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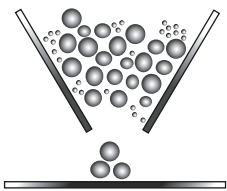
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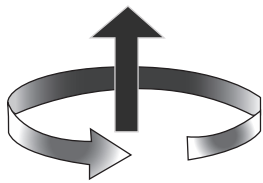
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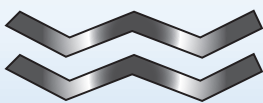
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Dear readers,

Welcome to the November 2016 issue of *Global Cement Magazine*, the world's most widely-read cement magazine, which will be distributed to delegates at the forthcoming 21st Arab-International Cement Conference & Exhibition (AICCE) in Abu Dhabi, UAE on 16-18 November 2016. This issue brings our usual mix of technical case-studies, features and interviews, plus the second part of our report into the cement markets of the rapidly-growing Association of South East Asian Nations (ASEAN). (The first part can be found in the October 2016 issue).

This issue also features a plant visit report from a very interesting plant indeed. On the face of it, you could be forgiven for thinking that North Lincolnshire in the UK would be one of the less interesting places to operate a cement plant anywhere in the world. However, in December 2013 the Cemex South Ferriby plant, located directly on the River Humber estuary, was inundated with a 2m high wall of water during a tidal storm surge. Much of the plant's infrastructure, including a majority of its electrical fittings and part of one of its kilns, was damaged or destroyed. It took two full months to even clear the site so that reconstruction work could begin in earnest and it was a full year before the plant was able to produce clinker once more. Since that time, the plant has recovered much lost ground. The fact that the reconstruction did not take far longer is a testimony to Cemex's local and international engineering and logistical prowess, as well as that of its main contractor and many subcontractors. Even during *Global Cement's* visit, reconstruction work was ongoing. A new office building will not be completed until the end of 2017 - four full years after the flood! Turn to page 38 to read about this very interesting plant and the ongoing work.

In our technical section in this issue we cover alternative fuels (Pages 20 and 22), refractory insulation (Page 10) and non-linear modelling techniques for improved cement production and quality (Page 24), plus ways to increase the efficiency of electrostatic precipitators without making changes to the physical dimensions of the ESP itself (Page 16). We also have a review of the VDZ Annual Cement Conference, which took place in Düsseldorf, Germany earlier in the autumn (Page 44) and are proud to introduce our quarterly column from Philippe Fonta of the Cement Sustainability Initiative (Page 31).

We hope you enjoy this issue of *Global Cement Magazine* - the world's most widely-read cement magazine! If you are attending the 21st Arab-International Cement Conference & Exhibition in Abu Dhabi, we look forward to seeing you - Come and say 'Hi' to us on stand F10.

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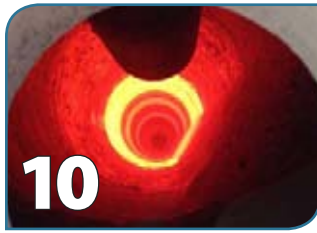
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Mario Taddeo, Pyrotek Canada & Michael Dubovovich, Boral Cement

## Improving the performance of a lime kiln burning zone

The burning zone of a rotary lime kiln has the highest process and shell temperatures of anywhere in the kiln. Increasing production by increasing burning temperatures necessitates the selection of higher quality basic wear lining brick (improved thermochemical resistance) to optimise the refractory campaign life. Such bricks also have higher conductivity and, with minimal coating formation, shell temperatures are further increased. The resulting high shell temperature can cause shell deformation, increased energy consumption, loosening of the refractory lining and rotational and migration issues. Until now, dedicated insulation linings have not been used in such intensely thermomechanically stressful applications due to their inherent softness and fragility. Rotary kiln lime producers have to tolerate unacceptably high shell temperatures and energy consumption in order to achieve increased production targets. To correct this, a 13mm thick structural insulation board manufactured by Pyrotek, with world's best thermomechanical properties, was trialed in order to reduce the shell temperatures. Its performance was assessed over a three year campaign.

Boral Cement operates a 3.35m diameter, 84m long rotary lime kiln in Marulan South, New South Wales, Australia. It is lined with 220mm thick refractory brick. The kiln is supported by three tyres, with an operational speed of up to 2rpm. It converts 800t/day of limestone to 400t/day of lime. This has been achieved through use of higher quality refractories including basic brick in the burning zone. Compared to high alumina bricks, this material has greater chemical inertness and refractoriness, ideally suited for increased temperatures associated with increased production. However, this comes at the expense of higher thermal conductivity. The subsequent excessive high shell temperatures can cause: Increased shell deformation and repair costs; Loose refractory lining; Over-expansion of the shell and necking in the tyre; Increased exposure of equipment and personnel to heat stress and; Higher energy consumption and green-house gas emissions.

In the case of the Marulan plant, the resultant shell temperatures in the burning zone around tyre No. 1 regularly exceeded 450°C. Action was required to reduce the shell temperature and related high energy consumption. The solution would be to use a dedicated insulation lining. However, given the very high thermal, mechanical, chemical and fatigue forces involved, no material has offered long term performance in such an environment to date. Failure of the insulation lining would cause failure of the entire lining and result in prolonged kiln stoppage and loss of production.

### Pyrotek solution

Pyrotek is the producer of ISOMAG® 70XCO, a phosphate bonded MgO-SiO<sub>2</sub> structural insulating board, specifically designed for back up refractory lining in demanding thermomechanical applications. It has unmatched thermomechanical properties at operational temperatures, including minimal shrinkage with high strength while maintaining low thermal conductivity (See Table 1). Tested under cyclical compressive stress conditions at 500°C, ISOMAG® maintained its elasticity of up to 7MPa, offering further assurance of lining stability in this environment (See Figure 1).

ISOMAG® 70XCO, 12.7mm in thickness, was inserted between the wear lining and steel shell, did not compromise vessel capacity or the installation procedure. Thermal calculations showed significant reductions in shell temperature and energy use.

### The trial

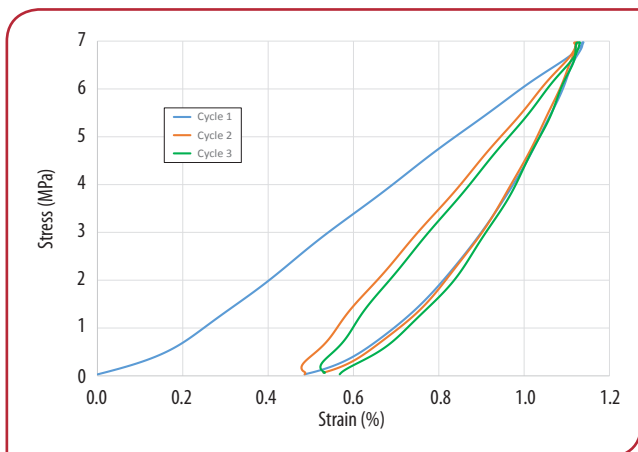
12.7mm ISOMAG® 70XCO board was installed at the No. 1 tyre of the Marulan's plant's No. 2 rotary lime kiln, which is shown in Figure 2. The tyre's centre-line is 8.84m from the kiln discharge end.

Right - Table 1: Physical properties of ISOMAG® 70XCO.

	Max. Service Temp. Limit	Shrinkage at 900°C	Cold crushing strength	Hot crushing strength at 5% strain at 500°C
ISOMAG® 70XCO	1050°C	1.64%	15MPa	17MPa

Right - Table 2: Burning zone refractory lining - Standard versus insulated practice.

Lining Material	Standard lining	Insulated lining	K Value at 600°C (W/mK)	Density (kg/m <sup>3</sup> )
Wear lining brick	220mm MgO-Spinel	220mm MgO-Spinel	3.25	2280
Insulation board	N/A	13mm ISOMAG® 70XCO	0.31	1250



Above left - Figure 1: Resilience behaviour of ISOMAG® 70XCO after three cycles at 500°C.

Above - Figure 2: Tyre No. 1 of the Marulan plant's No. 2 rotary kiln.

A 3.8m-long test area was selected and three rows of 1265mm x 76mm x 12.7mm board were installed over the full circumference in the burning zone on either side of the tyre centre-line. ISOMAG® 70XCO board was installed between 6.4m and 10.2m axial metres, mortared to the shell beneath the 220mm VDZ B222-B422 basic brick.

The basic wear lining bricks were radially mortared with 1mm magnesite mortar joint on the brick-to-brick faces around the ring for added mechanical flexibility in the rings of bricks. This aids resistance to ovality stresses in the tyre at operating temperatures. For comparison, 3m uphill of this trial area, only basic brick was installed. Table 2 shows the regimes to be compared.

**Results and discussion**

Figure 3 shows a calculated one dimensional (steady



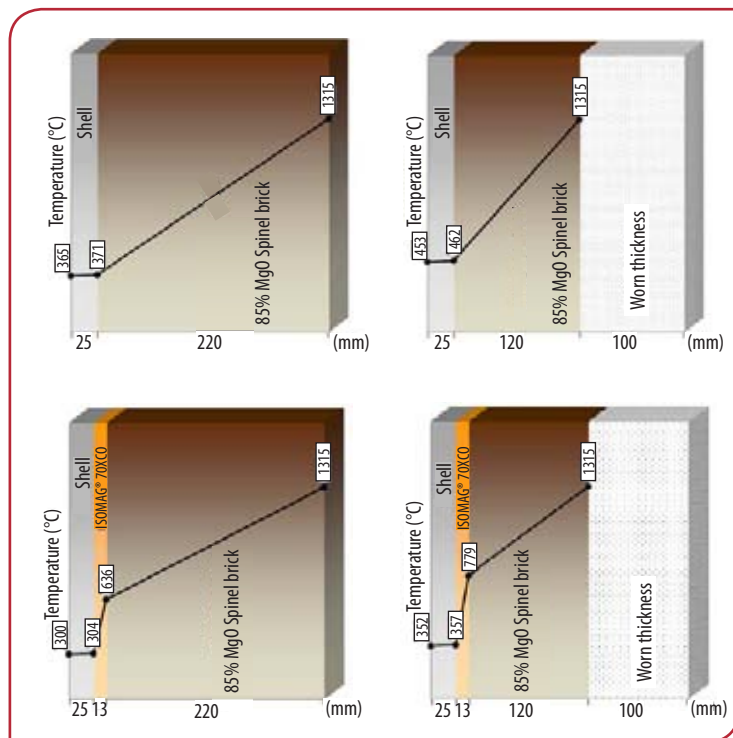
Left - Figure 3: Installation of the insulation board across the shell bottom half.

state) heat loss comparison between the standard lining and insulated lining with the wear lining in both new and worn conditions. The calculations measured through conduction represent the main mechanism of heat transfer through the wear lining.

For the standard installation in new condition, the calculated shell temperature is 365°C with an energy loss of 10.5kW/m<sup>2</sup>. With 13mm of ISOMAG® 70XCO insulation board, the shell temperature and heat loss are 300°C and 8.1kW/m<sup>2</sup> respectively. This is 65°C cooler and a 32% reduction in energy loss from the kiln shell.

When the wear lining brick is worn to 120mm thick, the calculated shell temperature is 453°C. Under this condition, the insulation board provides an even greater benefit, lowering the shell temperature by 101°C to a more tolerable 352°C. This represents an equivalent 50% energy loss saving.

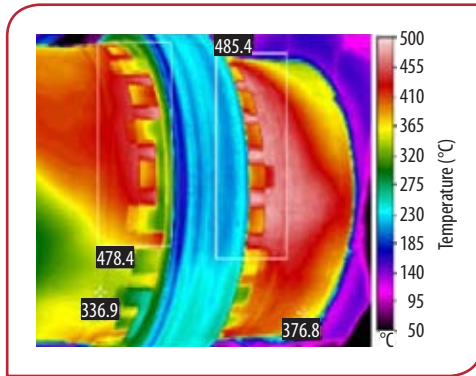
Figure 4 shows the effect an insulation board has on the thermal gradient. The wear lining brick has a flatter thermal gradient when insulation board is used, meaning hotter refractories and more energy retained within the lining. As a result, the wear lining brick accommodates more thermal load, with more uniform temperature throughout its thickness. The



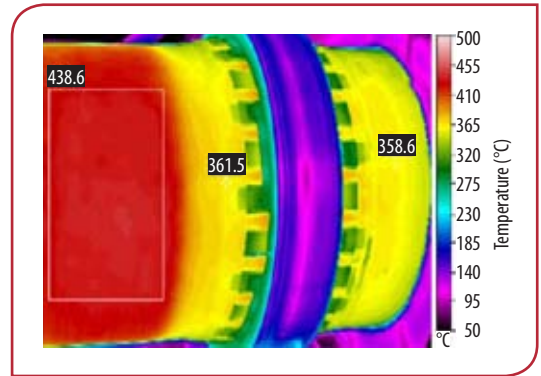
Left - Figure 4: One-dimensional shell temperature calculations for standard (above) and Pyrotek-recommended (below) solutions, in new (left) and worn (right) conditions.



**Right - Figure 5:** Infrared thermography picture of the burning zone, with no insulation. Temperature of 485°C exceeds control limit. Brick worn to 110mm.



**Far right - Figure 6:** Infrared thermography picture of the burning zone, with 13mm ISOMAG insulation and new magnesia spinel brick (220mm).



**Right - Figure 7:** Infrared thermography picture of burning zone, with 13mm ISOMAG insulation, after 28 months of operation.

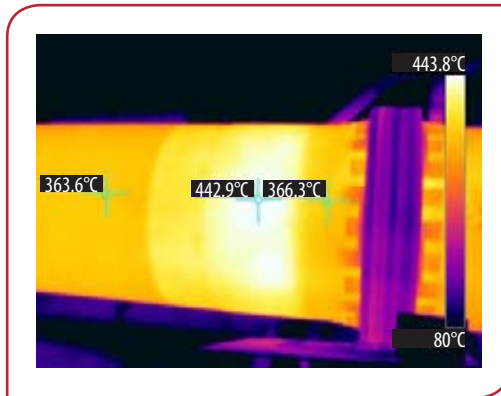


Figure 7 shows that, after 28 months of stop-start operation, the shell temperature under the tyre in the burning zone has been maintained at an average of 360-370°C, compared to 420-440°C without insulation. The 10.2-13m region had basic brick installed and, without insulation, averages 425°C. As the wear lining becomes more worn, its shell temperature could exceed the control limit set at 470°C, risking premature reline or stoppage. The shell temperature saving with 13mm ISOMAG® 70XCO is confirmed to average 70°C.

result is more uniform thermal expansion, which should promote lining tightness and minimise thermal shock and fatigue during operation. With increased thermal expansion, the wear lining brick is under increased thermomechanical load, so assessing the refractory wear is also of great interest.

### Actual comparison

Figure 5 is a thermograph taken in March 2011 of the burning zone (Pier 1) and tyre section, which was toward the end of the standard refractory campaign. It shows the concern, where large areas of the kiln shell exceed 485°C under the No.1 tyre, with the wear lining approaching its minimum thickness. This value is consistent with the theoretical calculation of 453°C, as shown in Figure 4.

Five months later, the burning zone was relined with 220mm of basic brick and 13mm of ISOMAG® 70XCO (6.4-10.2m from discharge). The effect is shown in Figure 6. The thermography company stated, "Pier 1 showed a steep decrease, with an even distribution of temperatures around the circumference in the range of 355-365°C. This is a decrease of 90-120°C below the previous survey."

**Right - Figure 8:** Basic brick in the burning zone after 43 months.



**Right - Figure 9:** Basic brick on ISOMAG (not crushed): Burning zone - Uphill 6.6m after 43 months.



### The benefits of lower shell temperature

Reducing the shell temperature results in less shell distortion for a more uniform or circular shell profile, which allows for better keying and tighter refractory installation. A lower shell temperature also reduces the risk of necking; where thermal expansion of shell exceeds the tyre diameter. Necking can cause catastrophic refractory failure and operational issues as well as potential shell repair/replacement. Finally, lowering the shell temperature protects surrounding equipment like bearings, drives and also aids operator comfort and safety. High shell temperatures indicate excessive energy loss.

### The potential pitfalls

Reducing the shell temperature reduces shell thermal expansion and may have adverse consequences in terms of ovality - the relationship between the horizontal and vertical shell diameters. The kiln is designed so that shell expansion at operating temperature results in the optimal ovality and migration (rolling distance of the tyre in relation to the shell) control. Where migration and ovality is not under control it can result in adverse effects such as spalling, loosening and even spiralling of refractories.

In the Marulan trial, nei-



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Region	HF Brick	Length (m)	Internal surface area (m <sup>2</sup> )	Shell $\mu\Delta T$ (°C)	$\Delta HL$ (kW/m <sup>2</sup> )	MWh day gain	t/day	GJ/t gain	Saving/yr (US\$)	ISOMAG RoI
Zone 1 (0 - 25m)	85% Mg-Spinel	25	262	82	3.87	24.4	420	0.21	191,355	14
Zone 2 (25 - 46m)	85% Alumina	21	220	65	2.09	11.1	420	0.09	86,098	12
Zone 3 (46 - 84m)	43% Alumina	38	399	36	0.80	7.7	420	0.07	57,455	8
<b>Totals</b>		<b>84</b>	<b>881</b>	<b>61</b>	<b>2.26</b>	<b>14.4</b>		<b>0.37</b>	<b>334,908</b>	<b>12</b>

**Above - Table 3:** Energy saving calculations with ISOMAG insulation in the lime kiln.

ther migration or ovality were recorded *per-se*, but they were calculated to be within the plant's operational limits when the insulation lining was included. Subsequent refractory inspections during the trial showed none of the above adverse refractory wear issues and kiln operations.

In summary, refractories placed on the insulation lining wore at the same rate to the adjacent standard lining. Shell temperature reduction and refractory lining stability were maintained through its 43 month campaign (See Figures 8 & 9).

### Effects on energy consumption

Table 3 is a theoretical calculation measuring the energy savings in GJ/t based on the heat loss calculation shown in Figure 4 and other inputs from the plant.

In general, Zone 1 is comprised of basic brick (lower transition, burning). Zone 2 is the upper transition (preheating) zone of high alumina brick. Zone 3 (charging zone) is comprised of a super duty brick and 'tumbler rows' construction.

Zone 1 has hotter process zones and more conductive brick has the highest energy loss. The prediction of 82°C  $\mu\Delta T$  (average shell temperature difference) is consistent with the actual measurements. It yields a calculated energy saving of 0.21GJ/t. Zone 2 has lower process temperatures and less conductive bricks. The calculated shell temperature improvement is lower, at 65°C, consistent with actual measurements, and results in an energy saving of 0.09GJ/t.

For zone 3 the calculated  $\mu\Delta T$  was reduced by 36°C, with a 0.07GJ/t energy saving due to the larger surface area, lowest process temperatures and conductive wear lining brick. Given the higher shell temperature reductions, if 46 lineal metres from discharge (or 55%) is insulated with ISOMAG®, this would lead to an energy saving of 0.3GJ/t. Data from the plant has already confirmed a 0.2GJ/t improvement by insulating just the kiln hottest zones.

### Conclusions

The decision to insulate a rotary kiln was done to reduce shell temperature or save energy. The shell temperature under No.1

tyre at Boral Cement Marulan lime kiln exceeded 480°C and traditional insulation materials could not offer effective performance guarantees in this high production / high temperature operational environment.

This article examined the effect of incorporating a 13mm insulation board with the worlds best thermo-mechanical properties in the burning zone of a high output lime kiln.

The refractory insulation lining showed no evidence of degradation throughout the campaign and had the following results:

- 70°C shell temperature reduction maintained for 43 months of stop-start production;
- Noticeable improvement in operator comfort adjacent to the burning zone;
- No effect on wear lining erosion/performance;
- Potential to reduce shell repair costs by being well under design limit temperature;
- Enhances productivity/costs by prolonging the life of the shell;
- 0.2GJ/t energy consumption saving, with further savings available by increasing the area of insulation;
- Improved lime quality noted by chemists due to insulation of the burning zone.

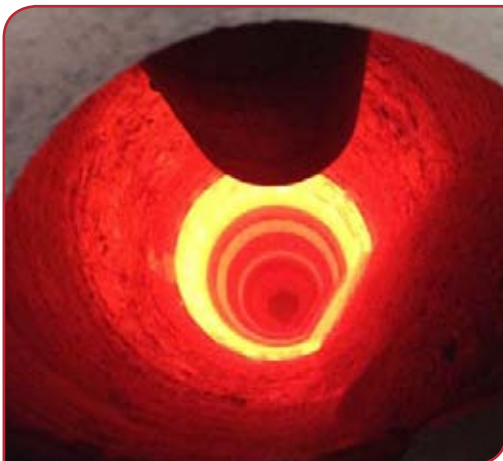
ISOMAG® has been specified as the dedicated insulation lining from the lower transition to upper transition zones of this kiln.

The results of this trial are significant for the global lime producers that use rotary kilns. Producers now have the option to operate their plant at peak performance while maintaining control of the shell temperatures in the burning zone. The Pyrotek manufactured ISOMAG® 70XCO structural insulation board has achieved reductions in shell temperature and energy savings with good lining stability under the most extreme thermomechanical conditions.

