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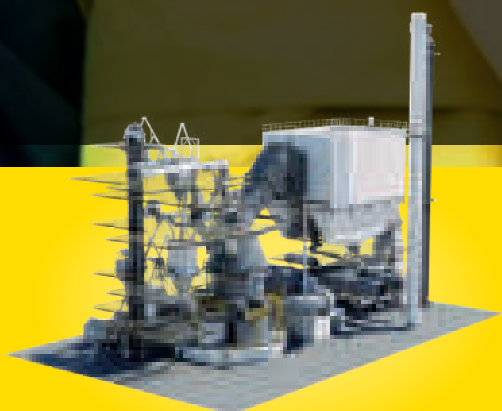
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On the cover...

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Dear readers,

Welcome to the April 2020 issue of *Global Cement Magazine* - the world's most widely-read cement magazine! This issue has a major North American focus ahead of the *IEEE-IAS/PCA Cement Conference* in Las Vegas, Nevada on 19-23 April 2020. The US cement sector has strong fundamentals at present, illustrated by PCA Chief Economist Ed Sullivan's forecast of 2.0-2.5% consumption growth for 2020. This comes on the back of an unexpectedly high 3.0% rise in consumption in 2019. In our interview, starting on Page 46, Sullivan discusses the drivers behind rising imports, plant reopenings and expansions, plus the possible future effects of the 2020 US Presidential Election on infrastructure, carbon taxes and more. We also speak with the PCA President Mike Ireland, who provides an account of the PCA's recent advocacy efforts. Turn to Page 40 to read how the PCA's closer ties to allied associations in the building materials sector are beginning to bear fruit. Ireland adds that there is a lot to be learned from new links to other national and regional cement associations fostered through the *Global Cement & Concrete Association* (GCCA). Meanwhile, *Global Cement* provides a regional report on the US, Canada and Mexico (Page 52) and there's also commentary on novel cement standards from Jack P Moehle at the University of California Berkeley (Page 50).

On the technical side, this issue contains an interview with Axel Jahn, the long-standing Managing Director of cement fan manufacturer Pollrich GmbH (Page 10), as well as a detailed Canadian ID fan replacement study from Howden (Page 14). Authors from ABB introduce the benefits of water-cooled motors for cement applications (Page 18), while HASLE provides a detailed refractory casting case-study from Asia (Page 22), Trinidad Cement lifts the lid on a thorough burner upgrade at its Claxton Bay plant (Page 24) and IGS presents its low-cost alternative to air cannon replacements (Page 64).

Enjoy the issue!

P Edwards

Peter Edwards
Editor



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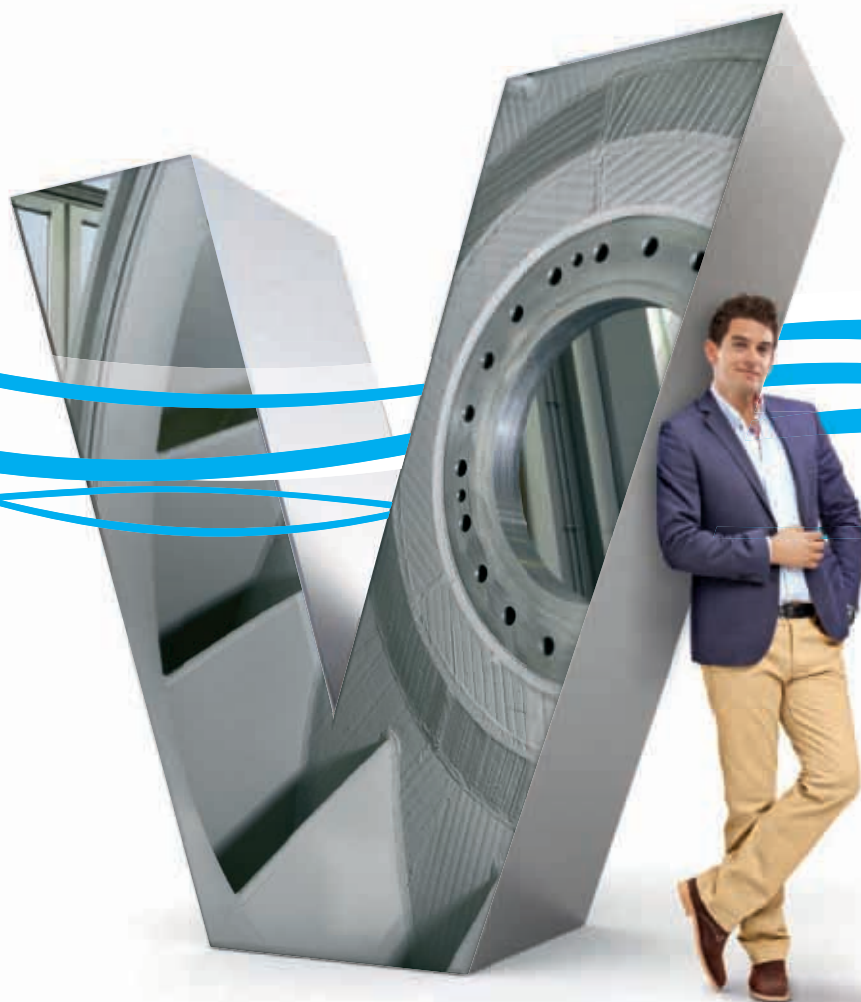
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Interview by Peter Edwards, Global Cement Magazine

In discussion: Axel Jahn, Pollrich

The Managing Director of German fan manufacturer Pollrich GmbH speaks about the company's history and development, fan expertise and future trends.



Above: Axel Jahn joined Pollrich in 1989 and became Managing Director (MD) in 1991. After 18 years he became MD of Rotamill in 2009, before returning to the helm at Pollrich in 2016 when the two firms merged.

Global Cement (GC): Please could you introduce Pollrich GmbH?

Axel Jahn (AJ): Pollrich was founded by Paul Pollrich in Mönchengladbach, North-Rhine Westphalia, in 1906. He was fascinated by air flow technologies and brought a pioneering methodical approach to fan development. In the early 1900s the area around Mönchengladbach was home to many textile and wood producers, so the first applications were dust collection and evaporation. 114 years later the company continues with a strong focus exclusively on fans for industrial applications, predominantly heavy-duty centrifugal fans.

Today Pollrich retains its main facilities, R&D, sales, service and manufacturing functions in Mönchengladbach. We also have a second manufacturing facility in Siegen, around 130km to the east. Our headquarters is located there. The Siegen site was controlled by Rotamill until the two companies merged in 2016 and Pollrich took on the companies' combined fan production facilities. It now controls two laser cutting machines and four fan balancing machines across the two sites. There is a total of 220 employees, half of whom are in the workshops. We have licenced partners in Brazil and sales offices or partners in the US, Turkey, Spain, China and many other locations.

GC: How important are cement makers to Pollrich?

AJ: The cement sector has always been important to Pollrich. It represents ~20% of new fan sales and contributes to our spare parts business. The more installations we have in a given sector, the more replacements and spare parts we will supply to it. At present our cement earnings are growing steadily. We also supply paper producers - our largest client base - as well as steel makers and power generators.

GC: What is the most challenging area of a cement plant for fans?

AJ: There are two. First is the raw mill fan. These fans experience caking of raw meal on the blades, which causes imbalances as lumps of material fly off. To mitigate this as much as possible, Pollrich has developed an in-depth understanding of the relationships between various material characteristics and the blade geometry needed to minimise caking. Experience is crucial as, even with modern tools, it is nearly impossible to predict caking behaviour.

The other main challenge is the clinker cooler fan, where the problem is abrasion. This can be mitigated with carbide coatings. Care has to be taken to ensure that the carbide particles are the correct size in order to avoid pitting of the surface, which will lead to more serious wear and defects.

GC: What happens when an order is placed?

AJ: We will receive a specification that states, among other things, gas temperature, air flow rates and dust load, with as many other dust characteristics as possible. This determines the initial designs, coating requirements and the highest possible impeller speed, as wear effects rise exponentially with speed. This process leads to a fan that is not too small (which would be cheap but wear rapidly due to its high impeller speed) and not too big and cumbersome. Once we have designed the fan, including inlet and outlet configurations, manufacturing takes 12-14 weeks.

For installation and commissioning Pollrich is very proud to have a team of 12 field engineers who travel permanently. It is the largest and most experi-



Right: Welding impellers.

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GLOBAL CEMENT: FANS



enced field team in the industrial fan sector. If issues arise, they are able to laser-align couplings, dynamically balance the fan, analyse bearings and otherwise ensure that everything is ready for commissioning.

GC: How do the technical demands of the cement sector compare to other sectors Pollrich supplies?

AJ: Every sector is convinced that it presents 'unique' challenges for the fan manufacturer but they have remarkably similar issues. Fans in plywood plants have to deal with abrasive wood dust and sand that is similar to clinker dust. In the food industry coffee powder sticks to blades just like raw meal. We can, of course, transfer our knowledge across different sectors.

GC: How are cement sector needs changing?

AJ: Stopping a fan means stopping the cement plant, so there is a strong tendency towards longer-lasting wear coatings. 30 years ago coatings typically lasted 3-4 months. Now it's more like 12-18 months.

Another trend in the cement sector has been the use of larger and larger fans. When I joined Pollrich, an impeller diameter of 2.8m was considered huge! Now we have impellers of 3.5m in use in the cement sector and up to 4.0m in other applications. Cement fans are also speeding up, but not as rapidly as in other sectors. The maximum tip speed, i.e. the speed



Left: A large fan for the cement sector at Pollrich's manufacturing site in Mönchengladbach.



Right: A wear-protected rotor in the workshop.



at the end of the blade, when I joined the company was around 140m/s. Now we can get up to 220m/s, close to a sonic boom! This creates engineering challenges in terms of vibrations and bearing design, lubrication systems and so on. However, our cement clients are still working at 140-150m/s. They are conservative because the fan is so important to their process. Reliability is prized over performance.

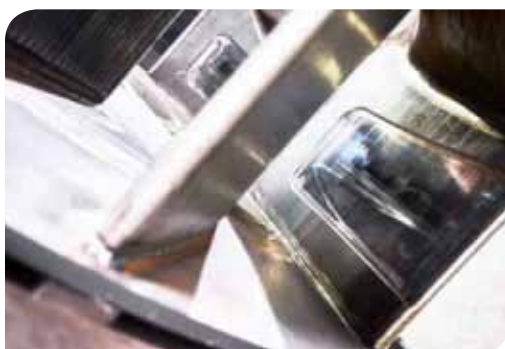
GC: Where are most cement sector orders coming from at the moment?

AJ: The Far East, particularly Vietnam and Malaysia, has been our busiest region in the recent past and I would expect that to continue, the coronavirus notwithstanding. The Middle East is also strong, as it is one of the few regions that continues to bring new capacity online. We have recent references in Qatar, Kuwait, Saudi Arabia, Iran, Iraq, Morocco and Algeria. I am sure that we will be able to add Syria, Libya and Yemen to this list if and when their respective political situations improve. Of course, unusual political events, wars, trade disputes and so on have the potential to disrupt business pretty much anywhere in the world at the moment.

GC: Where is the next big region for Pollrich?

AJ: Aside from those countries that I just mentioned, we are looking to merge with an Indian fan maker. The main shareholder of that company is due to retire in the coming years and there is a great opportunity for Pollrich to increase its shareholding. The Indian plant is a greenfield facility that is only two years old.

Right: Carbide-coated blade tips offer long maintenance intervals.



Elsewhere, Russia is a market for the future, both for new installations but also the many upgrades the country requires. However, access to Russia is currently difficult due to restrictions imposed by the World Bank. There is also good intrinsic demand in Turkey, but the Lira has now depreciated to such an extent that European suppliers are very expensive.

GC: What's next for Pollrich?

AJ: We are developing our service offering to include a comprehensive consultancy approach to fan upgrades, regardless of the supplier. This would be able to handle all kinds of situations, for example assisting the owner of an old fan where the original supplier no longer exists, as might be the case in former Soviet countries. Possible remedies might include replacing the rotating parts, improving the fan or making a copy of the worn out original. We can also handle excessive wear and coating issues and offer general advice on best practice.

There is also ongoing consolidation in the fan sector, which I expect to continue, especially if there is a global recession, perhaps even due to the coronavirus. As it is debt-free, Pollrich is well positioned to acquire other parties during a downturn.

GC: We understand that you will step down as Pollrich's MD at the end of 2020. What's next for you?

AJ: I will become an executive consultant at the company for a minimum of two years. This will encompass projects like the merger with the Indian firm, improvements to the sales force and other activities away from our day-to-day fan activities.

GC: What has been your biggest achievement as MD of Pollrich?

AJ: I would say that this is the successful (albeit still ongoing) conversion from paper drawings in the late 1980s to first 2D Computer Aided Design (CAD) and now 3D CAD. There are a lot of advantages that come from this approach, including Computational Fluid Dynamics (CFD), although even this is not foolproof when handling dusty fans.

Nowadays everything has to be 'smart,' and we found that our clients almost 'expected' a 'smart fan.' To meet this expectation, we have developed our FANGUARD® system, which can be implemented on any fan. FANGUARD provides full real-time data and predictive maintenance information to bring even the very oldest cement sector fans into the 21st Century.

GC: Axel Jahn, thank you very much for your time.

AJ: You are very welcome indeed!

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Jim Greenzweig PE, Howden

Long-term benefits from a successful fan upgrade

Howden reports on the long-term benefits of an induced draft (ID) fan upgrade at St Marys Cement's Bowmanville plant in Ontario, Canada...

St Marys Cement in Bowmanville, Ontario, (part of Votorantim Cimentos) decided to increase the capacity of its 5000t/day plant to 5800t/day back in 2000. This required the output of a 2237kW calciner induced draft (ID) fan to be increased, while saving energy through efficiency improvements.

Two attempts were taken to achieve these goals. The first involved a retrofit of the ID fan with a new rotor provided by a company that specialises in fan retrofits. This was completely unsuccessful, to the extent that the retrofit components had to be removed and the original fan components reinstalled to allow the plant to continue.

Following this experience, an entirely new replacement fan was purchased from Howden. This has met or exceeded all of the desired criteria for increased production rates and efficiency. It has operated successfully for 20 years with minimal maintenance. This article documents both the unsuccessful and successful upgrades, the lessons that can be learned from each and the long term benefits achieved via the successful upgrade.

Background

The St Marys Cement plant is a high volume producer of Type 1 cement clinker. Constructed in 1991 with a design capacity of 5000t/day, the plant uses the dry process with a preheater and precalciner. It was built as a turn-key project by FLSmidth. The kiln is 5m in diameter.

For most cement manufacturers, it is more practical to increase the capacity of existing facilities than to build new ones. For this reason, efforts to obtain greater production typically focus on modifying equipment and refining operating methods. For numerous plants, process fans have been identified as the primary bottlenecks to achieving greater output.

At the Bowmanville plant, studies indicated that the kiln preheater system would benefit if increased capacity could be obtained from the calciner induced draft fan. The objective of the upgrade was to reach a production rate of 5800t/day.

A simplified layout of the preheater air system is shown below opposite. To reduce energy requirements, modern cement plants preheat the raw materials in cyclones prior to being fed into the upper end of the kiln. Exhaust gases are drawn out of the kiln into the cyclones. The direction of gas runs counter to the direction of the raw material which drops from the cyclones into the kiln. The gases are drawn by the ID fan(s), which discharge into a baghouse to remove the entrained dust. At the Bowmanville plant, there are two sets of cyclone strings and two ID fans. FLSmidth refers to this design as a Separate-Line Calciner (SLC). Only the calciner string is shown in the schematic opposite.

The mechanical and performance details of the original FLSmidth calciner ID fan were:



Left: View of the St Marys Cement Bowmanville plant in Ontario, Canada.

Source: St Marys Cement.



Fan type: Single inlet centrifugal
Impeller type: Backward curved (12 Blades)
Impeller diameter: 344cm
Impeller tip width: 25.4cm
Drive: Directly coupled
Bearings: Anti-friction roller
Motor: 2237kW (DC)
Control: Variable speed

Fan total efficiency: 87% (peak)
Fan power: 2582kW

Above left: Original fan.

Above: Original impeller.

Design performance details:

Volume flow rate: 554,557m³/hr
Fan total pressure: 85mbar
Density: 0.624kg/m³
Temperature: 315°C
Dust load: 40g/m³
Fan speed: 966rpm
Fan total efficiency: 80%
Fan power: 1618kW

First attempt to upgrade

The calciner ID fan was retrofitted with the objective of obtaining a performance increase. New components were purchased from a company that conducts retrofits, rather than the original manufacturer. The modifications were as follows:

Fan type: Backward curved (9 Blades)
Impeller diameter: 347cm
Impeller tip width: 58cm

New inlet cone to suit wider impeller.
Circulating oil sleeve bearings to replace bearings.
Relocated casing cut-off to host larger impeller.

The design point for the performance of the retrofitted fan was as follows:

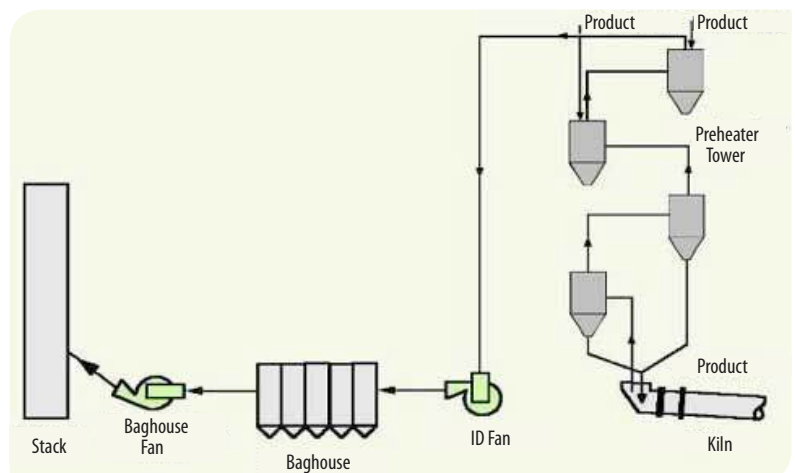
Flow volume: 849,505m³/hr
Fan total pressure: 96mbar
Density: 0.64kg/m³
Temperature: 280°C
Fan speed: 1013rpm

As a result of the higher power, the plant was also required to purchase a 2600kW DC motor. Due to the long delivery time, the plant anticipated running at lower speeds and production levels until it could be installed.

During the commissioning of the retrofitted fan the bearing vibration levels were unacceptably high. Several attempts were made to balance the fan, without success. Cracks were also discovered. As a result, the plant was forced to run the fan at reduced speeds as an interim measure. Faced with these issues, the owner brought in FLOWCARE Engineering Inc to conduct an independent investigation and trouble-shooting. The company found that:

1. The high vibration levels were due to structural resonance of an impeller natural frequency;
2. The vibration excitation force was primarily the imbalance of the impeller. The excitation force may also have been influenced by an unstable oil film on the overloaded thrust bearing;

Below: System schematic.





3. Cracking problems could be attributed to the very high stress levels due to centrifugal force and to fatigue as a result of the resonance;
4. Both fan performance and total efficiency were substantially lower than the predicted curve provided by the retrofit manufacturer. If the fan could have been run at its design speed the size of the new DC motor would have been marginal;
5. Impeller stress levels were unacceptably high and could not be reduced in a practical manner.

Due to the magnitude of the problems and the absence of practical solutions, the decision was made to remove the retrofitted components. The original fan impeller and hardware was reinstalled as an interim measure.

Second upgrade attempt

When it became apparent from FLOWCARE's analysis that the retrofit impeller could not be corrected to work properly, the owner immediately requested that it prepare a specification and evaluate proposals for a replacement fan. After evaluation, FLOWCARE recommended that a replacement fan be purchased from Howden. Its details are:

Fan type:	Double inlet centrifugal
Impeller type:	Backward curved (12 Blades)
Impeller diameter:	314cm
Drive:	Directly coupled
Bearings:	Oil sleeve
Motor:	2600kW (DC)
Control:	Variable speed

Design performance details:

Flow volume:	757,419m ³ /hr
Fan total pressure:	99mbar
Density:	0.624g/m ³
Temperature:	287°C
Dust load:	48g/m ³
Fan speed:	1013rpm
Fan total efficiency:	84%
Fan power:	2426kW

The new 2600kW motor purchased for the first attempt at the upgrade was also installed with the new fan. After the unsuccessful first upgrade attempt, the timing for the second attempt at upgrade was critical. Howden was able to design and deliver the complete fan in an expedited fashion to comply with the owner's requirements.

Two months after commissioning the new fan, independent confirmation tests were conducted by FLOWCARE. Two performance tests were completed with one at a process load of 5850t/day and one at 6300t/day. From these tests, the fan's total efficiency was shown to be 85% and the measured flow and pressure exceeded the rated performance curve. It was determined that, for the same system resistance curve as established during the earlier retrofit and original fan tests, the 6300t/day capacity could be achieved at 930rpm and 2237kW. This means that the purchase of the new 2600kW DC motor had been unnecessary.

