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Contents

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Ad Index

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ALL MILL TYPES FROM A SINGLE SOURCE

SOLID FUELS

CEMENT RAW MATERIAL

CEMENT & BLAST FURNACE SLAG

LM 41.4 D
Silifke, Turkey

LM 56.6
Silifke, Turkey

LM 56.3+3 C
Silifke, Turkey

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• Ariyalur, India • Batalurpadu, India • Baturaja, Indonesia • Citeureup, Indonesia
• Dalmiapuram, India • Dingui, Congo • Gümüşhane, Turkey • Hon Chong, Vietnam
• Ibese, Nigeria • Itsoseng, South Africa • Kotputli, India • Maros, Indonesia
• Menagasha, Ethiopia • Mtwara, Tanzania • Nallalingayapalli, India • Ndola,
Zambia • Nordeste, Brazil • Obajana, Nigeria • Piura, Peru • Pout, Senegal
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On the cover...

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Dear readers,

Welcome to the February 2020 issue of *Global Cement Magazine* - the world's most widely-read cement magazine! This issue will be distributed at the forthcoming *Global CemFuels Conference & Exhibition* - the world's leading event for alternative fuels for cement and lime - in Paphos, Cyprus on 19-20 February 2020. To tie in with the location of this event, this issue's regional report heads to Cyprus, as well as five other countries in the Levant region (Page 62). Pre-registered delegates will also visit the Vassiliko Cement plant on 21 February 2020. Find out more about the plant on Page 66. Don't worry if you are not yet registered for the event: visit www.cemfuels.com for more information and to register.

This February 2020 issue also has a strong alternative fuels and pyroprocessing focus, with contributions on coal substitutes (Page 12), RDF preparation (Page 22), thermographics (Page 24), refractory installation (Page 26) and explosion protection (Page 28), as well as a report from alternative fuel handling expert Di Matteo Group on the occasion of its 50th Anniversary (Page 18). Elsewhere, the pyroprocess theme continues with our in-depth discussion on clinker cooler optimisation with industry expert Hartmut Meyer (Page 30). There's also a dust mitigation case-study from Germany (Page 36).

This issue also includes a wide-ranging discussion with Angus Maclean from consulting firm Proudfoot on the major trends and challenges that cement producers are likely to face in the 2020s. Chief among these will be an increasingly narrow tightrope for producers to walk. On one side, producers have to make money to pay their shareholders and survive. On the other, ever more stringent environmental regulations will combine in a perfect storm that accelerates margin erosion. Early movers in this area are already at an advantage. Turn to Page 12 to see how to catch up.

Enjoy the issue!

P Edwards

Peter Edwards
Editor



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Features

12 Meeting the challenges of the 2020s

Angus Maclean from consulting firm Proudfoot gives his take on the cement sector's opportunities and risks in the 2020s in our exclusive interview.

16 10 steps to a renewable coal substitute

Follow these 10 simple steps to make your own 'coal'.

Technical

18 50 years of Italian curiosity and German precision

The Di Matteo Group celebrates half a century.

22 CENOSA boosts waste-derived fuel production by 700%

A Honduran alternative fuels case-study.

24 Total thermographic monitoring of rotary kilns

The benefits of thermal kiln cameras.

26 Brick by brick

The many advantages of bricking machines.

28 Preventative explosion protection upgrade

A Colombian explosion protection upgrade.

30 Stay cool

Consultant Hartmut Meyer opens the lid on coolers.