### Acknowledgements

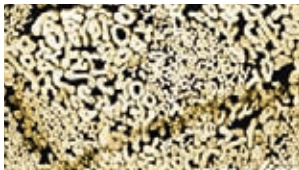
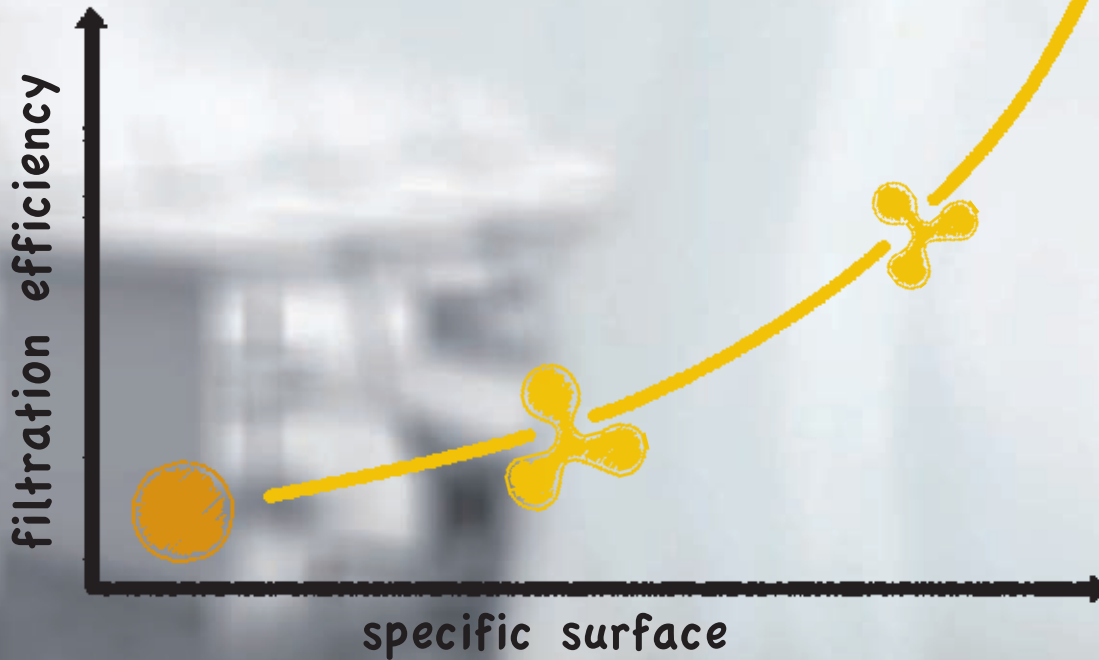
The authors would like to thank Boral Cement Australia, and others in the cement industry for their cooperation.

**Right - Figure 10:** Visual camera image of the inside of the lime kiln 20 minutes after flame off. The areas that are insulated with ISOMAG insulation can clearly be seen to retain more heat than adjacent areas.



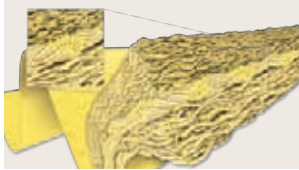
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Paulo Oliveira & Jia (Erick) Ma, Babcock & Wilcox; Xu Hue, Anhui Conch Cement

## Increasing efficiency of particulate collection in cement plants

Environmental legislation is becoming more stringent and requires industrial mills to refer to best available technologies (BAT) and practices in order to achieve enhanced performance from existing equipment. Cost-conscious end users will also look for efficiency improvements without major capital expenditure, looking for ways to revamp the existing plant in order to achieve the desired level of particulate matter (PM) emissions in a reliable and cost-effective way. This can involve improving the performance of existing electrostatic precipitators (ESP).

ESP efficiency is related to:

- Migration velocity (i.e.: how quickly the dust in the ESP migrates toward the collecting plates) in cm/s;
- The specific collection area (SCA) in  $m^2/(m^3/s)$ ;
- Total gas flow through the ESP box ( $m^3/s$ ).

For an existing ESP, the parameters are fixed. Increases in SCA cannot take place without considering a mechanical and structural revamp. Total gas flow is a given process condition that the customer will set. The migration velocity is a correlation of the two other parameters. However, simple inspection steps can be taken in order to assure that the existing ESP is in the best operating condition, mechanically and electrically.

**Plate and high voltage frame alignment:** The proper clearances inside the ESP must be maintained in order for particles to be charged correctly. This ensures proper dust collection and avoids tripping the ESP fields due to excessive sparking.

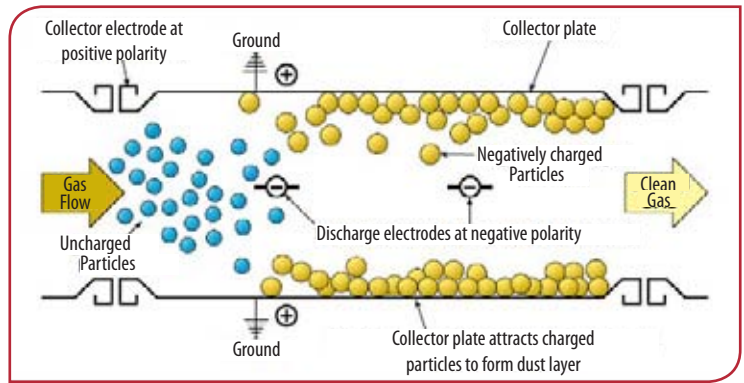
**Gas flow distribution:** Proper cleaning and good physical condition of the turning vanes in the ductwork leading to the ESP and downstream, the perforated plates in both the inlet and (sometimes) in the outlet nozzle of the ESP, and any internal baffle plates need to be kept in adequate condition to guarantee proper flow of gas throughout the ESP. This, in turn, guarantees proper treatment time and a more uniform gas distribution inside the ESP.

**Rapping system conditions:** Good rapping density ( $140m^2$  of plate area or less per rapper) should be properly secured at the design phase. Proper plate

**Below - Figure 1:** The Anhui Conch Xuancheng plant in Anhui Province, China has recently had two electrostatic precipitators upgraded by Babcock & Wilcox.







**Above left - Figure 2:** The ESP prior to renovation by Babcock & Wilcox.

**Above - Figure 3:** An ESP separates dust, fume or mist from a gas stream using a high-voltage field.

cleaning is a matter of making sure the optimum G forces are imposed from the impact point of the rapping down to the furthest point of the plate/voltage frame that it is intended to clean. Proper rapping frequency and good mechanical condition of the rapping system are key for reliable ESP operation.

**Transformer-rectifier original nameplate capacity:** Together with the automatic voltage controller (AVC), this will indicate how much more power can effectively be put into the ESP box to improve particulate collection.

**Other factors:** Lastly, end users should look for signs of erosion, corrosion, bowed plates and loosened emitting electrodes that could correlate to poor temperature distribution, air leakage, excessive sparking, bad rapping alignment, dust build-up or issues with acid dew point.

After carefully assessing and investigating all key factors prior to proposing a solution, B&W did not recommend any additional mechanical modifications in the ESP box. Instead it was decided to replace the existing eight single-phase transformers with eight new low frequency TPPS and B&W AVCs.

The TPPS, compared to the single-phase technology, results in more power input to the ESP. This is achieved as the TPPS technology has a peak-to-average voltage ratio near 1.0, compared to 1.2 from the predecessor technology. That means the average power input to the ESP approaches the peak (maximum) power (with minimal sparking), enhancing the corona current discharge, which charges the particles more effectively. Ultimately, more dust will be collected.

**Case study: Anhui Conch Cement, Xuancheng plant (Before)**

Babcock & Wilcox (B&W) recently used three-phase power supplies (TPPS) in conjunction with AVCs as part of a low-cost solution to reduce particulate emissions in a Chinese cement mill's ESP. Anhui Conch Cement Company Limited (Conch) has two 4500t/day dry process cement kilns at its Xuancheng plant in the city of Xuancheng, Anhui, China, each equipped with one dry ESP to collect particulate emissions from the kiln and raw mills. Conch requested an evaluation of the ESP installed at Kiln #1 and waste heat boiler.

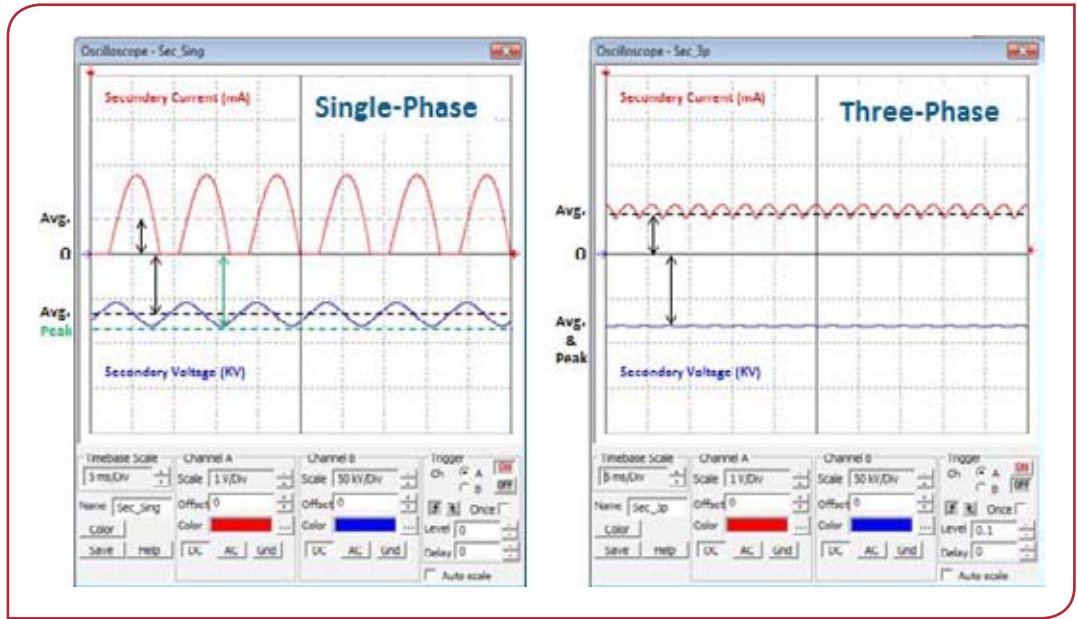
The ESP consisted of two chambers, each with four fields in the direction of the gas flow. All eight fields were powered by conventional single-phase transformer-rectifier sets rated at 271AAC / 380VAC / 1000mA / 72kV with a locally-manufactured AVC.

To meet China's most recent Emission Standard of Air Pollutants for Cement Industry (GB4915-2013), the outlet emissions of Line #1's ESP had to be reduced from 72mg/Nm<sup>3</sup> to less than 30mg/Nm<sup>3</sup>.

Description	Value	Units
Number of casings	1	Each
Number of chambers per casing	2	Each
Gas passage width	400	mm
Number of mechanical fields	4	Each
Total number of electrical fields	8	Each
	Field 1-8	380V, 271A, 72kV, 1000mA, 50Hz
	Current density	359µA/m <sup>2</sup>
CE rapping type	Tumbling hammer	
DE rapping type	Tumbling hammer	
Total collecting plate area	22,278	m <sup>2</sup>
Specific collecting area (SCA)	94.4	m <sup>2</sup> /(m <sup>3</sup> /s) @ 400mm G.P.
Gas velocity	0.81	m/s
Gas leakage	3-6	%
Gas volume	85,000	m <sup>3</sup> /h
Gas temperature (Average)	90-100	°C
Gas moisture content	<10%	% by volume
Inlet dust loading	80	g/Nm <sup>3</sup>
Outlet emission (Designed)	50	mg/Nm <sup>3</sup>
Outlet emission (Existing)	72.15	mg/Nm <sup>3</sup>
Outlet emission (Required)	30	mg/Nm <sup>3</sup>

**Left - Table 1:** Pre-assessment ESP conditions.

**Right - Figure 4:** Typical measurements of secondary current and voltage in both single-phase and three-phase power supplies.



**After installation**

Considering the three-phase power supply characteristics, B&W recommended that Conch use a higher kV/mA nameplate rating (1200mA / 80kV) to obtain better performance.

This retrofit was a direct replacement of eight conventional single phase transformers, control cabinets and controller. After the outage procedures were completed and site work was concluded, new readings were collected from the newly installed equipment. The average secondary voltage increased by 17%, while the average secondary current increased by 143%. Field results also showed a total average kW increase of 156%, while input kVA increased by 5%.

PM emissions at the stack were reduced to 10.8mg/Nm<sup>3</sup>, a decrease of 85% compared to the original conditions and well-below the 30mg/Nm<sup>3</sup> that is

required by environmental regulations. The end result was significantly reduced particulate emissions, which allowed the customer to meet its emissions targets without the large capital expenditure of fully upgrading or replacing major equipment.

**Right - Table 2:** The before and after AVC readings at the Xuancheng mill.

BEFORE	Conventional single phase	
	Secondary voltage (kV)	Secondary current (mA)
<b>Field</b>		
1 - 1	40	320
1 - 2	52	320
1 - 3	69	500
1 - 4	58	380
2 - 1	52	240
2 - 2	58	400
2 - 3	32	480
2 - 4	66	260
AFTER	Low frequency three phase	
	Secondary voltage (kV)	Secondary current (mA)
<b>Field</b>		
1 - 1	65.5	372
1 - 2	63.5	1100
1 - 3	56.0	1060
1 - 4	61.9	1015
2 - 1	65.0	426
2 - 2	63.5	1102
2 - 3	57.4	1032
2 - 4	64.8	980

**Below - Figure 5:** Overall view of the Xuancheng mill.





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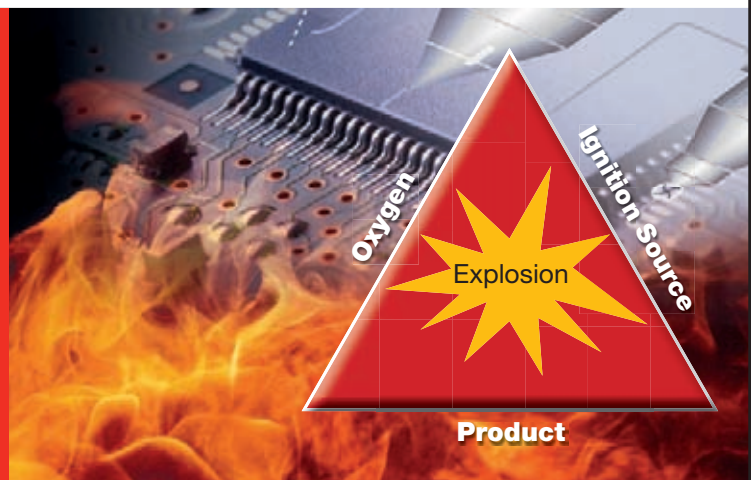
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Avanti Environmental Group & UNTHA UK Ltd

## Avanti expands waste capabilities with contracts for cement industry

Avanti Environmental Group is one of the latest resource specialists to transform waste into fuel for the cement industry. *Global Cement* found out more about the manufacturing process at this new, state-of-the-art facility in Merseyside, UK.

Avanti Environmental is no stranger to the recycling and waste management sector. The business has been trading for more than 20 years, operating mainly in the North West of England, but also with facilities from as far north as Scotland, down to the South West of England. However, the team is always keen to do more.

### Making alternative fuels for cement

The journey to create a new alternative fuel production line began in late 2014 at Avanti Environmental Group's Kitling Road site in Merseyside. Initial conversations unfolded with various manufacturers, each proposing different waste processing methods. However, UNTHA UK, part of Austrian alternative fuel production expert UNTHA shredding technology highlighted an efficient way to treat the waste to produce a saleable resource. Based on the proactivity and level of interrogation provided by the company, Avanti proceeded to procure a complete turnkey package from North Yorkshire headquartered UNTHA UK.

### The solution


Now installed and fully operational, the solution comprises a bespoke in-feed conveyor which – once loaded by either a grab or wheeled loader –

transports pre-shredded, high calorific material into an XR3000C waste shredder. The shredder's indexable cutters and interchangeable screens can achieve a precise, yet flexible shred, with a particle size as small as 30mm, in a single pass. The machine is also fitted with intuitive, ultra-responsive fire suppression technology and a touch screen control panel that facilitates remote diagnostics to UNTHA's HQ.

The shredded material then continues up a discharge conveyor fitted with over-band magnets to extract both ferrous and non-ferrous recyclates. This quality control mechanism ensures a high quality 'on spec' end product and utmost waste hierarchy compliance throughout. An eddy current separator, which draws out any aluminium, completes the system. The homogeneous, high calorific, confetti-like material is then baled and wrapped for onward shipment to cement kilns in both in the UK and across Europe.

The slow speed, high torque waste shredder will present uptime, maintenance and safety benefits without compromising throughputs. Operating as quietly as 70dB(A), the plant will also ensure noise compliance while protecting operator well-being.

Talking about the process, Avanti's group recycling director Steve Kinley said, "UNTHA challenged us to think carefully about the input material, output speeds and the final product that Avanti wished to achieve. I believe this has ensured that we built a more efficient, intelligent and profitable plant that is well equipped to produce best-fit fuels for the cement industry. The fact that the majority of equipment was supplied and commissioned by this one manufacturer was also a key deciding factor. UNTHA retained ownership of the project and ensured each component part would 'talk' effectively to the next."

"This has been a great, collaborative project and we're already thinking 'what next'. We've always looked for ways to work smarter and achieve more. I can see our 50,000t/yr capacity increasing as time goes on, and, because the shredder can handle an array of wastes, from pre-shredded material to bulky, rigid waste, we're likely to vary our feedstock too. This is important given the cement industry is constantly changing and specifications differ worldwide." 

**Below:** A new UNTHA XR3000C shredder is at the heart of Avanti's new alternative fuel production process.



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Rick Schnarre, WM Organic Growth, Inc.

## An introduction to SpecFUEL®

US-based SpecFUEL Partners LLC has been recognised by the US Environmental Protection Agency for the creation of a high-specification engineered 'non-waste' alternative fuel, called SpecFUEL, for the cement industry. The company now has bold plans to build a number of SpecFUEL preparation plants around the US to serve the cement industry.

As cement companies expand their alternative fuel (AF) programs, the challenge to source a high quality fuel at quantities that make sustainable and economic sense is always present. While many AF suppliers have tried unsuccessfully to create this AF stream, SpecFUEL Partners, LLC has created a sustainable alternative fuel source with blends of Municipal Solid Waste (MSW) and recycled materials. The SpecFUEL product achieves higher quality standards, functions very well in fuel delivery systems and performs outstandingly as a coal or petcoke substitute in the combustion process. SpecFUEL is a proven, long-term solution for the cement industry.

The SpecFUEL product is manufactured in a continuous process using MSW and augmented with plastics to increase calorific value and improve quality. The SpecFUEL process uses the latest state-of-the-art multi-step, waste sorting technologies to remove unwanted material such as glass, organics, ferrous/non-ferrous metal, as well as chlorine-based plastics. SpecFUEL's minimum calorific value is approximately 22.1MJ/kg (dry) when processing straight MSW. Higher specified calorific values are achieved by blending a higher percentage of plastics.

Particle size distribution (PSD) and density play a major role in the combustion process. The PSD and density of fuel may need to be adjusted for combustion in the kiln or pre-calciner section to optimise heat transfer. The SpecFUEL manufacturing process has the ability to adjust the PSD and density in order to maximise the coal or petcoke fuel substitution rate. Other quality parameters that are closely monitored and adjusted during manufacturing include moisture, chlorine and calorific value. Inherently, the fuel product is low in sulfur and mercury, averaging

0.2% and 50ppb, respectively. This has a direct impact on emissions as substitution rates are increased.

In August 2013, the United States Environmental Protection Agency recognised SpecFUEL as a non-waste engineered fuel product under the Non-Hazardous Secondary Material (NHSM) Rule (40 CFR part 241) in a so-called 'comfort letter'.<sup>1</sup> The US EPA comfort letter is used to assist end users with state and/or local level permitting requirements.

Companies that are looking to be environmentally responsible by striving to reduce their carbon footprint, look at the SpecFUEL opportunity as a viable outlet for their recyclable plastics. This fact combined with a SpecFUEL biogenic content of nominally 50%, provides a great story line when discussing the SpecFUEL alternative route to landfill avoidance. SpecFUEL provides a readily accessible, high quality product to help ensure long-term commitments with end users.

### SpecFUEL Partners, LLC

SpecFUEL Partners, LLC is a joint venture between WM Organic Growth, Inc., part of Waste Management Inc., and Continuous Energy, LLC. The two companies formalised their partnership in the first

quarter of 2016. Under the agreement, Continuous Energy and WM Organic Growth will combine experience and technological resources to jointly design, construct, and operate fuel manufacturing facilities. The new partnership has begun the process to develop new, full scale operational facilities to complement its current operation in Philadelphia, PA, USA.

The partnership expects multiple facilities to be designed and constructed across the country, with the first of the new plants to begin operating by the fourth quarter of 2017.