Vibration tests conducted by FLOWCARE during commissioning indicated that the fan operated smoothly. The fan was accelerated to its full speed of 1013rpm. On ramp down, vibration levels were checked on all fan and motor bearing locations at

Right: Howden fan.



every 5% reduction in speed. At no location did vibration levels exceed 2.5mm/s in horizontal, vertical or axial directions. A vibration sensitivity test was conducted by installing a 600g temporary out-of-balance weight at the impeller periphery. It was found that the fan was much less sensitive to imbalance than would typically be expected.

Lessons learned

Reflection on the calciner ID fan retrofit experience prompted FLOWCARE to outline how problems such as the first unsuccessful upgrade can be avoided in the future. Its Seven Step Approach was developed as the recommended method for plant owners and their engineering consultants to take when embarking on fan retrofit and upgrade projects.

Step 1: Define objectives

Upgrade projects that are initiated without a thorough understanding of the existing operation are prone to failure. Before upgrades can be considered, maintenance and production records, constraints, advantageous conditions, resources and performance targets need to be clearly defined.

Step 2: Feasibility study

Feasibility studies are required for all fan upgrade projects. The study needs to be supported by field test data from the existing operation. The feasibility study is essentially a business case that determines the costs and benefits of potential retrofit options.

Step 3: Detailed engineering

Once the technical direction is selected, conduct tests that establish constraints; i.e. speed, temperature, power, stress, fatigue, etc. At the conclusion, re-evaluate all equipment on the basis of what can be reused, what can be modified and what new components are required.

Step 4: Specifications

Comprehensively review all aerodynamic, mechanical and quality control issues. As most industrial fans are a 'one-off' design, minimum requirements need to be clearly established.

Step 5: Procurement

Ascertaining the vendor credibility is difficult without detailed investigation. Some suggestions include:

- If the work initially involves only one fan vendor, seek the advice of major vendors for technical comparison and to establish a consensus. If major vendors express a unified doubt, one should be sceptical of projections from smaller players;
- Contact the owners of fans listed in the fan vendor's 'Proof of Ability' list. If at all possible,

inspect the equipment first-hand to obtain the best information;

- Review documentation of air performance standards and laboratory test records validating fan ratings;
- Meet the vendor's engineers and review engineering standards related to aspects like stress analysis and rotor dynamics;
- Meet the field service engineers and technicians to assess their capabilities;
- Thoroughly review manufacturing capabilities with respect to welding and balancing;

Once a vendor selection is made, identify all milestones for source inspections and hire competent inspectors to follow through.

Step 6: Installation, commissioning and start-up

The installation of retrofit components should be treated even more carefully than original equipment, as the condition of reused components may be less than adequate. The fan vendor must be involved. It is advisable to have the vendor return for a full internal inspection before the end of the warranty period.


Step 7: Post-installation confirmation tests

Conduct identical aerodynamic and mechanical tests to those performed on the original equipment. The results need to be documented to establish a starting point for the new operating scenario and to assess how well each of the initial objectives was met.

Long term benefits at Bowmanville

Prior to the upgrade, the Bowmanville plant's production capacity was limited to 5000t/day. After the successful upgrade of the new Howden fan, the production capability was upgraded to 6300t/day, an increase of 1300t/day. At a selling price of US\$40/t, this represents a revenue rise of US\$19m/yr, or US\$380m over the 20 years since Howden completed the upgrade. In addition, to this, the efficiency of the fan was increased from 80% for the original fan to a field-test verified 85% for the Howden fan, saving significantly on energy costs, while requiring minimal maintenance expenditures.

Note

Figures and selected text provided courtesy of FLOWCARE Engineering Inc. as selected from *Fan Performance and Efficiency Upgrade case study: Lessons Learned from the Unsuccessful and Successful Retrofit of a Calciner Induced Draft Fan*, previously presented at the IEEE-IAS/PCA Cement Industry Technical Conference. 



Charles Blankenship, Large AC Motor Product Manager, ABB; Len Eros, Global Cement and Mining Manager, ABB Motion

Water-cooled motors: A good way to boost cement plant profitability

Motors are key components in many cement industry applications such as conveyors, crushers, kilns, mills and assorted fans and pumps. Here, ABB presents the benefits of water-cooled motors for these applications in cement plants...

Traditionally, the cement sector uses air-cooled motors with totally enclosed fan cooled motors or those with Weather Protected Type 1 or 2 (WPI or WP2) enclosures. They range in power from 500-5000hp and are often controlled by variable frequency drives. Their reliability and performance have a direct impact on the efficiency and uptime of a cement plant and are, therefore, crucial to ensure profitability.

Although TEFC motors work well, the dusty environment in which they operate makes it challenging to keep them running within their optimum temperature range. TEFC motors require a flow of air across their external cooling ribs. When those become covered with dirt and dust, their cooling capacity is severely reduced. On the other hand, WP motors are cooled by air that flows through an open frame design. However, this allows dust into the motors. Once cement dust particles are inside and exposed to humidity they can set. This contamination impacts cooling efficiency and, without frequent cleaning, the motors become hotter and hotter. This, in turn, causes accelerated wear on key motor components, particularly windings and bearings, and reduces the life expectancy of the motor.

Below: Large water-cooled motors can reduce maintenance costs in cement plants and reduce the downtime associated with cleaning other types of motors.



Changing to a totally enclosed air-to-air cooled (TEAAC) enclosure could improve the motor's lifespan. While these enclosures work well if the tubes are cleaned periodically, the downside is that it is a time-consuming exercise owing to their size.

Enter the water-cooled motor

A noteworthy alternative is the introduction of large water-cooled motors, such as the AXW motor from ABB. Water-cooling is a highly efficient method of transferring heat away from the motor without the need for external ventilation. This method not only reduces the maintenance expenses and downtime associated with cleaning other types of motors, but also permits a compact installation footprint. Moreover, the absence of a fan provides two significant advantages: much quieter motors, and the elimination of dust being blown into work areas. Apart from environments with a large amount of contamination, the following applications are also more favourable for water-cooled motors:

- 1. High ambient temperatures:** High temperature environments require air-cooled motors to be oversized to meet the thermal ratings, resulting in higher motor costs and lower operating efficiencies. Larger motors also require more space as the base size increases. Water-cooled motors, in contrast, are unaffected by high ambient temperatures such as those typically encountered by kiln drive motors.
- 2. High altitude sites:** Air-cooled motors at high altitudes have to be resized to meet the necessary cooling requirements. Air is thinner at high altitudes and can't remove heat as effectively as at lower levels. In contrast, the cooling capacity of water is not reduced at high altitudes, so an oversized motor is not required. Even in a closed-loop water cooling system, where the heat exchangers need to be larger, the cost is much less than a larger

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motor. In open-loop systems the elevation has no effect on the system.

3. Applications with noise restrictions: To improve employee health and ensure safer working conditions, industries are trying to combat noise pollution in the workplace to limit noise-induced hearing loss. Noise measurement data for water- and air-cooled motors with the same frame size, power rating and speed demonstrate that water-cooled motors operate at significantly lower noise levels.

4. When space matters: Projects that increase product throughput usually require higher power, but available space is often limited to the existing motor area. It may either be cost-prohibitive and/or impractical to expand the area for a larger motor and its foundations. With a water-cooled motor with higher power density, it is possible to keep the existing motor frame size yet obtain substantially more power, while maintaining the same running temperatures.

5. Variable speed applications: To extend the operating range of variable speed motors, separate blowers are mounted directly onto the motor, thereby subjecting them to the same environmental contaminants as the motor. Dust, dirt, water and airborne chemicals cause wear, which means the blowers must be maintained. They are also noisy. An open-loop water-cooling system, however, is completely quiet and a closed loop system using a water-cooling radiator and fan, while not silent, can be located remotely. Fans on radiators are usually a larger diameter than motor fans and operate at slower, less audible, speeds.

6. Undesirable heat transfer: Excessive heat can contribute to worker fatigue and potentially more serious conditions, including heat cramps, heat exhaustion and heat stroke. In some applications where the ambient temperatures are already high, whether from the local climate or other equipment adding heat into the local motor environment, it is desirable to transfer the motor heat outside the immediate area. This action is achieved more efficiently with a water-cooled motor than an air-cooled motor.

7. Undesirable stirring of contaminants: Excessive contaminants in work environments can lead to harsh



Left: Dusty environments around mills are a challenging environment for air-cooled motors.

working conditions. Personnel can be exposed to high levels of dust and dirt that are circulated by the motors' cooling fans. Removing the external fans creates a healthier work environment.

A viable solution

The cement industry is under constant pressure to control costs and, given that water-cooled motor technology has proven itself in numerous industries for several decades, it makes sense to have a closer look at this option. ABB has produced water-cooled motors engineered and manufactured for very specific and demanding applications such as underground mining and oil-drilling rigs for many years. With the new water-cooled products, the proven technology is being applied to industrial-duty motors which are much more cost effective and suitable for a broader range of applications.

Below: Motors in hard to reach locations can be very difficult to replace. They must be as reliable as possible!





The AXW motor

A significant technical advantage of the new AXW motor comes from the multi-purpose NXR/AXR rib-cooled motors. This is the internal air-cooling loop which allows for better heat distribution and dissipation for higher power-density than the previous designs. Motor reliability is improved by the innovative cooling design, which keeps internal temperatures more balanced for longer lubrication intervals, increased bearing lifetime and less thermal stress on the motor insulation. The optimised water jacket construction of the AXW motor, combined with the internal air-cooling loop, gives the motor the best heat dissipation system available, further extending its lifespan.

Different applications in the cement industry require high ingress protection levels, of which IP54 is the standard. The AXW motor is IP54 compliant as it is fully protected against dust ingress. However, in some environments, protection from high pressure water jets is also required and if so there is an optional higher protection level of IP56.

Available in variable or constant speed options, the totally enclosed water-cooled AXW motor exhibits a 40% rating increase over AXR air-cooled motors and 25% over the existing G-series water-cooled motor. This is mainly attributed to the internal cooling loop that circulates air inside the motor and more water coverage. The new cooling configuration offers a more thermally equalised motor, eliminating the hot spots that are often seen in TEFC motors. Other product features include a pole count of 2-8, bearing RTDs to detect temperature increases and cast and bar rotors. Anti-friction and sleeve bearings are also available.

Below: An example of an AXW water-cooled motor.

Below right: The new cooling configuration of the AXW offers a more thermally equalised motor, eliminating hot spots. Better cooling reduces thermal stresses on the insulation system, which helps improve the motor's longevity.

Lower total cost of ownership

The new motors set a benchmark for the industry, offering a smaller footprint and more Watts per kilogram than has ever been achieved before with rib-cooled motors. The highly-customised design allows for exact customer needs to be met with a high degree of engineering flexibility.

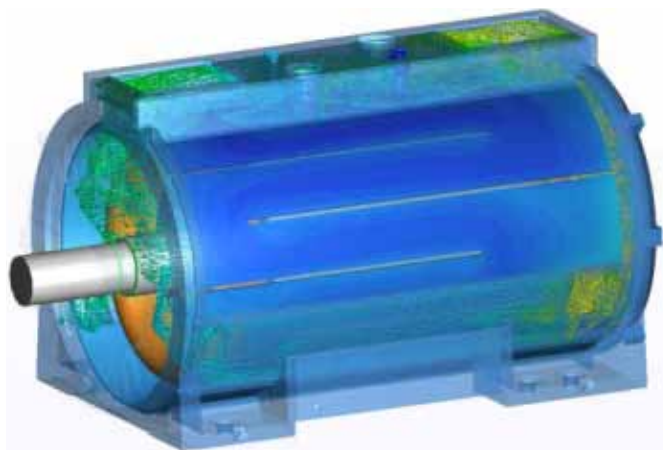
The design also enables flexibility in the positioning of the terminal boxes. The main terminal box can be mounted on either side. The auxiliary terminal box can also be mounted on either side and can be positioned along the motor. As a result, modifications can be done easily and quickly. This minimises the number of spare units needed if the plant is running several motors with the terminal boxes on different sides.

Pre-engineered fixing points enable easy mounting of condition monitoring systems to maintain maximum performance over the entire life cycle. Built-in serviceability makes maintenance straightforward and therefore reduces downtime. The rigid, weight-optimised frame is engineered to minimise vibration and increase stability. The innovative cooling design – which keeps internal motor temperatures more balanced for longer lubrication intervals, increased bearing lifetime, and less thermal stress – offers increased uptime.

The motors are built for high levels of performance, quality and reliability in demanding conditions and remote locations. They are well suited for applications in potentially explosive atmospheres (Class 1 Division 2). They offer a significantly lower cost of ownership together with smaller size, higher power density, lower losses, reduced noise levels and less maintenance. Variable speed drives, which are easy to install and operate, optimise the motor's performance, minimise energy consumption and control processes more accurately.

Conclusion

Large water-cooled motors such as the new AXW offer a compelling alternative solution for the cement industry. Specifically, they ensure constant cooling without the need for external ventilation. This attribute not only reduces the operating expenditure associated with maintenance, but also enables a compact installation footprint. The absence of a fan also reduces noise levels and does not blow dust into the air that people have to work in.



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Dorthe Lind Thornton, HASLE Refractories A/S

400t of HASLE castables for one of Asia's most efficient cement plants

HASLE Refractories A/S describes a recent castable refractory installation in Asia.

Right: HASLE D52A-ht was used for the burner.

One of Asia's largest and most efficient cement plants is once again in mint condition, following re-lining of its critical high temperature areas with a range of castable refractory products from HASLE Refractories A/S. In total, more than 400t of HASLE materials were chosen to cover a total area of 1100m².

The plant produces 8500t/day of cement and has an impressive run factor of >95%. The company that runs it plans to increase the use of fly ash from power plants and RDF (30%) in the future, which will affect the lifetime of refractory linings. In future, lining will potentially be subject to increased chemical attack and abrasion. It is therefore vital that all critical areas are lined with reliable alkali- and abrasion-resistant materials.

Right: A HASLE supervisor oversaw all of the mixing and casting.

In cooperation with a team of HASLE supervisors, the cement plant installed HASLE D39A-ht in the vertical bullnose of cyclone stages 1-3, HASLE D59A-ht in the inlet chamber, the inlet arch and in the kiln tray, as well as in the riser duct and calciner. It chose HASLE D52A-ht for the burner and the kiln hood, HASLE D59A-ht for the cooler take off and tertiary air duct, and, finally, HASLE D52A-ht for cooler gate No 2. All HASLE's castables were mixed in the presence of a supervisor from HASLE, who documented and advised the installation company during installation

to ensure the best possible installation of the castables.

For the castables used in the inlet chamber, a mixer with a 200kg capacity was used to mix six bags of castables, weighing 25kg each. The dry castables were mixed for one to two minutes and 5.0% water was subsequently added. Once the water was added, the castable was mixed for another three minutes before it was ready for use. Each mould contained around 150-200kg. The inlet chamber alone required 45 moulds to be completed. On average, it took 19 minutes

Below: HASLE D59A-ht was used for the tertiary air duct.

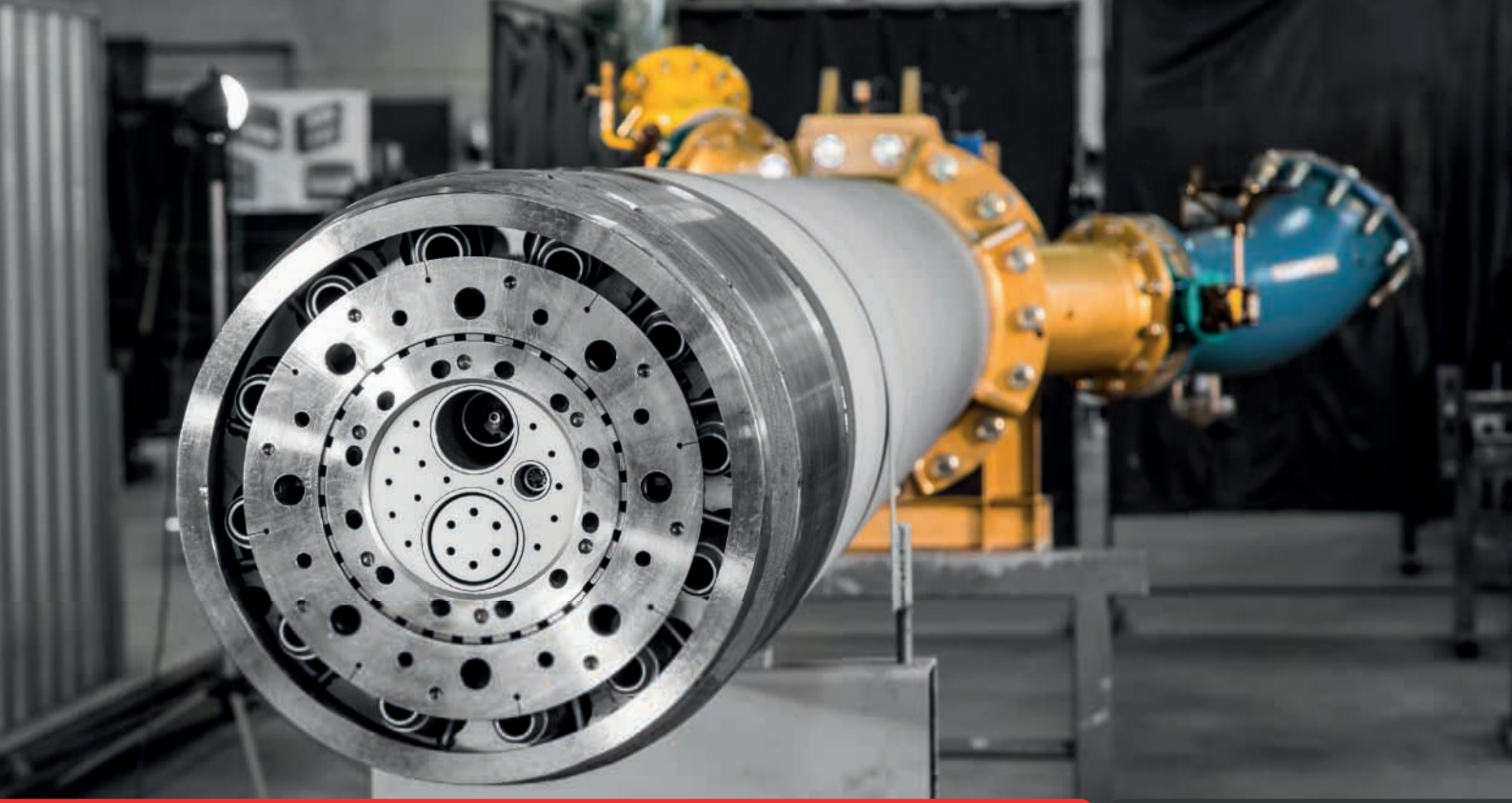


to cast a mould, which then was left to dry out for 24hr. After drying out, the mould was removed, and the overall condition of the castable after casting was inspected by a HASLE supervisor and found to be in satisfactory condition.

All installed castables were manufactured in HASLE's highly-automated plant in Denmark, a plant which ensures consistent, high quality castable products. All HASLE castables are manufactured from fresh raw materials with excellent chemical properties and based on HASLE's unique recipes. HASLE's internal quality assurance procedure specifies the highest standards for particle-size distribution and flowability.

With all the critical high temperature areas of the cement plant re-lined with HASLE's castables, the cement plant is once again ready to produce an impressive 8500t/day of cement.





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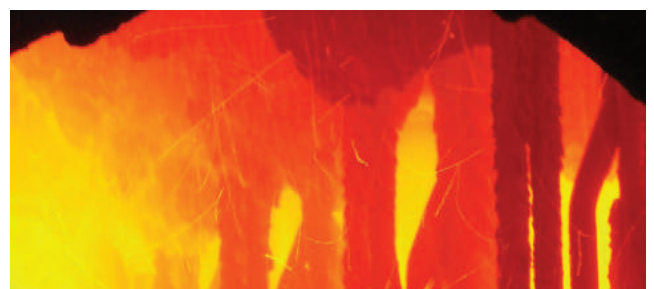
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Gloria Jacobs, Trinidad Cement Ltd

Kiln 3 burner project at CEMEX - Trinidad Cement Ltd

Trinidad Cement Ltd (TCL) reports on a recent burner upgrade project at Claxton Bay...

Right: The UNITHERM MAS® burner supplied to TCL.

CEMEX continues to execute its long-term investment strategy in TCL, its Trinidad & Tobago-based subsidiary. TCL is the nation's sole cement manufacturer and has been steadily improving its quality, safety and efficiency to align to international standards. TCL is located in Claxton Bay, Trinidad & Tobago. It operates two wet process kilns, kilns 3 and 4, both of which are fueled by natural gas. Kiln 3 (1100t/day, L = 145m, Ø = 5.2m) was commissioned in the mid 1980s. It has a specific heat consumption of 1730kCal/kg of clinker. The burner in kiln 3 was essentially a pipe that did not facilitate any flame control, leading to frequent refractory failures, low clinker quality control and excessive fuel use. The burner was also floor-mounted, which limited the space available during shutdowns, leading to poor safety conditions during shutdown and maintenance.

