arrive from Italy before the year ends. Block production will increase by 20%. An additional 25 people will be employed," he said. Ventriglia added that ZPC had remained competitive in block production because its product is high-quality and affordable.

South Africa: Lucky Cement fights South African anti-dumping duty

Pakistan's Lucky Cement has filed papers in the High Court in Pretoria contesting a 14.29% provisional antidumping duty imposed in May 2015 on its cement exports to the Southern African Customs Union (SACU).

Lucky Cement has accused the International Trade Administration Commission (ITAC) of failing to consider the losses suffered by producers due to a Competition Commission ruling on a cement cartel. The ITAC intends to oppose the motion.

The ITAC imposed provisional anti-dumping duties of 14.3-77.2% on Portland Cement originating in or imported from Pakistan from 15 May 2015 for six months. The duty was imposed on bagged cement.

"The breaking up of anticompetitive behaviour must have resulted in more normal competition in the industry with resulting lower prices and tighter margins," said Lucky Cement's CFO Muhammad Faisal. "It was illogical for the ITAC to attribute 100% of the injury to the SACU cement industry to Pakistani exports." Faisal also objected to the ITAC's decision to retrospectively limit its inquiry to only bagged cement. The dumping margin placed on Lucky Cement was based on all of its cement sales, whereas the ITAC focused only on bagged cement in the SACU.

The Competition Commission imposed a US\$9.3m fine on Afrisam and US\$11.1m on Lafarge in 2011 and 2012 respectively, after concluding that a cement cartel did exist. It estimated that its intervention would save consumers US\$335-454m in the 2010-2013 period.



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News in brief

Egypt: Arabian Cement's net profit grows

Arabian Cement Company's net profit grew to US\$15.9m in the first half of 2015, up from US\$13.8m in the same period of 2014.

UAE: Ras Al Khaimah Cement reports lower first half of 2015 profit

Ras Al Khaimah Cement Company has reported a decline in its net profit for the first half of 2015 to US\$670,000 from US\$860,000 in the same period of 2014.

Uganda: Ugandan president heckled

President Yoweri Museveni was heckled at a road commissioning ceremony by residents of Tororo, who alleged that Tororo Cement (TCL) is employing more Indian nationals than local citizens. TCL said that 'barely' 5% of its staff are Asian. The president has promised to look into the matter.

Egypt: Sinai Cement reports loss in 2015

Sinai Cement Company (SCC) has reported a US\$3.6m net loss in the first half of 2015 compared to a US\$11.2m profit in the same period in 2014. Its overall profits declined to US\$4.2m from US\$23m. SCC reported a US\$1.3m loss in the first quarter of 2015 compared to a US\$4.5m net profit in the same period of 2014.

Nigeria: Shonhiwa joins Dangote Group

Johnathan Shonhiwa, former chairman of Lafarge Zimbabwe, has joined Dangote Group. Shonhiwa, who resigned from Lafarge Zimbabwe recently, was chairman for almost two years after having taken over from Muchadeyi Masunda in January 2014.

Egypt: South Valley Cement orders line

South Valley Cement has signed a US\$34.7m contract with China's Sinoma for a new cement line.

Cameroon: Dangote Cement opens plant

Dangote Cement has opened its new 1.5Mt/yr Sinoma-built cement plant in Douala, Cameroon. The plant is part of Dangote's US\$4.3bn expansion across Africa and Asia.

Nigeria: CCNN reports US\$9.64m profit

The Cement Company of Northern Nigeria (CCNN), part of BUA Group, has declared a post-tax profit of US\$9.64m for its 2014 financial year, some 23.1% higher than in its 2013 financial year. Despite lower cement sales in the last quarter of 2014, the company's focus on efficiency and strategic investments has resulted in steady growth.

Kenya: Bamburi Cement's profit up 94%

Bamburi Cement's pre-tax profit rose by 94% year-on-year in the first half of 2015 to US\$43m. Its turnover grew to US\$186m from US\$166m as governments and others continued to invest in infrastructure projects. The strong performance was attributed to growth in its two main markets of Uganda and Kenya, cost cutting and gains in its US-Dollar-based liquid assets.

Ghana: Ghana Cement Manufacturing Association approves of import tax rise

The Ghana Cement Manufacturing Association (GCMA) has approved of a government customs decision to increase the cost and freight value of imported bagged cement into the country. The valuation of Freight on Board (FOB) for the import of bagged cement has been increased to US\$60/t from US\$25/t, according to GCMA chairman and strategy and corporate affairs director of Ghacem, George Dawson-Ahmoah.

"We are appealing to international cement companies to abide by fair trade practices to safeguard the industry, because it has consequences like workers losing their jobs, lower taxes to the government and the folding of local companies," said Dawson-Ahmoah.