1. <https://archive.epa.gov/epawaste/nonhaz/define/web/pdf/specfuel.pdf>



**Right:** Fully automated loading system filling a walking floor trailer with SpecFUEL.



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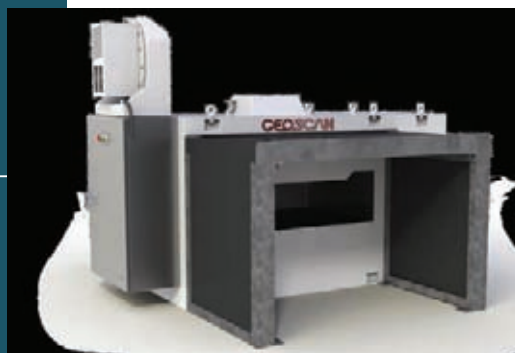
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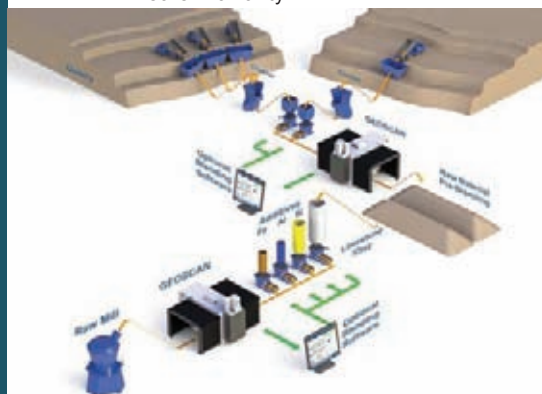
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A Bulsari, Ab Nonlinear Solutions Oy; M Frankenhaeuser, S Lindfors & M Westén, Finnsementti Oy

## Non-linear models help cement process and product development

Material compositions are related to material properties in complicated non-linear ways that are difficult to fathom. However, when advanced mathematical tools are used to describe the non-linearities in the relations, a wealth of new opportunities open up for cement producers. These can offer a wide range of process improvement and product development aids.

Mathematical models are useful: They can be used instead of experimentation if they are sufficiently reliable and can show the effects of variables in different situations. Thus, in the cement sector, they can be used to improve quality, make changes to the process and determine ways to produce new desired products. As there are often several ways to achieve the desired end result, it becomes possible to minimise a variable like energy consumption or production cost, while determining ways to arrive at a desired combination of product properties. In

general, mathematical models can help speed up the development of products, materials and processes.

In the case of cements, product properties of interest usually include strengths at 1 and 28 days, setting time, water demand, heat of hydration, energy consumption and production costs, among others. These properties depend on the composition of the cement as well as its particle size distribution. The relations between these variables are usually not very simple. However, production data usually contains a lot of valuable, yet crude information that can be refined into useful mathematical models.



Right - Figure 1: Satellite coolers around the Finnsementti cement kiln in Pargas, Finland.

### Traditional modelling

Mathematical modelling can be carried out in a number of ways, with different approaches more suitable than others in specific situations. Physical modelling involves ‘writing the laws of nature in mathematical form.’ It usually requires a lot of assumptions and simplifications. It is not particularly effective for predicting material behaviour.

Empirical and semi-empirical models are based on observations and do not need any significant assumptions or simplifications. The observations can be from production data, experimental data or a combination of the two. Such models simply describe the reality as seen from the data. Conventional techniques of empirical modelling, however, are linear.

### Nonlinear modelling

Nothing in nature is very linear and materials science is particularly full of non-linearities.



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**Right - Figure 2:** A typical set of non-linear models for cement with composition and surface area as input variables.



Conventional linear empirical models are not very efficient at treating non-linearities, even when non-linear terms are used. New methods of non-linear modelling are based on free-form non-linearities and do not require the knowledge of the type of the non-linearities at play in advance.

Among the new methods, feed-forward neural networks are particularly attractive because of their universal approximation capabilities.<sup>1</sup> These make them very suitable for most of the function approximation tasks that materials science and process engineering throw up.

Neural networks have been in use in process industries for over 20 years.<sup>2</sup> The multilayer perceptron, a kind of a feed-forward neural network, is the most common. Several sectors use them, including concrete,<sup>3</sup> metals, plastics, rubber, semi-conductors, power generation, biotechnology and ceramics.

Some things are common to modelling of various kinds of material behaviour. Material properties or product properties depend on composition variables, process variables and dimension variables. Non-linear models make materials and product development more efficient by reducing expensive experimentation and by helping achieve better combinations of material properties, sometimes optimised for cost.

### Finnsementti's cements

Finnsementti belongs to the CRH group and operates two production units in Finland. The Pargas unit (See Figure 1) produces cements that provide significantly higher strengths than described by

standard specifications. Superior quality is achieved by a deeper understanding of the process and the materials. Mathematical models play a key role in maintaining concise and precise information about the effects of relevant variables on product properties.

Several cement product properties are of interest to the concrete industry. Besides the strength development dynamics, workability (or rheology) is also important for most kinds of concretes. Therefore, the cement industry monitors properties like strengths at 1 day, 2 days, 7 days and 28 days, water demand, slump, setting time, heat of hydration and others, at frequent intervals to assure the quality of cement. All of the properties depend on composition and particle size distribution (See Figure 2). There are a lot of composition variables that can be taken into account. Among the more important constituents of cement are alite, belite, aluminates, sulphates, gypsum, hemihydrate, anhydrite, carbonates, limestone, free lime and alkali minerals. At Finnsementti, these are measured often enough to collect a good data set.

Particle size distribution can be represented in various ways. One can take just the mean and standard deviation of the particle sizes if there is a Gaussian distribution. In our case, we have taken only the surface area and the fraction of oversize particles.

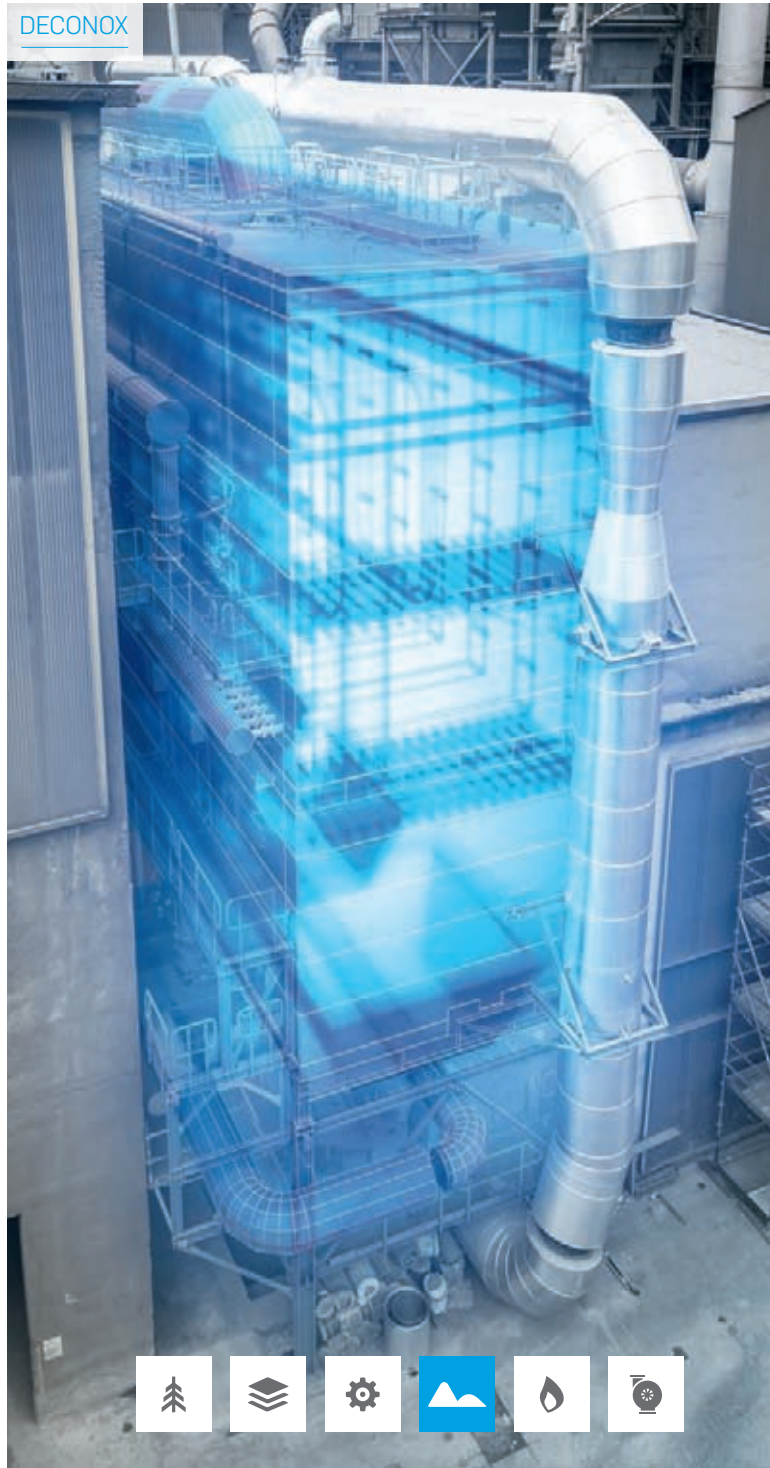
Particle size distribution can be represented in various ways. One can take just the mean and standard deviation of the particle sizes if there is a Gaussian distribution. In our case, we have taken only the surface area and the fraction of oversize particles.

### Non-linear models for strength

Production data for CEM I 52.5 R, CEM II/A-LL 42.5 R and CEM II/B-M (S-LL) 42.5 N was available for a duration of about one year. There was a good variation in the composition as well as the strengths. It was first analysed for its basic characteristics. Input variables that were expected to be important were selected for use. A large number of non-linear models were attempted in the form of feed-forward neural networks using the NLS 020 software, which Nonlinear Solutions has developed over the years.

Although non-linear models are algebraic equations, they are complicated and difficult to work with. Therefore, software systems have been developed over the last 20 years for easier use of the models. These are called Lumet systems and have been used in a large variety of applications in several industrial sectors. Lumet systems allow the user not only to predict the outputs of the models, but also have various features for plotting the effects of variables, various kinds of calculations like optimisation, and other tasks.

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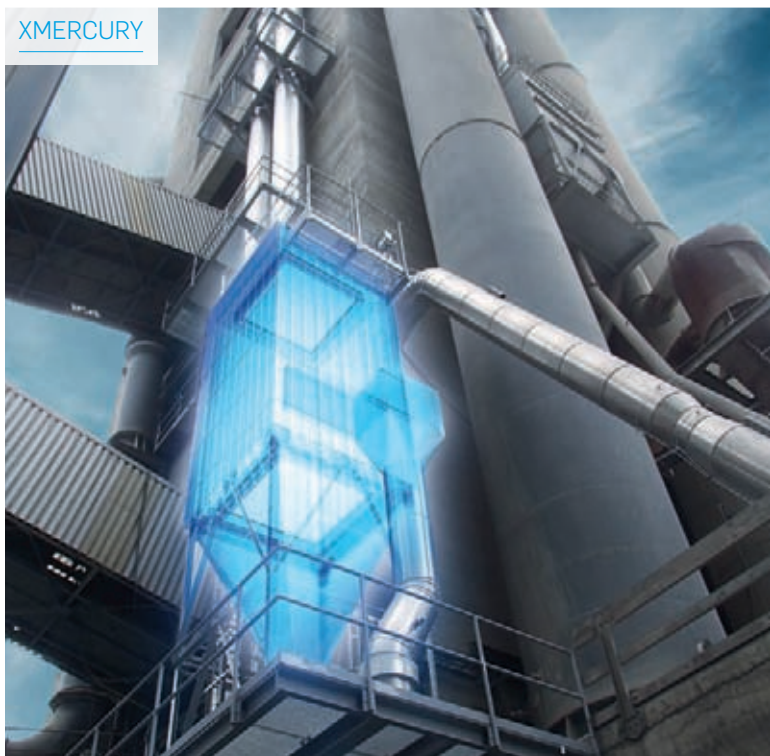


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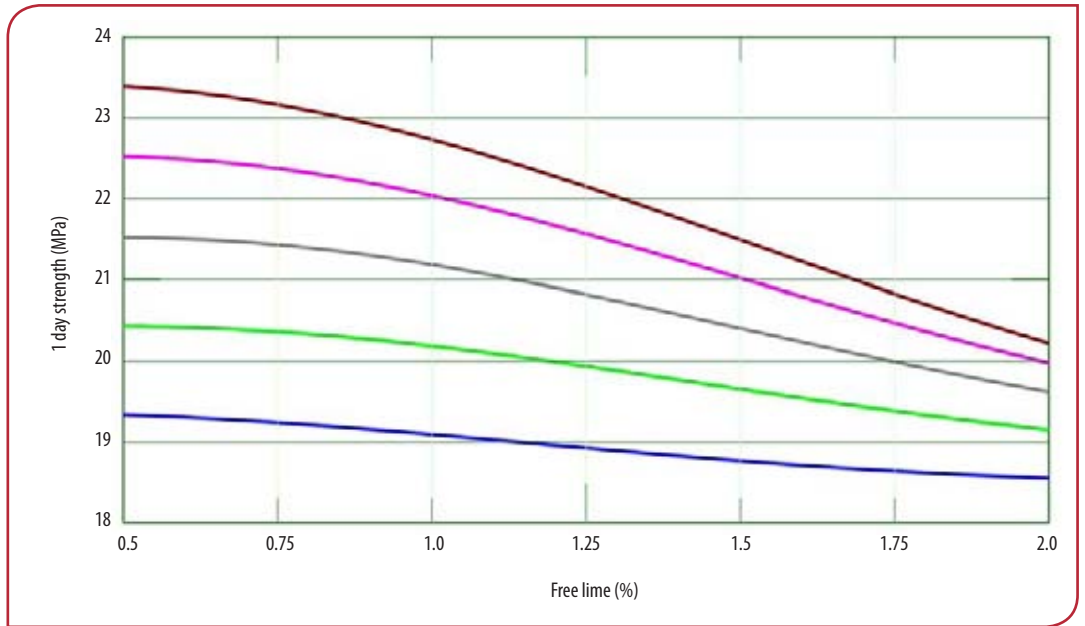
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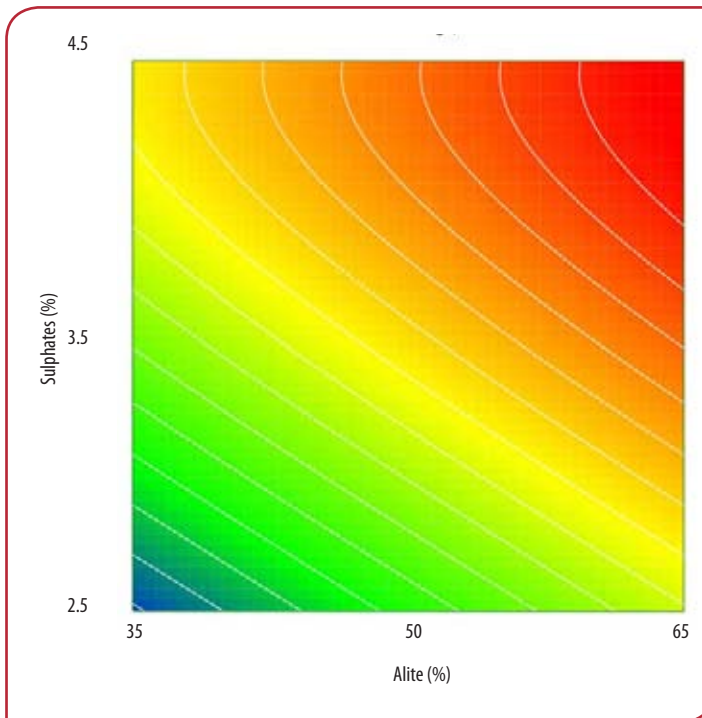


**Right - Figure 3:** Effect of free lime content on 1 day strength for different surface areas.

- 400cm<sup>2</sup>/kg
- 450cm<sup>2</sup>/kg
- 500cm<sup>2</sup>/kg
- 550cm<sup>2</sup>/kg
- 600cm<sup>2</sup>/kg



**Right - Figure 4:** Contours of 28 day strength on a plane of alite content and sulphate content.



The selected models for 1 day strength and for 28 day strength were then implemented in a Lumet system, which was used to produce Figures 3 and 4. Needless to say, there are significant non-linearities in the effects of several variables, even over the narrow range of just one type of cement.

Figure 3 shows the effect of free lime on 1 day strength at different surface areas. Free lime has an increasingly deleterious effect on the strength as surface area increases. Figure 4 shows the contours of 28 day strength against alite and sulphate content.

The non-linear models allow Finnsementti to predict the strengths as soon as the analysis results are

available. This allows the operator to make changes at the mill or in the kiln when the strength starts to reduce or increase significantly. Lumet systems also have the facility to determine suitable compositions in the presence of constraints on input variables as well as on product properties and thus help speed up product development.

### Conclusions

Non-linear models can help improve the production economics of most kinds of production processes, including cement production. Production data usually contains valuable information that can be used to develop non-linear models. With non-linear models, it becomes easier to improve quality and to speed up product and process development.

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## US/Brazil: Contracts for FCT

FCT Combustion has released details of contracts it has been awarded from CSN Cement Brazil and Ash Grove Cement. CSN Cement Brazil in Arcos, Brazil has ordered a Turbo-Jet kiln burner with a maximum thermal power of 102GCal/hr for high sulphur petcoke, heavy fuel oil, alternative solid fuel and alternative liquid fuels firing for its 6500t/day cement kiln. Ash Grove Cement in Seattle, Washington in the US has awarded a contract for a 63GCal/hr Gyro-Therm MKII kiln burner for natural gas firing.

FCT Combustion has also opened new offices in Fort Lauderdale, Florida, USA and São Paulo, Brazil.

## Uganda: Interchem releases contract information

Interchem has released details of a recently-completed project to build a cement grinding plant for Kampala Cement in Uganda. The equipment producer has supplied a 90t/hr cement grinding plant with a ball mill, a clinker silo and four 1000t steel cement silos.

Interchem's scope of supply included all works, except for the foundations. Three separate vibration feeders, two belt conveyors and a bucket elevator were installed. The four silos dispose of truck loading stations and the finished product is transported via air conveyor troughs from the silos to the new packing line. The contract between Kampala Cement and Interchem was originally signed in September 2014.

An additional contract was placed by Kampala Cement at the end of 2015 to order a Pozzolan-Dryer as well as a further storage for primary crushing and drying of the raw material due to the fact that the raw material was wetter than originally specified. Construction, installation and commissioning of all components have now been completed.



## Spain: Cemengal launches Plug&Grind® X-treme

Cemengal has introduced a new model to its range of modular and portable grinding stations, the Plug&Grind X-treme, the fourth generation in the series. The new addition has a production capacity of 50t/hr or 0.4Mt/yr. The concept still remains the same, with only eight containers and six modules. It includes a XP4 I classifier from Magotteaux.

Right: Plug&Grind® X-treme.

## Netherlands: Panalytical launches bench-top X-ray powder diffractometer

Panalytical has launched Aeris, a benchtop version of its X-ray powder diffraction (XRD) line. The system offers high data quality and speed of data acquisition for its power requirements and the manufacturer says that it is the first benchtop XRD system that is fully automatable and can easily be incorporated in industrial production control.



The diffractometer is available in a number of different models tailored for the cement, minerals and metals industries. Each model provides fast and precise mineralogical phase information, which can be used for control and optimisation of the production process. The Research edition of Aeris, on the other hand, is designed for quick XRD scans in any laboratory and is easily accessible for students. Especially with its unique 2D option it also serves as an ideal instrument for teaching XRD.



Harald van Weeren, product manager at PANalytical said, "We at PANalytical are proud that we have succeeded in developing an XRD instrument that is so easy to use and at the same time delivers such excellent data quality so quickly. This makes Aeris the ideal instrument for everyday X-ray diffraction analysis for everyone."



The 'Paris Agreement' on climate change modifies the business environment...

**Philippe Fonta** Managing Director of the Cement Sustainability Initiative (CSI)



The multilateral, legally-binding 'Paris Agreement,' adopted on 12 December 2015 at COP21,<sup>1</sup> officially entered into force on 4 November 2016.<sup>2</sup> This accelerated ratification process, a 'first' in United Nations history by being within one year, demonstrates a clear change in the Parties' commitment, reflecting the urgency for all stakeholders to tackle climate change and its impacts.

Members of the Cement Sustainability Initiative (CSI) welcome this historic moment!

Established in 1999 as a sectoral project of the World Business Council for Sustainable Development (WBCSD), the CSI is a collaborative platform that focuses on key cement sector sustainability challenges: climate change being the most significant, as the sector accounts for approximately 5% of global man-made CO<sub>2</sub> emissions.

The long-awaited agreement establishes a worldwide permanent regulatory framework that will enable the business community to scale up the implementation of low-carbon solutions for climate change mitigation and adaptation. For instance, should the whole cement sector match the same ambitious targets as those established by CSI members, a reduction of its CO<sub>2</sub> emissions by a range of 20% to 25%, compared to 'business as usual,' could be achieved by 2030. This would represent around 1Gt of CO<sub>2</sub> emissions, equivalent to the total annual emissions of Germany!