36 From dust 'til none

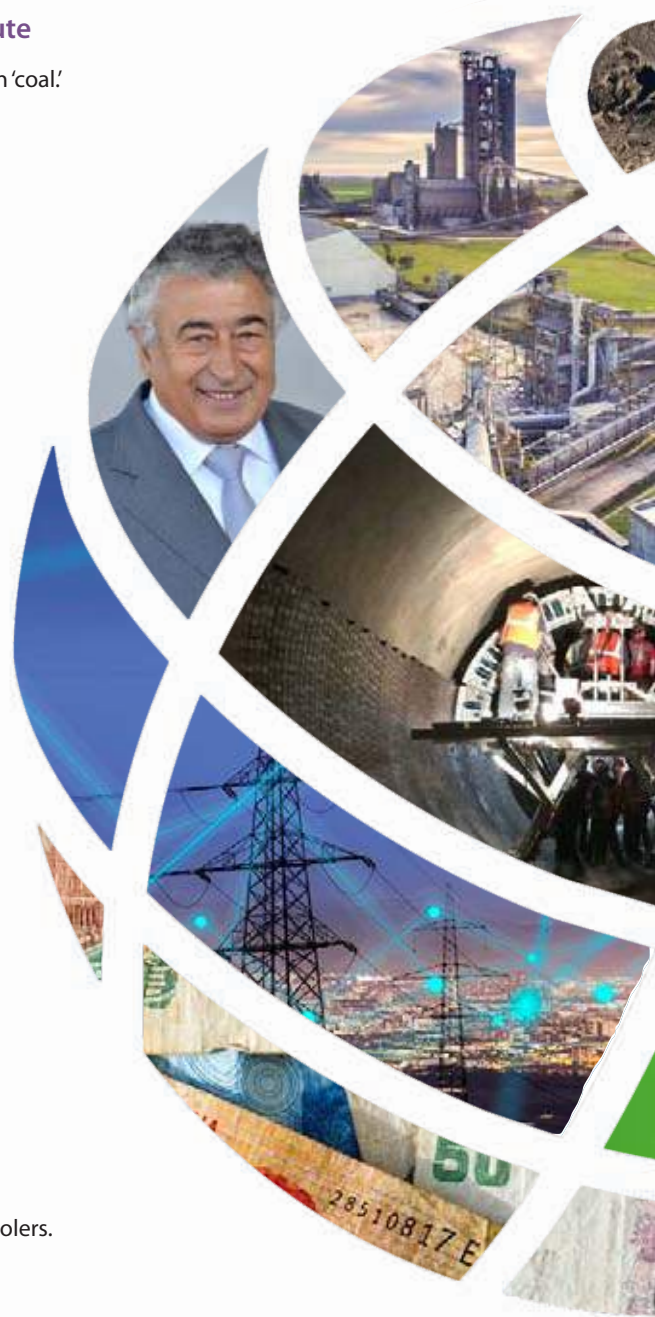
ScrapeTec presents a dust control case-study from Germany.

38 AUMUND commits to quality with in-house chains

AUMUND has given its in-house R&D team its highest priority mandate ever.

39 Concrete news

40 Products & Contracts





Europe

42 News

46 Zement in Germany

Global Cement turns its attention to the German cement sector.

Americas

52 News

56 Cement plant tours as a relationship builder

Titan America's Don Ingrassano highlights the benefits of opening up your cement plant.

Asia

58 News

Middle East & Africa

60 News

62 Cement in the Levant

A look at the cement industries of Cyprus, Israel, Jordan, Lebanon, Palestine and Syria.

66 Plant report: Vassiliko Cement

George Americanos, plant manager at Vassiliko Cement, reports on Europe's largest cement kiln.

Regulars & Comment

70 Global Cement prices

Cement prices from around the world. Subscribers receive extra information.