Dawson-Ahmoah added that the GCMA was not expecting any value less than US\$80/t to cover the cost and freight of imported cement from China to Ghana. He added that the country's local cement industry has a 2Mt/yr surplus of cement production capacity following expansion projects. Since lobbying the government on this issue, the GCMA has been monitoring the movement of imported bagged cement and will continue to insist on 'fair trade practices.'

Ethiopia: Messebo Cement conducts feasibility study for grinding plant

Messebo Cement has hired state-owned consultant Industrial Projects Service (IPS) to conduct an assessment of the cement market around Addis Ababa. It is considering opening a grinding plant where semi-processed clinker from Tigray would be used to produce cement.

"The project is mainly intended to minimise the transportation cost incurred from Mekelle to Addis Ababa, which is US\$24.5-33.7/t, and hence to enable the plant to compete with existing cement plants in the city," said Messebo's deputy project manager Kidane Tekelehaimanot. Mekelle is 770km away from Addis Ababa. The Mekelle plant produces 83% of its 2.24Mt/yr cement production capacity.

Messebo is the second company after Habesha Cement to undertake a market study. Habesha has hired Waas International Consulting to assess the current and future demand and supply of cement, as well as to determine the need for expansion. Dangote Cement and Derba Midroc have also planned expansions, with Derba intending to double its 2.3Mt/yr production capacity.



Here *Global Cement Magazine* presents its monthly review of global cement prices, in US\$ for easy comparison. Much more price information (including the latest information on prices and market trends throughout the global cement industry from our price correspondents) is only available to subscribers of *Global Cement Magazine*.

To get additional prices, you should subscribe - **See page 72**. In this issue subscribers receive information from the Philippines, India, Egypt, Honduras, Zambia, South Africa, Myanmar and Ghana.

World: International coal prices dropped by around 12% since June 2015 and stood at around US\$52/t on 21 September 2015.

Pakistan/Africa: Pakistan has formed a new policy to make a 'big push' in exports particularly to the Middle East, Africa, South East Asia and China.

This involves government-endorsed cement exports to Afghanistan, India, Sri Lanka and Africa. In the case of Africa, a favourable new freight rate for Pakistani producers that chose to export cement to the continent has been introduced.

This move may further lower the price of cement in East Africa and will be very controversial for traditional local players there, which claim to already be under siege from Iranian and Pakistani marine imports and the construction of new domestic cement capacity by Nigeria's Dangote Cement.

China: The average Chinese price for cement has fallen from around US\$54.93/t at the start of January 2015 to US\$47.40/t in September 2015. This continues a falling trend from around US\$62.00/t at the start of January 2014 and represents a 16% fall in the first eight months of 2015 alone. Although the July to September period has been a period of lower cement prices in recent years, the rate of decline from the start of 2015 is more pronounced than in 2011, 2012 or 2013. Prices failed to rally in the final quarter of 2014, unlike in the previous three years.

Argentina: Cement shortages in Mendoza Province in August and September 2015 have caused complications in terms of house building projects, as well as public and private sector works.

Retailers like Materiales Cuyo, which have reported shortages, have estimated that cement prices grew by 8–10% in July - August 2015, with a 50kg bag from Holcim costing US\$10.69 and a bag from Avellaneda currently at US\$10.10. This compares to just US\$9.38/bag

in July 2015. The company predicted further price increases for the rest of September 2015 and October 2015.

Nigeria: Dangote Cement cut prices in its home market of Nigeria at the start of September 2015 in an attempt to boost cement consumption and compete with lower-priced imports.

The price cut is significant, with Dangote slashing US\$30.23/t from the cost of its 3X cement brand. Chief Executive Officer Onne van der Weijde said that the margin on the product would still be satisfactory for the company. He added that Dangote is also hoping the lower prices will help increase export sales to neighbouring nations.

The move has taken analysts by surprise. Although Dangote claims that it is trying to increase competition, they say that slower than expected economic growth may harm producers in the long term.

"We expect the other cement producers such as WAPCO, UNICEM and AshakaCem in the Lafarge Africa Group and Cement Company of Northern Nigeria, to cut cement prices," said Tajudeen Ibrahim, an analyst at Chapel Denham. "The sales volumes of the cement industry may however not rise on the back of the price cut, as the relationship between price and consumption is weak."

Kazakhstan: Steppe Cement has reported lower selling prices so far in 2015.

Prices are for cement in metric tonnes, unless stated otherwise. Where a source has given a range, the published price is the minimum value.

FOB {+ the named port of origin} = Free On Board: The delivery of goods on board the vessel at the named port of origin (loading), at seller's expense. Buyer is responsible for the main carriage/freight, cargo insurance and other costs and risks.

CIF {+ the named port of destination} = Cost, Insurance and Freight: The cargo insurance and delivery of goods to the named port of destination (discharge) at the seller's expense. Buyer is responsible for the import customs clearance and other costs and risks.