Selecting a new burner

A decision was made to upgrade the burner as it would allow the plant to improve product and quality consistency, its equipment as well as use alternative fuels. A higher kiln reliability results in higher clinker production capability, well beyond market demand. Tenders to replace the burner in kiln 3 were invited at the end of 2018. Proposals were evaluated in early 2019 and all components were received in the fourth quarter of 2019. The project, executed at the beginning of 2020, comprised two main parts:



1. Procuring and installing the burner;
2. Re-engineering the burner support system.

The new burner selected was supplied by UNITHERM, which has produced over 400 burners for rotary kilns and has over 60 years' experience in the industry. The burner utilises the Mono Airduct System (MAS®) concept. This uses the whole primary air to cool the burner pipe and bring the whole primary air flow into a swirl intensity as required. This permits continuous swirl adjustment, reproducibility of flame shape, constant burner momentum and a single air jet penetration into the flame/kiln. The MAS® burner also has a channel that offers the option to burn liquid fuels in the future and the capability to support a second burner for the use of solid fuels.

The main benefits of the burner are lower required burner momentum for optimum burning of traditional and secondary fuels, lower pressure drop through the primary air nozzles and air channel and continuous flame shape control by the patented flame setting device to achieve optimum clinker quality. Only one high pressure fan is required, without a variable speed drive. This is independent from the number and kinds of fuels. In addition, the MAS® burner allows constant burner momentum along the entire flame setting range. The flame shape is easy to control and reproduce, with easy maintenance and service.

Below: Overview of Trinidad Cement's plant in Claxton Bay, Trinidad & Tobago.





Left: Eastern view of the old (left) and new (right) burner set up, with main gas and air connections.



Left: Western view showing the old (left) and new (right) pilot air and gas assemblies.



Left: Back view showing the modified kiln hood. The old burner is on the left and the new burner is on the right.



Left: Old (left) and new (right) images showing modified position of the main 20cm (8") gas line.



Left: Rear views of the old (left) and new (right) burner assemblies.



Right: View of the kiln immediately after first ignition of the MAS® burner.



The new MAS® burner was purchased as a complete system with a flame monitoring detection device, gas electric ignition device, new primary air fan, a new protection (cooling) air fan, a kiln burner trolley and components and burner management system.

Optimising local and international engineering support

The new burner is considerably heavier than the old burner, so a new burner trolley was required. For this, support was provided by CEMEX's regional office, which engaged Colombia-based Alfering to execute the detailed engineering and manufacturing of a new trolley after positive experience at the CEMEX Caracolito facility in Colombia. The manufacture of the trolley components was divided between UNITHERM's location in Austria and Alfering. Supervision and sign off on the quality of the trolley in Colombia was provided by CEMEX Caracolito and the unit was then shipped to TCL. The burner and fans were shipped directly to TCL from Austria.

The new, larger burner also reduced the already limited floor space on the burner platform at TCL. This meant that a clearance of only 1000mm would exist between the burner tip and the kiln access. To correct this issue, TCL suspended the new burner, including the old trolley, from the existing roof while the new trolley was manufactured. This resulted in a second equally large project that required significant additional capital expenditure. For this part of the project, design engineering was carried out by Trinidad-based RM Engineering. The execution was carried out by Amalgamated Engineering Services Ltd, also based in Trinidad & Tobago. This part of the project, which included various duct modifications, allowed the burner to be moved to the extreme north of the burner platform to provide significant extra space between the burner tip and kiln access.

The design engineering included interpretation of the OEM drawings and their dimensional requirements, assessment of the site conditions to ensure that the OEM requirements could be physically accommodated, including the burner/trolley having to traverse the length of the burner platform along the north-south axis.

The design also had to incorporate the gravity loads specified by the OEM in the structural design. Loads used in the analysis of the new support arrangement included gravity and generated seismic loads, together with the relevant load combinations (factor of safety) applied. This part of the project also incorporated design of the new burner/trolley suspended support system based on the analysis of the existing structure to ensure that the new burner/trolley and support structures could be safely suspended.

After the assessment of the existing structure, plate sections were added to stiffen the existing tapered rafters at vertical supports. Existing ducting was also modified as it obstructed the path of the trolley. The incoming gas line was also relocated to accommodate the new structure.

Project execution

The modifications to the burner platform and installation of the new kiln 3 burner started in January 2020 and took 35 days during a kiln outage at a time of high clinker inventory. There were no major issues in the execution phase of the project. The initial startup of the new burner on 26 February 2020 was seamless, with commissioning support provided by a UNITHERM representative.

A number of simulations were done for the startup of the new burner. The flame sensors indicated the presence of the flame to the operator. The operator was able to effectively control the gas and air flows to establish the stable minimum heating flame. The ignition flame is independent to the main burner, allowing for easier lighting and troubleshooting, which was also helped by new gas and air pressure sensors. The new burner takes approximately 1 minute to light. The old burner took about 20 minutes. This project was executed by a talented and well-trained cross-functional team of local engineers with the support of counterparts from CEMEX.

Fine-tuning continues

Fine-tuning of the new burner is still in progress at the time of going to press, so it is premature to evaluate the full operational benefits, as the kiln has not yet stabilised at full production. Initial observations include the fact that the new flame is narrower than the old flame and there is tight and consistent control of the flame shape.





El Salvador: Holcim plans concrete plant investment

LafargeHolcim subsidiary Holcim El Salvador has announced a planned investment of US\$7.5m in the establishment of six concrete plants in 2020, which will bring its total concrete plants in the country to 18. Esmerk Latin American News has reported that the investment also covers 'new trucks and other machinery.'

In 2019 Holcim El Salvador produced 1.2Mt of cement and 710,000m³ of concrete.

US: Oldcastle APG buys US MIX and US SPEC

Oldcastle APG, a subsidiary of CRH, has acquired dry mix manufacturer US MIX. The purchase adds to APG's dry mix manufacturing footprint and expands its network of facilities to the Denver, Colorado, market. In addition, the acquisition provides APG with materials science expertise and adds another brand, US SPEC, to its existing dry mix product portfolio of Sakrete and Amerimix. No value for the acquisition has been disclosed.

US MIX primarily operates out of a manufacturing facility in Denver, with a secondary speciality bagging location in Fontana, California. Founded in 1968, US MIX has been privately owned by the Peterson family for over 50 years. Its products include bagged concretes, mortars and speciality cement mixes, in addition to liquid repair products.

US MIX currently operates as a Sakrete and Amerimix licensee and offers a variety of speciality products under the US SPEC brand. US SPEC products are professionally engineered concrete and masonry repair products used in various applications, formulated and tested in laboratory conditions under ASTM testing methods and specifications.



Australia: Study makes flexible concrete from waste

A study at the Swinburne University of Technology in Melbourne, Victoria, has produced cement-free flexible 'concrete' from mostly waste materials. Researchers have reported that the concrete has the compressive strength of Ordinary Portland Cement (OPC) concrete and 400 times the flexibility due to randomly orientated short polyvinyl alcohol (PVA) fibres, making it especially suited to use for construction in earthquake zones. It is made from flyash-based engineered geopolymer composite (EGC) and a lime-based activator and cured at room temperature.



US: PCA launches 'Shaped by Concrete' educational campaign

The Portland Cement Association (PCA) has launched a campaign called 'Shaped by Concrete,' which aims to teach people about how concrete made with cement 'shapes the world to make our communities, city and country better' by telling stories based on the themes of 'sustainability, resilience and durability.' "We are excited to share bold, compelling stories of how we can make the world a better place, shaped by concrete," said PCA president and CEO Mike Ireland. (Turn to page 40 for more.)

Australia: Boral fined US\$9800 for slurry spill

The New South Wales Environment Protection Authority (EPA) has issued a US\$9800 fine and a clean-up order to Boral for damage caused by a discharge of slurry from its Maclean concrete plant. The Daily Examiner newspaper has reported that a member of the public alerted the body to the spill, which issued from a storm drain into the Clarence River, on 15 October 2019. EPA north regulatory operations director Karen Marler said that the slurry 'appeared to have been discharging from the Boral plant for some time prior.' She said, "Subsequent EPA inspections confirm that the clean-up and actions taken to improve plant operation were effective."



Global Cement staff

Preview: Global Slag Conference, Vienna, Austria

The 15th *Global Slag Conference & Exhibition* will take place at the Imperial Riding School Renaissance Hotel in Vienna, Austria on 11-12 November 2020. *Global Cement* looks at the confirmed presentation programme...

The *Global Slag Conference* will once again feature an exhibition of slag processing and related equipment and service suppliers. To secure YOUR exhibition stand, contact:

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Right: Busy networking in the 'Speed Dating' session at the 14th *Global Slag Conference* in Aachen, Germany.

Update on global slag supply and demand

Charlie Zeynel, ZAG International

Enhancing the value of LD Slag fines through sustainable means – Yellow gypsum: a green product from non-metallic LD Slag fines and its advantages to agriculture soils

Shrenivas Ashrit, Tata Steel Ltd

Hydraulic properties of granulometrically modified steel slags - Performance and simulation of road embankment lysimeters

Elissavet Barka, Emanuel Birle & Derik Demond, Technische Universität München

Steel slags as concrete aggregates – Technical and environmental challenges, Volkert Feldrappe, FEhS

A significant change in slag treatment - Industrial dry slag granulation

Thomas Fenzl, Primetals Technologies Austria GmbH

Experiences in producing slag and slag-cement in KHD roller press plants

York Reichardt, KHD Humboldt Wedag GmbH

CO₂ sequestration in concrete using steel slag products

Harsco Environmental and Carbicrete

Extraction of the maximum profit at the expense of transformation of slag of ferrous metallurgy into the valuable commodity in the conditions of the main production

MA Mikheenkova, Institute of Metallurgy of the Ural Branch of the Russian Academy of Sciences

Problematic technogenic formations of ferrous and non-ferrous metallurgy and possible ways of their processing

OY Sheshukov, Institute of new materials and technologies of the Ural Federal University named after BN Yeltsin



Current situation of the Libyan Iron and Steel Company (Lisco) and possibility of supplying slag products

Mohamed Saghayer, Lisco

Low-carbon steel industry - how will slag and its applications change?

David Algermissen, FEhS

Slag utilisation in manufacturing of fibrous insulation materials with controlled fibre properties

Benjamin Bizjan, University of Ljubljana

Optimised slag drying and cooling

Robert Primavesi, Allgaier Group

One common European slag market as part of industrial Circular Economy? What to expect of the new world, Friedrich Fries-Henrich, Circulania Services GmbH

Parameters affecting the utilisation of metallurgical slags in the building industry

Vlastimil Matejka, Technical University of Ostrava

Invitation of interest to make use of 10Mt of steel slag in India

Susmita Dasgupta, Ministry of Steel, India





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Vietnam: Xuan Thanh Cement orders liquid starters from AKA

Xuan Thanh Cement has ordered seven liquid starters from AKA. The plant in Ha Nam Province has a cement production capacity of 5.5Mt/yr from two production lines. The most recent production line was supplied by Denmark's FLSmidth. France's AKA supplies a variety of liquid starters, electronic starters and power controllers for industrial end users.



Germany: Flender partners with Currax

Siemens subsidiary Flender, which supplies couplings and gearboxes to the cement industry, has signed a partnership agreement for technological solutions with digital drive specialist Currax. The partnership aims to bring a comprehensive increase in efficiency to Flender's business and a high level of flexibility for customers. Currax executive director Daniel Aßman said, "From customer acquisition to sales, from implementation to support, Currax is the contact for all matters relating to the Flender portfolio."

Vietnam: Siam Cement Group signs plastic waste MoU

A memorandum of understanding (MoU) to build public-private collaborations towards a circular economy for plastic waste management was signed in Hanoi on 19 February 2020. The agreement, the first of its kind in Vietnam, was signed by the Ministry of Natural Resources and Environment, Dow Chemical Company Vietnam, Siam Cement Group (SCG), and Unilever Vietnam International.

Deputy Minister of Natural Resources and Environment Vo Tuan Nhan said the average use of plastic per capita in Vietnam is not as high as that of developed countries in the world. However, with a population of nearly 100 million and an incomplete solid waste management infrastructure, plastic waste has been a big challenge for developing countries like Vietnam. It is likely that SCG will act as an off-taker of non-recyclable plastic residues, burning them as an alternative for fossil fuels in its cement kilns.

Russia: ECO-Zoloproduct Invest orders Gebr. Pfeiffer lime hydrating plant

Germany-based Gebr. Pfeiffer has reported that it has received an order from ECO-Zoloproduct Invest for a lime hydrating line with a KLV 07/1000-6,3 lime hydrator for installation in the company's upcoming lime plant in Kassimow, Ryazan. The plant, which will produce lump lime as well as ground and hydrated lime of various fractions, is already set to receive a Gebr. Pfeiffer vertical roller mill MPS 160 B for quicklime grinding in mid-2020, in time for commissioning in late-2020. Gebr. Pfeiffer will deliver and install the lime hydrating line in 2021.



Königsmoor, Schleswig-Holstein, Germany. Source: MoorFutures.

Germany: Holcim Deutschland and MoorFutures sign 'eco pact' on offsetting

Holcim Deutschland has publicised further details of its plan to make its low-CO₂ concrete, EcoPact Zero, carbon neutral. It has partnered with German bog rewetting specialist MoorFutures to offset the remaining CO₂ from the reduced-emissions production process of EcoPact Zero concrete. LafargeHolcim has purchased a climate protection certificate from the company, which in return is restoring enough peatland in Königsmoor, Schleswig-Holstein, to capture 1t of CO₂ for every Euro64 it receives. MoorFutures says "Peatlands are the most effective CO₂ stores on Earth."



Switzerland: LafargeHolcim reports on record year

LafargeHolcim has announced a Euro1.95bn profit in 2019, up by 32% from Euro1.48bn in 2018. The profit was a company record, made possible by 'lower restructuring costs and financial expenses,' according to LafargeHolcim CEO Jan Jenisch. Sales were Euro25.1bn, up by 3.1% from Euro24.4bn, 'driven by good growth in Europe and North America, good price dynamics across all business segments and higher prices in most markets,' according to Jenisch. "We have achieved all our targets for 2019 and have moved our company to a new level of performance," he said.

Ireland: CRH shares 2019 results

CRH recorded sales of Euro28.3bn in 2019, up by 6% year-on-year from Euro26.7bn in 2018. Earnings before interest, taxation, depreciation and amortisation (EBITDA) rose by 25% year-on-year to Euro4.20bn from Euro3.36bn. The company said that the results were supported by a positive demand backdrop in the Americas and in key regions in Europe. It also set out a new CO₂ emissions roadmap with a target of 520kg/t of cement by 2030, a 33% reduction compared to 1990 levels.



UK: Lafarge Cement appoints new Caudon plant manager

Lafarge Cement has appointed Stuart Hutchings as the new plant manager of its Caudon integrated cement plant in Staffordshire. He holds over 20 years of experience in the cement industry and is a qualified chemical engineer with a master's degree in business.

The plant produces around 1Mt/yr of cement and employs around 150 staff. LafargeHolcim's local subsidiary Aggregate Industries is currently planning a potential investment project to develop an additional chloride bypass and a new pre-processing plant for the storage of solid and liquid alternative fuels at the plant.



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UK: Ribblesdale cement plant to host biomass and hydrogen fuels study

HeidelbergCement subsidiary Hanson Cement will be the subject of a study in the use of biomass and hydrogen fuels coordinated by the Mineral Products Association (MPA). The Department for Business, Energy and Industrial Strategy is funding the Euro3.81m study, the results of which it says will be shared across the cement industry. HeidelbergCement CEO Dominik von Achten said, "In addition to our activities in the field of carbon capture, use and storage (CCUS), this project is an important step towards realising our vision of carbon-neutral concrete by 2050."

Netherlands: Sesco Group buys terminal

Royal Cement Benelux, part of Royal El Minya Cement and the Sesco Group, has acquired a new 18,500m² facility in the port of Schiedam near Rotterdam. The new facility, which includes 13,500m² combined office, storage and operating space will be the company's second European location. Available on the premises is 160 M1 Quay, which can receive ships up to 15,000dwt.

"The opening of Royal Cement Benelux's new Schiedam facility is an important step towards the ambition to develop the European market," said Martin Bakker, general manager of Royal Cement Benelux. The company intends to target its white cement products from the terminal to Germany by barge, to several locations in Belgium and the Netherlands by inland rivers and to the UK by sea. The new location is intended to be first of several expansions for the company in 2020. The group will also open an Italian terminal.

Ireland: Limerick plant alternative fuel hearing scheduled for May 2020

The Environmental Protection Agency (EPA) has scheduled a four-day oral hearing in which it will review Irish Cement's application for a permanent licence to co-process a maximum of 90,000t/yr of tyres and other waste materials as fuel in the single dry kiln of its 1.0Mt/yr Limerick plant in County Limerick. Irish Cement received its preliminary licence to burn refuse-derived fuel (RDF) in September 2019. The Irish Times newspaper has reported that 5000 local residents have since petitioned the EPA against permitting the practice, including ex-Irish rugby international Paul O'Connell and a former Love Island contestant.

The EPA said that emissions from operations conducted in accordance with the proposed licence 'will meet required environmental protection standards.'

EU: CEMBUREAU ups Environmental Product Declaration standards

CEMBUREAU has responded to the European standardisation organisation Cenelec's CEN/TC 350 'sustainability of construction works' rules by amending its European Environmental Product Declarations (EPDs) for CEM I, CEM II and CEM III, corresponding to Portland cement, Portland-composite cement and blast furnace cement respectively. It says the update brings the three main cement types into 'full alignment with the EU Commission strategy for a sustainable built environment.'



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Germany: Matthias Mersmann returns to KHD

Matthias Mersmann has been appointed to the Management Board of KHD Humboldt Wedag International AG. Mersmann said, "While the cement industry emits 7% of all man-made CO₂ emissions alone, a future without cement is unthinkable. This, along with the digital transformation, will set the frame for all industry participants to re-shape their way of doing business. For KHD this provides so much more an opportunity than it provides a problem." KHD CEO Mario Zhu said, "We are all happy about Matthias' return."



Ireland: Quinn Cement lands Euro2000 pollution fine

The Irish Environmental Protection Agency (EPA) has won its case against Quinn Cement over the latter's violation of emissions laws. The Impartial Reporter newspaper has reported that an EPA monitor recorded 36 breaches at Quinn Cement's Ballyconnell plant between 5 October 2018 and 7 October 2018. The plant was also emitting four times the legal hydrogen chloride on 5 February 2019. Following its subsidiary

company's guilty plea, Quinn Industrial Holdings said via a spokesperson, "Though independent assessment confirmed there were no material environmental impacts arising, best practice environmental safety procedures were followed and production ceased on each occasion. Since then significant work and expenditure has been completed to prevent a recurrence." The Cavan district court fined Quinn Cement Euro2000.



Vassiliko Cement plant, Cyprus.
Source: Vassiliko Cement.

Cyprus: Vassiliko Cement wins gold for going green

Vassiliko Cement has won the Environmental Protector gold award for the second consecutive year at the Pancyprrian Environmental Awards for Organisations and Businesses 2019. The event was held at the Cypriot Presidential Palace by the Cyprus Centre for Environmental Research and Education (CyCERE), the Environment Commissioner's Office, the Cyprus University of Technology (CUT) Agricultural Faculty, the Employers and Industrialists Federation (OEB), the Association of Cyprus Tourist Enterprises (ACTE), the Business and Professional Women of Limassol (BPW) and the volunteers' network Together Cyprus. The company said that its "key aim is to promote environmental practices across all aspects of its activities, in order to protect the communities where it operates, achieving sustainable development."

Turkey: Exports rise 68%

Turkey exported a total of 23Mt of cement and clinker in 2019, a year-on-year increase of 68%, according to Dr Tamer Saka, the Chairman of the Board of Directors of the Turkish Cement Manufacturers' Association (TÇMB). The value of the country's cement and clinker exports was US\$877m, a 44% increase. The discrepancy between volume and value growth rates indicates that Turkish exporters are selling at lower prices in 2019 than in 2018 on average. The nation's cement was transported to more than 100 countries in 2019, with the most important recipients listed as the US, Israel, Ghana and Ivory Coast. Saka said "Our forecast is that the Turkish cement sector will grow by approximately 2% in domestic sales and 15% in exports this year."

Cyprus: Global CemFuels Conference takes place

The 14th Global CemFuels Conference successfully took place on 19-20 February 2020 at the Aphrodite Hills Resort, Paphos, Cyprus, with 130 delegates from 25 countries in attendance. There was also a popular visit to Vassiliko Cement on Friday 21 February. Scan the QR code or visit www.cemfuels.com to read our review.



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Italy: Davide Gambarotta named Gambarotta Gschwendt CEO

Gambarotta Gschwendt has appointed Davide Gambarotta as its chief executive officer (CEO) with immediate effect. He is also its sole owner-designate. Gambarotta will maintain his position as CEO and sole director of MDG Handling Solutions.

Both companies will operate jointly, under the holding company Gambarotta Group. MDG Handling Solutions will offer complete engineering and procurement (EP) and engineering, procurement and construction (EPC) projects. Gambarotta Gschwendt will design and produce equipment for bulk material handling.

Germany: New Flender CEO

Siemens AG subsidiary Flender Group, which equips cement plants with mechanical drive systems, has announced the appointment of Andreas Evertz as its CEO.

Evertz, who has been CTO and CEO of Walter AG and CEO of Schenck Process Group and was Flender Group wind gearbox segment Winergy managing director for 15 years, will assume the new position on 1 June 2020.