72 Subscriptions

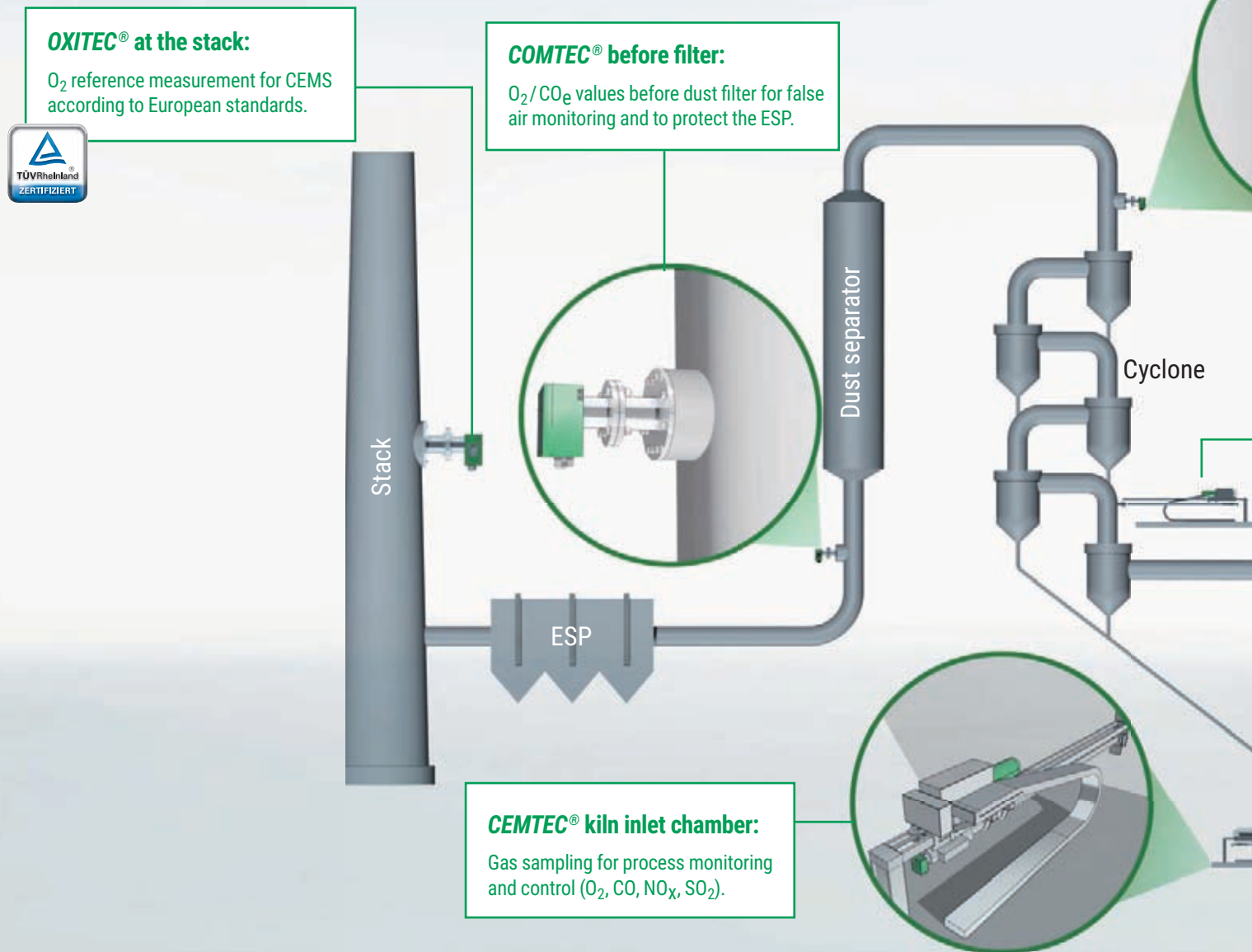
73 The Last Word

74 Advertiser Index & future issues



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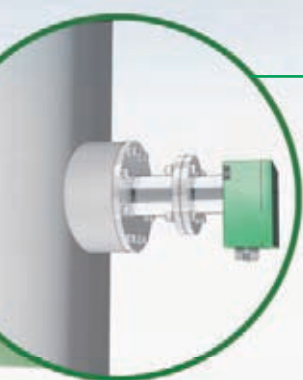
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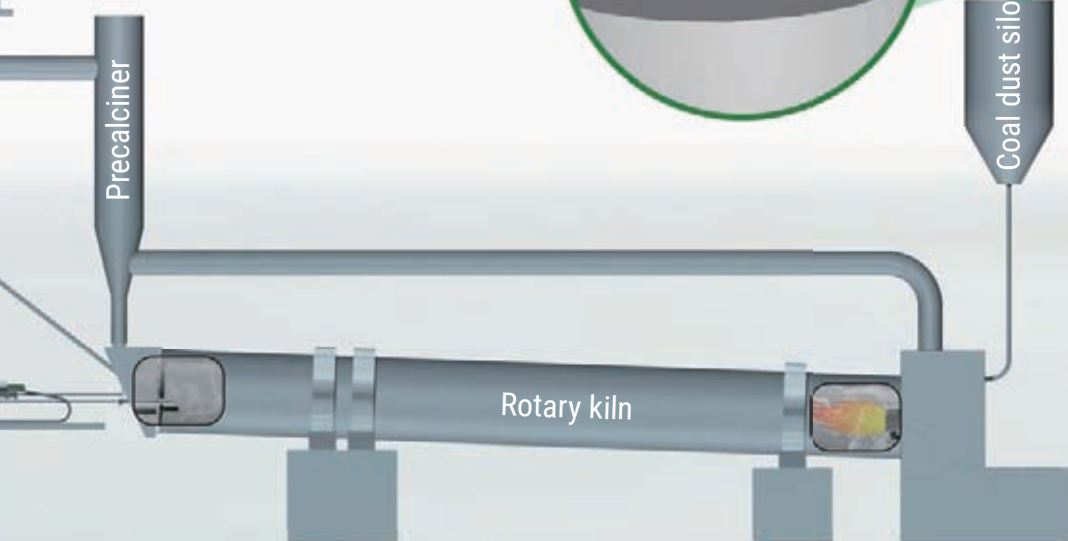
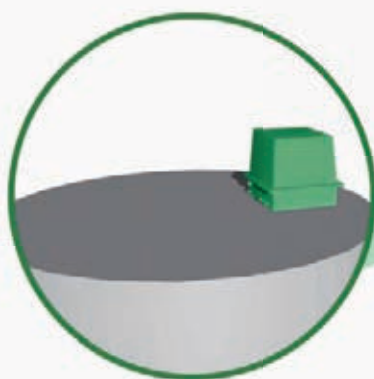
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Contents