### What gets measured gets managed

In 2001 CSI companies developed a common 'Energy and CO<sub>2</sub> emissions' reporting protocol for the cement sector, based on the reference Greenhouse Gas (GHG) protocol elaborated by the WBCSD and the World Resources Institute (WRI). This protocol (in its third version since 2011) ensures that all CSI members report their CO<sub>2</sub> emissions, using the same methodology, in a centralised database, called 'Getting the Numbers Right' (GNR).

The GNR database, managed by an independent third party to comply with anti-trust regulations, is the most comprehensive database of independently verified CO<sub>2</sub> emissions that any industrial sector has established. 2016 is the 10th consecutive reporting year, demonstrating a robust performance tracking of

the sector over a significant period of time. By evidencing a continuous reduction in CO<sub>2</sub> emissions, it also enables individual companies to define their future reduction targets.


This process, a requirement for CSI membership, demonstrated leadership within the cement sector by being fully consistent with the framework defined in the Paris Agreement by which Parties have to regularly report their CO<sub>2</sub> emissions, independently verified, and adjust their Nationally Determined Contributions (NDC) with more ambitious objectives accordingly.

### Building on the CSI collaborative spirit

The Paris Agreement emphasises the need for enhancing cooperation between Parties and non-Party stakeholders. As identified in the first sectoral low-carbon technology roadmap developed in 2009 by the CSI in partnership with the International Energy Agency (IEA), cooperation between businesses, policy makers and financial institutions is key to unlock existing barriers and provide appropriate incentives.

The CSI will continue scaling-up its activities through its collaborative platform, partnering with the sector's various trade and industry associations. On 13-14 December 2016, the CSI will convene in Madrid, Spain for the annual CSI Forum. At the event cement companies and a broad range of stakeholders will celebrate the achievements reached in the first year after Paris and the next milestones of its global action plan on climate change, including: enhancing energy efficiency and the use of alternative fuels; reducing the clinker to cement ratio; identifying and measuring the avoided emissions throughout the value chain by using innovative types of concrete; developing new cements and concretes and investigating future carbon capture opportunities.

1. COP21 is the 21st session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris from 30 November to 13 December 2015.

2. In order to enter into force, at least 55 Parties accounting for at least 55% of global greenhouse gas emissions must have deposited their instruments of ratification, acceptance, approval or accession, with the Agreement then entering into force 30 days later. 



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## What do we want...?

**Koen Coppenholle** Chief Executive of CEMBUREAU, the European Cement Association



With the Emissions Trading Scheme (ETS) debate heating up in the EU Parliament, CEMBUREAU is making sure the voice of the cement industry is heard. Here we focus on exactly what it is that CEMBUREAU is calling for and why maintaining a European cement industry really matters. CEMBUREAU is calling for the ETS legislation to ensure that:

- All energy-intensive industries are on the carbon leakage list. All installations receive a free allocation based on ambitious but realistic benchmarks and benefit from free allocation based on actual production;
- Sufficient free allocations for energy intensive industries at risk of carbon leakage are made available. The auction share should not be higher than 52%;
- No further burden is imposed on EU-ETS sectors. The 43% reduction objective and the 2.2% linear reduction factor for Phase IV should not be increased;
- Support for innovation in energy-intensive industries is extended to cover low carbon technologies including industrial carbon capture and utilisation (CCU).

Industry needs regulatory stability and a level playing field. Non-European competitors are not subject to CO<sub>2</sub> obligations. To allow carbon investments to proceed with confidence, CO<sub>2</sub> prices need to be somewhat predictable over both the short and medium terms. If CO<sub>2</sub> pricing is maintained as the trigger for capital investments for a low-CO<sub>2</sub> economy, it is imperative to take into account the reduction potential of the cement industry where process emissions represent almost 70% of total emissions and are irreducible by nature. A bottom-up approach towards CO<sub>2</sub> reduction should be encouraged, starting from the 2050 Low Carbon Roadmap and based on reasonable and achievable benchmarks. From that perspective; the upcoming review of the Emission Trading Scheme (ETS) Directive is of particular concern as it could undermine investments if it does not create sufficient protection for industry against the risk of carbon and investment leakage.

Two important measures could lead to a decreasing level of protection against carbon leakage. **1.** If the cement sector is not recognised as being at risk of carbon leakage after 2020; **2.** If the best performers face an arbitrary cut of their carbon leakage protection for direct and indirect emission costs due to a limit on free allocation. If any of these two measures were to be decided at EU level under the ETS revision, it would add costs to the sectors concerned. Energy-intensive industries,

unlike the power sector, cannot pass through their CO<sub>2</sub> costs to consumers. Instead, this would largely erode profit margins and the ability for industries to make a return on investment. This would make non-EU countries a more attractive place to invest.

We think that the EU ETS can ensure that long-term environmental goals are achieved while still allowing for industrial growth and industrial investments in the EU. The European Council conclusions of October 2014 could serve as guidance. There is no need to penalise the best players in the ETS sectors and to add unilateral costs to them that will inevitably cause an investment leakage.

**But why does a European cement industry matter?** The cement and concrete sector forms the backbone of a strong supply chain in Europe that is firmly rooted in the local communities. The industry employs 44,800 people and turns over Euro17.5bn/yr. Through purchases and spending on direct and indirect employees, the industry generates a total value added of Euro56bn in the EU28 and generates over 1m jobs. For every Euro spent, the industry generates Euro2.80.

Despite being global technology leaders that provide lean CO<sub>2</sub> solutions to the economy, European energy intensive industries and the cement industry in particular, are facing huge competitiveness concerns in a depressed macro-economic environment. In 2015 cement production in the EU28 was 37.3% below the 2007 peak. Yet the cement industry remains deeply committed to its long-term economic, social and environmental responsibilities. It needs a long-term consistent legal framework that allows for future investment planning in Europe.

**What are we doing to reduce our impact?** The cement industry has a proven track record of investments that have driven down CO<sub>2</sub> emissions from clinker production over the past 20 years. In its 2050 Low Carbon Roadmap, the cement industry sets out how it aims to further decrease emissions to 32% below 1990 levels by 2050 and as much as 80% below if it can successfully implement CO<sub>2</sub> capture projects. The downstream product, concrete, can make a huge contribution to realising policymakers' objectives for an energy-efficient, low-CO<sub>2</sub> economy.

The cement industry is committed to a low-CO<sub>2</sub> Europe and accepts that legislation aims for incentives to further reduce emissions. The essential demand we have in this debate is that any burdens imposed on the industry reconcile the EU's environmental ambitions with a search for a competitive industry that continues to serve its value chain by growing and investing... in Europe.







## EU: Cement sector now more CO<sub>2</sub> intensive than before ETS

Data from the Cement Sustainability Initiative (CSI) suggests that the CO<sub>2</sub> intensity of European Union (EU) cement increased from 2008 to 2014, according to analysis by the environmental campaign group Sandbag. It adds that the sector made greater strides in reducing emissions in the years *prior* to the EU Emissions Trading System (ETS). Since 2011, the EU cement sector has increased exports of cement clinker outside the EU, demonstrating that the EU ETS has not made the sector globally uncompetitive.

"EU policymakers have overprotected the cement sector in the EU ETS to such an extent that companies have not taken any action to reduce their greenhouse gas emissions. The EU's approach is killing with kindness; by maintaining the status quo on free allocation of allowances they are making their own climate targets undeliverable," said Wilf Lytton, an analyst at Sandbag.

Sandbag says that this highlights the inability of the EU's climate policy, as currently designed, to address European cement sector emissions. Meanwhile, low-carbon new entrant cement companies operating outside of the EU ETS have commercialised technologies to dramatically reduce the carbon footprint of cement, yet are struggling to scale-up as they fight through a mass of regulation and product standards that 'support the high-carbon status quo.'

Research by Sandbag revealed in March 2016 that incentives in the design of the EU ETS have driven higher greenhouse gas emissions in the sector.



## Belgium: HeidelbergCement completes sale of assets to Cementir

HeidelbergCement has completed the sale of its operations in Belgium, primarily consisting of Italcementi's subsidiary Compagnie des Ciments Belges (CCB) to an affiliate of Cementir Holding. The European Commission has approved the agreement.

"With the disposal of the Belgium assets we fulfil the obligation of the European Commission and improve the net financial position of HeidelbergCement after the acquisition of Italcementi," said Bernd Scheifele, CEO of HeidelbergCement.

HeidelbergCement and Cementir Holding announced the sale on 25 July 2016. The transaction has an enterprise value of Euro312m on a cash and debt-free basis.

## Croatia: EC investigates Schwenk / HeidelbergCement deal

The European Commission has opened an investigation to check whether the proposed acquisition of Cemex Croatia by HeidelbergCement and Schwenk is in line with the European Union (EU) Merger Regulation. The commission has concerns that the proposed takeover may reduce competition for grey cement in Croatia. It will make its decision by 23 February 2017.

"The construction sector, like any other sector, needs competition. As cement is an essential part of the sector we need to make sure that consolidation does not lead to higher prices for construction companies and ultimately consumers in Croatia," said commissioner Margrethe Vestager.

The commission has concerns regarding the supply of grey cement in southern Croatia, including Dalmatia in particular, where Cemex Croatia operates three cement plants in Split and faces competition from DDC's imports from Bosnia and Herzegovina, which is not an EU member. The proposed transaction would combine Cemex Croatia, the largest producer in the area, and DDC, the largest importer. The commission's initial investigation indicates that the proposed transaction may remove a significant competitor from an already concentrated regional market.

The remaining current or potential suppliers may exercise only limited competitive pressure on the merged entity because of the transport costs to reach southern Croatia. Additionally, the domestic cement suppliers Cemex Croatia and LafargeHolcim control all the cement terminals in ports along the Croatian coast. The commission has preliminary concerns that the transaction may strengthen the market power of Cemex Croatia in southern Croatia and result in price increases for grey cement.

HeidelbergCement and Schwenk plan to acquire, via their joint subsidiary DDC, assets in Croatia and Hungary that currently belonging to Cemex. The Hungarian part of the transaction has been referred to the Hungarian competition authority, so the commission's investigation will focus on the acquisition of Cemex's Croatian assets.

## Italy: Italcementi to lay-off workers

Italcementi will start temporary lay-offs for workers at its Scafa and Monselice cement plants when unemployment benefits end on 31 January 2017. The plans were announced at a meeting on 14 October 2016 following agreements signed in December 2015 at the Ministry of Labour by trade union representatives and Italcementi's workers. The cement producer has confirmed that the on-going reorganisation at its plants are related to poor market conditions and not the acquisition of Italcementi by HeidelbergCement. The Italian Industry Minister Carlo Calenda had earlier said he was a 'little' worried about the intentions of HeidelbergCement and feared that it may reduce its activities within Italy.



## Italy: New board for Italcementi

HeidelbergCement, the sole shareholder of Italcementi, has appointed a new board of directors for its subsidiary at a shareholder meeting on 19 October 2016. The new members are Luca Sabelli (chairman), Dominik von Achten (executive vice president), Lorenz Näger (executive vice president) and Roberto Callieri (chief executive officer).

On 12 October 2016, HeidelbergCement purchased the remaining Italcementi shares that had not been tendered in the mandatory tender offer. From this date HeidelbergCement became the sole shareholder of Italcementi and owns 100% of the share capital. Italcementi shares were delisted from the Italian Stock Exchange on the same day.

## Slovenia: LafargeHolcim to pay farmers

LafargeHolcim will pay Euro270,000 in compensation to farmers in the Zasavje region, who claimed that pollution damaged their land. LafargeHolcim settled with the farmers before a long running court case ordered three other companies to pay up to Euro1.17m each.

The farmers presented measurements showing permitted emissions had been exceeded by 10-fold or in some cases even 100-fold between 1991 and 2002, alongside evidence of declining yields and animal reproduction rates, as well as damage to orchards and forests. The other companies involved in the case were the Termoelektrarna Trbovlje (TET) thermal power plant, the Steklarna Hrastnik glassworks and the TKI chemicals factory.

## Russia: Savinskiy upgrade considered

Eurocement Group is considering implementing upgrades at its Savinskiy cement plant in Russia's Arkhangelsk region. Production at the plant was stopped in 2010, according to the Rossiyskaya Gazeta newspaper. The plans were discussed at a forum in Sochi.

## Russia: Silo contract for Claudius Peters

Germany's Claudius Peters has received an order to supply four silo conversions and a new loading plant, consisting of four loading bins at the 0.8Mt/yr Slantsev 'Celsa' cement plant near St Petersburg, owned by HeidelbergCement. As part of the modification works, the storage silos will be equipped with new bottom aeration and new discharge systems. The order is part of an upgrade to raise the plant's production capacity to 1.2Mt/yr. To convey the cement to the new loading plants, Claudius Peters will install two Fluidcon lines each, with a capacity of 300t/hr each, supplied with Claudius Peters X-pumps. Four truck loading plants with a capacity of 200t/hr will be installed.

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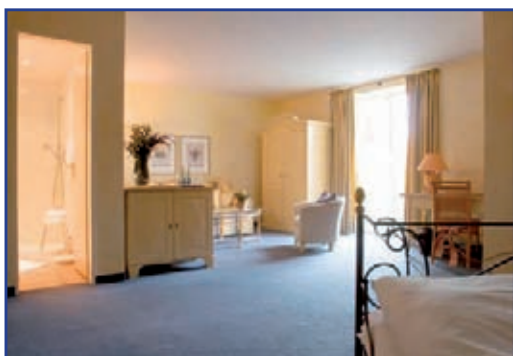
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## UK: New Tunstead packing plant

Tarmac has launched a cement-packing unit at its Tunstead cement plant in Derbyshire. The Haver and Boecker 10-spout Adams 2000 packing plant increases the plant's packing capacity. The launch took place on the site's 50th anniversary of cement production. The plant will manufacture Tarmac's range of plastic packed and tubbed cement products for merchant and retail customers. The plant will also be used to house the company's new 12.5kg mixer bags, which were launched earlier in 2016.

"This new plant is an exciting development for us. It enhances our existing UK-wide supply capacity, ensuring we continue to offer customers and end users superior packed cement products, service and supply. As a business with a strong culture of innovation, the plant will use some of our most pioneering developments, such as plastic packaging," said Kevan Greenhalgh, Packed Business Manager for Tarmac's cement business.

The plant has created 23 new jobs at Tunstead, which employs around 450 people. It will also offer training opportunities for existing employees, through the use of the packing plant's automated technology. The plant launch coincides with the recent upgrade of Tunstead's rail freight infrastructure, part of Tarmac's strategy to support sustainable delivery of materials and cut transport CO<sub>2</sub> by 10% by 2020.

## Russia: LafargeHolcim installs Schenck equipment on two lines

Schenck Process has installed two Logiq dispatch automation systems at two LafargeHolcim cement plants at Ferzikovo and Voskresensk. This has resulted in the plants being upgraded to the LafargeHolcim group's Smart Factory standard.

At Ferzikovo LafargeHolcim is currently engaged in a major investment project. The plant has three incoming and outgoing scales as well as 11 loading stations for loose cement and two bag loading stations. Schenck Process converted the parking lot with registration, the incoming and outgoing scales and all loading points for fully automatic, unmanned operation. Self-service terminals for registration and weighing were installed in the entrance and exit areas. In the loose loading area, a Logiq loading terminal, including the Disomat Tersus weighing electronics with Profibus interface to the PLC and ultrasonic sensors, were installed. In Voskresensk the conversion work included the car park with registration, incoming and outgoing scales, three loading scales and one loading point for packaged goods.

Schenck Process ensured smooth delivery operations at both plants throughout the installation and commissioning process. Incoming silo trucks for loose loading, more than 300/day at Ferzikovo alone, continued to be processed throughout. Since 2013, Schenck Process has installed the Logiq dispatch automation system at many LafargeHolcim plants, including 18 in eastern Europe.



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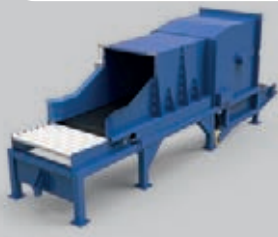
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### Russia: New director at Lipetskement

Arpad Farkas has been appointed general director of Lipetskement, part of the Eurocement Group. Farkas previously ran a cement plant for Lafarge.

### Germany: KHD appoints Keune as CEO

The Supervisory Board of KHD Humboldt Wedag International has appointed Gerold Keune as chief executive officer. He replaces Johan Clossen who resigned with immediate effect for personal reasons in March 2016.

### Belgium: New MD for CCB

Taner Aykac has been appointed the managing director of Compagnie des Ciments Belges (CCB). The board of directors has also appointed Eddy Fostier as general manager of the company. Aykac, a Belgian national aged 53 years, holds a Bachelor of Science in Engineering and a MBA. He started his career in the agrochemical sector before moving into the pharmaceutical sector. Aykac became CEO of Turkey's Cimentas, part of the Italian cement maker Cementir, in 2011.

### Germany: Flexicon opens office in Germany

Flexicon (Europe) has opened a new office to provide factory-direct engineering services and technical sales support to customers throughout Germany.

"The Aschaffenburg location will fuel Flexicon's rapid growth in the region by providing a dedicated German-language staff with full access to corporate resources," said Keith Bourton, Managing Director.

The Aschaffenburg office is headed by Christian Löchler, Regional Sales Manager. He holds an Engineering degree in Plastic Processing Technology from Fachhochschule Darmstadt (University of Applied Sciences), and possesses 20 years of experience in plastics processing, compounding and recycling, most recently as a Sales/Project Engineer for a consultancy specialising in gravimetric and volumetric dosing for granulates, powders and liquids. At Flexicon he will be responsible for building relationships with plant engineers, managers and other equipment specifiers in facilities that handle bulk solid materials across the cement, mineral, food, pharmaceutical, plastics and general chemical industries.

Flexicon specialises in bulk handling equipment. Flexicon (Europe) is located in Whitstable, Kent, UK and is a fully owned subsidiary of Flexicon Corporation of Bethlehem, US. In addition to the Kent manufacturing location, Flexicon Corporation owns and operates manufacturing facilities in Brisbane, Australia and Port Elizabeth, South Africa, and maintains factory-direct sales offices in Barcelona in Spain, Santiago in Chile and Singapore.

### Ireland: McDonald resigns from CRH board

Rebecca McDonald has resigned from the board of CRH with immediate effect. The non-executive director for the building materials producer cited family commitments as her reason for resigning.

### Belgium: Calix's CO<sub>2</sub> capture plans take shape

The Low Emissions Intensity Lime and Cement consortium has announced plans to build a pilot plant in Belgium to test new technology to capture CO<sub>2</sub> produced during cement processing.

"What Direct Separation and what the Low Emissions Intensity Lime and Cement (LEILAC) project is trying to pilot is a new technology that addresses CO<sub>2</sub> emissions by capturing the pure CO<sub>2</sub> that comes off the limestone," said Daniel Rennie, project co-ordinator at Calix, the lead member of the consortium and the firm behind the Direct Separation technology.

Calix has spent the past eight years developing the technology to capture CO<sub>2</sub> from magnesite calcining. However, while magnesite is calcined at around 750°C, limestone requires >950°C. The pilot plant aims to test whether direct separation is possible at such temperatures.

Plans for a cement pilot plant cleared a crucial hurdle after being signed off by consortium members at the end of October 2016. Construction is expected at the site of the HeidelbergCement plant at Lixhe, Belgium in 2017. Rennie says that the technology should be up and running by 'very early 2019'.

A two-year intensive testing period would follow, to allow consortium members to assess the feasibility of deploying the technology on a commercial scale.

## Austria/Brazil/Netherlands: RHI and Magnesita to merge

RHI and Magnesita are to merge to create a new refractory company called RHI Magnesita. RHI's management board has agreed to sign a share purchase agreement with Magnesita's controlling shareholders regarding the acquisition of a controlling stake of at least 46%, but no more than 50% plus one share of the total share capital of Magnesita, pending RHI's supervisory board's approval. The purchase price for the 46% stake will be paid in cash amounting to Euro118m and 4.6 million new shares to be issued by RHI Magnesita. The new company will be established in the Netherlands and listed on the London Stock Exchange.

As part of the agreement, GP Investments (GP) will become a relevant shareholder of RHI Magnesita. The combined company's corporate governance will consist of a one-tier board structure while GP will be represented on the board of directors.

The deal is dependent on approvals by the relevant competition authorities, the migration of RHI to the Netherlands, the listing of RHI Magnesita's shares in the premium segment of the Official List on the Main Market of the London Stock Exchange and RHI's shareholders not having exceeded statutory withdrawal rights in an amount of more than Euro70m in connection with organisational changes preceding RHI's migration from Austria. The migration and the preceding organisational changes in Austria require qualified approval by RHI's shareholders' meeting. If the deal is terminated for reasons not under the control of Magnesita's controlling shareholders, an aggregate break fee of up to Euro20m is payable by RHI to Magnesita's controlling shareholders.

The merger transaction is expected to complete in 2017. Until then, the two companies will remain completely separate and independent. Therefore customers, suppliers, employees and other stakeholders should expect no change in management teams, commercial relationships, supply chains and product offerings during this period.