Flender Group Supervisory Board chairman Horst Kayser said, "With Andreas Evertz we have found a well-experienced CEO to succeed Stefan Tenbrock. Together with Dr. Ulrich Stock as CFO, he will continue the successful path of Flender."



Poland: Belarusian Cement Company opens Polish office

Belarusian Cement Company (BCC) says that it has responded to 'increased demand for Belarusian cement in Central Europe in 2019' by opening an office in Warsaw, Poland. Belarus Daily News has reported that one purported aim of the office is to court supply contracts with 'European, Polish, German and other partners.'

Both Krichevtsementnoshifer and Krasnoselskstrojmaterialy, the remaining two of Belarus' three cement producers, have reportedly concluded preliminary agreements for export of their cement to Poland in 2020.

Bosnia & Herzegovina: Tvornica Cementa Kakanj profit falls 15%

HeidelbergCement subsidiary Tvornica Cementa Kakanj (TCK) recorded a profit of Euro7.35m in 2019, down by 15% year-on-year from Euro8.63m in 2018. Sales rose by 1.8% over the period, to Euro37.7m from Euro37.0m. The company explained the profit drop in terms of increased operating costs, which rose by 3.8% to Euro29.4m from Euro22.7m in 2018.

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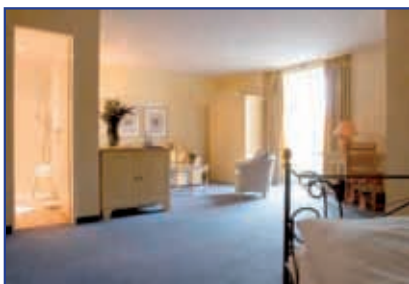
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Mexico: Cemex sales set back by slow markets

Cemex's operating earnings have fallen in Mexico and the US. Its net sales fell by 3% year-on-year to US\$13.1bn in 2019 from US\$13.5m in 2018. Its cement sales volumes dropped by 7% to 62.8Mt from 67.2Mt. Its operating earnings before interest, taxation, depreciation and amortisation (EBITDA) decreased by 11% to US\$2.38bn from US\$2.69bn.

"In a very challenging year with weaker macroeconomic and market conditions prevailing in several of our operations, we were able to limit the downside to our EBITDA and free-cash-flow generation through the decisive and proactive initiatives under our 'A Stronger Cemex' program," said Fernando A Gonzalez, chief executive officer of Cemex. He added that the group was 'cautiously optimistic' about its outlook for 2020, with market improvements expected in Mexico and the US.

By region, sales and earnings fell in Mexico due to decline in public and private investment. In the US sales grew, but earnings fell, in a market beset by bad weather, weak residential performance and competition in Florida. Sales and earnings grew in Europe on a like-for-like basis driven by infrastructure demand. Elsewhere sales and earnings fell, although a stronger market was noted in Colombia.



Mexico: GCC beats forecast with strong US results

Group Cementos Chihuahua (GCC) reported a better-than-expected fourth quarter in 2019, due largely to record sales volumes in the US, its main market. Despite a delay to the start of the construction season, an order book containing contracts for oil well cement and alternative energy projects and strong residential and infrastructure segments boosted its cement sales volumes by 12.3%. Along with an increase of 2.9% in prices overall (4.8% rise in the US), this gave rise to sales figures 13.2% higher than in the fourth quarter of 2018.

"Our excellent operational execution and robust distribution network, supported by an improved climate, once again contributed to record volumes in cement in the US, surpassing our estimates," said Enrique Escalante, GCC's Managing Director.

In its domestic Mexican market, sales increased by 5.6% due to a mixture of higher prices and appreciation of the national currency. Industrial warehouse construction segments, mining projects and middle housing in border towns were factors for the rise.

Colombia: Rio Claro plant produces calcined clay cement

Cementos Argos' Rio Claro cement plant has completed construction of a new 0.45Mt/yr production line for calcined clays, an artificial pozzolan. This innovation makes the cement less environmentally damaging, as the production process' CO₂ emissions are 38% lower, with energy consumption 30% lower than ordinary Portland cement.

"With this project we are leading the industry and sowing the seeds of the Argos of the future, which today starts a new production line at Rio Claro," said Juan Esteban Calle, President of Cementos Argos. "It has gigantic growth potential in all geographies, not only from the point of view of the product, but because it is a concrete action for the sustainability of our industry. In our commitment to climate change, this project clearly makes us very proud."

El Salvador: Cemento Regional plant opens

Guatemala-based Cemento Regional has announced the completion of its first production facility in El Salvador. Construction began in September 2019 with an investment of US\$16m. Cemento Regional anticipates that the plant's 0.12Mt/yr capacity will secure it around 10% of the local market.



Cuba: Cementos Cienfuegos plant burns tyres

State-owned Cementos Cienfuegos has started to burn waste tyres in order to save on imported petcoke costs. Cuba is suffering a coal shortage due to reinforced economic sanctions led by the US.

The plant is using 130-150 tyres per day as part of a project that, in its initial phase, makes it possible to replace 5% of its petcoke requirements. Plant manager Ernesto Gálvez, explained the plant eventually aims to burn 400 tyres per day.



Colombia: Cementos Argos sees sales and EBITDA boom in 2019

In 2019 Grupo Argos subsidiary Cementos Argos' sales rose by 11% year-on-year to US\$2.8bn from US\$2.5bn in 2018 and its earnings before interest, taxation, depreciation and amortisation (EBITDA) rose by 14% year-on-year to US\$0.5bn from US\$0.4bn in 2018. Cement dispatches rose by 0.6% to 16Mt. In the US, its main market, the company sold 6.3Mt of cement, up by 9.5% from 5.8Mt in 2018.

Peru: Cementos Pacasmayo sales boosted by infrastructure work in 2019

Cementos Pacasmayo's sales have been boosted by infrastructure work, coastal El Niño reconstruction projects and private projects. Its cement, concrete and precast shipments rose by 10.6% year-on-year to 2.62Mt in 2019 from 2.34Mt in 2018. Its sales grew by 10.3% to US\$410m from US\$372m. Its consolidated earnings before interest, taxation, depreciation and amortisation (EBITDA) increased by 7.7% to US\$118m from US\$109m.

Colombia: Cemex Colombia extends Wärtsilä deal

Finland's Wärtsilä has signed a further four-year extension to its operation and maintenance (O&M) agreement with Cemex Colombia. The original agreement began in 1998 and will now end in 2023. Cemex's integrated Caracolito cement plant uses a 26MW power plant operating on five Wärtsilä 18-cylinder 34SG engines in V-configuration running on natural gas. Wärtsilä employs 15 personnel in the running of the power plant, all of whom were hired locally.



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Bolivia: Gas shortage casts shadow over Potosí plant construction

Antonio Pino, Vice Minister of Hydrocarbons, says that a new gas pipeline will have to be built to supply the Potosí cement plant at Chiutara. This may delay the start of the new plant to as late as early 2022, according to the El Potosí newspaper. The 1.3Mt/yr integrated unit was previously planned to start operation in February 2020.

The project was supported by the country's previous government administration through the creation of Empresa Publica Productiva Cementos de Bolivia (ECEBOL). The plant is being built by Sociedad Accidental Imasa Polysius, a joint venture created by Polysius and Imasa.

US: Charah Solutions scores ash contract

Charah Solutions has secured a contract with energy supplier Entergy for provision of environmental services to three coal-fired power plants in Louisiana and Arkansas. This gives Charah Solutions the right to dispose of or market 0.9Mt/yr of coal combustion residuals (CCR), including to cement producers in the region for use as a cement additive.



Mexico: Cemex backs bison

Cemex has worked together with AES Mexico, the Mexican Fund for the Conservation of Nature (FMCN), the Mexican Ministry of Environment and Natural Resources (SEMARNAT) and the National Commission of Natural Protected Areas (CONANP) to successfully reintroduce 19 American bison (*Bison bison*) in El Carmen Nature Reserve, in Coahuila, to establish the second conservation herd of this species in Mexico.

"For almost two decades, we have carried out different alliances with companies and conservation organisations to protect and increase biodiversity in El Carmen. Examples of this include the reintroduction of the American bison, the bighorn sheep and the pronghorn, as well as the increase in the populations of desert mule deer, white-tailed deer and black bear," said Vicente Saisó, director of sustainability at Cemex.

El Carmen Nature Reserve is a private cross-border conservation area in Mexico and the US that contains five different ecosystems and habitats to diverse species of plants, birds, mammals, reptiles, and amphibians over more than 140,000 hectares.

US: Eagle Materials names new Heavy Materials leadership

Eagle Materials has appointed Mike Nicolais as the chairman and Michael Haack as the president and chief executive officer (CEO) of its Heavy Materials spin-off business. The building materials company intends to split into separate Heavy Materials and Light Materials businesses in the summer of 2020. The Heavy Materials company will focus on cement production with complementary concrete, aggregates and sand operations. It will also continue to evaluate strategic alternatives with respect to its frac-sand business.

US: Mike Gordon appointed Continental Cement Company Senior Vice President, Sales and Marketing

Continental Cement Company has appointed Mike Gordon as Senior Vice President, Sales and Marketing. He previously worked in a variety of roles for Lafarge North America since 1991, most recently as Vice President, Sales and Marketing at the building materials producer since 2015.



US: IEEE-IAS/PCA Cement Industry Conference announces future locations until 2023

The IEEE-IAS/PCA Cement Industry Conference has announced its location for the next three years, all at Gaylord hotels. The 2021 event will take place in Orlando, Florida, on 23 - 27 May 2020, while the following year the meeting will move to Dallas, Texas, albeit with no date yet announced. In 2023, the IEEE-IAS/PCA Cement Industry Conference is scheduled to take place in Washington DC.



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Interview by Peter Edwards, Global Cement Magazine

In discussion: Mike Ireland, PCA President

This interview was conducted on 25 February 2020.

US Portland Cement Association (PCA) President Mike Ireland reflects on another busy year advocating on behalf of US cement manufacturers...



Above: Mike Ireland, the PCA's President.

Global Cement (GC): What have been the PCA's major achievements since we spoke a year ago?

Mike Ireland (MI): The main success that we've had is to successfully pivot away from the negative press that has surrounded cement and concrete in recent years. We have brought a positive message to stakeholders and decision makers about the resilience and sustainability of our material and have wrestled the narrative away from other parties that may not have our best interests at heart.

GC: How did the PCA change the narrative?

MI: There have been two main approaches. The first is that we have set up a Climate Strategy Taskforce, composed primarily of cement sector members. That team has spent the past 12 months putting together a strategy as to how we present the sector to the Federal Government. It involves staff from members' research and development, production and government relations departments.

We also hired an external public relations firm to help us refine our public messaging about cement and concrete's sustainability role. The result is our *Shaped by Concrete* campaign, which we soft-launched at World of Concrete in Las Vegas in January 2020. This comprises a promotional video and micro-site to promote the role of concrete in society, as well as its sustainability and resiliency characteristics.

Below: The PCA is reaching out to a wide cross section of people, including the general public, with its *Shaped by Concrete* campaign.

Image source: *Shaped by Concrete* website.



GC: What other 'wins' have there been in the past 12 months?

MI: We continue to push for infrastructure funding and have continued to develop our relationship with the Environmental Protection Agency (EPA) and other government agencies, but this will become more difficult in the run up to the 2020 Presidential Election. The government could continue in a similar 'deregulation vein' if Trump is re-elected. If a Democrat wins, we could see a return to Obama-style regulations, or even more stringent conditions.

GC: Preparing for two very different scenarios must add to your workload quite substantially.

MI: We have two plans in parallel, so yes, there is a lot to look at and a lot of bases to cover. Election years are always busy. We are currently liaising with both parties to show them the roles that cement and concrete play in the US, for the economy, sustainability and the resiliency of construction. We impress upon them that every US\$1 spent on resilient construction saves US\$6 in remediation costs after a natural disaster.

GC: Last year you spoke about fairly substantial integration with other building materials associations, notably with the National Ready Mix Concrete Association (NRMCA) and the National Stone, Sand and Gravel Association (NSSGA). What progress has been made in this regard?

MI: We have continued our drive to eliminate duplicated functions with these partners and others, particularly regarding back-office roles. We're now at the point where we're dealing with practical issues like standardising accounting software, to give a fairly 'mundane' example. We're also blending the different cultures, which will bring benefits to the group of associations.

Of course, we're doing this to better focus on the things that our member companies pay us for. They don't want money spent in the back office. Neither do NRMCA members, so combining forces increases efficiency and lowers costs for everyone. We've reduced



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Above: Concrete is the essential building material, not just of today, but of the future.

Image source: Shaped by Concrete website.

our overheads quite a lot. We've combined meetings and started to coordinate on our external messaging. The payback is clearly improved according to the key performance indicators we've seen to date.

GC: Are PCA and its partners now operating more like a 'Building Materials Association'?

MI: We are not integrated that closely at this point and are certainly not like the Mineral Products Association (MPA) in the UK. The associations retain their own branding and members and each is keenly focused on its own sector. The next logical step, if it were to be taken, would be to rebrand everything and become like the MPA. However, I think that the feeling among each association's members is that the brand is well known in the industry. I don't think that there's much appetite for further integration at this point, but that's up to the members.

GC: How has the PCA's relationship with the Global Cement & Concrete Association (GCCA) developed over the past 12 months?

MI: The PCA is an associate member of the GCCA and met very recently with the other associates in Brussels. We exchanged best practice and spoke about coordinating our communications and innovation efforts. This is to ensure that we don't needlessly duplicate research or other spending in different world regions. Technology and innovation is going to play an increasingly important role, be it in novel mixes, gaining efficiencies in the kiln or, more pertinently, in carbon capture utilisation and storage (CCUS).

The bulk of reducing our CO₂ footprint will come from CCUS. What PCA and other GCCA associate members want is to step back from regarding low-CO₂ as a 'competitive advantage' and bring the benefits of the best approaches to as many users as possible. We all have to move forward in lock-step.

GC: Do you stand by your 2019 statement that there will likely be a US-wide CO₂ tax or trading scheme in the period to 2025?

MI: I think I may have 'jumped the gun' a little on that, but the long-term drivers still point the same way. As with so much in our country, a lot will depend on the result of the 2020 Presidential Election. With four more years of Trump, we would expect to see a continuation of the 'self-driven' CCUS projects and other efforts to reduce CO₂ emissions. If the US elects a Democrat for President and there's a Democratic majority in both Houses of Congress, there is a far greater chance of a US-wide CO₂ scheme. In any eventuality, individual states may choose to go their own way, as California has done in recent years.

Of course, there are some that claim CO₂ taxes or cap-and-trade schemes do little to address the problem of CO₂ emissions to the atmosphere and simply create a cost burden that has to be distributed along the value chain, notably towards producers and end-users.

I think the PCA should work with the Federal government and regulators to find out the most efficient and cost-effective ways to reduce CO₂ emissions. That could include a number of 'traditional levers,' for example biomass fuels, waste heat recovery, renewable power sources and lower clinker factor, which we feel are underutilised in the US at present.

GC: We've noticed a few CCUS projects in the US (and Canada) over the past 12 months. What's driving this trend?

MI: There is a tax credit mechanism that pays industrial users for every tonne of CO₂ they capture. This is a far better way to get US companies to 'do things' than threaten them with a new tax burden. There is a host of varied approaches, which is great for the sector. Some of the companies are doing this to get ahead of the competition and use their green credentials to capture market share.

GC: What are the PCA's main advocacy aims for the next 12 months?

Right: PCA is bringing a positive message surrounding cement and concrete resilience and sustainability to a range of stakeholders.

Image source: Shaped by Concrete website.





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Right: US construction continues apace. For more on cement consumption turn to Page 46 for our interview with PCA Chief Economist Ed Sullivan.

Image source: Shaped by Concrete website.

MI: We will continue to press for greater infrastructure spending and concentrate on areas that we can influence. On top of this, it is vital that we continue to develop the narrative around the sustainability and resiliency advantages of concrete. The regulators and decision makers don't know this and it is up to us to tell them.

We need to tell the good story of cement and concrete. We need to inform them that our sector has reduced the embodied energy in a tonne of cement by >30% since 2000. We need to emphasise our increased use of alternative fuels and the wide range of approaches taken. Indeed, concrete is the 'hero' of the story, eventually readsorbing up to 43% of the CO₂ that was emitted to manufacture it.

GC: How do you see the GCCA relationship developing in the 2020s?

MI: I think we're off to a great start and feel that we will gain more and more from sharing experiences with other players under the GCCA 'umbrella' in the future. For example, the PCA is well placed to advise cement associations and producers in rapidly urbanising countries using our past experience. In turn, there might be research from one of those countries that can benefit manufacturers in the US, Europe or elsewhere. The collaboration opens up many potential benefits for all parties.

GC: Do you think that the GCCA could eventually replace regional and national associations?

MI: I don't think so, because each regional association knows its members best and will be best placed to advocate on their behalf for the foreseeable future. Where the GCCA comes in is in relation to how the global cement sector presents itself with players like the United Nations (UN) and non-governmental associations (NGOs). This is a new area that the sector is only just stepping into.



GC: Finally, could you comment on 'the war with wood'?

MI: Construction with wood has developed a strong following recently in the US, particularly in the low and medium rise sector. For quite a while the wood sector was telling an incomplete story about cement and concrete and we're now being far more proactive in countering that approach. We believe that the benefits of concrete are clear and we don't need to 'attack' wood.

We are getting a great reaction from this positive approach. When we look at the benefits of the material now, it is clear that cement and concrete are not just the materials for now, but also for the future. It's what the 21st Century world needs!

GC: Mike Ireland - Thank you very much for your time today!

MI: It was great to talk again!



Right: Some projects will always need cement and concrete. The PCA is working with the GCCA and its national and regional association peers to minimise the impact on the environment.

Image source: Shaped by Concrete website.



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Interview by Peter Edwards, Global Cement Magazine

In discussion: Ed Sullivan, PCA Chief Economist

This interview was conducted on 25 February 2020.

Global Cement caught up with the Portland Cement Association (PCA) Chief Economist Ed Sullivan ahead of the 62nd IEEE-IAS/PCA Cement Conference on 19-23 April 2019...



Above: Ed Sullivan, the PCA's Chief Economist.

Global Cement (GC): How did the US cement sector fare in 2019?

Ed Sullivan (ES): The US cement sector performed very solidly in 2019, growing by 3.0% year-on-year, a fair bit more than the 2.4% we expected. Consumption levels were depressed in the first half but jumped back strongly in the second half. In the first quarter cement consumption grew by 2.6% year-on-year but then it stalled in the second quarter, mostly due to exceptionally wet weather in many states. 40 states recorded above normal precipitation. Five states, largely in the Great Lakes and Plains in the centre of the US, recorded their wettest years ever. Another 17 states saw very high precipitation levels, again, mostly across the Mid-West and central states.

The third quarter saw a return to growth, 7.0% year-on-year, followed by 4.0% year-on-year in the fourth quarter. The year really ended with a 'bang' in December 2019, when consumption rose by 8% year-on-year across the US.

GC: What drove this impressive performance?

ES: There are two main drivers. Firstly, the US economy is really strong at present. Secondly, there has been a resurgence in residential construction work due to lower mortgage rates. We are also seeing some public spending initiatives in certain states.

Opposite: Infrastructure investments come at a cost.

Below: A massive Highway intersection in Los Angeles, California.



GC: Which regions saw the biggest changes?

ES: The results for 2019 were very interesting. Across 49 of the 50 states, our forecast for cement consumption growth was exactly spot on at 2.4%. However, when we add Texas into the data, we see the boost that takes the national figure up to 3.0%. Texas did incredibly well. It grew by 8.0% year-on-year, drawing increasingly on imports as well as its own production. We had forecast 3.0% growth for Texas. The other region that was fairly strong was the south east: Florida, Georgia, the Carolinas and so on.

GC: Where fared less well in 2019?

ES: The most 'disappointing' state in 2019, if you can call it that, was California. This was dampened by unusually wet weather in the first half, combined with a growing shortage of labour. This muted the second-half revival in the state. I think the fundamentals are strong but the realities on the ground limited construction activity over the course of the year.

GC: What data do you have on 2020 so far?

ES: The cement consumption data takes a little while to collect, so there is nothing to report for 2020 on that side so far. However, we have economic data that is in line with what we expected. I have no reason to think that there will be any critical threats to its growth over the course of 2020, which will feed into construction growth and, hence, cement.

At present we expect cement consumption to grow by 2.0-2.5% in 2020, which is somewhat higher than the 1.7% we expected in the fourth quarter of 2019. This translates to around 103Mt of cement for the year. The main reason behind the increase is the state of residential construction, which to be honest, we did not anticipate being so strong. Those changes in the residential outlook may add 1Mt in 2020.

GC: What do you see as the largest obstacles for PCA members to grow in 2020?

ES: The main 'drag' on cement consumption in 2020 will remain access to labour. The economy is adding



175,000 net new jobs every month. This puts pressure on the labour market. It has become more difficult to get skilled drivers and workers and is impairing the construction sector. This is actually the reason that we underestimated Texas in 2019. For some reason, I'm not sure how, the workforce in Texas was not as constrained as we thought it would be.

GC: What is the biggest change in the situation over the past 12 months?