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Ad Index

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Interview by Peter Edwards, Global Cement Magazine

Meeting the challenges of the 2020s

Angus Maclean from consulting firm Proudfoot gives his take on the cement sector's opportunities and risks of the 2020s...



Above: Angus Maclean, Proudfoot.

Global Cement (GC): What is the biggest challenge to cement producers' success in the 2020s?

Angus Maclean (AM): The largest challenge for cement businesses in the 2020s will be continuing to provide strong shareholder returns while operating in an increasingly tight regulatory environment. While this will be most notable in developed markets, particularly Europe, there will be tighter restrictions everywhere. The fuels that can be used, 'traditional' emissions limits and clinker factor will come into focus like never before. CO₂ reduction management will be a major factor too, not just a 'nice to have.'

Over the next 10 years we will see a surprisingly high number of older plants become obsolete on a technical front. At the end of the day, these plants make money from producing cement. If they cannot perform to the new standards, they will become a burden and will be closed. The trick for producers is to optimise their inventory now so they're not caught out later.

GC: What can producers do to handle these risks?

AM: There are two angles we can use to think about walking this increasingly tricky tightrope. First is the workforce. Put bluntly, the global cement workforce is not well prepared for the future. Not only is it increasingly hitting retirement age, but there is no new blood coming in. The cement industry, whether it knows it or not, is in a period of intense resource competition for workers of all types. Indeed, some US ready-mix concrete firms have already reported lower sales that can be directly attributed to fewer drivers.

This issue will only become more pronounced in the future as roles increase in complexity. Newer workers, for example data scientists and networking /IoT experts, are vital if cement producers are to respond effectively to all kinds of new challenges. Indeed, companies are now rushing to digitise to minimise the human input elsewhere. Of course, every other sector actively recruits these same workers. Some sectors, finance, insurers, retailers, aerospace, power, may be in a position to outcompete the cement industry in terms of what they're willing to pay and some of them already have a head start. It's going to be very tough.

Right: The 2Mt/yr Loma Negra (Inter cement) cement plant at Olavarria, Argentina. **Source:** Diego Hall, entrant to the Global Cement Photography Competition.





The second angle is on the technical side. There are things to learn from other industries. For example: A low cost airline might only buy 737s or A319s and keep them for 6-7 years before replacement. Maintenance costs are minimal with such an approach, not just because the planes are always nearly new but because they are identical across the fleet. If a cement producer took the bold step of applying that kind of approach to the cement sector, they could stand to gain quite significantly. Changing equipment every 5-10 years might seem wasteful but the plants would always be running at, or very close to, the best available technology in terms of process efficiency, emissions, digitisation and more.

GC: Would that feed into the trend we're seeing toward centralised clinker production and regional grinding plants?

AM: Indeed it could - A huge clinker plant, perhaps even larger than the 12-13Mt/yr monsters seen in Asia, could service a large number of grinding plants. The grinding element would be operated akin to the low-cost airline model. This is potentially very good news for manufacturers of modular grinding plants!

GC: What other operational challenges will the 2020s bring?

AM: Companies will have to deal with changes to the cement product itself. It is clear to me that there will be a fairly major transition to cements containing calcined clay, the kind of which have been promoted extensively by the LC3 project. This means 50% clinker or less, which changes the amount of clinker a given group needs to produce, while increasing the amount of time and attention it spends on securing other materials.

Elsewhere, some players are taking the approach that the end product is not cement, but a modular concrete block, not unlike LEGO blocks. There will be opportunities for cement producers to move up and down the value chain, which will mean increased concrete recycling, alternative raw materials and more participation by 'cement producers' at the building site itself. A common theme, whatever product is being made, will be the elimination of human labour wherever possible through digitisation. In the future this could even extend to robotic site 'workers.'