RHI and Magnesita say that the new refractory company will bring together complementary businesses, both in terms of products and geographical footprint. Magnesita has a presence in South America and the US, compared to RHI's presence in Europe and Asia. The merger is also expected to aid the company's position against the growing Chinese refractory industry. In addition, Magnesita's position in dolomite-based products is complementary to RHI's asset portfolio, which traditionally has a strong focus on high-quality magnesite products.

Synergies from the merger are expected to deliver at least Euro36m in earnings before tax (EBIT) by 2020. However, if RHI Magnesita's stake in Magnesita significantly exceeds 46%, RHI expects substantially higher synergies of approximately Euro72m, especially in the areas of enhanced production efficiency and cost benefits in research and development, marketing and administrative functions. In addition, capital expenditure synergies are expected to amount to Euro2-7m/yr and aggregate working capital savings of Euro40m are expected in the coming years.

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Interview by Peter Edwards & David Perilli, Global Cement Magazine

## After the flood - Cemex South Ferriby, UK

The Cemex South Ferriby plant has stood proudly on the Humber Estuary in North Lincolnshire, UK for nearly 80 years. Over the years, the river has been a vital lifeline for the plant to bring in raw materials and export cement. However, in December 2013 the plant was completely overwhelmed by a tidal surge, leaving it with major damage. Here, key plant staff describe the damage, the renovation and the plant's unusual semi-dry Lepol grate production process.

### GC: Can you describe the history of production at South Ferriby?

**Jan Peters, Plant Director (JP):** The South Ferriby plant began life as a wet process plant, operated by Rugby Group, in 1938. The original line was replaced with two semi-dry Polysius Lepol kilns, the first (kiln 2) coming in 1967 and the second (kiln 3) in 1973. Both have a capacity of 1000t/day, taking capacity to around 0.7Mt/yr. In 2000 the Rugby Group was acquired by RMC, which, in turn, was bought by Cemex in 2005.

### GC: What process does the plant use today?

**JP:** We use clay and chalk from our quarry, which is 1.6km from the plant. It is transferred to the plant site via a long conveyor and is taken to our chalk and clay domes, which have capacities of 12,000t each. It then heads to two double rotator closed circuit raw meal ball mills (both 90/hr), where iron oxide and sand are added.

The raw meal is then processed in a blending silo array, in which each mill has two silos. We can homogenise the raw meal before the kilns by draw-

ing material from each silo as required. From the homogenisation step, the material goes onto the noduliser tables, which is a key part of the Lepol semi-dry process. The fine raw meal is mixed with a minimum of water on four rotating tables, two for each kiln line. The nodules are typically 20-30mm in diameter. Obtaining a consistent size is critical for the Lepol process. For those that may not be that familiar with the process, it is essentially a 'reverse clinker cooler.' The nodules are pre-heated via a hot gas flow, which starts calcination within the grate itself.

From the Lepol grate, the material heads to the kiln. The excess water is completely driven off and calcination is completed, much as in a dry process line. The clinker coolers are very conventional. From there we have various clinker silos (a total of 45,000t) and two ball mills. We ship cement and clinker in bulk and do not have bagging facilities. We currently produce CEM I, although we are able to produce CEM II as well.

### GC: Where do the additives come from – sand, iron, gypsum, etc...?

**JP:** The area around the plant is rich with minerals.

**Below:** The Cemex South Ferriby plant is located right on the Humber Estuary, where the Humber meets the River Ancholme. The Ancholme is shown in the foreground.



### Plant profile: Cemex South Ferriby

<b>Location:</b>	South Ferriby, Lincolnshire, UK
<b>Kiln 1 (wet) started:</b>	1938
<b>Kiln 2 (Lepol semi-dry) started:</b>	1968
<b>Kiln 3 (Lepol semi-dry) started:</b>	1973
<b>Kiln 1 dismantled:</b>	1973

**Cement production capacity:** 0.85Mt/yr

### Other Cemex UK plants:

1. Rugby, Warwickshire, 1.3Mt/yr
2. Tilbury, Essex, 1.2Mt/yr (Grinding)



**Left and far left:** Photos of the aftermath of the flood. Such was the force of the incoming water that walls were destroyed and cement silo trucks left the ground.

*“A 2m high wave came crashing over the plant...”*



Sand is actually from the next village, while iron oxide comes from Scunthorpe, a large steel-making town. The gypsum is also sourced locally from Fauld mine in Staffordshire. We also use some from recycled gypsum wallboard.

**GC:** Paper can often be included in the ‘gypsum’ fraction from the wallboard recycling process. Does this cause a problem?

**JP:** It is not a problem, because the recycled gypsum is currently only 10% of the total gypsum feed. As the gypsum is only added at 5% to the final product, this means that the final cement product contains only 0.5% recycled gypsum by mass. Any minor paper fraction in the recycled gypsum is a very small fraction of the final cement product. However, the question of paper in the gypsum stream may require more attention in the future if we are to increase the use of recycled gypsum.

**Flood, damage and renovation**

**GC:** What caused the flood in December 2013 and what was the extent of the damage?

**JP:** To understand the extent of the damage, we need to properly describe what happened. Low atmospheric pressure, onshore winds and high tides caused a tidal wave to come up the Humber Estuary. The water totally over-topped the banks and road alongside on the south of the Estuary and a 2m high wave came crashing over the plant. It happened at 19:30 in the evening in December, so it was totally dark.

**Damian Marsden, Engineering Development Manager (DM):** We knew that the weather would be bad, so we were able to minimise the risks to staff. We reduced the number of staff on the night shift. On top of this, we arranged for the workers to park at the quarry, so that their cars were not at risk. We had emergency plans in place, which were followed. This



**Left:** Damian Marsden, the plant’s Engineering Development Manager, stands next to a beam inside the plant. The high water mark is clearly visible, some 80-90cm above his head.



**Above:** Unusually, the two kilns at South Ferriby are covered.



**Above right:** One of the Lepol grate preheaters.



**Centre right:** Back of a nodulising table

**Right:** Front of a nodulising table.

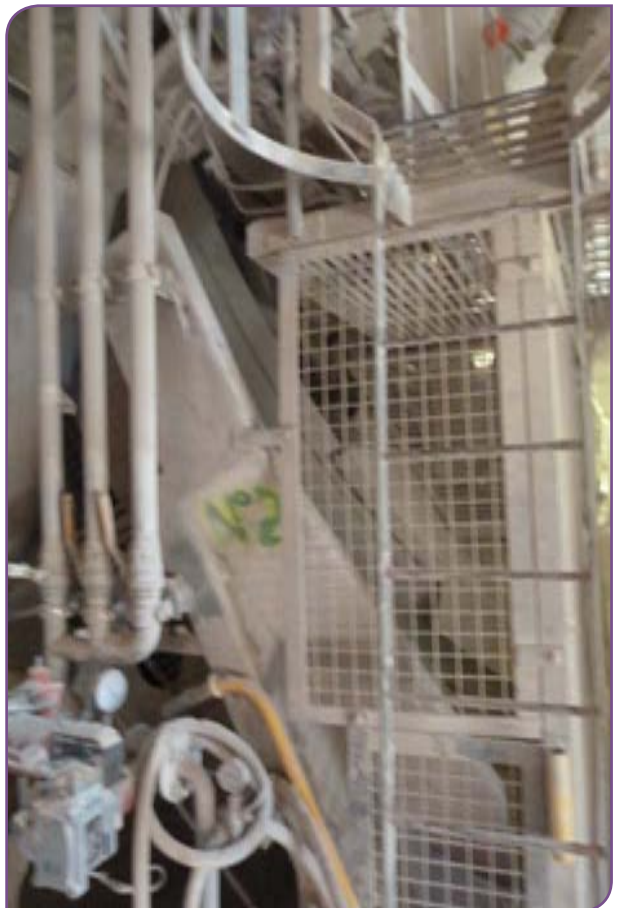
included provisions for high ground areas, which contributed to the fact that nobody was injured.

In terms of damage, the plant was very seriously affected. We lost a lot of structural components and the main office block was damaged beyond repair. At the time the wave came in, kiln 2 was producing cement but kiln 3 was offline and cold. As it was in operation, kiln 2 sustained very serious damage. We had to replace a 22m-long section of the shell because it had bent completely out of shape by the sudden cooling. Kiln 3 was 'lucky' in that it sustained 'only' peripheral damage.

Unfortunately, many of the electrical components were destroyed. We had to replace around 40% of the electrical components.

**GC: What was the most challenging aspect of the renovation?**

**DM:** Maintaining health and safety standards was by far the most challenging aspect, especially in the early days. We were dealing with an area that was extremely dangerous: Unstable structures, contaminants, sewage in the water, dead sheep, dead fish. There was no lighting and it was freezing cold. Into that environment, we had to put a peak of 400 staff and contractors. That period was not over quickly.







It was two months before you could walk through the plant safely.

**GC:** What was the most challenging technical aspect of the renovation?

**DM:** The most challenging technical aspect was the reconfiguration of the control system of the plant. Prior to the flood there had been five local centres for different areas. However, the best solution was to put them together. This is the case now in our temporary control room and it will be transferred across to the new office building, once it is complete.



Just adjusting to the new configuration was itself a challenge. The system was completely new for the operators. We had to test every single item within the control system. That's 1500 motors and thousands of cables. Every one had to be checked, rechecked and documented. There was also a wider replacement of damaged electrical fittings. Every piece of I/O, every motor, every drive had to be refurbished or checked.

On top of that, many mechanical parts were beyond repair. Major equipment was contaminated with silt, sand and salt. The work was intense and there was a lot of equipment that had to be renovated and replaced, aside from the section of kiln 2 that I mentioned earlier.

**GC:** Aside from the control room was any other aspect of the plant changed compared to the previous configuration?

**JP:** Prior to the flood we had several different compressed air stations around the plant. This, like the control room, had grown organically over time. We have now replaced this with a central compressor station, which had lower capital expenditure and is easier to operate.

Aside from those two aspects, the plant is exactly as it was. We replaced everything like-for-like and did not conduct or bring forward any other projects during the renovation.

**GC:** What has been done or can be done to prevent a future flood or reduce the damage in the event of another flood?



**Left:** Several separate compressed air stations were centralised into a single facility as part of the renovation work.

**JP:** There are two answers to this. Firstly, we are party to ongoing discussions with the local councils and the UK Environment Agency regarding the improvement of flood defences throughout the Humber Estuary. This is a long-term discussion and technical solutions are being investigated.

**DM:** The second answer is that we now have better procedures on site to deal better with another very large flood. Throughout the rebuild we constantly considered what the quickest solution was in line with modern equipment and standards. Fortunately in some areas the solutions came with inherent flood protection. For example, our motor control centre

**Left:** New cabling is now significantly above ground level. This made renovation more rapid and protects against potential damage by future floods.



**Left:** Motor control centres had to be replaced.

(MCC) manufacturers could produce bottom entry units quicker and installation contractors claimed time benefits during installation. The result is an MCC above flood level. The new office block will also be planned to be 1.45m off the ground.

**GC:** Did you ever think, given the damage, that Cemex would decide to close the plant?



**Right:** Inside the temporary control room, which will be transferred to the new office building when it is complete. The plant's laboratory is also in temporary buildings and will likewise move to the new office building.



**DM:** There was never any doubt at management level and that was communicated literally overnight to the staff. I was called by the plant manager at 05:00 the day after the flood and he asked, "Are you aware that there has been a flood?" I said 'Yes' and, by the time I got to the site at 06:00, the question was, "How do we rebuild this?"

**GC:** How did Cemex supply its customers in this region when the plant was down?

**JP:** It was a case of rearranging customers and allocating cement from different facilities, mainly from the Cemex Rugby plant. There was some imported clinker coming from abroad too. The timing could have been worse, because the damage came in winter and demand was fairly low.

Throughout the stoppage, however, every customer was supplied with cement exactly as they would have been normally. There were no complaints. By March 2014 we were supplying customers with cement from the clinker made prior to the flood. It was remarkable to think that so much was damaged but we were still able to use the clinker in the silos!

**GC:** When did the flames come back on?

**DM:** It was almost a year to the day of the flood and there was an enormous sense of achievement. We had worked flat out for 12 months and by the time we could restart it was a case of 'go home and have Christmas.' It was a big job from the plant staff but we also had a lot of practical and moral support from around Cemex, including colleagues from Mexico. It was a major Cemex-wide effort.

**GC:** How was the work managed?

**DM:** The renovation was very difficult, with 300-400 persons on site at any one time. Jacobs Engineering was the principal contractor, who pretty much owned the site, taking into account that the entire plant was one construction design and management area. Cemex management and staff were integrated into different teams from Jacobs, with a large number of local firms also sub-contracted.

**GC:** When will everything be completely finished?

**JP:** The renovation will be complete when the new plant office opens. This is currently scheduled for the end of 2017, which will be four years after the flood. We are also still completing the lighting inside the plant, which is a work in progress.

**DM:** Of course the office building is not just an office building: It will house the control room and the laboratory, which, like the office we are sitting in, are currently in porta-cabins. The ground has been cleared and we look forward to getting on with the next stage.

**GC:** Were you aware of any plans to replace the plant with another configuration, for example a dry process line?

**DM:** Any considerations like that would have been made above plant level and we cannot comment. However, if we had changed the process, the project would have been even more intense than it was. It would also have involved new consultations with local stakeholders, the Environment Agency and a lot of extra investment. The objective was always to supply customers with cement.

## Fuels and environment

**GC:** What fuels are used to fire the kilns here?

**JP:** We use a mixture of petcoke, a specified solid recovered fuel (SRF) known as Climafuel and secondary liquid fuel (SLF). The petcoke is brought in by barge at Immingham. The RDF comes from Waste-cycle and the liquid fuel is a mixture of solvents from Sheffield, around 100km from here.

**GC:** Can you describe the development of the AF substitution rate at the plant?

**JP:** The plant started with SLF in 2002 and Climafuel SRF was introduced in 2006. Over the years the use of both fuels has increased. In 2012, the last full calendar year before the flood, the plant was operating with 70% alternative fuels. In 2011 we achieved a world first: the first trial using 100% alternative fuels for an extended period. We are very proud of that.

**GC:** What effect has the flood damage had on the use of alternative fuels?

**JP:** Since the flood we have been focused on stabilising the kiln process as far as possible, while we increase the level of alternative fuels. It was easier to reintroduce the SLF, as liquid fuels are relatively easy to burn. Achieving pre-flood SRF levels is proving more difficult, but it would be in any plant like this.



In 2015, with a lot of work, we achieved a substitution rate of 54%, of which around 28% of the total fuel was SLF and 24% was SRF. The target rate for 2016 is more than 60%. We are improving the kiln efficiencies month-on-month and with higher efficiency comes higher potential for using alternative fuels.

*“Like everyone else we are waiting to see what will happen...”*



**DM:** I think it is important to highlight just how much of an achievement this has been. You have to remember that the main ‘flood stop’ was not the only stoppage. There have been numerous hiccups along the way, which knocks back the ability to use alternative fuels.



**Left:** A large area of ground has been cleared prior to construction of new office buildings for the plant. Work is expected to be completed by the end of 2017, four years since the flood.

**GC:** Are there any challenges specific to the Lepol kiln regarding the use of alternative fuels?

**JP:** The challenges are similar to most other kilns because one of the hardest things is getting the right fuel quality and consistency. One difference compared to a preheater kiln is that we have more capacity in our ID fans. That means that we are not as constrained on the amount of air that can be pulled through the kilns, which allows the extra moisture from the Climafuel to be handled relatively well by the kiln.

**GC:** Are there plans to introduce other alternative fuels in the future?

**JP:** Not at present. We are focused on increasing the amount of RDF. We are, however, conducting trials with coal, with a view to replacing petcoke.

**GC:** What environmental protection systems does the plant use?

**DM:** We use urea to control NO<sub>x</sub> and inject lime to remove acidic gases from the stack. For dust we have electrostatic precipitators (EP), both of which are fairly new. This is because, while a bag filter is better at trapping dust, the EPs are more forgiving with respect to the temperature spikes that are typically seen with Lepol grate kilns.

**Markets and the future**

**GC:** Where are South Ferriby’s main markets and how is cement transported to each of them?

**JP:** The plant distributes to Scotland and the north of England. In terms of transport type, everything

leaves the plant by truck. Cement for Scotland is loaded onto barges at Grimsby, approximately 40km to the east. Around 25% of the plant’s cement is sent there. In terms of truck distribution to the local area, we supply across the whole of the north of England. Our sister plant at Rugby predominantly covers the south. Both plants also send clinker to our Tilbury grinding plant in the south east of England.

**GC:** What are your expectations for the UK cement market in the coming months and years, especially given the recent vote to leave the EU?

**JP:** Like everyone else we are waiting to see what will happen. We know that the fundamentals of the UK construction sector are strong. With respect to the ‘Brexit’ I think a lot of scenarios can be ‘imagined’ but it’s too early to say what will happen.

**GC:** What one thing would you change about the plant, be it technical, regulatory or otherwise?

**DM:** Technically, there is only one answer – to replace it with a dry process line. That said, this plant is very efficient within Lepol kiln plants. It has been extensively modified to increase its efficiency. For example, the kiln speed is much faster than it was originally designed for. We push it to the maximum and then go beyond.

**GC:** Thank you very much for your time.

**PJ/DM:** You are most welcome.





Global Cement staff

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## Environmental policy change and technical progress at the VDZ Annual Cement Conference

Over 350 delegates converged on the VDZ Annual Cement Conference 2016, which took place on 26-27 September 2016 in Düsseldorf, Germany to address themes affecting the cement and concrete sectors. *Global Cement* attended and reports from this major event.

The VDZ Annual Cement Conference took place once again at the Maritim Hotel, Düsseldorf. The meeting featured 18 papers and focused on domestic and European industrial and environmental policies as well as a variety of technical and scientific topics in the field of cement process engineering. The programme included a number of presentations on the challenges associated with emissions trading and the influence of developments in the building industry on the demand for cement and concrete. The highlights of the conference were the awarding of the VDZ Safety at Work Prize and the 5th Klaus Dyckerhoff Prize.

“The regulations on environmental policy issues such as emissions trading, energy policy and the abatement of emissions are becoming ever more complex,” said Gerhard Hirth, President of the German Cement Works Association (VDZ), as he opened the conference. “We have to consider the long-term consequences these may have for our plants. We also look beyond our own horizons, to find out about the challenges facing the plant engineering and lime industries.”

In the light of the process of change in the German cement industry, Hirth appealed to the political

decision makers to create ‘a reliable framework allowing us to plan for the future and giving us the assurance that we as an industry are welcome in this country.’ He went on to say that the cement industry has always been and intends to remain a dependable partner at all political levels and that the industry can be proud of its achievements. “Our products help to build the world. A modern society as we know it could not exist without cement and concrete,” explained Hirth.

The VDZ annual Safety at Work Prize and the 5th Klaus Dyckerhoff Prize were both awarded during the course of the evening of the first day’s proceedings. Gerhard Hirth moderated the safety awards, during which first-place accident-free operation awards were presented to 10 grinding plants and 15 integrated plants. An improvement of almost 11% was noted compared to the previous year’s figure, dropping from 10.6 accidents per million hours worked to 9.5.

The 5th Klaus Dyckerhoff Prize, awarded in appreciation of pioneering contributions to research or professional achievements in the invention and/or development of application or manufacturing processes in the field of hydraulic binders, was awarded

1: Gerhard Hirth, VDZ president, gives his opening address.

2: Dipl.-Ing. Anton Secklehner, Kirchdorfer Zementwerk Hofmann GmbH presenting his paper ‘Operational Experiences with the DECONOX system at the Kirchdorf cement works’.

3: Frank Henning (left), the VDZ’s senior expert for maintenance, and Dr.-Ing. Nijat Orujov (centre), environment and plant technology expert at the VDZ, in discussion with VDZ chief executive Dr Martin Schneider (right).

4: Dipl.-Ing. Helmut Reiterer, Lafarge Zementwerke GmbH, giving a paper jointly-authored by colleagues Dipl.-Ing. Günter Kohlmayr and Franz Wratschno entitled ‘Maximising alternative fuel rates through utilisation of a flash dryer at the Retznei plant’.

5: The KIMA process optimisation team. Left to right: Alexander Scholl, Norbert Spennrath, Matthias Kalkert, Dirk Schmidt and Peter Kalkert.

6: Hendrik Leopold of Holcim (Deutschland) GmbH giving the presentation ‘Modification of the Clinker Cooler on Kiln 11 in Lägerdorf’, co-authored with Florian Gross.





## The VDZ

The VDZ is the German cement manufacturers' association. The 19 member companies together operate 49 cement works in Germany, employ around 7900 people and generate an annual turnover of more than Euro2.5bn. Three German companies and 27 businesses in other countries are currently associate members of the VDZ. Since the association was established more than 135 years ago, its research work has helped to make cement production both competitive and more environmentally accountable and has contributed towards the development of high-quality construction methods.



7: Winners of the 2015 Safety at Work prize.



8: Presentation of the 5th Klaus Dyckerhoff Prize to Professor Dr.-Ing. Siegbert Sprung (centre front) by VDZ CEO Dr Martin Schneider (left), VDZ President Gerhard Hirth, (centre back) and benefactor Dr Edith Dyckerhoff (right).