ES: If you look at the forecasts and what we expect, nothing has really changed drastically over the past 12 months, at least in terms of the numbers themselves.

What has changed is the main factors behind those numbers. Twelve months ago we were very worried about the impending US-Chinese 'trade war' and how that might affect the US construction market. This has not really transpired and it is a low level concern at this point. Meanwhile, out of left-field in early 2020 came the Covid-19 coronavirus outbreak. This could conceivably represent a threat to the US construction sector now that it has shut down parts of Iran, Italy and South Korea, as well as China. US stock markets were suspended on 9 March 2020 and there could be further disruption for the construction sector and the economy more widely going forward.

GC: You previously discussed another threat, that of inflationary pressures arising from the lack of labour. Are we near to the 'tipping point?'

ES: Wages are starting to grow rapidly, for sure. Do we expect them to continue to grow more quickly in the future? Yes we do, but there are more factors that affect inflation than just labour supply. The US Dollar is strong, which puts a lid on inflationary spirits. The competition for goods is also different to how it was say 10-20 years ago, due to the rise of internet shopping. What we are seeing is that prices are not rising as much as we would have expected in a pre-internet age, given the current economic conditions.



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Far right: US President Donald Trump. Cement consumption is set to grow this year and next, regardless of the occupant of the White House come January 2021.
Source: Drop of Light / Shutterstock.com.

Another thing that has changed is that we no longer expect the large fiscal stimulus that President Trump promised when he first took office. That has removed some of the inflationary pressure. For now, we are okay!

GC: Is the much trumpeted US\$1tn 'Trump Infrastructure Bill' dead?

ES: When we speak of infrastructure spending in the US, it is easy to get distracted by this 'headline' figure, which has been discussed now for a number of years. I think that it is unlikely that this will come to fruition, if it ever does, until well after the 2020 Presidential Election. Nobody is going to promise large spending increases for infrastructure in an election year because they will be hit with the question 'How do you pay for it?' Among the most sensible answers to that is 'Higher taxes.' This is not how you get elected in the US! The big infrastructure bill may come back on the table in 2021, but nobody is talking about it right now.

However, what's not as well-known about is the spending under the Fixing America's Surface Transport (FAST) Act, Federal Government spending for states to improve their surface infrastructure. At present the spending is US\$44bn/yr. This funding runs out in September 2020. Right now, there are discussions in the Senate that aim to increase this figure by 28%, towards the region of US\$56-57bn/yr. This is not insignificant extra funding that could translate through very nicely to higher construction levels and higher cement consumption. This could be voted upon in mid to late 2020 to take effect in early 2021.

GC: What's your verdict on the Trump Administration's influence on the US cement sector to date?

ES: The first thing was the Tax Reform Bill, which, at least in the short term, boosted consumer spending

and GDP. That had an immediate effect on increased construction activity, with a commensurate increase in cement consumption. One can argue whether or not the tax reforms gave rise to a temporary effect, depending on your political persuasion.

The second policy was one of lowering the regulatory burden on cement producers, especially with regard to the environment. The previous administration was fairly aggressive in terms of environmental regulations and some of those have been rolled back under Trump.

On a less positive note, the harsher stance of Trump with respect to immigration means that many Latin American construction workers, some estimates as many as 500,000 from Mexico alone, left the US during the economic downturn and have not subsequently returned. This has added to the existing shortage of workers.

GC: Cemex has announced plans to reopen its Wampum, Pennsylvania plant. Do you think that further plants could follow suit?

ES: The discussions surrounding Wampum really surprised me, especially as there's talk about increasing its capacity. I think this will be an outlier, as Pennsylvania was not a particularly strong performer in 2019.

If I would have expected plants to restart anywhere, it would have been in Texas, where imports rose by 24% in 2019. The other 49 states averaged 3% import growth in 2019. Much like our consumption forecast, 3% was our national forecast for the year.

Texas is now operating at record levels. Not only does it have positive demographics, the economy has diversified massively away from oil. It is one of the strongest economically performing states in the country.

GC: How is supplementary cementitious material (SCM) use changing in the US?

ES: We are not party to monthly data on SCM use or imports but take a longer term view. We know that SCMs will continue to increase in importance as energy consumption and environmental concerns rise up the agenda. However, as these become more scarce over the longer term, again due to environmental concerns, we could see greater inclusion of limestone or even natural pozzolanic materials. The sources may change but the emphasis on increased SCMs will stay.

GC: Talking of environmental concerns, do you have mechanisms to factor a US CO₂ tax or trading scheme into your forecasts?

ES: This is something that we have modelled for possible future application to our forecasts, but I think

Below: Population increases will drive cement consumption upwards in the coming decades, while SCMs will take a bite out of cement demand.





we are quite a long way from implementing such a scheme at present. There are certain key factors that you have to be able to estimate, for example how much carbon leakage we could expect. That requires a methodology known as an Armington Elasticity, which measures the extent to which domestic price rises feed through to imports. Is the correlation strong or weak? This is a very important piece of the puzzle, should the US go down the CO₂ tax path. We have modelled several aspects like this so that they can be 'plugged in' as required to future forecasts.

GC: What is your latest estimate for US cement consumption over the longer term?

ES: Our 20 year outlook to 2040 has settled down slightly to 140-150Mt/yr over the past 12-24 months. This is due to population growth not being quite as rapid as we thought it could be a few years ago. That's tied into some of the tougher immigration policies. Secondly, longer term growth is expected to be lower, related to our enormous debt. Thirdly, the rising use of SCMs will reduce cement production over the coming decades.

There will be a play-off between rising *per-capita* cement consumption (based on a long-term economic growth assumption of 2%/yr) on the one hand and rising SCM use on the other. Quite how these factors play off against each other is hard to predict but it will certainly be interesting to see how the US develops from here.

We certainly expect the current 11-year run of cement consumption growth to continue this year and next for sure. The 11-year run is already unprecedented. In a couple of years we could be talking about 13-14 years of continuous consumption growth. That would be great for the US economy, great for the PCA and great for our members.

GC: Thank you for your insights once again Ed.

ES: You are most welcome. See you in Las Vegas!



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Dr Jack P Moehle, Department of Civil and Environmental Engineering at University of California Berkeley

ACI 318-19: Building code requirements for structural concrete addresses alternative cements

New provisions in ACI 318-19 represent a step forward with the incorporation of alternative cements into the code...



Above: Dr Jack P Moehle is the past Chair of ACI 318 Building Code Committee and is the Ed and Diane Wilson Professor of Structural in the Department of Civil and Environmental Engineering at UC Berkeley. He has played a leading role in the development of building codes and professional engineering guidelines on subjects related to reinforced concrete and earthquake engineering.

Below: The onus to test the applicability of concretes that contain novel cement formulations remains with designers, suppliers and concrete producers on a project-by-project basis.

Owners, architects and engineers are actively seeking alternatives to OPC in concrete. The American Concrete Institute (ACI) initially addressed this shift in its 2018 publication *ITG-10R-18: Practitioner's Guide for Alternative Cements*, which identified three root causes for the change. These are: reduced cost (both initial cost and life-cycle cost); reduced environmental impact; and the need for specific properties unattainable with Portland cement concrete. Several new materials have now come to market. These can replace Portland cement in some applications or may be used in combination with Portland or blended hydraulic cements. They include inorganic materials such as geopolymers, activated glassy cements, activated fly ash cements, activated slag cements, calcium aluminate cements, calcium sulfoaluminate cements, magnesia cements, CO₂-cured cement and others.

The July 2019 release of *ACI 318-19: Building Code Requirements for Structural Concrete* represented a major step forward in incorporating alternative cements into the building code. However, because most alternative cements are not currently covered by standard material specifications such as those for Portland cement or blended cements, (e.g.: *ASTM C150: Standard Specification for Portland Cement*.) ACI 318-19 has added provisions that allow the use of alternative cements, but only under

strictly controlled conditions. Until more industry testing has been performed, it will fall to the design team, materials suppliers and concrete producers to identify criteria, perform testing and provide data on the expected performance of products. It is hoped that once data for a given product or process have been generated, they should be applicable to a much larger number of projects.

Once a design professional has identified the concrete properties that are necessary for a given application, the material suppliers must provide detailed information on their own products' expected influence on the concrete relative to Portland cement concrete as a benchmark. Basic material properties that must be established for any alternative material to be used in structural concrete include: chemical composition; loss on ignition; air content of mortar; fineness; autoclave expansion results; compressive strengths; heat of hydration; and sulphate resistance. There may also be other tests depending on the material itself.

Suppliers can expect to be required to conduct laboratory and field testing assessing a material's effect on a mixture, including: thermal cracking; placeability; strength; volume stability; elastic properties; creep; permeability; corrosion of metals; reactions with aggregates; and resistance to freeze/thaw, chemicals and high temperatures.

Concrete producers must provide evidence that alternative cements will behave consistently during batching, transportation and placing. Concrete mixtures made with the alternative cement will also require testing to determine how production should be modified, if at all. Considerations include: safety; storage of materials; mixture proportions; compatibility with admixtures and ability to entrain air; mixing time; restrictions on time in the mixer; testing of fresh and hardened concrete properties.

Structural design and performance of the concrete should also be adequately tested, including: axial, compressive, flexural, shear and torsional strength; ultimate strain and



stress-strain relationship; volume change properties (drying, thermal, creep, and shrinkage); modulus of elasticity; bond of reinforcement; strain compatibility of concrete and reinforcement.


Standards for cements apply to the cementitious material considered alone or in a mortar, and not to mixtures that might be considered to be structural concrete. Therefore, even if an alternative cement meets the chemical or physical requirements of one of the applicable provisions in ACI 318-19, it may not automatically be appropriate for use in the production of structural concrete.

Hydraulic limitations?

It should also be noted that the material specifications in ACI 318 apply only to hydraulic cement, which is defined as one that sets and hardens by a chemical reaction with water and is capable of doing so *under water*. Many alternative cements do not rely on a chemical reaction with water. For non-hydraulic materials, the relationships between water-cementitious materials ratio (w/cm) and strength and durability may not be the same as for Portland cement concrete. This point has implications for design and concrete production as well as for specifying concrete durability.

The performance and durability requirements in Chapter 19 of ACI 318-19 remain unchanged from previous versions of the code. However, both durability and performance may be achieved differently in concrete mixtures that use alternative cements than they are in traditional cement mixtures. ACI 318 assesses durability based on anticipated exposure categories: exposure to freeze/thaw, exposure to sulphates, contact with water, and corrosion protection of reinforcement. Existing mitigation strategies for these categories have been developed for Portland cement concrete based upon testing using ASTM standard methods. Concrete produced with an alternative cement may react differently to any or all exposure categories and will therefore require testing. Durability testing is a long-term undertaking and will be difficult to do on a project-specific basis. Gathering data in advance, for example by conducting parallel tests of resistant Portland cement concrete and alternative-cement concrete, will be beneficial for both producers and suppliers.

Further reading

More information on the applicability of existing test methods and new testing needs can be found in *ITG-10.1R-18: Report on Alternative Cements*. *ITG-10R: Practitioner's Guide for Alternative Cements* provides guidance for practitioners seeking to implement alternative cements and discusses currently available and emerging alternative cements. Printed and digital formats of ACI 318-19 are available at www.concrete.org in both SI and inch-pound units. 

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Peter Edwards, Global Cement Magazine

Cement in North America

Written prior to events of 10 March 2020 onwards.

Global Cement looks at the cement industries of the US, Canada and Mexico, their main producers, trends and news highlights from the past 12 months...

The United States, Canada and Mexico each has a large established cement sector with many long-standing plants. Most of these are operated by multinational producers, with a number of regional players also active in the US and Mexico. The overwhelming majority of plants are integrated.

Cement production across each country took a knock due to the late 2000s economic downturn, with production yet to climb back to pre-recession levels in the US and Canada. Alternative fuels are a growing area of interest, along with the use of supplementary cementitious materials (SCMs) and even carbon capture and storage (CCS) trials at a number of facilities.

Cement sector - Producers

The majority of cement capacity in the US, Canada and Mexico is owned by major multinational groups, with increasingly small influence from domestic players (See Figure 1). Following the acquisition of Ash Grove Cement - the last major US-owned cement producer - by Ireland's CRH in June 2018, US cement capacity has been foreign-owned to the tune of 84%. Canada's cement sector is around 78% foreign-owned. Mexico is the odd-one-out among the three countries, home as it is to the major multinational producer Cemex. Thanks to this producer, which controls around 43% of all Mexican cement capacity, 72% of Mexican cement capacity is controlled by home-grown interests.



Area = 9.83 Million km²
GDP = US\$19.39tn
GDP/capita = US\$59,531
Capacity = 126.0Mt/yr
Population = 327.2m
Capacity = 385kg/capita

Area = 1.97 Million km²
GDP = US\$1.15tn
GDP/capita = US\$8903
Capacity = 60.2Mt/yr
Population = 129.2m
Capacity = 466kg/capita



Area = 9.99 Million km²
GDP = US\$1.65tn
GDP/capita = US\$45,032
Capacity = 18.0Mt/yr
Population = 37.1m
Capacity = 485kg/capita

The largest cement producer in the three countries by installed capacity is Switzerland's LafargeHolcim, which operates 41.2Mt/yr (20.2%) of capacity across 26 integrated (39.9Mt/yr) and two grinding plants (1.3Mt/yr). The second-largest producer is Cemex,

USA
126.0Mt/yr



Mexico
60.2Mt/yr



12.0Mt/yr
9.5%

Foreign Multinationals
Domestic: Multi-site
Cemex
Domestic: Single-site

Canada
18.0Mt/yr



Figure 1: North American cement capacity by producer type.
Source: Global Cement Directory 2020.



Rank	Producer	Capacity (Mt/yr)		
		Total	Integrated	Grinding
1	LafargeHolcim	41.2	39.9	1.3
2	Cemex	37.3	37.3	
3	HeidelbergCement	24.6	22.3	2.3
4	Buzzi Unicem	19.1	19.1	
5	CRH	13.4	13.4	
6	Martin Marietta	7.0	7.0	
7	Votorantim	6.2	4.8	1.4
8	Elementia	6.1	6.1	
9	Cementos Argos	6.1	4.3	1.8
10	Eagle Materials	5.7	5.7	

which controls 38.3Mt/yr of capacity across 26 integrated plants. Germany-based HeidelbergCement comes in third with 19.9Mt/yr across 15 integrated (17.6Mt/yr) and four grinding plants (2.3Mt/yr). These and the other Top 10 producers in North America are shown in Table 1.

United States of America



The US is the world's third-largest cement producer by installed capacity after China and India, with 126Mt/yr of cement capacity, according to the *Global Cement Directory 2020*. The United States Geological Survey (USGS) reported that the US produced 88.5Mt of Portland and masonry cement in 2019 from 94 plants in 34 States, indicating a capacity utilisation rate of around 67%. Texas, California, Missouri, Florida, Alabama, Michigan and Pennsylvania were, in descending order of production, the seven top cement-producing States. These accounted for ~60% of US cement production for the year.

Across all States, shipments of cement to end users came in at 100Mt. This was achieved via 15Mt of cement and 1Mt of clinker imports. Combined, these values represent a year-on-year increase in imports of 8.6% compared to 2018, when a total of 14.7Mt of cement and clinker entered the country. Canada was the largest single source of cement and clinker in the period 2015 to 2018 (35%), followed by Greece (18%), China (14%) and Turkey (11%).

After a small volume of exports is removed from the figures, apparent US cement consumption for 2019 came out at 102Mt, 3.6% higher year-on-year than the USGS's revised figure of 98.5Mt for 2018. If the 2019 figure is not revised downwards by the USGS, it would be the first year since 2007 that apparent consumption in the US exceeded 100Mt. The initial figure for 2018, reported in our May 2019 issue has been revised downwards from more than 100Mt.

A longer backstory

A look at recent cement production and import trends shows a steady recovery in US cement consumption following the economic crisis of 2008 (See Figure 2). Overall consumption in 2019 was still 27.6Mt less than the 2005 peak of 129.6Mt.

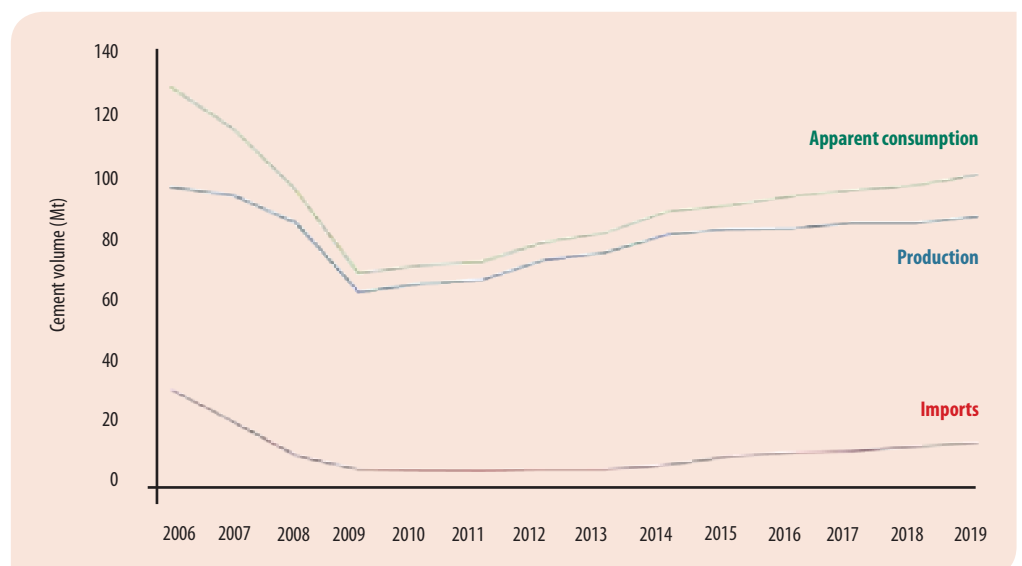
US cement imports have nearly tripled since their nadir of 5.8Mt in 2011. The USGS attributed the continued steady improvement to modest increases in construction spending, predominantly in the residential and public sectors.

Above - Table 1: Top 10 cement producers in North America by installed capacity.

Source: *Global Cement Directory 2020*.

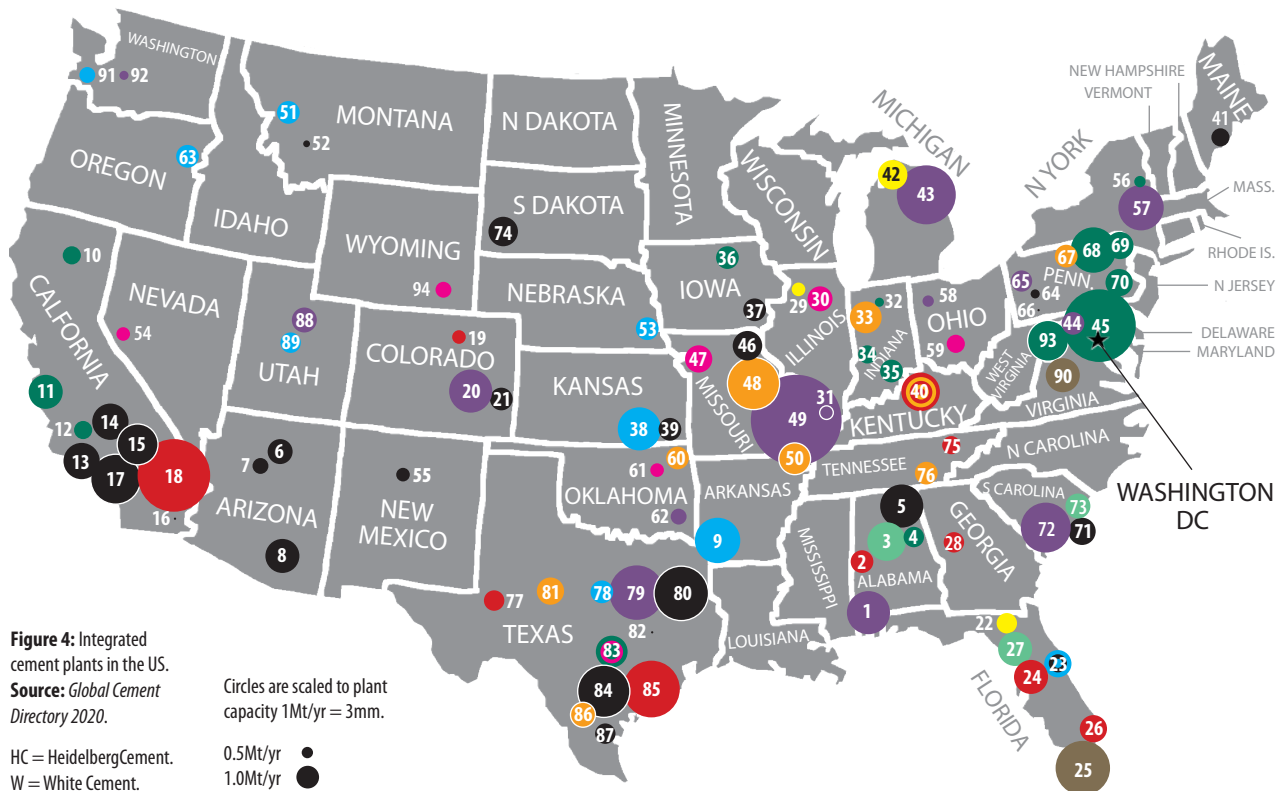
Below - Figure 2: US cement production, imports and apparent consumption, 2006 - 2019.