GC: Is digitisation really a 'golden bullet' for cement plant optimisation?

AM: The cost of digitisation, particularly cloud computing, have now dropped to the point that they are accessible to most cement plants. Cloud-based solutions can compete very favourably with established control and optimisation methods, so the potential



"Only in the past 6-9 months have producers woken up to the fact that their systems are all disconnected from each other."

Above: New skills are needed to help cement producers navigate the 2020s... but are there enough to go round?

ongoing savings are massive, even before the optimisation benefits are considered. Cement players are still behind the curve on digitisation despite fairly significant efforts over the past few years towards digitisation and computer / AI control. This includes fleet management in the quarry, dispatch from the plant and cloud computing approaches for the kiln, mills and other parts of the plant.

Only in the past 6-9 months, however, have producers woken up to the fact that these systems are all disconnected from each other. Their business knowledge is all over the place and nobody can have full oversight. The true benefits of digitisation cannot be realised until the producer can see the full picture. There are also issues surrounding scalability of digital solutions. Something that works in a particular plant designed in the 2000s may translate badly to one from the 1970s.

To show how much of an undertaking this can be, even seemingly innocuous tasks like simplifying a spare parts list is a huge headache. Within a single company there will be different numbering systems for parts at different plants. Translating between them is inefficient, but sorting it out is also really expensive and time consuming. What Proudfoot is doing right now is helping producers, of all sizes, gain control of their chaotic IT systems.

GC: Which kind of cement producers are best placed to handle all of the challenges you've described above?

AM: There are advantages and disadvantages for cement producers that vary depending on their



Above: Could mammoth clinker plants combined with local grinding plants be an effective cement sector strategy in the 2020s?

Source: Krzysztof Burek, Caspi Cement (HeidelbergCement).

location and their size and it's difficult to say that one set of advantages/disadvantages is better or worse than any other. Large producers are often characterised as being hard to change, but there are notable examples of fantastic innovation driven by central funding. Mid-size regional players are well placed to adapt rapidly to changing circumstances while not being reliant on any given market. There are examples of this in the Mediterranean region, for example CIMAT in north-west Africa and Cem'In'Eu in the EU. The risk in this position is biting off more than you can chew. Smaller players know their own markets intimately, but may find themselves under pressure to sell up to bigger players.

GC: Will consolidation, driven by business and financial optimisation, speed up or slow down in the 2020s?

AM: I think consolidation will continue at the same rate as in the late 2010s for the foreseeable future. LafargeHolcim has sold many assets recently and may continue in that vein. CRH is selling various chunks of the business and Cemex is offloading several non-core assets too. Just in January 2020 it announced the sale of a raft of UK concrete assets. We can expect a lot more of the same, from these players and more besides.

GC: How can Proudfoot help producers meet the challenges of the 2020s?

AM: Proudfoot is working with many of the Top 50 cement firms to identify the operating methodologies they aspire to achieve. We do this with Target Operating Models (TOMs). These develop and ensure that behaviours, underpinned by processes and management tools, are optimised, from 'quarry-to-lorry' across a cement producer's business. They go beyond simply optimising each cement plant at a local level, instead defining *how* each plant should be optimised uniformly across the group. Such approaches can target all areas of the

technical, financial, HR and environmental aspects of cement production. We work with the producer to identify where it is weak or strong in different areas, to improve a whole host of metrics relative to whatever baseline it deems appropriate.

The first TOMs Proudfoot implemented were at the largest producers. However, we now increasingly work with smaller and smaller producers. At the same time the complexity of TOMs is also increasing. They will gain only in importance in the future as the margins between success and failure in the cement sector become narrower.

As a next step, we now integrate TOMs with digitisation and changes to producers' IoT systems added on top. This really pins down those areas with fast payback. Remember, digitisation will not always bring benefits. Recently, a producer wanted to optimise fleet movements in the quarry. It was really looking forward to the savings but they did not materialise. There was so much information that it couldn't be processed to any real benefit.

GC: What comes afterwards, once a TOM has been successfully incorporated?

AM: We're still working on what comes next because TOMs are still in their infancy! They are a continuous process. First, they are designed and developed. Then they are assessed at a specific site or number of sites. Finally they are rolled out to different plants, usually over a multi-year timeframe. Only then can improvement begin. Once improvements have been made, the TOM should be refined further to drive further improvements and incorporate changing demands, for example CO₂ emissions and digitisation. The most advanced operators are now reaching this point. TOMs have a very long way to run: There will always be something new to add in to the mix.