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9: Hildegard Kranz (centre) and Thomas Kranz (left) of Kranz Engineering sharing a lighter moment with delegates.

10: Michael Janzer, CemProTec GmbH listens attentively to the Holcim clinker cooler modification paper detailing his company's expertise now installed at Lägerdorf.



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11: Jessica Thiess (right) of Technische Universität Clausthal, in conversation with colleague Lisa Karthaus (left).

12: Dr.-Ing. Michael Müller-Pfeiffer of Cemex Deutschland giving a paper, jointly authored with Dr.-Ing. Philipp Fleiger of the VDZ, entitled 'Status quo grinding technology'.

to Prof. Dr.-Ing. Siegbert Sprung by the Dyckerhoff Foundation in honour of his life's work and for his exceptional achievements with respect to the development of cement and its production and application in mortar and concrete. Siegbert Sprung spent his entire professional career at the VDZ and the Research Institute of the Cement Industry in Düsseldorf. From 1998 to 2000 he was Spokesman of the Executive Management of VDZ and Director of the Research Institute. The jury emphasised that Sprung's remarkable research work covers all important areas of the production and application of cement. This includes not only the problems of environmental protection

but also specific problems concerning the durability of concrete. Dr Martin Schneider, the VDZ's chief executive and head of the research institute, underlined the great significance of Sprung's achievements, confirming that much of what industry knows today about cement and its properties has its origins in the work that he undertook.

A relaxed Gala Dinner evening with musical accompaniment entertained the large gathering until late in the evening, followed by extensive networking.

The VDZ Annual Cement Conference 2017 will take place once again in Düsseldorf on 19-20 September 2017.

13: Martin Bollongino of Schenck Process in discussion with a conference delegate.

14: Dr Martin Schneider, the VDZ's chief executive and head of the research institute, addresses more than 350 participants.

15: Dr Stefan Puntke, Refratechnik presents 'Influence of refractory supplies on the economics of clinker production', co-authored with Peter Groger and Dr Hans-Jürgen Klischat.



## US: CPV approves sale of Giant stake to Elementia

The board of Spain-based Cementos Portland Valderrivas (CPV) has approved the sale of a 55% stake in its US subsidiary Giant Cement Holding to Mexico's Elementia. The deal includes a US\$220m capital increase in Giant Cement, with subscription rights granted to Elementia. Elementia will also extend a loan of around US\$305m to Giant Cement. In addition, CPV will transfer up to US\$66m in loans to Giant Cement to keep its remaining stake at 45%.

## Guatemala: New Plug&Grind for Cemento Regional

Cemengal has commissioned a new 12t/hr Plug&Grind portable grinding unit for Cemento Regional. The station will supply cement to south and central Guatemala including the capital, Guatemala City.

First cement production at the site was marked by the attendance of Roberto Díaz Durán, president and CEO of Cemento Regional, Antonio González Gallego, president and CEO of Cemengal and Moisés Rodríguez Nuñez, sales and marketing manager of Cemengal.

## Mexico: Cemex sales fall

Cemex's net sales have fallen by 2% year-on-year to US\$10.5bn in the first nine months of 2016 from US\$10.7bn in the same period of 2015. However, on a like-for-like basis adjusted for ongoing operations and currency fluctuations its sales rose by 5%. Its gross profit rose by 3% to US\$3.65bn and its operating earnings before interest, taxation, depreciation and amortisation (EBTIDA) rose by 9% to US\$2.14bn. It attributed the rise in sales on a like-for-like basis to higher prices in local currency terms and higher volumes in Mexico and its European and Asia, Middle East & Africa regions.

"During the third quarter, we continued to deliver strong underlying operational and financial results by remaining focused on the variables we can control. Our year-to-date operating EBITDA grew 17% on a like-for-like basis, with a 5% growth in sales. This was the highest year-to-date EBITDA growth in a decade," said the group's chief executive officer, Fernando A Gonzalez.

Overall, the cement producer saw its cement volumes rise by 1% to 50.8Mt from 50.1Mt. Its net sales (like-for-like) and sales volumes rose in most of its operating regions except for South, Central America and the Caribbean and Europe.

## Jamaica: Dehring resigns from Caribbean Cement

Chris Dehring resigned as chairman of Caribbean Cement on 12 October 2016. He was appointed chairman of Caribbean Cement in October 2014, months after joining the board of its parent company, Trinidad Cement. He has left the cement producer to commit to his next business venture in broadcasting. Previously, Dehring founded the Dehring, Bunting and Golding investment bank, served as managing director of the 2007 ICC Cricket World Cup, chief marketing executive of the West Indies Cricket Board, manager at Citibank NA and chairman of LIME Caribbean/Cable & Wireless.

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## US: Holcim completes Hagerstown upgrade

Holcim US has officially completed its US\$96m upgrade project to its Hagerstown cement plant in Maryland. The two-year modernisation project has helped the plant to adhere to NESHAP environmental rules and has increased production capacity at the site by 0.2Mt/yr.

"A cornerstone of the regional community for 113 years, we recognise the importance of this facility to the Hagerstown community," said John Stull, chief executive officer of US cement operations for LafargeHolcim. "Our investment to modernise clinker production represents our continued commitment to our customers and local manufacturing. The facility will continue to be a strong and reliable partner to the community for many more years to come."

The upgrades to the plant should deliver a more than a 60% reduction in nitrogen oxide (NO<sub>x</sub>) emissions, approximately a 50% reduction in sulphur dioxide (SO<sub>2</sub>) emissions and more than a 75% reduction in Particulate Matter (PM) emissions from the plant.

## US: Eagle Materials revenue up

Eagle Materials' revenue has risen by 2.6% year-on-year to US\$630m in the first half of 2016 from US\$614m in the same period of 2015. Its net earnings rose by 56% to US\$106m from US\$67.6m. Revenue from its cement business rose by 10% to US\$252m from US\$229m. The company singled out the strong performance of its cement business in the second quarter of 2016 with record earnings. However, it also noted that average net cement sales price at its joint venture declined year-on-year due to the shift from oil well cement to construction-grade cement over the past year. Overall cement sales volumes remained static at 2.23Mt in the first half of 2016.

## Mexico: Cemex to exit Grupo Cementos de Chihuahua

Cemex has announced that it wants to sell its 23% stake in Grupo Cementos de Chihuahua through a secondary public offering. Cemex has asked the Comisión Nacional Bancaria y de Valores, Mexico's banking and securities regulator (CNBV), to approve the planned transaction, under which the Mexican building materials company will offer the shares to domestic and foreign investors in a concurrent private placement. The sale will be part of Cemex's previously announced asset disposal plan. The company wants to sell up to US\$2bn worth of assets to reduce its debts.

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**Canada: Green light for tyre test**

Lafarge Canada has started a partnership with Dalhousie University researcher Mark Gibson to test tyre-derived fuel on an industrial scale at the Brookfield cement plant in Nova Scotia. Working under a Natural Sciences and Engineering Research Council of Canada Discovery Grant, the initiative will research the adoption of low CO<sub>2</sub> fuels in the sector.

"My students and I are very pleased to see this work enter the real world. Based on our research, we expect to see significant reductions in greenhouse gas emissions from the Brookfield cement plant and thereby help Nova Scotia move one step closer to a low carbon economy," said Gibson.

Due to earlier initiatives, including by Dalhousie's Faculty of Engineering, the Brookfield plant has substituted alternative fuels for conventional ones by using front-end burner injection in its kiln. The plant is expected to reach a substitution rate of up to 30% by the end of 2016. Following the test using tyres the cement producer expects to use 15% of its fuel requirements from 450,000 tyres per year, or just under half the amount of tyres generated in Nova Scotia.

**Chile: LafargeHolcim heads to the exit**

LafargeHolcim has signed an agreement with Inversiones Caburga, part of the Hurtado Vicuña Group, to sell its 54.3% stake in Cemento Polpaico for US\$225m. The transaction will be carried out by a public tender offer by Inversiones Caburga to all shareholders of Cemento Polpaico.

Cemento Polpaico operates one integrated plant and two grinding plants with a combined cement capacity of 2.3Mt/yr. The company is also a leading ready-mix concrete producer with 25 plants and produces aggregates. The launch of the public tender offer is subject to the approval of the Chilean competition authorities, which is expected in the first half of 2017. Following the successful completion LafargeHolcim would exit Chile completely.



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### US: St. Marys gets US\$150m funding

St. Marys Cement has received inducement resolution approval from the Michigan Strategic Fund (MSF) for up to US\$150m in private activity bonds to expand its Charlevoix plant in Michigan. The cement producer will now submit a more detailed plan to the MSF.

According to MSF, the plant upgrade will expand the plant's infrastructure to increase productivity. The project is expected to qualify for bond financing as a solid waste disposal and recycling facility. The company currently employs 232 people. The expansion project is expected to add up to 200 jobs during construction and up to 10 permanent jobs upon completion.

Private activity bonds are a source of financial assistance to economic development projects in Michigan. They provide profitable firms with capital cost savings that stem from the difference between taxable and tax-exempt interest rates. A bond inducement is the first step in a bond transaction.

### Honduras: Argos to upgrade plant

Argos Honduras, part of Colombia's Cementos Argos, plans to spend US\$25m towards upgrading its San Lorenzo grinding plant. The site has a production capacity of 300,000t/yr and it will develop its range of Ordinary Portland Cement products, according to Argos Honduras' director Harry Abuchaibe. The plant, formerly known as Cesur Grinding Station, was purchased from Lafarge in 2013 as part of a package of assets acquired at that time.

### US: Hanson Permanente collapses under weight of asbestos liabilities

Hanson Permanente Cement has filed for Chapter 11 bankruptcy with the US Bankruptcy Court in the Western District of North Carolina. The cement producer, based in California, has blamed the move on liabilities related to the sale of products containing asbestos since 1978. As of 31 August 2016, the debtors were defendants in approximately 14,000 pending asbestos-related bodily injury lawsuits filed in state courts across the country, according to New Generation Research.

### Barbados: Arawak to cut staff

Arawak Cement has formally offered its staff voluntary separation packages as part of its financial and operational restructuring programme that started in October 2015. In September 2016 the company said that it would offer voluntary separation packages because the first phase of the restructuring had not yielded the results necessary to attain profitability and competitiveness. It blamed 'unfavourable' economic conditions, significant excess cement capacity in the region and highly competitive, price sensitive markets. It also cited energy and labour costs as factors.

### **Brazil: Cade ends investigation**

**B**razil's antitrust watchdog Cade has decided to end its investigation into 18 cement companies over alleged anti-competition practices. The allegations were that some of the companies had reached an agreement to refuse to provide three types of cement to competitors outside of an economic group, which would lead to increased prices of the products, according to the Valor Economico newspaper. Cade determined punishments were to be applied to Holcim Brasil, Cimento Tupi and Votorantim Cimentos. However, case leader Paulo Burnier decided that there was insufficient evidence to apply sanctions on the majority of companies concerned. He also noted that some of the companies had previously been set punishments by Cade for involvement in cartel practices.

### **Canada: HeidelbergCement and Italcementi to integrate operations**

**T**he board of directors of Italcementi has met in Milan, Italy and has decided to integrate its operations in the Canadian market with the operations of HeidelbergCement, its new parent company.

The transaction involves the acquisition by Canadian Lehigh Hanson Materials (LHM), indirectly owned by HeidelbergCement, of the entire share capital, including ordinary and preference shares, of US-based Essroc Canada, which is indirectly owned by Italcementi, through vehicle company Essroc Netherlands. The price which Essroc will receive for the sale of Essroc Canada to LHM, equal to some US\$281m, will be paid by assigning to Essroc 42,288 LHM shares of the new issue, or 15.5% in LHM share capital, and, for the remainder, US\$151,000 in cash.

### **US: Oberhelman to retire from Caterpillar in March 2017**

**C**aterpillar Chairman and CEO Doug Oberhelman will retire from the company on 31 March 2017. The company's board of directors has elected Jim Umpleby, currently a Caterpillar Group President with responsibility for Energy & Transportation, to succeed Oberhelman as CEO.

Umpleby, a 35-year veteran of the company, will join the Caterpillar Board of Directors and become CEO on 1 January 2017. He joined Solar Turbines in San Diego, California in 1980. Solar, a wholly-owned subsidiary of Caterpillar, is a manufacturer of industrial gas turbine systems. Early in his career, he held numerous positions of increasing responsibility in engineering, manufacturing, sales, marketing and customer services.

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## Comment: Chinese cement production picks up so far in 2016

Despite the (at best) lacklustre results seen by the major Chinese cement producers so far in 2016 (see below) Chinese cement output is reported to have grown by 2.6% year-on-year to 1.77Bnt in the first nine months of 2016, according to data from the National Development and Reform Commission (NDRC). This is compared to a 4.7% drop in output that was noted for the same period of 2015 compared to the 2014 period.

Figures from the National Bureau of Statistics (NBS) show that property sector investment rose by 5.8% year-on-year in the first nine months of 2016, a faster rate than earlier in the year, supported by interest rate cuts and lower deposits.

Quite how one tallies this increased production with statements from the Chinese authorities regarding the need to reduce chronic overcapacity is hard to tell.



### China: CNBM takes a hit

China National Building Material Company's (CNBM) total operating revenue fell by 8.6% year-on-year to US\$10.4bn in the first nine months of 2016 from US\$11.4bn in the same period of 2015. Its net profit attributable to the owners of the company fell by 5% to US\$106m from US\$112m. No further comment was made regarding the results.

### China: Profit up, revenue down for Huaxin

Huaxin Cement's net profit has risen by 29% to US\$23.9m in the third quarter of 2016 from US\$18.5m in the same period in 2015. However, its sales revenue fell by 7.3% to US\$1.36bn from US\$1.47bn.

### Vietnam: Exports fall

Vietnam's exports of cement and clinker fell by 16.6% year-on-year to 11.3Mt in the first nine months of 2016. The value of the exports fell by 17.2% to US\$429.3m. The Philippines, Bangladesh, Taiwan and Mozambique were among major importers of Vietnamese clinker and cement in the nine-month period, according to data from the Ministry of Industry and Trade. Local cement producers have faced competition from those in Thailand and China.

### India: JSW launches Concreel HD

JSW Cement has launched a new product called Concreel HD in the south of India. It is marketed as an environmentally-friendly product with improved chemical resistance and superior cohesion. It is targeted at load-bearing applications such as beams, columns, slabs and foundations due to its high early and long-term strength as well as its quick setting time.

### China: China Resources profit tumbles

China Resources Cement's (CRC) profit has fallen by 36% to US\$102m in the first nine months of 2016 from US\$159m in the same period of 2015. Its turnover fell by 11.5% to US\$2.25bn from US\$2.55bn. Cement sales volumes grew by 5.4% to 57Mt from 54Mt and clinker sales volumes fell by 22% to 2.9Mt from 3.8Mt. Turnover fell in all regions that the cement producer operates in, with the exception of Yunnan and Guizhou. No explanation was provided for the falling turnover and profit but the company did highlight that the average cost per tonne of cement fell by 14% year-on-year.

### China: Anhui Conch revenue holds steady

Anhui Conch has reported that its revenue fell by 0.05% year-on-year to US\$5.6bn in the first nine months of 2016. Its net profit fell by 2.2% to US\$881m from US\$901m. However, after extraordinary items, including government subsidies and asset disposals, its profit rose by 28% to US\$782m. No comment was made on the results but the cement producer did note that its prepayments for coal and other raw materials and fuel rose during the third quarter of the year.

### India: Mixed bag for UltraTech so far in 2016

UltraTech Cement's net profit has risen by 27% year-on-year to US\$209m for the first half of its 2017 financial year from US\$164m in the same period of the previous year. Its sales revenue grew slightly by 1% to US\$2.08bn from US\$2.06bn. However, its sales revenue fell by 13% year-on-year to US\$967m for the quarter that ended on 30 September 2016 from US\$1.11bn a year earlier.

In a results presentation the cement producer said that the industry had been hit by low cement demand, low capacity utilisation rates and rising operating costs, including petcoke prices, in the latest quarter. It added that its capacity utilisation had fallen by 6% to 70% in the first half of its financial year from 76% a year earlier as its production capacity grew to 66.25Mt/yr from 63.05Mt/yr. Its sales volumes grew by 4% to 24.4Mt from 23.5Mt, with a particular boost in exports.

## China: FLSmidth and SEPTEC awarded alternative fuels project

FLSmidth, Sino Environment Engineering Development (SEPTEC) and China Resources Cement (CRC) have signed a partnership to provide pyroprocessing co-processing systems to cement plants. FLSmidth will be responsible for the design, engineering and integration of the integrated waste burning solution, with SEPTEC acting as a general contractor.

The agreement follows a project at CRC's Hongshuihe cement plant that took municipal and industrial waste from the city of Binyang in Guangxi. FLSmidth installed a Hotdisc system that could process 300t/day of waste to support the cement plant's cement production capacity of 3200t/day.

"China's energy-intensive industries, such as cement production, are coming under pressure from a government that wants to rebalance the economy towards a less energy-hungry mode of growth, curb pollution and reduce carbon emissions. CRC plans to initiate several similar municipal solid waste co-processing projects for other cement producers with FLSmidth and SEPTEC as partners," said FLSmidth China Country Manager, Cyril Leung.

In China's latest five-year plan, the government encourages more cement producers to co-process municipal solid waste in the cement industry, with an aim of getting 15-20% of the cement kilns in the country to co-process waste by 2020. China will introduce a national carbon-trading scheme in 2017.

## India: JK chief says demand to take off

JK Cement's Chief Financial Officer AK Saraogi has forecast that cement demand will rise by 8% in the 2017 – 2018 financial year due to government spending on infrastructure. JK Cement Special Executive Madhavkrishna Singhania said that demand in the current financial year is likely to be aided by 'good' monsoons that will boost spending particularly in rural areas, according to the Press Trust of India. The forecasts follow several years of poor demand for cement in the country. Ratings agency ICRA also predicts similar increases in demand.

## Pakistan: Maple Leaf applies for captive power plant

Maple Leaf Power has submitted an application to National Electric Power Regulator Authority (NEPRA) for a power generation license for a 40MW coal-based thermal power plant. The plant will be used to supply power to the Maple Leaf Cement plant at Mianwali in Iskanderabad. The project will cost US\$52.5m and it expected to start operation in December 2017.

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## India: Jaiprakash Associates approve sale of cement assets

The shareholders of Jaiprakash Associates have approved the sale of the group's cement business to UltraTech Cement. According to the deal, arranged earlier in 2016, UltraTech Cement will buy Jaiprakash Associates' cement plants in Uttar Pradesh, Madhya Pradesh, Himachal Pradesh, Uttarakhand and Andhra Pradesh, which have a total production capacity of 21.1Mt/yr, at an enterprise value of US\$2.4bn. In addition, it will acquire a 4Mt/yr grinding plant being built in Uttar Pradesh.

Approval has been obtained from the Competition Commission of India. The next step involves seeking approval from the concerned High Court and the final approval from the capital markets regulator.

## India: Emami plans 10-15Mt/yr expansion by 2021

Emami Group is planning to build a cement production capacity of 15-20Mt/yr by 2021. It started operations at its 5.5Mt/yr cement plant in Chattisgarh in July 2016. In addition, two cement grinding plants are set to open in West Bengal and Odisha. The West Bengal plant is due to open in January 2017.

"We aim to be among the top few players in the cement industry. Emami Cement plans to have a manufacturing capacity of 15-20Mt/yr over the next three to five years," said Aditya Agarwal, director of Emami Group.

Emami Cement has a limestone mine in Andhra Pradesh where it also plans to build a 2Mt/yr plant with an investment of US\$225m. It also plans to build a 6Mt/yr plant in Rajasthan for US\$524m.

Initially, the company will target markets in Chattisgarh, West Bengal, Odisha and eastern Maharashtra's Vidharbha region. It sells cement under the 'Double Bull' brand.

## Myanmar: Star Ferro sets up subsidiary

Star Ferro and Cement's subsidiary Star Cement has incorporated a subsidiary called 'Star Century Global Cement' in Myanmar. It said the new company has been created to provide 'engineering, technical, financial, management and skilled and other services relating to prospecting and exploration of mines and minerals' in the country. It also intends to offer technical consultancy services for exploration, mining, process, engineering and operating data.

## Japan: Taiheiyo revises profit downwards

Taiheiyo Cement has revised down its forecast for its net sales by 2.3% for its financial year that ends on 31 March 2017. It now expects to make net sales of US\$7.67bn, as opposed to the US\$7.85bn originally estimated in May 2016, due to falling cement sales volumes.

## India: Jaypee to return coal blocks after Orient sale

Jaypee Cement is seeking approval from the Ministry of Coal to return two captive coal blocks, which it previously won by auction in 2015. The company has told the ministry that it does not require the coal blocks as it has sold off the attached cement plants to Orient Cement. An official from the Ministry said that Jaypee Cement could be barred from bidding for other coal blocks for one year and that bank guarantees equivalent to a year's revenue from the mines could be seized.