Source: USGS.





GLOBAL CEMENT: UNITED STATES



ALABAMA - 7.4Mt/yr

1. LafargeHolcim, 1.9Mt/yr.
2. Cemex, 1.0Mt/yr.
3. Cementos Argos, 1.7Mt/yr.
4. Lehigh (HC), 0.9Mt/yr.
5. National Cement (Vicat), 1.9Mt/yr.

ARIZONA - 3.3Mt/yr

6. Salt River Materials, 1.1Mt/yr.
7. Drake Cement, 0.7Mt/yr.
8. CalPortland (Taiheiyō), 1.5Mt/yr.

ARKANSAS - 2.0Mt/yr

9. Ash Grove (CRH), 2.0Mt/yr.

CALIFORNIA - 13.6Mt/yr

10. Lehigh (HC), 0.8Mt/yr.
11. Lehigh (HC), 1.5Mt/yr.
12. Lehigh (HC), 0.8Mt/yr.
13. National Cement, 1.6Mt/yr.
14. CalPortland, 1.6Mt/yr.
15. Mitsubishi Cement, 1.8Mt/yr.
16. TXI (Martin Marietta), 0.1Mt/yr.
17. TXI (Martin Marietta), 2.2Mt/yr.
18. Cemex, 3.2Mt/yr.

COLORADO - 3.5Mt/yr

19. Cemex, 0.6Mt/yr.
20. LafargeHolcim, 1.9Mt/yr.
21. GCC Rio Grande, 1.0Mt/yr.

FLORIDA - 8.7Mt/yr

22. Suwannee Cement (Votorantim), 0.9Mt/yr.
23. American Cement (50% Elementia, 50% CRH), 1.2Mt/yr.
24. Cemex, 1.5Mt/yr.
25. Titan Florida, 2.4Mt/yr.
26. Cemex, 1.2Mt/yr.
27. Cementos Argos, 1.5Mt/yr.

GEORGIA - 0.9Mt/yr

28. Cemex, 0.9Mt/yr.

ILLINOIS - 2.3Mt/yr

29. St Marys (Votorantim), 0.6Mt/yr.
30. Illinois Cement (Eagle), 1.1Mt/yr.
31. LafargeHolcim, Joppa, 0.6Mt/yr.

INDIANA - 3.6Mt/yr

32. Essroc (HC), 0.4Mt/yr.
33. Buzzi Unicem, 1.4Mt/yr.
34. Lehigh (HC), 0.8Mt/yr. (Upgrade)
35. Essroc (HC), 1.0Mt/yr.

IOWA - 2.0Mt/yr

36. Lehigh (HC), 1.0Mt/yr.
37. Continental Cement, 1.0Mt/yr.

KANSAS - 2.9Mt/yr

38. Ash Grove (CRH), 1.9Mt/yr.
39. Monarch Cement, 1.0Mt/yr.

KENTUCKY - 1.7Mt/yr

40. Cemex/Buzzi Unicem, 1.7Mt/yr. (Cemex stake being bought by Eagle Materials).

MAINE - 0.8Mt/yr

41. CDN Dragon Products (55% Elementia), 0.8Mt/yr.

MICHIGAN - 3.9Mt/yr

42. St Marys Cement (Votorantim), 1.3Mt/yr.
43. LafargeHolcim, 2.6Mt/yr.

MARYLAND - 4.2Mt/yr

44. LafargeHolcim, 1.0Mt/yr.
45. Lehigh (HC), 3.2Mt/yr.

MISSOURI - 10.2Mt/yr

46. Continental (Summit), 1.3Mt/yr.
47. Central Plains (Eagle), 1.2Mt/yr.
48. Buzzi Unicem, 2.3Mt/yr.
49. LafargeHolcim, 4.0Mt/yr.
50. Buzzi Unicem, 1.4Mt/yr.

MONTANA - 1.3Mt/yr

51. CRH, 1.0Mt/yr.
52. GCC, 0.3Mt/yr.

NEBRASKA - 1.0Mt/yr

53. Ash Grove (CRH), Louisville, 1.0Mt/yr.

NEVADA - 0.6Mt/yr

54. Nevada Cement (Eagle), 0.6Mt/yr.

NEW MEXICO - 0.6Mt/yr

55. GCC Rio Grande, Tijeras, 0.6Mt/yr.

NEW YORK - 2.5Mt/yr

56. Lehigh (HC), 0.5Mt/yr.
57. LafargeHolcim, 2.0Mt/yr.

OHIO - 1.3Mt/yr

58. LafargeHolcim, 0.5Mt/yr.
59. Eagle Materials, 0.8Mt/yr.

OKLAHOMA - 2.3Mt/yr

60. Buzzi Unicem, 1.0Mt/yr.
61. Central Plains (Eagle), 0.6Mt/yr.
62. LafargeHolcim, Ada, 0.7Mt/yr.

OREGON - 1.0Mt/yr

63. Ash Grove (CRH), 1.0Mt/yr.

PENNSYLVANIA - 6.7Mt/yr

64. Armstrong Cement, 0.4Mt/yr.
65. LafargeHolcim, 0.8Mt/yr.
66. Lehigh (Cementir), 0.1Mt/yr (W).
67. Buzzi Unicem, 1.0Mt/yr.
68. Essroc (HC), 2.0Mt/yr.
69. Keystone Cement (HC), 1.2Mt/yr.
70. Lehigh (HC), 1.2Mt/yr.

SOUTH CAROLINA 4.5Mt/yr

71. Giant (Elementia), 1.2Mt/yr.
72. LafargeHolcim, 2.2Mt/yr.
73. Cementos Argos, 1.1Mt/yr.

SOUTH DAKOTA - 1.3Mt/yr

74. GCC Dakotah, 1.3Mt/yr.

TENNESSEE - 1.8Mt/yr

75. Cemex, 0.8Mt/yr.
76. Buzzi Unicem, 1.0Mt/yr.

TEXAS - 16.2Mt/yr

77. Cemex, 0.9Mt/yr.
78. Ash Grove (CRH), 1.0Mt/yr.
79. LafargeHolcim, 2.4Mt/yr.
80. TXI (Martin Marietta), 2.4Mt/yr.
81. Buzzi Unicem, 1.2Mt/yr.
82. Lehigh (Cementir), 0.1Mt/yr (W).
83. Lehigh (HC) / Eagle, 1.4Mt/yr.
84. TXI (Martin Marietta), 2.3Mt/yr.
85. Cemex, 2.5Mt/yr.
86. Alamo Cement (Buzzi), 1.1Mt/yr.
87. Capitol Cement, 0.9Mt/yr.

UTAH - 2.0Mt/yr

88. LafargeHolcim, 1.1Mt/yr.
89. Ash Grove (CRH), 0.9Mt/yr.

VIRGINIA - 1.5Mt/yr

90. Roanoke Cement (Titan), 1.5Mt/yr.

WASHINGTON - 1.1Mt/yr

91. Ash Grove (CRH), 0.7Mt/yr.
92. LafargeHolcim, 0.4Mt/yr.

WEST VIRGINIA - 1.8Mt/yr

93. Essroc (HC), 1.8Mt/yr.

WYOMING - 0.7Mt/yr

94. Mountain (Eagle), 0.7Mt/yr.

Cement plants

The *Global Cement Directory 2020* lists 94 integrated cement plants in the United States that hold a total production capacity of 126.0Mt/yr. Figure 4 shows the updated integrated cement assets in the country and their capacities. They are operated by a range of multinational and local players.

Top five cement producers

1. LafargeHolcim operates 14 integrated cement plants in the US that share a cement capacity of 22.1Mt/yr, according to the *Global Cement Directory 2020*. It also operates 1.3Mt/yr of grinding capacity at two sites. LafargeHolcim is present throughout the US, with the exception of the south west.



In 2019 LafargeHolcim's operations across the US and Canada generated sales of US\$6.53bn, with recurring earnings before interest, tax, depreciation and amortisation (REBITDA) of US\$1.68bn, 6.4% higher than in 2018. The group saw its net profit rise by 13.5% year-on-year to US\$1.04bn. Its cement sales in both countries rose by 5.0% to 20.8Mt. The group noted that strong sales in the region boosted its global performance over the course of the year.

HEIDELBERGCEMENT

2. HeidelbergCement became the second-largest cement producer in the US when it acquired Italy's Italcementi in July 2016. By adding Italcementi's US subsidiary Essroc to those of its existing Lehigh subsidiary, the headline capacity of HeidelbergCement's US integrated assets grew to 17.8Mt/yr. It also operates 1.0Mt/yr of grinding capacity at two sites, with the majority of its facilities in the mid-west.

HeidelbergCement sold 16Mt of cement in the US and Canada in 2019, the same volume as in 2018. Despite a 12% increase in revenue to US\$5.32bn (a 5% like-for-like increase), the group's profit for current operations was 3% down at US\$739m.



3. Cemex has eight integrated cement plants in the US that share a capacity of 11.7Mt/yr. The Mexico-based multinational reported that its operations in the US recorded net sales of US\$935m in the fourth quarter of 2019, an increase of 8% on a like-to-like basis from the same period in 2018. Operating

earnings before interest, tax, depreciation and amortisation (EBITDA) fell by 18% on a like-to-like basis to US\$149m compared to the fourth quarter of 2018.

4. Buzzi Unicem has 11.2Mt/yr of integrated cement capacity across nine plants in the US, primarily across the mid-west, south and north-east. Across all operations, the Italian firm saw its consolidated sales rise by 12% year-on-year to US\$3.58bn in 2019 from US\$3.19bn in 2018. The company saw a rise in cement sales volumes of 4.3% year-on-year to 29Mt from 28Mt.



5. CRH: With 10 integrated plants and 10.1Mt/yr of cement capacity across the US, CRH has grown significantly in the US, acquiring the Holcim Trident plant in Montana and Ash Grove Cement.

Globally, CRH's sales revenue rose by 6% year-on-year to US\$31.5bn in 2019 from US\$29.7bn in 2018. It said that economic growth continued in the US in 2019, particularly in the second half, with sales from its Americas Materials business for the full year being 4% higher than in 2018.



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Sun-powered pre-calcliner research

California-based Heliogen has developed concentrated solar-thermal plants (CSPs) with the ability to focus sunlight to generate temperatures over 1000°C by micro-adjusting mirrors using computer technology. It has engaged Parsons Corporation to build arrays of its CSPs for use in cement pre-calcliners, which require tempera-

tures of 900°C. Heliogen CEO Bill Gross says that the installations will make carbon capture and storage (CCS) of the remaining CO₂ emissions from the conversion of limestone to lime easier by removing minority pollutants from the combustion of fuel. Heliogen will next target 1500°C from its CSPs, which would enable them to replace thermal fuels in cement kilns.

Upgrades and changes of ownership

The US cement sector has seen a period of relative calm over the past 12 months, after the acquisition of Ash Grove Cement by Ireland's CRH in 2018. Some cement plants, however, have changed hands over the past 12 months, while others are being upgraded and one long-standing mothballed plant may even reopen.

HeidelbergCement bought Giant Resource Recovery's 1.2Mt/yr integrated Keystone cement plant in Bath, Pennsylvania for US\$151m in September 2019.



HeidelbergCement subsidiary **Lehigh Hanson** began construction work on a US\$600m upgrade to its 0.8Mt/yr Mitchell, Indiana plant in October 2019. The groundbreaking ceremony followed approval of an air permit by the Indiana Department of Environmental Management (IDEM) in July 2019. A new line will replace three existing lines at the site, with commissioning scheduled for the third quarter of 2022.

National Cement broke ground on an US\$250m upgrade to the Ragland plant in Alabama in early 2020. The subsidiary of France's Vicat is building a second kiln at its 1.9Mt/yr plant in Alabama, due for completion in 2022.

Cemex has made a number of announcements regarding the possible recommissioning of its Wampum plant in Pennsylvania, which was mothballed in 2010 due to the global financial crisis. At a public meeting, Cemex's legal staff advised residents that 100 new jobs and at least US\$100m was at stake.

Eagle Materials acquired Kosmos Cement Company, which operates the 1.7Mt/yr Kosmos integrated cement plant and seven distribution terminals in Wyoming, from Cemex and Buzzi Unicem in early 2020. This followed approval by the Federal Trade Commission in mid January 2020. Cemex received US\$449m and Buzzi received US\$116m.

Eagle Materials will complete the restructuring of its business into Heavy Materials and Light Materials companies in the summer of 2020. The Heavy Materials company will focus on cement production with complementary concrete, aggregates and sand operations. It will also continue to evaluate strategic alternatives with respect to its frac-sand business.



Puerto Rico focus

Cement was produced at two plants in the US Commonwealth of Puerto Rico in 2019, HeidelbergCement subsidiary Essroc's 0.8Mt/yr integrated plant in San Juan, and Cemex's Ponce grinding plant, itself formerly an integrated facility. Cemex stopped clinker production at the Ponce plant in early 2018, stating that the island only needed around a third of its installed capacity.

Cement sales in Puerto Rico experienced a year-on-year fall of 7.4% in September 2019, to stand at 43,500t, the most recent month for which full data is available. The figure represented the eighth consecutive monthly fall. The island's domestic cement production rose by 1.0% in same month, to reach 41,000t.



Environmental projects

There have been numerous announcements concerning a variety of environmental measures in the US cement sector over the past 12 months, notably with a focus on renewable energy and carbon capture and storage.

GCC's 0.9Mt/yr integrated cement plant in Odessa, Texas, will run entirely on wind and solar power from July 2022 for 10 years. This will cut 45,000t/yr of CO₂ emissions and represents a saving of US\$4.6m in energy costs over its period of effect, an annual saving of 22% compared to GCC's current bill.

In January 2020 **Holcim US'** 1.9Mt/yr Portland cement plant in Colorado announced that it would host a large-scale cement plant carbon capture and storage (CCS) study. Holcim US, in partnership with Canada-based Svante, France-based Total and US-based Occidental subsidiary Oxy Low Carbon Ventures, will install a facility designed to capture 0.73Mt/yr of CO₂, which Occidental will store underground. The study will assess the financial viability and design requirements of such an installation on a permanent basis.

Lehigh Cement and **Lehigh White Cement** announced in December 2019 that they would invest US\$12m in pollution control technology across their 11 active cement plants.

Future prospects

The PCA's Chief Economist Ed Sullivan estimates that cement consumption will grow by 2.0-2.5% in 2020, somewhat higher than the 1.7% that it had expected in the fourth quarter of 2019. This translates to around 103Mt of cement for the year as a whole. The main reason behind the upgrade in the forecast was an unexpected increase in residential construction in 2019. This bodes very well indeed for cement producers in the world's biggest economy.

For more from Ed Sullivan, see Page 46 in this issue. PCA President Mike Ireland provides insight into the association's advocacy efforts on Page 40.

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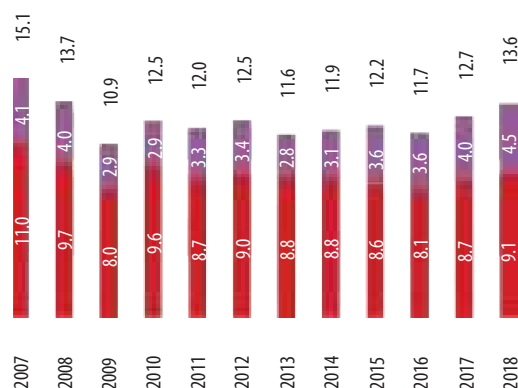


Canada



Right - Figure 5: Canadian cement production, exports and apparent consumption, 2007 - 2017 (Mt).

Source: Statistics Canada.



Canadian cement production rose by 20% from 12.6Mt in 2000 to more than 15Mt in 2007 but then slumped back by 27% to 11Mt in the two years to 2009 due to the global financial crisis. After a period of stability at ~12Mt/yr from 2010 to 2016, production once again started to increase in the late 2010s. It reached 13.6Mt in 2018, the most recent year for which Statistics Canada has released information.

Canada is a long-standing cement exporting nation, predominantly to the US. Before the late 2000s crisis, it routinely exported 5Mt/yr of cement (or more) to its southern neighbour, but the figure was cut to less than 3Mt in 2010 due to reduced demand in the US. In 2018 Canada exported a total of 4.5Mt, an 11.5% increase from 4.0Mt in 2017.

As a significant proportion of Canadian cement, around 33.1% in 2018, is exported only 9.1Mt of cement was consumed in Canada itself in 2018. Production, export and apparent consumption data for 2007 to 2018 is shown in Figure 5.

Although Statistics Canada stopped releasing Provincial data in early 2017, there have been relatively few changes in the sector in the past three years. Ontario, Canada's most populous Province, (38% of the population) consumed 3.2Mt of cement in 2016, around 38% of the 8.2Mt consumed in Canada that year. The Province that consumed the next most cement was Quebec (24% population), which had shipments of 2.0Mt, around 24% of the national total.

Below - Figure 6: Map of Canada with integrated cement plants.

Source: Global Cement Directory 2020.

LH = LafargeHolcim.
HC = HeidelbergCement.

Circles are scaled to plant capacity 1Mt/yr = 3mm.

0.5Mt/yr ●
1.0Mt/yr ●

BRITISH COLUMBIA - 2.4Mt/yr

1. Lafarge Canada (LH), 1.1Mt/yr.
2. Lehigh Hanson (HC), 1.3Mt/yr.

ALBERTA - 3.6Mt/yr

3. Lafarge Canada (LH), 2.2Mt/yr.
4. Lehigh Inland (HC), 1.4Mt/yr.

ONTARIO - 6.4Mt/yr

5. Essroc Canada (HC), 0.8Mt/yr.
6. Federal White, 0.5Mt/yr.
7. Lafarge Canada (LH), 1.1Mt/yr.
8. St Marys Cement (Votorantim), 1.2Mt/yr.
9. St Marys Cement (Votorantim), 0.8Mt/yr.
10. CRH, Mississauga, 2.0Mt/yr.

QUEBEC - 5.6Mt/yr

11. Ciment Québec (HC), 1.0Mt/yr.
12. Lafarge Canada (LH), St Constant, 1.0Mt/yr.
13. CRH, 1.1Mt/yr.
14. Colacem Canada, 0.3Mt/yr.
15. McInnis, 2.2Mt/yr.

NOVA SCOTIA - 0.6Mt/yr

16. Lafarge Canada (LH), 0.6Mt/yr.



Cement producers

Canada's cement industry comprises 16 currently-active integrated cement plants (See Figure 6). The active plants share 18.0Mt/yr of capacity, giving a national capacity utilisation figure of around 76% in 2018. In 2020 the largest producers of cement by installed capacity are LafargeHolcim (five plants, 6.0Mt/yr), HeidelbergCement (three plants, 3.5Mt/yr) and CRH (two plants, 2.5Mt/yr).

Canada: Cement carbon capture centre

Canada has seen a flurry of cement carbon capture projects over the past 12 months, with Lafarge Canada set to develop and demonstrate a full-cycle solution to capture and reuse CO₂ from the Richmond cement plant in British Columbia. The CO₂MENT project will demonstrate and evaluate Inventys' CO₂ capture system and a selection of CO₂ utilisation technologies at the plant between 2020 and 2024.

Meanwhile, Lehigh Cement is trialling the cement industry's first full CCS installation at its 1.4Mt/yr Edmonton, Alberta, plant in partnership with Canada's International CCS Knowledge Centre and Emissions Reduction Alberta. The installation will have a CO₂ capture rate of 90-95%.

Finally, McInnis, Écotech Québec and the Gaspésie Cleantech Hub, in collaboration with the Québec Ministère de l'Économie et de l'Innovation, have launched a call for innovations to identify CCS technologies for the McInnis plant in Port-Daniel-Gascons. The call for innovations will run until May 2020, after which selected organisations will be invited to explore their suggested options.

These initiatives come ahead of an increase in the Federal Carbon Tax, which is set to more than double to US\$37.64/t in 2022 from US\$15.06/t at present. There are concerns that the increase could divert production to regimes with less intense CO₂ regulations, notably the US. The Fraser Institute, an independent think-tank, named cement and concrete among 13 industries most likely to be adversely affected, with a 2.7% rise in production costs.



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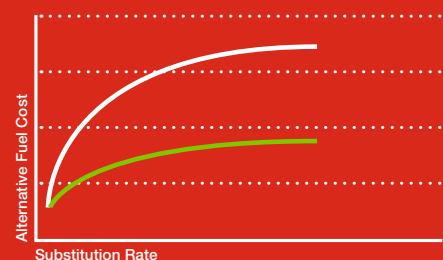
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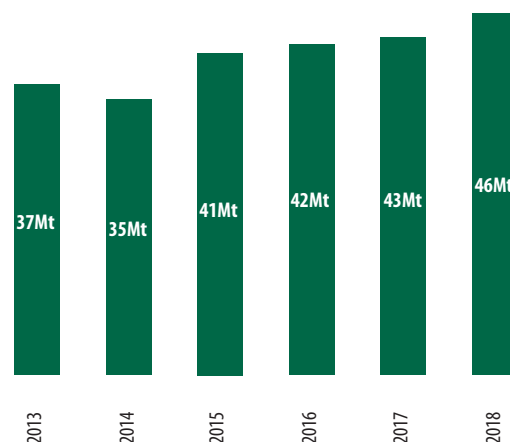
Mexican cement production has followed a similar pattern to the other two countries in this review, following the global economic downturn of the late 2000s. Cement production has risen steadily in recent years, increasing by 24% between 2013 (37Mt) and 2018 (46Mt), the most recent year for which the Instituto Mexicano del Cemento y Concreto has full data.