GC: Do you think that cement producers will be able to run TOMs on their own in the future, with no input from Proudfoot?

AM: This is possible but it will depend on how the producer is structured internally. Some prefer to have central expertise and some prefer to take external advice. The smaller and regional firms, plus some multinationals, will need services like those supplied by Proudfoot well into the future. Some of the larger ones may well decide to replicate the function provided by Proudfoot in-house, as they have done with engineering arms in the past.

GC: Thank you for your time today.

AM: You are very welcome indeed!



Read more about TOMs in the June 2018 issue of Global Cement Magazine.

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Frank Harris, Helvellyn Group

10 steps to a renewable coal substitute

Coal may be on its way out of cement kilns - but is the perfect renewable substitute just around the corner?



Above: Frank Harris, CEO of Helvellyn Group.

In the event that you find yourself operating a large industrial plant that requires a high thermal input and has been designed around a fuel that is being legislated out of existence, you will find that there are some uncomfortable options open to you.

Initially you may be able to diversify your fuel inputs by utilising biomass and wastes, but you may find that these have a natural ceiling in your plant, above which the technical delivery of fuel, the manner in which it burns and the effect on your plant and product becomes problematic.

Your legislators will discuss carbon capture and storage (CCS) technology, the ultimate benefits of which seem absolute, but the capital investment required together with the operational cost increase makes for uncomfortable reading.

In an ideal world, you would find a direct replacement for your primary fuel, which has the same physical, chemical and combustion properties, with lower lifecycle greenhouse gas, thus relieving the regulatory pressure to spend capital on unproven plant additions. I will tell you how to create this perfect fuel, in 10 simple steps.

Below: Cement producers may have to learn to operate without coal in the near future.



Step 1 – Don't do it

Making a good fuel repeatedly is difficult. You need a really good reason to do it. So, Step 1 is to look for every possible alternative before taking the plunge.

Step 2 – Start at the end

You've got to Step 2, and that means you have been on a journey looking at all sorts of different potential fuels. You will have considered the practical aspects of sourcing, transporting, storing and feeding each fuel to your plant. You will have looked at the combustion properties and maybe you have modelled how they will react in your plant. You will have considered whether to have more than one fuel source and - if so - how they will interact and you will have considered what is left after combustion both in your product and as emissions.

Yet here you are, because you have a plant designed to run on one fuel and, try as you might, no other fuel will work without modification to your plant and, even then, it might only take you part of the way. You need to design a fuel that can work in your plant, but before you do...

Step 3 – Rebuild your plant

Just a thought: if you build a new plant (planning permission notwithstanding) you may be able to utilise more of the alternative fuels you looked at in Step 2!

Step 4 – Get physical

OK, so you need to use your existing plant. There is no other fuel available with the same characteristics as coal. You need to make a fuel. First things first, it has to be able to be stored, handled, ground and delivered to your plant in the same way as coal.

1 - Storage: Will it degrade in sun, rain, snow or ice? Will it leach? Will it absorb water? Will there be microbial growth (and if so, will it heat up)? Will it withstand a vehicle driving over it and shovelling it up?



2 - Handling: what size is the fuel? What shape is the fuel? Does it clog? Does it create dust? Does it maintain form?

3 - Grinding: before you can think about grinding, you'll need to understand how the fuel burns (see Step 5), as this will inform the particle size required which will, in turn, inform the grinding characteristics and how you can achieve them when milling/co-milling with coal.

4 - Delivery: do you have a buffer store? What is the residency time? What delivery practices must be implemented to deal with moisture and the risk of dust?

Step 5 – Ignition

It may seem obvious, but your fuel will need to burn. What is not obvious is *how* it will burn. Less energy means more fuel (more deliveries, more storage, more grinding, more handling, more ash, more maintenance, more emissions).

When you get deeper into the details you will think about combustion time, which will inform your target particle size from grinding/milling, so as to best mimic the combustion properties of coal, despite the material differences.

Step 6 – Cost (Part 1)

Having profiled the physical and thermal properties of the fuel, you will need to start thinking about cost. Presenting a fuel that is more expensive than coal may not be warmly received by your board. While you do not yet know the exact capital expenditure (capex) or operating expenditure (opex) of fuel production, you can estimate that they are going to be quite high.