## Pakistan: Fecto goes to court to resume Margalla mining

Fecto Cement has appealed to the Islamabad High Court to allow it to continue mining in the Margalla Hills. In August 2016 it had its mining lease cancelled by the Capital Development Authority (CDA) and a fine was issued. This followed an order by the Supreme Court in March 2015 to stop all development and stone crushing activities. In 2013 the Islamabad Capital Territory issued a mining lease that allowed Fecto Cement to carry out stone crushing activities in the area until 2030.

## Bangladesh: Plant upgrade

The government-owned Bangladesh Chemical Industries Corporation (BCIC) has signed a memorandum of understanding with Saudi Arabia's Al Rajhi Group to build a new production line and a captive power plant at the Chhatak Cement plant. The project is a joint venture between the companies and it will be run as a public-private partnership.

The new cement line and power plant will have a production capacity of 1.5Mt/yr and 330MW respectively. Industries minister Amir Hossain Amu, BCIC secretary Hasnath Ahmed Chowdhury and managing director of Al Rajhi Company for Industry and Trade Yousif Al Rajhi signed the agreement in Bangladesh on 20 October 2016.

## Tajikistan/Uzbekistan: First Tajik cement hits Uzbekistan

Tajikistan began to export cement to Uzbekistan in 2016, according to the Ministry of Industry of Tajikistan. 162,000t of cement were sent to the neighbouring country in the first nine months of the year. Cement has also been sold to Afghanistan.

Previously Tajikistan exported cement only to Afghanistan and Kyrgyzstan, with the majority going to the former. Cement production in Tajikistan has increased by 37% year-on-year to 1.51Mt in the first nine months of 2016.

Meanwhile, Uzbekistan's Ahangarancement, part of Russia's Eurocement Group, has increased its cement production by 6% year-on-year to 1.42Mt in the first nine months of 2016. Clinker production grew by 3.8% to 1.02Mt and cement sales volumes grew by 6.1% to 1.42Mt.





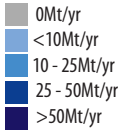
Peter Edwards, Global Cement Magazine

## ASEAN - Rising up the ranks - Part 2

The 10 countries of the Association of South East Asian Nations (ASEAN) became more economically linked in December 2015 when they formally entered into the ASEAN Economic Community (AEC). Modelled partly on the predecessor organisations of the European Union, the AEC comprises 609 million people, has a regional GDP of US\$2.6tn and a cement capacity of 273Mt/yr.

In this second part of our review of the cement sector of the bloc, we look at Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam. The history of ASEAN, its cement producers and trends, plus details of the markets in Brunei, Cambodia, Laos and Indonesia, were covered in the October 2016 issue of *Global Cement Magazine*.

**Right - Figure 1:** ASEAN Member States, colour-coded by integrated cement production capacity.



MEMBER	JOINED
Brunei	1984
Cambodia	1999
Indonesia	1967
Laos	1997
Malaysia	1967
Myanmar	1997
Philippines	1967
Singapore	1967
Thailand	1967
Vietnam	1995





## Malaysia

Malaysia's GDP rose by 6.0% year-on-year to US\$338bn in 2014, while its GDP/capita rose to US\$11,307. The country has 11 active integrated cement plants in Malaysia and 27.4Mt/yr of cement production capacity. The CMS Cement plant at Kuching is currently undergoing expansion via the installation of a new mill from Christian Pfeiffer of Germany. Although work was expected to have been complete by the first quarter of 2016, further news has not been forthcoming. If completed, the extra capacity will increase the national count to 29.2Mt/yr.

In 2015 LafargeHolcim cemented its place as Malaysia's largest cement producer when it bought Holcim Sdn Bhd from Holcim Indonesia for US\$71.2m. "With this merger, our installed cement capacity will rise to 14.1Mt/yr from 12.9Mt/yr through the combined strength of three

integrated cement plants, two grinding stations, over 40 ready-mix concrete batching plants and six aggregate quarries," said Lafarge in a statement. As in Indonesia, LafargeHolcim was allowed to take all of Lafarge and Holcim's Malaysian pre-merger assets. This represents more than half of national capacity.

YTL Cement, Malaysia's second-largest producer, has two plants and 5.0Mt/yr of production capacity, while Cement Industries of Malaysia (CIMA) has two plants and 3Mt/yr of cement production capacity via its Negeri Sembilan Cement subsidiary. Malaysia also has seven grinding plants, which raise overall cement capacity to around 32Mt/yr.

According to the USGS, Malaysia produced 21.4Mt of cement in 2013, down from the 21.7Mt it produced in 2012. The IMF has predicted that Malaysia's GDP will grow by 4.4% in 2016 following growth of 4.8% in 2015. With a government that is dedicated to further developing its country via heavy investments, housing and infrastructure construction, especially in Malaysia's underdeveloped eastern regions on Borneo, cement demand is expected to grow solidly in the near future.

	Producer	Location	Capacity (Mt/yr)
1	Aalborg Portland Malaysia	Darul Ridzuan, Perak	1.9
2	Lafarge (51% LafargeHolcim)	Teluk Ewa, Langkawi	5.4
3	Lafarge (51% LafargeHolcim)	Kanthan, Perak	4.2
4	Lafarge (51% LafargeHolcim)	Rawang, Selangor	2.6
5	Negeri Sembilan Cement	Jalan Tampin, Bahau	1.3
6	Negeri Sembilan Cement	Kangar, Perlis	1.7
7	YTL Cement	Bukit Sagu, Pahang	1.5
8	Perak-Hanjoong Semen (YTL)	Perak	3.5
9	Tasek Cement	Ipoh, Perak	2.3
10	CMS Cement	Kuching, Sarawak	1.0 (Expansion to 2.8)
11	Hume Cement	Gopeng, Perak	2.0
<b>ACTIVE TOTAL (Total of above)</b>			<b>27.4</b>
<b>POSSIBLE CAPACITY after CMS expansion</b>			<b>29.2</b>

**Left - Table 1:** Integrated cement production facilities in Malaysia. **Source:** *Global Cement Directory 2016* and work towards publication of the *Global Cement Directory 2017*. **Note:** Completion date of CMS Cement expansion is unknown.





## Myanmar



Myanmar is one of the ASEAN region's fastest-growing economies. Its GDP grew by 8.5% year-on-year to US\$64.3bn in 2014, while its GDP/capita rose to US\$1200. This rapid growth was despite the fact that the country remains subject to US economic sanctions, which were first implemented in response to the country's 1988 military coup and oppression of pro-democracy demonstrations. Some sanctions were lifted in May 2016 following elections in November 2015, the first poll in decades.

Myanmar has 14 active cement plants but most are relatively small, wet process facilities. The exception is the Arr Thit Man dry process plant in Kyaukse, Mandalay, which, with 1.2Mt/yr, has around a third of Myanmar's integrated capacity. In total, the country has around 4.9Mt/yr of cement production capacity.

Myanmar's under-supply and low quality domestic cement makes it an attractive destination for importers and for new projects, with a further 7.1Mt/yr of capacity slated to come onstream in the coming years. A 1.8Mt/yr dry-process facility is being built by a subsidiary of Thailand's Siam Cement Group, which is due to come online during 2016. Arr Thit Man has ambitions to increase its cement capacity to 3.2Mt/yr by installing a second line at its 'Double Rhinos' plant in Mandalay. Semen Indonesia has previously stated that it would invest in a 2.5Mt/yr plant in the country and MCI is looking to drastically increase production at its Hpa An plant from 0.4Mt/yr to 1.6Mt/yr.

However, it is unlikely that all of this extra capacity will actually be built. Semen Indonesia expressed doubts over the prospect of its project due to disagreements with its Myanmar-based partner back in January 2015. At the time it said that it would look to invest either with another Myanmar-based company or look for projects in other south east Asian nations. The company has since gone quiet on the project. Local support for the MCI expansion took a knock in March 2016, when residents staged a protest. Those present held a 'no cement' prayer vigil and demanded that the project be scrapped over health concerns.

The above two examples show how investment in Myanmar remains tricky, especially for foreign firms. This may become easier as the AEC develops. Indeed, as early as 2013 the government announced that 13 companies were to establish joint ventures with the local state-owned cement plants in order to drive investment and raise efficiency. Myanmar's smaller producers were already under threat from large local players and importers in the region. They will have to step up their game to survive in the AEC.

**Right - Table 2:** Integrated cement production facilities in Myanmar. **Source:** *Global Cement Directory 2016* and work towards publication of the *Global Cement Directory 2017*. **Note:** 'Possible future capacity' presumes that all projects listed come to fruition and that no other plant closes. U/C = Under construction.

	Producer	Location	Capacity (Mt/yr)
1	MCI	Kyaukse, Mandalay	0.2 (1.6 planned)
2	MCI	Hpa An, Karen	0.4 (1.6 planned)
3	MCI	Kyagin, Hinthada	0.6
4	MCI	Napyitaw	0.3
5	KBZ Development	Thuanggyi, Shan	0.4
6	Mandalay Cement	Mandalay	0.1
7	Thayet Cement	Magway	0.2
8	AAA Cement	Mylt Nge Chaung, Mandalay	0.2
9	Tiger Head Cement	Mandalay	0.2
10	Myanmar Elephant	Mandalay	0.2
11	Myanmar Economic Corp	Yangon	0.1
12	Yangon City Cement	Mandalay	0.2
13	Dragon Cement	Tigyit	0.2
14	Arr Thit Man	Kyaukse, Mandalay	1.6 (3.2 planned)
<b>ACTIVE CEMENT CAPACITY (Total of above)</b>			<b>4.9</b>
14	Mawlamyine Cement (Siam Cement)	Mon	1.8 (U/C - 2016)
15	Semen Indonesia	Undecided	2.5 (Possible)
<b>POSSIBLE FUTURE CAPACITY</b>			<b>13.4</b>

## Philippines



The Philippines' GDP grew by 6.1% year-on-year to US\$285bn in 2014, while its GDP/capita rose to US\$2870. The country has 17 active cement plants, which currently share a total capacity of 24.8Mt/yr.

LafargeHolcim, which took control of the vast bulk of Lafarge and Holcim's cement assets in the Philippines in July 2015, is the largest player, with 10.1Mt/yr of capacity, equivalent to around 40% of national capacity. It was forced to shed three integrated cement plants at Batangas, Bulacan and Norzagaray. These were picked up by Ireland's CRH as part of its Euro6.5bn purchase of Lafarge and Holcim divestments. Along with minority stakeholder Aboitiz Equity Ventures, it now commands 3.7Mt/yr of capacity across the three sites.

Another major player in the Philippines is Cemex, with 4.7Mt/yr of capacity across two sites. Cemex, however, is currently in the process of reducing its stake in the market as part of its efforts to cut debt. The rest of the market is made up of six smaller suppliers with only one plant each. Together they share 11Mt/yr, around 44% of national capacity.

Following a lacklustre 2014 in which capacity utilisation was around 68%, the cement sector in the Philippines saw improved conditions in 2015. The Department of Trade and Industry reported that capacity utilisation was up to 85% during the first half of the year. Across the whole of 2015 cement sales rose by 14.3% year-on-year to 24.4Mt/yr, according to the Cement Manufacturers' Association of the Philippines (CEMAP). The sales volume was 21.3Mt

in 2014. In the fourth quarter of 2015 cement sales rose by 16.6% year-on-year to 6.1Mt from 5.2Mt in the same period in 2014. CEMAP president Ernie Ordonez attributed the growth to higher investments in construction of the public sector, backed with the private sector's confidence in the government, new housing projects with low interest rates and better weather in 2015.

2015 was also full of significant project announcements. Eagle Cement announced that it would spend US\$1.2bn on three cement lines, bringing a total of 5Mt/yr into operation. In September 2015 San Miguel Group allocated a total of US\$400m for two 2Mt/yr plants. Although they have not all broken ground, these projects indicate very strong confidence in the Philippines' cement industry going forward.

Cement demand in the Philippines grew by 12% in the first quarter of 2016, on sustained rollout of private sector projects and higher state spending for infrastructure. However, the start of 2016 was only 'flat' for Holcim Philippines, the major subsidiary of LafargeHolcim. The company's profit was flat year-on-year in the first quarter of 2016 at US\$31.7m, despite revenues increasing by 17% to US\$213.6m. The company reported that production costs rose by 23%, eating into revenues.

Holcim Philippines president and country chief executive Eduardo Sahagun said that the company's first-quarter performance was due to its ability to make supply available in the market on time and its strong regional presence. "Moving forward, we are cautiously optimistic as we await the results of the coming elections," said Sahagun at the time. "Hopefully, the focus on infrastructure remains, as this is much needed by the country to sustain its development."

## Singapore

Singapore's GDP grew by 2.9% year-on-year to US\$308bn in 2014. Its GDP/capita, which rose to US\$62,000 in the same year, is the highest of the ASEAN countries. Indeed, Singapore is the only country in south east Asia with an advanced economy, as defined by the IMF.

Singapore has no integrated cement plants and just one 0.3Mt/yr capacity grinding plant in Tuas Crescent, which is owned by G & W Industries.

A number of other companies operate cement terminals that import cement from neighbouring countries. They are listed in Table 4.

	Company	Capacity (Mt/yr)	Notes
1	G & W Industries	0.3	Grinding
2	EnGro	1.2Mt/yr	Terminal throughput
3	Singapore Cement	50,000t	Terminal storage
4	United Cement		
5	Sin Hen Chan		

	Producer	Location	Capacity (Mt/yr)
1	Republic Cement (CRH)	Norzagaray	1.7 (3.6 planned)
2	Republic Cement (CRH)	Bulacan	0.5 (1.3 planned)
3	Republic Cement (CRH)	Batangas	1.5
4	LafargeHolcim	Teresa, Rizal	1.9
5	LafargeHolcim	Iligan, Mindanao	0.6
6	LafargeHolcim	Norzagaray	3.3
7	LafargeHolcim	Davao, Ilang	2.1
8	LafargeHolcim	La Union, Bacnotan	1.2
9	LafargeHolcim	Lugait, Misamis Oriental	1.0
10	Lloyds Richfield	Danao, Cebu	1.0
11	Taiheiyo Cement	San Fernando, Cebu	1.5
12	APC (Cemex)	Tina-An, Cebu	4.0
13	Mabuhay Filcement	South Poblacion, Cebu	0.6
14	Northern Cement	Pangasinan	1.2
15	Cemex	Luzon, Rizal	2.2 (3.7 planned)
16	Goodfound Cement	Palanog, Albay	1.0
17	Eagle Cement	Brgy Akle, Bulacan	1.0 (6.0 planned)
<b>TOTAL ACTIVE CAPACITY (Total of above)</b>			<b>24.8</b>
18	Pacific Cement	Surigao	0.2 (Mothballed)
19	LafargeHolcim	Bulacan, Norzagaray	2.5
20	San Miguel	Pangasinan	2.0 (U/C - 2017)
21	San Miguel	Quezon	2.0 (U/C - 2017)
<b>POSSIBLE FUTURE CAPACITY</b>			<b>40.7</b>

## Thailand

Thailand's GDP grew by 0.9% year-on-year in 2014 to US\$405bn, with GDP/capita rising to US\$5977 in the same year. The country has 12 cement plants with 49.6Mt/yr of cement production capacity, including Siam City Cement's 12.3Mt/yr facility at Saraburi. Indeed, with five plants that have capacities of 5Mt/yr or greater, Thailand's operators run an unusually high number of large plants. Indeed, it has one of the highest capacity to plant ratios in the world at 3.9Mt/plant. Most of these giant plants are in the limestone rich Saraburi Province, which is home to almost all Thai cement capacity.

According to the Thai Cement Manufacturers Association (TCMA) cement production in Thailand came to 36.2Mt in 2015. This is around 73% of integrated capacity. It estimated domestic demand at 29.1Mt in 2015, with exports reaching 7.1Mt/yr.

Siam City Cement is the largest cement producer in Thailand. It operates a 12.3Mt/yr plant in Saraburi and an 0.8Mt/yr plant that it acquired from Cemex after agreeing to buy Cemex's Thai and Bangladeshi assets in March 2016. This relatively small increase in capacity to a total of 13.1Mt/yr was enough to push it past the former capacity leader Siam Cement Group.

Like Siam City Cement, Siam Cement Group is a Thai-owned firm. It is involved in a very wide

**Above - Table 3:** Integrated cement production facilities in the Philippines. **Source:** *Global Cement Directory 2016* and work towards publication of the *Global Cement Directory 2017*. **Note:** 'Possible future capacity' presumes that all projects listed come to fruition and that no other plant closes. U/C = Under construction.

**Left - Table 4:** Cement producers and importers in Singapore. **Source:** *Global Cement Magazine*, April 2015.



	Producer	Location	Capacity (Mt/yr)
1	Asia Cement (49% HeidelbergCement)	Pukrang, Saraburi	5.0
2	Samukkee Cement	Saraburi	0.1
3	Saraburi Cement	Saraburi	0.7
4	TPI Polene	Ampurkaengkhalai, Saraburi	12.0
5	Siam Cement Group	Kaeng Khoi, Saraburi	7.3
6	Siam Cement Group	Ta Luang, Saraburi	3.2
7	Siam Cement Group	Lampang	2.1
8	Siam Cement Group	Saraburi	0.1 (White)
9	Siam Cement Group	Nakorn Si Thammarat	6.0
10	Siam City Cement	Saraburi	12.3
12	Siam City Cement	Chalerm Phrakiar, Saraburi	0.8
<b>ACTIVE TOTAL (Total of above)</b>			<b>49.6</b>

**Above - Table 5:** Integrated cement producers in Thailand. **Source:** Global Cement Directory 2016 and work towards publication of the Global Cement Directory 2017.

range of industrial sectors. It operates four grey cement plants and one white cement plant, with a total capacity of 12.7Mt/yr. 2015 was a less than stellar year for the group's cement arm, which reported a 22% decrease in profit in 2015 to US\$286m. Its revenue fell by 3% year-on-year to US\$5bn from US\$5.2bn. It blamed the performance on poor market recovery in Thailand.

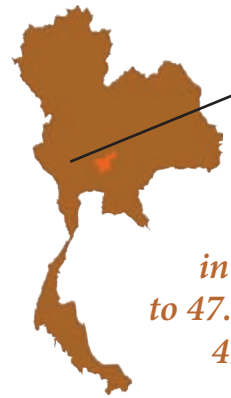
Speaking earlier in 2016, company President Roongrote Rangsiyopash indicated that ASEAN markets would provide a strong base for the company going forward. "We are continuing as planned and are able to accommodate and meet the market demand dynamics," said Rangsiyopash. "The cement plant in Indonesia commenced commercial operation in November 2015, while the cement plants in Myanmar and Laos are expected to begin operation in the middle of 2016 and 2017, respectively. These investments are integral to the ability to support our market expansions and serve our ASEAN customers' demands."

SCG expects that the ASEAN Economic Community will advance its businesses in key export markets in Cambodia, Laos, Myanmar and Vietnam. It stated that positive economic trends are also anticipated in Thailand due to government stimulus policies and projects.

Third in the Thai cement sector is TPI Polene, an 88% Thai-owned conglomerate that operates in the building materials and chemicals sectors. It operates one of Thailand's huge plants, a 12Mt/yr facility at Saraburi.

Three other producers make up the remainder of the market; two local and one that is 49%-owned by HeidelbergCement. Aside from integrated plants, Thailand also has two grinding plants, both operated by Jalapathan Cement, which has 2.7Mt/yr of production capacity.

Going forward, Thai firms appear to be well-placed to export cement in the ASEAN region in the



*The region around Saraburi has one of the highest concentrations of cement production in the world. It is home to 47.5Mt/yr of Thailand's 49.6Mt/yr capacity!*

event that the Thai market performs more weakly than expected. Producers like Siam Cement Group were among the first to investigate the benefits of the ASEAN project, meaning that they are now well placed to take advantage relative to players from other countries.



### Vietnam

Vietnam's GDP grew by 6.0% in 2014 to US\$186bn, while its GDP/capita rose to US\$2052. Despite its relatively small GDP, it has a very large cement industry, one effect of a centrally-planned industrial sector. The Vietnamese cement market is the largest in the ASEAN region, with 59 active integrated cement plants and 94.6Mt/yr of cement production capacity.

According to Le Van Toi, Head of the Building Materials Department under the Ministry of Construction, over 72Mt of cement is estimated to have been sold in 2015, up by 3% compared to 2014. Some 16.3Mt was shipped abroad, down by 17.3% year-on-year, but domestic consumption rose by 11.1% to 56.5Mt.

The Vietnamese cement sector is dominated by two main producers, state-owned Vietnam Cement Industry Corporation (VICEM) and Vissai Group. VICEM has a total of 23.4Mt/yr across 11 sites, whereas Vissai Group has four cement plants and 11.6Mt/yr of cement production capacity. There are many smaller players that have one integrated plant, as shown in Table 12. Vietnam also has 15 grinding plants, which add an extra 13.7Mt/yr of production capacity. Siam City Holcim has four of the plants, as does VICEM (via Ha-Tien Cement).

After many years of rapid expansion, the cement sector is undergoing a period of less rapid capacity addition at present. High volumes of exports are increasingly difficult to sell, although the country's rulers expect that cement production will rise to 72-74Mt in 2016, a rise of around 3Mt/yr. This is due in part to the doubling of capacity of Cong Thanh Cement to 3.6Mt/yr in November 2015.