The main cement producer in Mexico is the multinational producer Cemex, which operates 25.6Mt/yr of capacity across 13 plants. Its main production base is in Hidalgo and Monterrey, where its predecessors, Cementos Hidalgo and Cementos Portland Monterrey, were formed, prior to their merger to become Cemex in 1931. The group's net sales in Mexico fell by 11% on a like-for-like basis in the fourth quarter of 2019 to US\$722m. Operating earnings before interest, tax, depreciation and amortisation (EBITDA), fell by 21% on a like-for-like basis US\$227m in the fourth quarter of 2019 compared to a year earlier. It reported that this was due to declines in public and private investment.

The second-largest cement producer in Mexico is LafargeHolcim's Mexican subsidiary Holcim Mexico. It operates 11.8Mt/yr of capacity across six plants. Third is the Buzzi Unicem subsidiary Cemento Portland Moctezuma, which operates 7.9Mt/yr of capacity between three integrated sites. Mexico's other cement producers are shown in Figure 8.



Right - Figure 7: Mexican cement production, 2013 - 2018.
Source: Instituto Mexicano del Cemento y Concreto.



Plant upgrades

In January 2020 Cemex announced that it would expand its 7.2Mt/yr Tepeaca, Puebla, plant during 2020 to make it 'the largest Cemex plant in the world and one of the largest on the entire American continent.' It did not announce the capacity of the upgrade, which will cost a total of US\$530m.

Meanwhile, Holcim Mexico has announced a forthcoming investment of US\$40m in the construction of a new 0.7Mt/yr grinding plant in the state of Yucatán. Jamie Hill Tinoco, general director of Holcim Mexico, said that the plant, which will receive clinker from Holcim Mexico's Macuspana and Orizaba cement plants, signifies the company's commitment to the state, enabling it to 'optimise local solutions with greater benefits for customers and communities.'

France-based Fives FCB began construction work on new grinding units for Cooperativa La Cruz Azul at its two plants in 2018. Both orders, part of wider upgrade projects, were finalised in November 2017. The Hidalgo plant ordered a 280t/hr grinding unit and the Oaxaca Lagunas plant has ordered a 300t/hr grinding unit. Each raw grinding plant features an FCB Horomill 4000mm grinding mill, an FCB TSV Classifier 6500mm and an FCB Aerodecantor.

Solar contract for GCC

Grupo Cementos Chihuahua has signed a 15-year power supply agreement with a Mexico-based solar energy provider for renewable electricity from 1 January 2021. The contract covers the supply of solar power to GCC's 0.2Mt/yr Juarez cement plant in Chihuahua, as well as its head office and ready mix and aggregates operations, constituting roughly 20% of its electricity consumption. The agreement will save GCC US\$2.5m/yr and will reduce CO₂ emissions by 0.3Mt throughout its duration.



AGUASCALIENTES - 3.1Mt/yr

1. CYCNA, 2.1Mt/yr.

BAJA CALIFORNIA SUR - 1.0Mt/yr

2. Cemex, 1.0Mt/yr.

CHIHUAHUA - 2.4Mt/yr

3. GCC, 1.0Mt/yr.

4. GCC, 0.2Mt/yr.

5. GCC, 1.2Mt/yr.

COAHUILA - 3.7Mt/yr

6. Cemex, 1.0Mt/yr.

7. Holcim Mexico (LH), 2.7Mt/yr.

COLIMA - 2.5Mt/yr

8. Holcim Mexico (LH), 2.5Mt/yr.

DP / MEXICO - 6.4Mt/yr

9. Holcim Mexico (LH), 1.6Mt/yr.

10. La Cruz Azul, 3.4Mt/yr. (Exp)

11. Cemex, 1.4Mt/yr.

GUERRERO - 0.6Mt/yr

12. Holcim Mexico (LH), 0.6Mt/yr.

HIDALGO - 8.2Mt/yr

13. Elementia, 0.5Mt/yr (W).

14. Cem Fortaleza

(Elementia), 1.0Mt/yr.

15. Cemex, 0.1Mt/yr (W).

16. Cemex, 4.3Mt/yr.

17. Elementia, 2.1Mt/yr.

18. Cemex, 0.2Mt/yr.



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Mexican manufacturers go green

Two major cement producers in Mexico have recently announced measures to reduce their impact on climate change. The largest, Cemex, announced a new Climate Action strategy for its global operations in February 2020. The strategy outlines the company's vision to advance towards a carbon-neutral economy and to address society's increasing demands more efficiently. The company states that it believes climate change to be 'one of the biggest challenges of our time' and that it supports collective action.

Launching the strategy, Cemex stated that it has already reduced its net specific CO₂ emissions by more than 22% compared to its 1990 baseline. It has now defined a more ambitious target of a 35% reduction in net specific CO₂ emissions by 2030. This new goal is aligned with the Science-Based Targets (SBT) methodology, a requirement that is necessary to meet the goals of the Paris Agreement. To complement this strategy with a longer-term vision, Cemex is also establishing a new ambition to deliver net-zero CO₂ concrete by 2050.

To fulfil its plans, Cemex has laid out a CO₂ roadmap to accelerate the roll-out of proven technologies across its facilities, including investment in energy efficiency, using alternative fuels, expanding the use of renewable energy and increasing the substitution of clinker with supplementary cementitious materials. It says its aim of net-zero CO₂ concrete will require 'open innovation' that requires strategic partnerships and cross-industry collaboration in the development of breakthrough technologies like CO₂ capture, storage and utilisation, novel clinkers with low heat consumption, alternative decarbonated

raw materials, carbonation of concrete waste for use as recycled aggregates, and the promotion of circular economy models that transform waste into fuel.

Meanwhile, Grupo Cementos de Chihuahua (GCC) says it will set greenhouse gas reduction targets in line with climate science by joining the SBT initiative. GCC will set science-based emission reduction targets in line with the level of decarbonisation required to keep global temperature increase well-below 2°C compared to pre-industrial temperatures, as described in the latest Special Report of the Intergovernmental Panel on Climate Change (IPCC).

"By joining the SBT, GCC will ensure that the company's low-carbon transformation is aligned with climate science and is a further reflection of our unwavering commitment to implement global best practices related to sustainability," said GCC's CEO Enrique Escalante.



Work at the Oaxaca plant started in August 2018. Mechanical erection of the raw materials feeding workshop and the FCB Horomill grinding circuit started in July 2019. Electrical installation took place in late 2019 and the raw meal grinding workshop was scheduled to be operational by the end of March 2020. Construction work at the Hidalgo plant started in December 2018. Mechanical and electrical erection works began in 2019. First raw meal is scheduled by the end of May 2020.

Germany's Loesche is also involved in the projects. It has supplied two LM 41.4 D type coal mills,

one to each project. In addition to the mills, which both have a capacity of 50-65t/hr, Loesche has also supplied process gas filters, mill fans, inerting units, explosion vents, cyclone separators, conveyor augers and drag chain conveyors. The scope of supply also includes the complete detail engineering for the steel and concrete construction. Installation was underway at both plants by the close of 2019.

Looking ahead

Mexico's cement capacity is currently 60.2Mt, while production is closer to 46Mt, indicating a capacity utilisation rate of 76%. This provides sufficient headroom for growing demand, even without the new capacity being brought online.

Whether or not Mexico will truly need this new capacity remains to be seen. In its January 2020 update, the IMF forecast that the Mexican economy would grow by around 1.0% in 2020, a downgrade from 1.3% in its October 2019 update. This points to a continuation of the country's protracted construction slump over the next 12 months. A US\$45bn raft of major infrastructure projects, announced by incoming President Andrés Manuel López Obrador, could help to turn the situation around, feeding back positively into cement demand.



Below: Construction of a hotel and resort in Cancun, Yucatan.





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Air cannon retrofit at Roanoke Cement plant

Integrated Global Services reports on a recent air cannon retrofit at Roanoke Cement.

Right: A completed retrofit on an older air cannon at the Roanoke Cement plant.

The lifetime of an air cannon depends on the environment in which it is mounted. Those close to extreme heat and cement dust will not fare as well as those that fire infrequently at ambient temperature. Air cannons used to require just a few spare parts to keep going. However, several suppliers have taken the decision to no longer supply spares for their products. In several cases this coincided with the roll-out of next generation models.

This move was generally received badly by cement plant managers, many of whom had dozens of older cannons performing well. An upgrade to new models forces hundreds of thousands of dollars to be spent unnecessarily, just to ensure reliable cannons.

Do you really need to upgrade?

Integrated Global Services (IGS) decided to buck this trend by supplying a relatively inexpensive retrofit kit that replaces the cannon's internal components, regardless of the original supplier. This costs just a fraction of a new cannon.

At the same time, IGS has made several improvements to the internal components. These include upgrading materials from aluminium to coated carbon steel. By doing so, it has eliminated the need for the spring cushion, a reliability weak-point in traditional designs. Another change is the use of standard hard chrome tubing, rather than aluminium tubing, which can become scratched or dirty, leading to failures. The IGS solution uses

Below: The Roanoke Cement plant is the only cement producer in Virginia.




standard hard chrome tubing that is also part of the IGS backplate, instead of aluminium. The backplate can simply be unbolted and removed. The chrome tubing provides a smoother surface that facilitates more reliable operation.

IGS also offers upgrades for the retrofit kits. These include the addition of an air cylinder to provide better control of the pounding action of the air cannon, which extends maintenance-free periods. In addition, the air cylinder does not necessitate the storage of air in the air tank between firing, which reduces air consumption by $\geq 50\%$.

Roanoke retrofits

Roanoke Cement was an early adopter of the retrofit solution, purchasing kits for 12 air cannons in early 2019. Some of the cannons were still capable of firing, while others had not operated for some time.

The original components were removed from the air cannon valve bodies and the IGS components were installed while the cannons were *in-situ*. Existing solenoid valves, air lines and programming systems were used, making installation quick and easy. It took an average of 20 minutes to perform the retrofit if the internals were relatively clean. If they had become clogged with cement the upgrade typically took 60 minutes. Crucially, the plant was in full production throughout all 12 retrofits.

After six months of operation, the plant reported that the cannons were still firing as well as when the retrofits were carried out. No maintenance had been required and there have been no operational issues. 



China: Cement shortages cut 50,000 construction jobs in Hong Kong

Hong Kong construction companies have laid off 50,000 workers and reduced the hours of a further 80,000 because of a shortage of cement, with production still suspended in China due to the coronavirus epidemic. New World Construction co-managing director David Kwok Chun-wai said the company's supply chain had been disrupted, adding, "It is still too early to predict the impact."

The Hong Kong Construction Industry Employees General Union chairman Wong Ping said, "Workers can nail boards, however without cement, they cannot proceed to laying floors."

China: Anhui Conch uses closures for maintenance

Anhui Conch's subsidiary China Cement Plant Company (CCPC) has made the best of the downtime necessitated by the coronavirus outbreak by carrying out necessary maintenance work on its integrated plant's third line, including the installation of a new vertical roller mill. Anhui Conch says CCPC is undertaking the work with the greatest degree of care for the 'prevention and control of new coronavirus cases.'



China: CNBM resumes production in wake of outbreak

China National Building Material Group (CNBM) restarted some of its operations on 4 March 2020 following the outbreak of the novel coronavirus. Priority has been given to activities related to epidemic control, according to the China Daily newspaper. Its plans are aligned with instructions from the Assets Supervision and Administration Commission of the State Council to ensure stable production and operations to back the country's economic development while preventing the virus from spreading further.

Zhou Yuxian, chairman of CNBM, said that the company aims to grasp 'the first market share' after the epidemic. The state-owned company intends to watch market demand and the reactions for companies from the upstream and downstream supply chain. CNBM also released guidelines for resuming work and epidemic prevention for different sectors earlier this month.

For its cement business, CNBM has urged the resumption of full production by subsidiaries related to life and medical waste handling. CNBM has asked its other subsidiaries to restart work gradually in different sectors, based on market demand.

Vietnam: Cement exports fall by 49% year-on-year in January and February 2020

Producers exported approximately 2.82Mt of cement in January and February 2020, down by 49% year-on-year from 5.75Mt in the corresponding period of 2019. Vietnam News has reported that this is a result of the coronavirus outbreak. In February 2020 Vietnam's Ministry of Construction said that Vietnamese cement exporters would face fierce competition as China and Thailand increase exports over the coming year.

Vietnam Cement Association president Nguyễn Quang Cung previously predicted that Vietnamese cement exports would hold steady at 34.0Mt in 2020 before falling by 26% to 25.0Mt in 2021 as a forecasted rise in domestic demand reduces the reliance on low-priced exports. China remains the primary importer of Vietnamese cement, which it buys at US\$36.3/t. Domestic demand fell by 37% year-on-year to 2.88Mt in January 2020 from 5.43Mt in January 2019, according to Arab News.

Production rose by 0.1% year-on-year to 13.0Mt in January and February 2020 from 12.9Mt one year previously. February was an especially voluminous month for production, with 6.7Mt of cement produced over its 29 days, up by 18.6% year-on-year from 5.6Mt in February 2018.

China: Huaxin Cement helps with coronavirus cleanup

Huaxin Cement says that it has disposed of 55t of medical waste from coronavirus-infected hospitals in Wuhan province at its 3.4Mt/yr Yangxin cement plant in Hubei province. Xinhuanet News has reported that the batch was delivered in sealed trucks and burnt along with all packaging in the plant's precalciner and rotary kiln.

Pakistan: Production, consumption and exports grow

Pakistan has recorded year-on-year production growth of 34%, to 4.49Mt in February 2020 from 3.35Mt in February 2019. Consumption grew by 31% to 3.74Mt from 2.84Mt in February 2019. Exports throughout the month were 753,000t, up by 48% from 508,000t. Export growth was bolstered by a weak Pakistani rupee and was stronger in southern Pakistan than in northern Pakistan, with the latter feeling the effects of lowered Afghan demand and zero exports to India.



Philippines: Holcim Philippines' profit booms

Holcim Philippines has recorded a profit of US\$70.9m in 2019, up by 41% from US\$50.3m in 2018. This was in spite of a 5.9% year-on-year sales fall to US\$660m from US\$701m in 2018. The Philippines Star newspaper has reported that a more favourable product mix and the steady contribution of its aggregates unit helped Holcim Philippines to offset the effects of slowing construction activity throughout the year. Holcim Philippines president and CEO John Stull said that the company is 'well-positioned to deliver sustainable and healthy growth to shareholders and continue support to the country's development.'

In 2019 Holcim Philippines brought its total production capacity to 10Mt/yr with the completion of upgrades at its integrated Bulacan, Davao and La Union plants. In March 2019 it launched Solido, a blended cement suited to use in road and infrastructure construction.

India: ACC Limited announces 2.5Mt/yr plant

ACC Limited has announced that it will open a 2.5Mt/yr integrated cement plant with 'state-of-the-art pollution control technology,' along with a 25MW coal-fired power plant that will serve the plant in addition to an existing 15MW coal-fired power plant on the site in Chandrapur, Maharashtra. The opening in March 2020 will follow the expiry of a period of respite for continued operation of ACC's 0.9Mt/yr integrated Cement Nagar plant on the same site.

The Times of India has reported that the plant, the company's oldest, first shut on 30 November 2010 due to repeat violation of pollution standards, and was permitted to reopen in January 2011 up until 28 February 2020, subject to its adherence to strict conditions imposed by the Maharashtra Pollution Control Board (PCB). The company says that it is investigating the use of cladding in the old power plant to bring noise pollution down to 55dB.

India: Capacity utilisation forecast to remain below 70%

Production capacity utilisation in the cement industry is expected to remain below 70% in the 2020 – 2021 financial year due to new plant projects in the next two years. Credit ratings agencies ICRA, India Ratings and Crisil all forecast relatively low demand for cement compared to a decade-high of 13% in the 2019 – 2020 period, according to the Press Trust of India. Cement production rose by 0.7% year-on-year in the first nine months of the 2019 – 2020 period. However, production growth has hastened since then. The ratings agencies offer different outlooks on anticipated profits look forward.

India: New MD and CEOs for LafargeHolcim subsidiaries

Bimlendra Jha, Managing Director and CEO of Ambuja Cement, a member of LafargeHolcim, has left the company to pursue other interests. The company has appointed Neeraj Akhoury as MD and CEO with effect from 21 February 2020. His appointment is subject to the approval of the shareholders.

LafargeHolcim's other Indian subsidiary, ACC, which is in the process of merging with Ambuja, has promoted its chief commercial officer Sridhar Balakrishnan to the position of MD and CEO.

Australia: Adelaide Brighton's profit flops

Adelaide Brighton's profit in 2019 was US\$31.1m, down by 74% from US\$122m in 2018. Sales were down by 7% to US\$997m from US\$1.07bn. Adelaide Brighton chairman Raymond Barro explained that 'increased competition and softer demand for construction materials' locally impacted revenue and earnings, which he said were unable to offset 'cost pressures across sea freight, transport and raw materials.'

Australia: Boral sees 40% fall in profit in 2019

Boral's profit during the first half of its fiscal year (1 July 2019 – 31 December 2019) declined by 40% to US\$90.4m from US\$151m for the period a year earlier. Boral said that this was due to higher costs and weak housing activity in Australia and South Korea. It was also affected by the costs of transactions between its USG-Boral joint-venture partner USG and Knauf, which bought USG in 2019, along with its interest in USG-Boral.



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Uzbekistan: Environmental committee suspends SingLida plant operation

The State Committee on Ecology and Environmental Protection (SCEEP) has suspended operations at SingLida's 0.1Mt/yr integrated Ahtachi plant in Andijan region. Trend News has reported that, following an audit of clinker production between 12 February 2019 and 21 February 2019, the cyclones had failed to meet lawful standards of dust collection. Rates varied between 53% and 61% dust collection, compared to a design capacity of 100%. The government body said that it had given 'instructions for prompt elimination of deficiencies and reduction of pollutant emissions into the air,' and has suspended operations of the clinker line and mill until such a time as the problem is resolved.

Azerbaijan: January volumes decline by 24% year-on-year

Azerbaijan produced 0.19Mt of cement in January 2020, down by 24% from 0.25Mt in January 2019. Trend News Agency has reported that construction companies are using concrete with a lower cement factor and more bricks. Azerbaijan produced building materials worth US\$30.8m, up by 35% from US\$22.8m in January 2019.

India: Ambuja's profit falls by 48% year-on-year

LafargeHolcim-owned Ambuja Cement's consolidated net profit almost halved to US\$100.4m during the three months to 31 December 2019, from US\$191.4m in the three months to 31 December 2018. Due to the 2018 result having been boosted by a one-off benefit of US\$121.5m, underlying operating profit has improved year-on-year. Ambuja's revenue from operations was up by 6% to US\$992m from US\$936m.



Afghanistan: Ghorī Cement achieves 0.2Mt/yr capacity

Ghorī Cement says that it has produced 18,600t of cement in January 2020, up by 400% from 3720t in January 2019. This would give the plant an annual production rate of 0.22Mt/yr, following 'operational reforms and modernisation of spare parts.' Arab News has reported that plans for the replacement of Ghorī Cement's Ghorī, Pul-e-Khumri, cement plant with a new 0.4Mt/yr plant were interrupted by on-going civil strife in the region, north of the Afghan capital Kabul. Ghorī cement plant general manager Riazudin Sharifi said, "Efforts are underway to further improve the capacity of the plant."

Tajikistan: Residential construction up by 24%

Builders completed the construction of 1.36Mm² of multi-storey housing in Tajikistan in 2019, up by 24% from 1.10Mm² in 2018. Tajikistan Newslines has reported that all residential construction concrete comes from domestically-produced cement. Tajikistan produced 4.2Mt of cement in 2019 - up by 11% from 1.8Mt in 2018 - exporting 1.5Mt. It imported 20,000t, primarily of white cement.

Australia: Queensland quarries come under safety scrutiny

A report commissioned by the Queensland Ministry of Mines has investigated the causes of all 47 deaths in mines and quarries in the state between 2000 and 2019, concluding that systemic, organisational, supervision or training failures caused the deaths in almost all cases. The report proposed that the state government should require quarry operators to use the Serious Accident Frequency Rate (SAFR) as their metric for health and safety monitoring, calling the Lost Time Injury Frequency Rate (LTIFR) unreliable because it is prone to manipulation, being "a measure of how the industry manages injuries after they have occurred. It is possible, therefore, to reduce the LTIFR without making the industry safer," said the report's author Sean Brady.

In the Australian 2019 financial year ending 31 July 2019, six people died in Queensland's quarries and mines.