Step 7 – Raw material

Having done the cost calculations, you have worked out that the raw material needs to be a waste. But you know all of the issues that come with waste-derived fuels, so how do you avoid them? Ultimately, after looking at lots of specifications of generally traded waste-derived fuels you realise that the only way to ensure consistency and quality is to pre-process the feedstock, eliminating all of the unwanted elements that inevitably arise in all waste raw materials.

Step 8 – Production equipment

Now you know the raw material and its shortcomings you can work out your pre-production process equipment that will get you the desired feedstock.

You also know the desired physical and combustion properties of the finished fuel. All you need is a process to take your feedstock through to consistent quality homogeneous fuel. (Hint: I would recommend allowing 5 - 7 years for this part, including laboratory and combustion plant testing).



Above: Helvellyn cement fuel.

Step 9 – Cost (Part 2)

You are nearly there. Now you have a raw material, a process and a consistent finished fuel, you can calculate all of the costs of production (not forgetting the sunk research and development costs) per tonne of fuel.

Step 10 – Protection

You now have a competitive edge that you will want to maintain, so you should patent your process and your finished product globally.

You are also conscious that your product, although mimicking coal, remains a new product, so you should consider getting one of the biggest insurers in the world to underwrite your fuel quality and production capacity as this will give your board a great deal of comfort.

Heading forward

The 2020s will be defined by the progress made against the greenhouse gas emissions reductions targets for 2030. Industrial processes will, inevitably, be put under great pressure to achieve reductions, despite the difficulties they face due to the size and complexity of their processes.

Changing fuel has been a relatively easy win at the start of that journey, but it gets much more difficult from here onwards. Ultimately CCS and partial clinker substitutes will likely come to bear, however, even with CCS, it is unlikely that coal extraction and transport will be politically popular (in most of Europe, at least) by 2030.

Swapping out fossil fuel can still be a quick and inexpensive environmental win that can help to relieve the political pressure. All you need do is follow the 10 steps above to create a fuel that you can use.

Frank Harris is the CEO of Helvellyn Group, a manufacturer of high energy, low impact, renewable coal substitute fuels.





Dr Dominik Aufderheide, Di Matteo Group

50 years of Italian curiosity and German precision: The Di Matteo Group celebrates half a century

The history of the Di Matteo Group now spans half a century. The bulk material handling specialist celebrated its success story with all 250 of its employees at the end of 2019, providing an ideal time to take a look back and reflect on the company's founding, development and current activities as a major player in the alternative fuels sector.



Above: Orlando Di Matteo, the founder of the Di Matteo Group. "The secret behind a successful business is to know when to take risks and learn from your own and others' mistakes along the path. Remain innovative, remain hungry for success. At the end, quality is the best possible business plan."

The story of the Di Matteo Group began in 1961, when its founder, Orlando Di Matteo, decided to leave his small hometown in the south of Italy to look for fortune and success in Germany. Skilled workers and technicians were desperately needed during that time, so it was not a huge surprise that he was successful from the start. He initially worked for local companies in Beckum, North Rhine Westfalia, including Bollmann, Nienkemper, Beumer and Dupont, focusing early on the installation, design and fabrication of bulk material handling equipment.

Just seven years after he left Italy, he decided again to put all his eggs in one basket by founding his own company, ODM Fördertechnik GmbH & Co. KG in 1968. There was continuous demand from the local cement sector and so he employed his first staff and bought a new manufacturing facility on Römerstrasse in Beckum, where the group is still based.

Just three years later Di Matteo took over the Nienkemper company along with its 10 employees. This was followed in 1979 by the acquisition of the Bollmann company, which had been founded over a century earlier. As a result, a further 25 employees joined the rapidly-evolving Di Matteo company. After a dozen years of steady business activity, in 1991 Orlando Di Matteo founded a new facility in Ilmenau, Thuringia. This was followed in 2007 by

an investment in the company Ehrhardt, Beckum. Further expansion took place only one year later with the acquisition of the neighbouring site previously owned by Steinhoff, complemented by the construction of an additional production facility.

In 2010 Di Matteo acquired Koob & Buschkötter, whose facilities are today operated as a second fabrication facility located also in Beckum, Germany. In 2016 the former DIMA iron foundry in Dingelstädt was acquired and is operated today as an independent company within the group, Di Matteo Eisengiesserei GmbH. The foundry manufactures tailor-made castings for the parent company and other customers all over Europe. The latest step in the company's history was the complete acquisition of the company Ehrhardt, which serves today to offer services and steel construction within the Di Matteo Group.