	Producer	Location	Capacity (Mt/yr)
1	Chinfon Cement	Chinfon, Haiphong	4.5
2	Siam City (Ex-LafargeHolcim)	Hon Chong, Kien Luong	2.0
3	Taiheiyō Cement	Nghi Son, Thanh Hóa	4.4
4	Lucky Cement	Phuc Son, Hai Duong	3.6
5	VICEM	Bim Son, Thanh Hóa	3.2
6	VICEM	Ha Tien, Kien Giang	1.0
7	VICEM	Ha Tien, Kien Giang	0.9
8	VICEM	Haiphong	1.7
9	VICEM	Hoang Thach, Min Tan, Hai Duong	3.5
10	VICEM	Tam Diep, Ninh Binh	1.4
12	VICEM	But Son, Ha Nam	2.8
13	VICEM	Kim Dinh	3.1
14	VICEM	Vinakansia, Ninh Binh	2.8
15	VICEM	Lam Thach	0.7
16	VICEM	Duyen Ha, Ninh Binh	2.3
17	Vissai Group	Gia Vien, Ninh Binh	3.6
18	Vissai Group	Than Liem, Ha Nam	0.5 (2.8 planned)
19	Vissai Group	Dong Banh, Lang Son	1.0
20	Vissai Group	Do Luong, Nghe An	6.0
21	La Hein Cement	La Hein, Thai Nguyen	0.6
22	Quan Trieu	An Khanh, Thai Nguyen	0.8
23	Thach My Cement	Quang Nam	1.7
24	Thang Long Cement	Quang Ninh	2.3 (4.6 planned)
25	Xuan Thanh Cement	Ha Nam	2.4 (4.5 planned)
26	Cam Pha Cement	Quang Nihn	2.3
27	Tua Thien Hue Luks Cement	Thua Thie, Hue	1.5
28	Nam Dong Cement	Nam Dong	1.8
29	Vietnam Construction Materials	Quang Binh	1.6
30	Dong Binh Cement	Lang Son	1.0
31	Dong Son Cement	Thai Nguyen	0.6
32	Lang Bang Cement	Quang Ninh	1.5
33	Luong Son Cement	Thai Nguyen	1.2


	Producer	Location	Capacity (Mt/yr)
34	Mai Son Cement	Son La	1.2
35	Quang Ninh Cement	Ha Long, Quang Ninh	1.2
36	Quang Son Cement	Dong Hy, Thai Nguyen	1.5
37	Can Tho-Hau Giang Cement	Hau Giang	0.8
38	Cao Ngam Cement	Thai Nguyen	0.6
39	Song Thao Cement	Phu Tho	1.4
40	Tuyen Quang Cement	Tuyen Quang	0.6
41	X18 Cement	Lang Son	0.1
42	Yen Bai Cement	Yen Bai, Tan Binh, Ho Chi Minh	0.2
43	An Giang Cement	Long Xuen, An Guing	0.4
44	Fico Tay Ninh Cement	Tayh Ninh, Ho Chi Minh	2.0
45	Ha Tien Kien Giang Cement	Kien Luong	0.2
46	Quang Tri Cement	Quang Tri	0.6
47	Ngu Hanh Cement	Lien Chieu, Quang Nam	1.0
48	Hai Van Cement	Lien Chieu, Quang Nam	1.0
49	Hoang Mai Cement	Hanoi	1.0
50	Sai Son Cement	Sai Son, Hanoi	1.0
51	Dong Lam Cement	Phong Dien	1.5
52	Dien Bien Cement	Muog Thanh, Dien Bien	1.0
53	Bac Giang Cement	Lang Son	1.0
54	Morning Star Cement	Hao Bai, Trung, Hanoi	1.4
55	Binh Phuc Cement	Binh Phuc, Quang Nam	1.3
56	Ha Long Cement	Ha Long, Quang Ninh	2.1
57	He Duong Cement	Ha Long, Ninh Binh	0.2
58	Cong Thanh Cement	Nghe An	1.8
59	Vietnam Construction Materials	Dong Nai	1.6
<b>ACTIVE TOTAL (Total of above)</b>			<b>94.6</b>
60	Hoang Long Cement	Thanh Lein, Ho Chi Minh	0.8 (Mothballed)
61	Vietnam Machinery	Do Luong, Nghe An	0.9 (U/C)
62	Roli-Quang Tri	Cam Ko, Quang Tri	1.2 (U/C)
63	Thang Long Cement	Thang Long	1.5 (Planned)
<b>POSSIBLE FUTURE TOTAL</b>			<b>106.1</b>

## The ASEAN way ahead

The ASEAN region should offer significant growth opportunities for cement producers in the coming years as other regions of the world, notably Europe and the Americas, continue to suffer the after-effects of the global financial crisis. It is possible that ASEAN Member States' rapid economic and population growth could spur rising investment from the types of multinational producers that are already prevalent in other world regions. However, the existing structure of the industry in certain countries, notably Vietnam and Myanmar, could make it difficult for foreign investors. Those best placed for expansion may be producers that already operate in the bloc.

## Current expansion plans are from locals

Notable among the regional players in the ASEAN region is Thailand's Siam Cement Group, which is the most widely spread of all pan-ASEAN producers. It, like a number of other local producers, is already expanding in the region.

Indeed, much of the new capacity already slated to come is from local producers that already know the 'ins and outs' of their respective markets. Out of the 69.7M/yr of projects that could be online by 2020, only four projects, comprising 6.7Mt/yr of capacity, are expected from what might be considered global multinational cement producers. It is possible that as the AEC develops, conditions will prove more suitable for the larger players. Time, as always, will tell. 



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## Egypt: Government turns up heat on alternative fuels

The Egyptian cabinet has approved a plan submitted by the Ministry of Environment that seeks to encourage the increase in waste used as energy in cement plants to 15% by 2030, according to Minister of Environment Khaled Fahmy.

Fahmy said that the cabinet adopted the plan, adding that discussions are underway with heads of plants to discuss problems they face in using waste as fuel.

In a press conference held on 1 November 2016, Fahmy added that Prime Minister Sherif Ismail directed all sectors operating in the Egyptian market to begin conducting studies to understand the current amount of energy consumed in all factories and to investigate

ways to diversify their energy mix, including through processed waste streams.

The minister noted that the Ministry of Environment's plan cited the need to take advantage of the nearly 22Mt tonnes of solid waste and 30Mt of agricultural residues produced in Egypt every year.

"The real problems facing investors in the waste recycling business is the lack of commitment by cleaning companies to provide the required quantities of waste to be recycled and used as an alternative fuel," Fahmy said. "The ministry is currently trying to equip waste management vehicles with the latest technology to improve their collection performance."



## Algeria: Investors to buy ASEC Algeria

A group of Algerian investors has agreed a share purchase framework to buy 100% of ASEC Algeria from ASEC Cement and ASEC Cement Djelfa Offshoren for US\$60m. ASEC Cement is an Egypt-based producer and supplier of cement and other construction materials. ASEC Cement Djelfa Offshoren is a subsidiary of ASEC Cement, a subsidiary of Qalaa Holdings.



## Jordan: Solar unit for Lafarge in 2017

Lafarge Jordan is set to start building a 15MW solar power unit for its Rashadiya cement plant in early 2017. The power plant, which is being built by Adenium Energy Capital, is expected to be operational by the third quarter of 2017. The agreement between Adenium and Lafarge was signed in late October 2016.

"This is an important milestone for the domestic industrial sector in general and the cement industry in particular as this agreement emphasises the positive role that industries can play in using alternative and renewable energy resources," said Lafarge Jordan's chief executive officer Amr Reda. This project will also follow the national Jordanian strategy for renewable energy launched by the Ministry of Energy and Mineral Resources in 2015.

## Benin/Cameroon: LafargeHolcim moves in

LafargeHolcim Maroc Afrique has purchased a 50% stake in SCB Lafarge Benin and 54.7% in Cimencam in Cameroon. Amounts for the deals have not been disclosed. LafargeHolcim Maroc Afrique, a joint venture between Lafarge Holcim and the Société Nationale d'Investissement also bought Socimat in Cote d'Ivoire in July 2016.

SCB Lafarge in Benin produces about 0.6Mt/yr of cement and Cimencam produces 1.7Mt/yr. The new acquisitions are part of LafargeHolcim's expansion strategy across Africa. Countries with high growth potential such as Burkina Faso, Gabon, Mali, Mauritania, Congo, DRC and Senegal have also been targeted.

## Tunisia: Carthage's exports fall as domestic sales rise

Carthage Cement's turnover grew by 17% to US\$66.2m in the nine months to 30 September 2016, compared to US\$55.8m a year earlier. Locally, the firm's sales reached US\$42.3m, a rise of 21% from US\$34.9m in the same period of 2015. This growth helped Carthage Cement bring its market share up to 19% in Tunisia, compared to 15.5% a year earlier. This bucked the trend in the sector, which contracted by 3.3% year-on-year between the review periods.

In terms of exports, sales fell by 2% to US\$8.4m from January to September 2016, against US\$8.5m in the first nine months of 2015. The third quarter of 2016 saw a higher decrease year-on-year, of 16%. The firm said it was due to lower demand, from Algeria in particular.

## Saudi Arabia: Aumund and Sweidan offer spare parts stock

Aumund Fördertechnik and Sweidan Industrial Services have opened new spare parts stock at their Riyadh warehouse. In addition a local Aumund supervisor will be present to support customers.



**Nigeria: Dangote profit falls 10.9%**

Dangote Cement's pre-tax profit has fallen by 10.9% year-on-year to US\$466m in the first nine months of 2016 from US\$523m in the same period of 2015. Its earnings before interest, taxation, depreciation and amortisation (EBTIDA) fell by 16.3% to US\$559m from US\$667m. However, sales revenue rose by 20.9% to US\$1.38bn from US\$1.14bn. It blamed the drop in profitability on falling prices in Nigeria, negative currency effects and on rising fuel and power costs.

"Nigeria has achieved record volume growth and our non-Nigerian operations are performing well across Africa. Our switch to coal in Nigeria will have an immediate impact on margins now that we have abandoned the use of low pour fuel oil (LPFO), improving fuel security and reducing the need for foreign currency. Furthermore, our new pricing will offset the impact on costs of the devalued Naira," said the chief executive officer, Onne van der Weijde. He added his company's strong performance in sales had been hit by poor economies in the countries it operates in and by heavy seasonal rains in west Africa.

The producer reported that its cement sales volumes grew by 28.1% to 11.9Mt in Nigeria and by 72.9% to 6.5Mt elsewhere in Africa. Sales outside of Nigeria were bolstered by production increases in Ethiopia and Zambia, new operations in Tanzania and improved sales in Ghana. Plants in the Republic of Congo and Sierra Leone are due to become operational in mid-November 2016.

**Ghana: Ministry responds to CMA call**

The Ministry of Trade and Industry has responded to calls by the Cement Manufacturers Association (CMA) that it stop imports of cement by saying that the CMA has misrepresented the role of the Cement Monitoring Committee (CMC) and the process of the licensing regime. The CMA took exception to the issuance of permits by the ministry to three foreign cement producers given that they claim the country has a surplus of cement.

In a statement the Ministry of Trade said no authority or mandate has been given to the CMC to instruct or direct the Minister on which firms should be awarded a license and what that company's specific annual imports should be. It added that the CMC's role is intended to give the ministry and all stakeholders access to relevant information and data for the effective implementation of the relevant legislation. It said that the law does not place a ban on imported cement but rather provides a mechanism, rules and procedures for controlling imports.

It went on to explain that the major reason for granting China's Fujian Cement a licence to import cement into Ghana was because it was building a cement plant in the country and that the company was attempting to establish itself in the market ahead of local production. Fujian Cement originally asked the ministry to import 1.5Mt/yr of cement into the country but this was restricted to 0.5Mt/yr. The ministry also reinforced that it had not granted any import licenses to Dangote Cement and Sol Cement, the two companies accused by the CMA of importing cement.

**Zimbabwe: Redcliff grinding plant to be complete by end of 2017**

Mortal Investments Manufacturing Company expects to complete construction of its US\$10m slag cement grinding plant in Redcliff by the end of October 2016. The Chinese investor started construction of the project in August 2016, with testing starting at the end of October 2016. Commissioning is scheduled for the end of 2016.

**Oman: Profit rises at Oman Cement**

Oman Cement's profit has risen by 39% year-on-year to US\$26m for the first nine months of 2016, from US\$18.1m in the same period of 2015. Its revenue grew by 12.45% to US\$114m from US\$101m.

**Uganda: New public-private plant**

The Ugandan government intends to build a cement plant in Karamoja in partnership with Moroto Ateker Cement. The company is a formation of Uganda Development Corporation and Savannah Mines, a local firm based in Karamoja, with shareholdings of 51% and 49% respectively. Moroto Ateker has contracted India's Saboo Technologies to build the cement plant in the Moroto Industrial Park. A feasibility study has already been completed.

**Kenya: ARM secures funding**

ARM Cement has completed an equity deal to secure US\$140m in funding from CDC Group. The investment is believed to be the largest equity deal in Kenya and East Africa in 2016 and one of the largest equity deals in Kenya to date. The cement producer intends to use the investment to build a new cement plant in Kitui County.

**Tunisia: New plant by 2018**

A new 1Mt/yr cement plant in Sidi Bouzid is set to open in 2018, according to Director General of Manufacturing Industry Brahim Chebili. The project is budgeted at US\$220m and will create 300 jobs.

**Mozambique: President opens plant**

President Filipe Nyusi has inaugurated a new US\$24m cement grinding plant in Metuge, Cabo Delgado. The plant has a production capacity of 0.25Mt/yr. Cement produced at the site will be sold under the 'African Elephant' brand. Once construction is complete the plant will employ 67 local workers alongside Chinese technical staff.



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**India:** Builders in Andhra Pradesh were gearing up to declare a 'construction holiday' in early November 2016 if the 'spiralling price' of cement were not brought down 'immediately.' The builders are planning to stop construction works after 6 November 2016 if the government did not respond to the concerns of the construction industry. Industry associations planned to make a representation to Chief Minister N Chandrababu Naidu before bringing construction works to a halt.

The builders complain that, to date, ministers have not acted adequately to reduce prices. Ministers had earlier issued demands to cement producers that prices be reduced to US\$3.45-3.60/bag (50kg) for government projects. The builders claim that this request has had no effect on prices.

"The issue has been brought to the notice of the government umpteen times but in vain," said Confederation of Real Estate Developers' Association of India (CREDAI) Andhra Pradesh President A Siva Reddy. "At present, the price of a cement bag is around US\$4.65-4.80/bag, depending upon the grade." Reddy pointed out that the price was just US\$3.45/bag in early August 2016.

"We are not asking for underpricing," said Capital Region Builders' Association (CRBA) Vice Chairman A Nagamalleswara Rao. "It is clear that the present price is not driven by any external conditions, as cartelisation of big and small cement companies is now an open secret. There is a large gap between demand and supply."

Across the rest of India, all-India cement prices increased by US\$0.05/bag month-on-month to US\$4.98/bag in October 2016, led by price increases in the west, according to Kotak Institutional Equities. Kotak expects that prices in the west and south could continue to rise (by around US\$0.36/bag), while the north and central regions may see marginal declines, of US\$0.15/bag and US\$0.08/bag, respectively in the rest of 2016.

The average cost of petcoke for cement producers in India was US\$84/t, up by 58% from US\$53/t in the second quarter of 2016.

**Egypt:** Prices of Portland cement as at 3 November 2016. Arabian Cement Al Mosalah = US\$54.32/t; Arabian Cement Al Nasr = US\$53.23/t; Cemex Al Muhandis = US\$55.19/t; Building Materials Industries Co = US\$52.50/t; Elnahda Cement = US\$51.41/t; Wadi El Nile Cement = US\$52.50/t; Lafarge = US\$52.74/t; Medcom Aswan Cement = US\$51.19/t; Arish Cement = US\$50.83/t; Sinai Cement = US\$50.83/t; National Cement = US\$53.96/t; El Menya Royal Cement = US\$52.50/t; Suez Cement = US\$53.96/t; Portland Torah Cement = US\$49.38-53.96/t; Helwan Cement = US\$53.95/t; Shora Cement = US\$50.82/t; Misr Beni Suef Cement = US\$53.95/t; South Valley Cement = US\$53.95/t; Misr Cement Qena = US\$51.19/t.

White cement prices as at 3 November 2016: Sinai White Cement = US\$103.84-106.74/t; El Menya Cement - Royal = US\$100.93-101.66/t; Menya Helwan Cement = US\$102.39/t.

Blended cement prices as at 3 November 2016. Sinai Cement = US\$47.78/t; National Cement Altawfir cement = US\$47.78/t.

Sulphate-resistant cement prices as at 3 November 2016. Cemex Al Mukawem Cement = US\$55.90/t; ASEC Cement Asic Sea Water cement = US\$56.13/t; Lafarge Kaher Albehar Cement = US\$58.09/t; Suez Cement Alsuez Sea Water cement = US\$56.13/t; El Sewedy Cement = US\$56.13/t.



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.

Conversions to US\$ from local currencies are as at the time of original publication.





Do you have a bucket list?

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



What would you do if the doctor said to you that you had six months to live?

Our first response might be to weep at our fore-shortened horizons, and what we will miss out on in the future. I asked my parents - both now in their 80s - what they would like to achieve if they had only 6 months left on this Earth. My mother said that she would still like to track down her ancestor from the 1650s, Thomas Tweed, who she's been trying to find as part of a family history project going back 40 years. My father said that he would like to visit the graves of his ancestors from the 1800s around Dublin, as well as the graves of those early McCaffreys that headed over to the US as part of the Gold Rush, only to wash back like a receding tide to Boston, where they are buried. As you inch closer to the end of your days, do you dwell more upon your origins? Perhaps it's an effort to place yourself in a long line of ancestors and of descendants, which will hopefully go on long after you have gone. After all, apart from our children, and our children's children, how much do we leave behind that endures?

A list of family things that I hope to see within my lifetime might include the following:

- Seeing my daughters graduate and/or get a job;
- Seeing my daughters get a place of their own;
- Seeing them settle down with a kind partner;
- Spend time with any grandchildren;
- Grow old with my wife.

However, that's not all: I'd really like to see some or all of the following list 'come true':


- Discovery of proof of extra-terrestrial life (microbes would suffice - I'm not asking for little green men);
- The discovery of the nature of Dark Matter and Dark Energy - which between them apparently make up 95% of the universe but about which we have next to no information at the moment;
- I'd like to see a person walking on Mars - and coming back to Earth to tell the tale (this time I think that we should send poets and writers instead of geologists);
- An end to diseases like malaria, polio, tuberculosis, HIV/AIDS and influenza;
- Widespread use of robust building materials like cement/concrete to cope with a warming world and its associated wilder weather (Hurricane Matthew flattened everything in its path in Haiti apart from buildings made of concrete or concrete-based materials) as well as to improve living standards through provision of well-

insulated, comfortable, well-lit, affordable housing for the widest number of people;

- A more equitable distribution of wealth around the world (more than one billion people in the world live on less than one US dollar per day<sup>1</sup>: The 62 richest people in the world have more wealth than the poorest half of the world's population<sup>2</sup>);
- Everyone in the world having access to clean water (around 700 million people don't have access to clean water<sup>3</sup>);
- Everyone having access to a toilet: astonishingly, around 2.4 billion people - one third of our planet's current population - do not have access to a toilet. I've been to places where there are no toilets, and it is grim - like walking through a mine field (on which topic...);
- An end to the use of anti-personnel mines - banned under the 'Ottawa Treaty'<sup>4</sup> by 162 states, but not signed by the US, Russia and China, amongst others, although the US has said it will abide by the terms of the treaty;
- People defaulting to kindness and politeness, instead of abuse and violence.

Oddly enough, I think that the first wish on my list is more likely to happen than the last one.

I don't see myself having much influence over many or any of the things on my wish list (maybe I could encourage the children to leave home, or join a charity to help end diseases), but there would be some things that I could enact in my putative last half year. I've long wanted to visit a few hard-to-access countries including Bhutan and Nepal, Bolivia, Pakistan and Nigeria - perhaps I could make a special effort to visit them at last. I would like to go drag-racing with my brother Paul again (watching, not driving) - since he used to take me and my brother when we were little, and I found it to be one of the most exciting (but certainly the loudest) things I've ever done.

Probably though, if I really thought about it, I would tend to my garden, perhaps plant some trees, spend time with my family, enjoy every sunrise and sunset, walk in the fresh air and enjoy the 'now' while I'm still on the green side of the grass. 

1 [http://www.unmillenniumproject.org/resources/fastfacts\\_e.htm](http://www.unmillenniumproject.org/resources/fastfacts_e.htm)

2 <https://www.theguardian.com/business/2016/jan/18/richest-62-billionaires-wealthy-half-world-population-combined>

3 <http://water.org/water-crisis/water-sanitation-facts/>

4 [https://en.wikipedia.org/wiki/Ottawa\\_Treaty](https://en.wikipedia.org/wiki/Ottawa_Treaty)



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