ASWP = Any safe world port.

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In the future we will expect less from life - and need less as well.

Robert McCaffrey Editorial Director, *Global Cement Magazine* (rob@propubs.com)

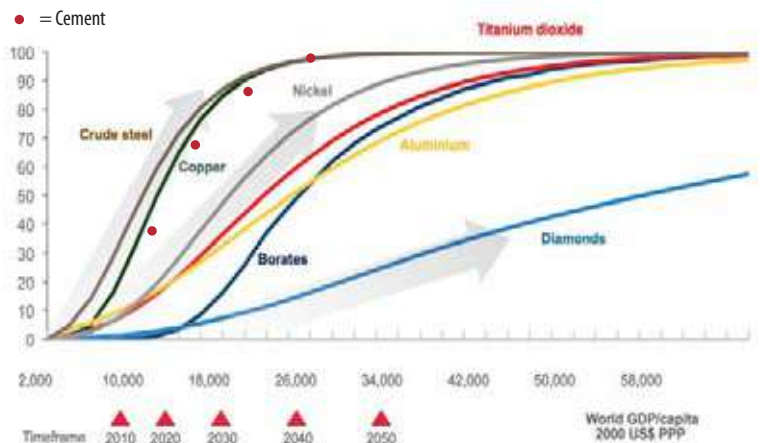


I recently saw a news item that suggested that we will all be able to live until we are 150 years old (but most likely this will only apply to rich people, as usual). I shuddered. Imagine - living to 75 and then living another 75 years as a very old person. Imagine living 75 years as a very old *poor* person - since low industrial growth rates around the world will almost certainly translate into lower returns on pensions. In the future you will have to have an enormous pension pot to live off it alone - most people will also have to work, albeit part-time - deep into what is now considered their retirement ages. Perhaps it would be best to go out with a bang at an earlier age, as soon as the money runs out. As has been noted before, 'There are no pleasures in life worth denying yourself for an extra two years in an old-folks home in Weston-super-Mare [a older seaside town in the west of England].'

The increasing longevity of those in the developed world (which is mirrored by that in the developing world as well) will lead to many changes in the global economy; State pensions will increasingly have to become funded (rather than unfunded - where your pension payments are being paid for by today's workers, rather than by what you have put away for yourself) since there will be fewer workers per retired person; Pensions will become less valuable in real spending terms; Diseases of old age will come to predominate medical spending (and research). Imagine producing more of the products that older people use, rather than those used by the young: more zimmer frames and fewer skateboards (and concrete skate-parks).

The overall picture will no doubt be complicated by the coming revolution in artificial intelligence and roboticisation. Robots will increasingly take over from humans in manual work (and in progressively more intricate work as well), while intelligent systems will make many of today's white collar workers (the so-called 'meat-puppets') redundant. It has been said that if your job can be broken down into a work flow and a series of algorithms (such as financial advice, some medicine, estate agents and legal advisors), then you can be replaced by a computer. The number of workers being paid a wage as a proportion will decrease - and, there's no getting around it, we will have more under-employed people, with a lower economic output. However, we can usefully ask ourselves, 'Is that such a bad thing?'

The graph on the top right shows how consumption of a number of commodities changes as people become



richer. For example, as soon as a society has a GDP per capita of more than US\$10,000, it will already be using a lot of steel and copper (and cement) - and that will continue to increase, but only until the GDP per capita is around US\$25,000 - when it levels off and even starts to decrease (as was shown to be the case for the cement industry by Emma Davidson in *Global Cement Magazine*, in June 2014). Consumption of diamonds, however, requires a society to be far richer before the saturation point comes. My point here is that many western countries have already passed the US\$25,000/capita GDP point, and consumption of cement has ready levelled off or started to decrease (as we'll have seen throughout Europe, notwithstanding the 2008-2011 financial crisis). Plenty of other countries are approaching the same GDP level, at which point their cement industries will go into long-term decline. China may already have passed the point, even with a GDP of US\$7000/capita.

So, I ask again, 'Is this such a bad thing?' The cement industry is busy abandoning its traditional origins in Europe and is now seeking growth in developing markets (just see LafargeHolcim). However, for each of us, it probably means a less economically-active life, with less likelihood of an affluent old age. An old joke goes like this: The poverty-stricken fisherman asks the visiting CEO of his dream and the CEO replies, 'To stop working so hard, to stop having to worry about everything all the time, and just to sit on the beach, to drink a beer, to strum my ukelele and to have not a care.' And the fisherman says to him, 'Welcome to my world.'

Perhaps just dialling down our expectations is the best preparation for tomorrow's world, after all.

Above: World GDP/capita versus percentage of the 'Saturation level' (point at which consumption per capita does not increase with income levels). Cement points estimated by Global Cement. Graph courtesy Rio Tinto.



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