Pakistan: Fauji Cement's three-month profit falls

Fauji Cement has reported a profit of US\$1.23m in the second quarter of the 2020 fiscal year, between 1 October 2019 and 31 December 2019. This corresponds to a drop of 82% year-on-year from US\$6.83m in the corresponding period of Pakistan's 2019 fiscal year. The Express Tribune newspaper attributed the plunge to currency depreciation, lower retention prices and higher electricity tariffs. Sales in the three months to 31 December 2019 were US\$34.4m, up by 5.5% year-on-year from US\$32.6m to 31 December 2018.



Tanzania: Manyara Cement plans 0.2Mt/yr cement plant

Manyara Cement has shared plans for a 0.2Mt/yr integrated cement plant in Hanang district, for which it has already acquired limestone and pumice extraction licences for sites around Mount Hanang. The plant will use a vertical shaft kiln. The plant will sell cement on the northern Tanzanian and southern Kenyan markets.

South Africa: PPC upgrades George Depot

PPC has reported that it has invested US\$548,000 in the construction and installation of a pneumatic offloading facility including a 250t silo at its George Depot cement terminal in the Western Cape. The company said that this 'allows the business to receive cement by rail, improving its turnaround to customers without compromising quality.'

Algeria: Successful test of new kiln at Chlef plant

Fives has reported that it has installed and produced a batch of clinker with a new 6000t/day FCB kiln line at Entreprise des Ciments et Dérivés d'El Chellif (ECDE)'s integrated 1.0Mt/yr Chlef cement plant. When commissioned, the line will bring the plant's capacity to 3.2Mt/yr.

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Oman: Oman Cement plant to burn waste tyres

Oman Environmental Services Holding Company (Be'ah) has signed an agreement with Oman Cement Company, in which Be'ah will supply expired tyres to the cement producer for use as an alternative fuel.

The agreement was signed by Eng Tariq bin Ali al Amri, CEO of Be'ah, and Eng Salem bin Abdullah al Hajri, CEO of Oman Cement Company. Eng Hajri reported that the agreement will contribute to the national economy, diverting 30,000t of waste tyres from landfill.

Congo: Dangote to begin exports from Congo

Nigeria-based Dangote Cement has announced that it will begin shipping cement produced at its 1.5Mt/yr integrated Mfila plant in Bouenza region, Congo, to other African countries.

Reuters News has reported that Dangote Cement's Nigerian exports fell by 41% to 0.5Mt in 2019 from 0.8Mt in 2018. Dangote Cement CEO Joseph Makoju attributed the reduction to the government's closure of Nigeria's border with Benin, part of a crackdown on smuggling and the illegal weapons trade.

Algeria: Beni Saf targets 45,000t/yr clinker exports

Public Industrial Cement Group of Algeria (GICA) subsidiary Beni Saf has announced a target of 45,000t in 2020 of clinker exported to Africa. Algérie Presse Service has reported that the recipient countries include those in the sub-Saharan region.



Madagascar: Raysut announces plant plans

Onan-based Raysut Cement has shared plans for a US\$30m, 0.75Mt/yr clinker grinding plant in Toamasina, Madagascar. L'Express de Madagascar newspaper has reported that Raysut Cement will begin construction in June 2020 and enter production at the facility by mid-2022 at the latest. Raysut Cement Indian Ocean regional director Pascal Naud said, "Madagascar's per-capita cement consumption is around 22kg/yr, compared to 125kg/yr on average in sub-Saharan countries. It is therefore a market with high potential for this investment."

The group said it is currently 'developing an external growth strategy by investing in several African countries such as Kenya and Uganda.' On 2 February 2020 Raysut Cement entered into talks with Switzerland-based Cimentia for acquisition of the latter's 75% stake in the latter's LH Maldives cement terminal.

Gabon: Dangote plans grinding plant

Dangote Cement has shared plans for the construction of a 1.1Mt/yr grinding plant on a greenfield site near the New Owendo International Port in Owendo, Komo-Mondah department. Dangote Cement has stated that the US\$75m facility, scheduled for completion in early-2021, will 'close the cement production gap in this emerging country.' It will supply cement to Gabon and the central African region.

Tunisia: Votorantim places Fons Technology order

Brazil's Votorantim Cimentos has ordered a clinker cooler and clinker roller crushers from Turkey's Fons Technology International for an upgrade to its 1.2Mt/yr integrated Jbel Oust plant in Tunisia. Votorantim has been present in Tunisia since 2012 where it sells cement under the Jbel Oust brand.

Nigeria: Dangote Cement shares results

Dangote Cement's profit in 2019 was US\$685m, down by 17% from US\$822m in 2018. Sales were US\$2.46bn, down by 1.1% year-on-year from US\$2.49bn in 2018. "Export sales were affected by the Nigeria-Benin border closure in the second half of 2019. Looking ahead, I expect an increase in volumes in 2020 as we commence clinker exports via shipping from Nigeria," said Dangote Cement CEO Joe Makoju. The group reported pan-African volume growth to 9.4Mt/yr, noting a 94% growth in Tanzanian volumes, aided by the commencement of operations at a temporary gas power plant in the East African country.

Retiring from the company, Makoju said, "I am proud to have watched Dangote Cement grow from a local producer back in 2007 to a major force in global cement production. Dangote Cement has eliminated Nigeria's dependence on imported cement." He wished his successor Michel Puchercos all the best in his new role.

Nigeria: Lafarge Africa consultant brought coronavirus to Nigeria

The Lagos State Commissioner for Health Akin Abayomi has said that an Italian national employed as a consultant by Lafarge Africa was Nigeria's 'patient zero' in the international coronavirus outbreak. The country has yet to record any further cases. Vanguard newspaper has reported that the consultant, who flew to Lagos from Milan via Istanbul and visited Lafarge Africa's 3.9Mt/yr integrated Ewekoro plant in Ewekoro, Ogun State, before staying at a guesthouse there, has been confined to a treatment facility in Yaba, Lagos State. Abayomi praised Ewekoro medics for isolating the man after he began to show symptoms during his second day in the country.

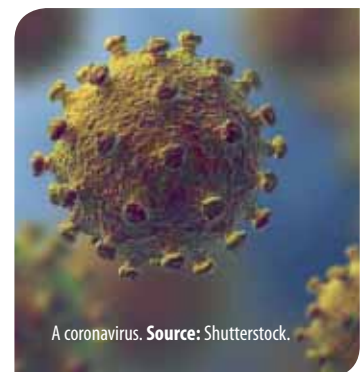
Egypt: Alexandria Portland narrows losses

Alexandria Portland Cement has reduced its margin of loss by 40% year-on-year to US\$15.2m in 2019 from US\$25.3m in 2018.

Greece-based Titan Cement is the 89% owner of Alexandria Portland Cement via its subsidiary Alexandria Development Ltd.

Kenya: EAPCC sees rise in losses in 2019

East African Portland Cement Company (EAPCC) has recorded losses of US\$16.2m in 2019, up by 0.6% from US\$16.1m in 2018, in spite of sales growth over the period of 8.0% year-on-year to US\$14.7m from US\$13.6m. Reuters has reported that the company will not be paying a dividend to its shareholders.



A coronavirus. Source: Shutterstock.



These pages give *Global Cement Magazine's* monthly review of global cement prices - in US\$ for easy comparison. Some price information is only available to subscribers to *Global Cement Magazine*. Subscribe on Page 72. In this issue subscribers receive extra price information from Pakistan, Malaysia, Nigeria, India, Mali, Kenya and Bangladesh.

Prices are for metric tonnes unless otherwise stated. US\$ conversions from local currencies are correct at the time of original publication.

China: All-China 42.5 grade cement prices from *sunsirs.com*. 10 March 2020 = US\$70.78/t. "Average cement prices in China may increase in 2020 as demand could quickly recover after the coronavirus epidemic," depleting the relatively low inventories, according to Dow Jones, which added, "A supply shortage may even emerge in East China in the upcoming peak season."

Colombia: Cementos Argos has reported that its FOB prices in Colombia increased by 16% year-on-year in the fourth quarter of 2019 compared to the same period of 2018.

EU ETS: CO₂ emissions permits cost Euro23.89/t on 11 March 2020, 0.4% increase week-on-week from Euro23.80/t on 4 March 2020, a 2.8% fall month-on-month from Euro23.25/t on 4 February 2020 and a 7.7% increase year-on-year from Euro22.18/t on 11 March 2019.

Egypt: Ordinary Portland cement prices as at 10 March 2020: Arabian Cement Co (Al Mosalah) = US\$50.76/t; Arabian Cement Co (Al Nasr) = US\$49.49/t; Cemex (Al Fahd) = US\$47.71/t; Minya Portland Cement (Minya) = US\$49.48/t; Minya Portland Cement (Horus) = US\$49.17/t; El Nahda Cement (Al Sakhras) = US\$49.17/t; Lafarge (Al Makhssous) = US\$49.62/t; Medcom Aswan Cement (Aswan) =

US\$49.28/t; Arish Cement (Alaskary) = US\$49.17/t; Sinai Cement (Sinai) = US\$48.98/t; Suez Cement (Al Suez) = US\$49.95/t; Helwan Cement (Helwan) = US\$50.59/t; Misr Beni Suef = US\$50.78/t; El Sewedy Cement = US\$50.90/t; Misr Cement Qena (Al Masalah) = US\$49.28/t; Al Watania Company for Cement (Beni Suef) = US\$49.28/t.

White cement prices as at 10 March 2020: Sinai White Cement (Alabid Elnada) = US\$159.03/t; Sinai White Cement (Super Sinai) = US\$156.49/t; El Menya Cement (Super Royal) = US\$152.10/t; El Menya Cement (Royal Elada) = US\$154.67/t; Menya Helwan Cement (Alwaha Alabiad) = US\$154.27/t.

Blended cement prices as at 10 March 2020: Sinai Cement (Al Nakheel) = US\$45.48/t; El Menya Cement (Al Omran) = US\$45.48/t; Helwan Cement (Al Waha) = US\$46.43/t. Sulphate-resistant cement prices as at 10 March 2020: Cemex (Al Mukawem) = US\$52.47/t; Minya Portland Cement (Asec Sea Water) = US\$51.85/t; Lafarge (Kaher Al Behar) = US\$52.47/t; Suez Cement (Al Suez Sea Water) = US\$52.17/t; El Sewedy Cement (El Sewedy Al Mukawem) = US\$52.47/t.

Ethiopia: The Ethiopian government has lifted the ban on foreign investment in the domestic cement sector in an effort to reduce local cement prices, which rose in 2019 on the back of irregular power supplies.

Samuel Halala, director general of the Chemical and Construction Inputs Industry Development Institute, told local press that, "The cement factories are not using their production capacity by more than 50% due to various constraints." Erratic power supply, shortage of foreign currency and spare parts are the major contributing factors towards low productivity.

Do you have your finger on the cement price pulse where you are?
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The economics of fear... and the importance of *effective* action.

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



In his inauguration speech as 32nd President of the United States, Franklin D. Roosevelt said the following: “the only thing we have to fear is fear itself — nameless, unreasoning, unjustified terror which paralyzes needed efforts to convert retreat into advance.” His New Deal - a muscular package of public spending and make-work programmes aimed at the Great Depression - dragged the country out of the economic doldrums and back into robust economic health during the next six years.

showed that it was not. The markets promptly fell 10%, one of the worst days for stock markets for several decades, with Mr Trump’s 11 minute address credited with eliminating US\$500bn of value from global exchanges. Whether Mr Trump and Mr Pence can between them take effective action to stave off an epidemic in the US remains to be seen.

Some ‘facts’

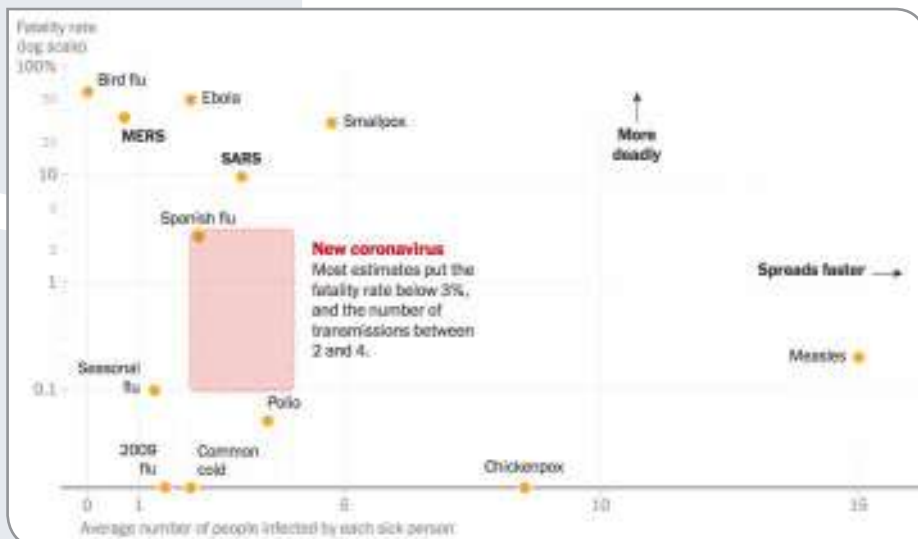
In his opening remarks at the March 3 media briefing on COVID-19, WHO Director-General Dr Tedros Adhanom Ghebreyesus stated: “Globally, about 3.4% of reported COVID-19 cases have died. By comparison, seasonal flu generally kills far fewer than 1% of those infected.” Later studies¹ have suggested an overall mortality rate of between 1-3%. Additionally, the incubation period (time from exposure to the development of symptoms) of the virus is estimated by the WHO to be between 2 and 10 days.

The transmissibility (how rapidly the disease spreads) of a virus is indicated by its reproductive number (R_0 , pronounced R-nought or r-zero), which represents the average number of people to which a single infected person will transmit the virus. The WHO estimated on January 23 that the R_0 for coronavirus to have been 1.4 and 2.5. Another study² suggests that the earlier number is an underestimate and that the true value is likely to be around 3. Critically, the transmissibility can be influenced by our own behaviour.

Rapidly changing situation

As you may have seen in the rest of this month’s magazine, we have taken the usual step of putting on several articles the dates that they were created. This allows you to take into account the level of knowledge of the situation that was available at that time. Please take into account that this column was written on Friday 13 March (unlucky for some). By the time you read this (in digital or print version), the situation will have changed dramatically. Despite this rapidly changing scene, it is of some use to look at how the coronavirus outbreak might develop, and how it might end.

China has managed to subdue its own outbreak by quarantining tens of millions of people. It is clear, given the size of the ‘official’ outbreak, that the virus was left to spread unhindered for too long - certainly



Above: Comparison of mortality rate and transmissibility of novel coronavirus and other epidemic pathogens.

Source: <https://www.nytimes.com/interactive/2020/world/asia/china-coronavirus-contain.html>

Note log-scale on mortality rate.

It is perhaps worthwhile looking back at FDR’s snappy line on ‘fear,’ now that we all seem to be staring into an abyss caused by the coronavirus pandemic. That’s because, despite the relatively mild effects for most people of the SARS-CoV-2 virus (which is in the same family as the common cold and SARS, and which causes the disease COVID-19), the impact of the outbreak has been magnified worldwide by fear. The amplifying effects of fear can clearly be seen in a recent example.

When on 11 March Mr Trump announced a ban on Europeans travelling to the US, it seemed not to be on epidemiological grounds, since most experts have suggested that such a ban will have next to no effect on the eventual spread of the virus in the US. However, the move seems to have backfired in spectacular fashion and instead of reassuring the markets that the administration was ready to take effective action, it instead



for several weeks after the first cases emerged in mid-November 2019. Arguably, China took about three weeks from finally realising the magnitude of the situation and taking robust action to seeing a serious reduction in daily infection rates. Its tough measures appear to be bringing the situation under control (see the graph, right).

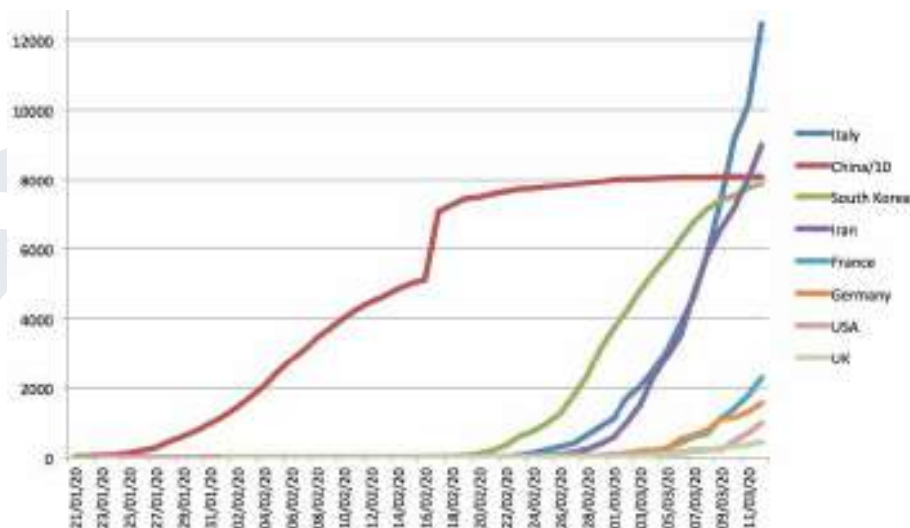
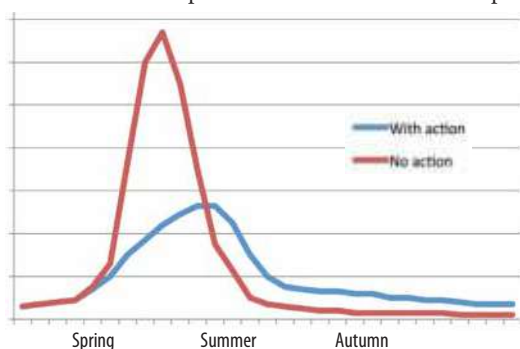
Italy's outbreak was also allowed to fester for weeks before it was properly recognised, and before the government of the country first quarantined the north of the country, and then finally the whole of the country. Despite the quarantine, there is currently no sign of the numbers being infected dropping on a day-to-day basis, although that will inevitably change.

South Korea's outbreak has had a different course to these other two countries: It has largely been confined to a particular group of people, and it has not infected a significantly wider cohort. The Koreans are now testing more than 20,000 people per day for the virus, in the hopes of identifying individuals or hotspots, before the virus can be passed on. (By the time that the Koreans had tested 100,000 people, the UK had tested 25,000, and the US fewer than 5000³). South Korea has already started to see the cumulative number of cases in the country plateauing, suggesting that it is on top of the transmission of the virus. It managed to do this within around 21 days from the first significant number of infections.

France, Germany and Spain appear to be 10-14 days 'behind' where Italy was. The UK seems to be a further week behind (but the government has admitted that the 'real' number of infections is likely to be 10 times higher than the official statistics, a situation that is likely to be mirrored in every country in the world without blanket testing). However, it is not inevitable that each epidemic will have the same trajectory as in Italy.

The epidemic will die out when the number of people that the virus is passed on to by each person infected (the transmissability) decreases below 1. Whether through washing one's hands, good respiratory hygiene, self-isolation, enforced quarantine (or an effective vaccine, which is not likely to arrive in 2020), if fewer people are infected than currently have the virus, then the epidemic will be on its way to being over. We have it in our power to end this situation.

Will we use this power? The answer seems to be 'per-



Above: Progress of individual country epidemics (total infected) with time (note China's numbers are divided by ten for easier comparison).

Data from <https://ourworldindata.org/coronavirus-source-data>

haps.' Those countries that are prepared to take swift and effective action will (as shown by South Korea) be able to end their own national epidemics. It is clear that before the situation improves, every country will have to take significantly tougher decisions with regards to onwards transmission of the virus. It could be that one country manages to 'beat' the virus, but at the same time, through not taking effective measures against it, the epidemic could be ongoing in other countries (or States). Despite the WHO declaring the situation a pandemic, I see this as many individual epidemics, each one with its own characteristics.

Mohamed El-Erian, the highly respected chief economist of insurer Allianz, said⁴ that "The advanced economies are now likely to feel the full force of economic sudden stops that destroy both supply and demand at the same time. The collapse in economic activity risks being amplified by the economics of fear, uncertainty and adverse economic-financial feedback loops. I believe there is a high probability of a global recession."

Aside from a general economic downturn, the coronavirus pandemic will affect the cement industry in other ways, for example:

- Concrete transport and placement labour shortages due to quarantine and illness;
- Delays in construction planning and contracting due to heightened risk aversion and lack of labour;
- Stressed supply chains for some raw materials and equipment spare parts;
- Labour shortages at cement plants.

Infection is not inevitable: Please take precautions and stay safe. *Good luck.*



1 <https://www.bbc.co.uk/news/health-5167473>

2 <https://www.sciencedaily.com/releases/2020/02/20200214111519.htm>

3 <https://www.theatlantic.com/health/archive/2020/03/coronavirus-testing-numbers/607714/>

4 <https://www.theguardian.com/world/2020/mar/12/coronavirus-global-recession-fears-intensify-as-trumps-europe-ban-fails-to-reassure>

Left: Forecast of the number of new infections in the UK, with and without preventative action. No scale given for 'y' axis.

Source: UK Department of Health



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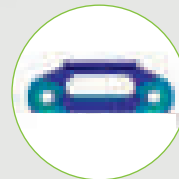
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