The Di Matteo Group today

Orlando Di Matteo served as the CEO of the company from 1968 until 2013. He was joined in management by his daughter Clelia and his son Luigi along the way. Today Dr Luigi Di Matteo is responsible for all technical and strategic aspects and serves as the CEO, while Clelia Di Matteo leads the commercial and financial departments as the CFO.

The company currently employs around 250 staff. The company is active in a number of areas applicable to cement, chemical, waste incineration, power generation, non-metallic minerals, waste control and lumber/biomass. This includes bulk handling, conveyor technology, process engineering, alternative fuels, silo technology, environmental engineering, research and development and service.

Di Matteo conducts fundamental research with the highest degree of precision, meaning that its products, along with the process engineering, act in line with its customers' goals and type of bulk material. As a manufacturer of complex conveyor systems, Di Matteo is also an engine builder and craftsman, planning, constructing and installing complete systems and tailoring them to individual demands. The

Below: The Di Matteo Group Headquarters in Beckum, Germany.





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Products like the innovative ODM-MultiFUEL-System, ODM-WeighTUBE® RWS, ODM-Docking station BOX, ODM-Injector rotary valve IZS and various state-of-the-art screw conveyors are worldwide in operation.





Di Matteo Group runs its own technical centre, which is used for practical research and continuous development of the fabricated machines. Furthermore clients are always welcome to test their individual bulk materials regarding their characteristics. The overall product range encompasses from classical mechanical conveying systems, through storage and preparation plants, to dosing and drying facilities.

Mechanical conveying

In the field of mechanical conveying, Di Matteo presents innovative, goal-oriented, custom and sustainable technology. Clients can select between a complete or partial system with specifications derived from their individual bulk material. A new development introduced in recent years is ODM-HoverBELT air-supported belt conveyors. Here the belt is not transported by classical rollers, but instead by means of an air cushion generated by dedicated fans attached to the conveyor body. Thus, the typical maintenance problems associated with rollers can be avoided and, furthermore, the overall power consumption of the conveying system can be drastically reduced, especially over long distances. Since the introduction of the new technology, numerous installations for different kinds of bulk materials were successfully installed in cement plants in Turkey, Austria, Switzerland and elsewhere.

Precise dosing systems

Di Matteo's gravimetric dosing weigh feeder, the ODM-WeighTUBE®, is a precise tool for accurate dosing of bulk materials. It can be used to greatly help cement and power plants to achieve higher energy-efficiency. The sealed construction avoids high dust generation during the utilisation of secondary fuels and the equipment can be adapted to existing plants thanks to its low height.

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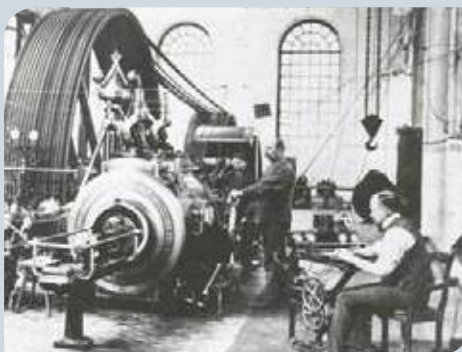
Above: The Di Matteo family during the 50th anniversary celebration in December 2019, together with the Mayor of Beckum and the Italian consul. From left to right: Clelia Di Matteo, Dr Luigi Di Matteo, Dr Franco Giordani (Italian Consul), Orlando Di Matteo and Dr Karl-Uwe Strothmann (Mayor of Beckum).

Cement in the building

The modern Di Matteo manufacturing facilities in Beckum's Römerstrasse have a very interesting history. Behind its walls it was once the Illigens, Ruhr & Klasberg, colloquially known as the 'Römer' cement plant, established in 1897. The images show the old machine hall of the plant and its façade which still stands today as part of Di Matteo's modern facility.

After two years' painstaking construction the works went into operation with nine shaft kilns and was continuously modernised, receiving two 60m long Polysius rotary kilns in 1911. By 1912 cement dispatches hit 57,120t (336,000 x barrels @ 170kg/barrel), made by 127 employees. These were considerable capacities at the time.

After merging with the Neubeckumer Zementwerk Mark I in 1919 and acquisition by the Wicking Konzern in 1921, the Römer works was temporarily closed in 1929. In 1931 when Wicking collapsed, Dyckerhoff recommissioned the works before they were shut once and for all just before the Second World War. Its machinery was dismantled and shipped to the Baltic.



Left: The Illigens, Ruhr & Klasberg cement plant in 1903.



Left: The façade of the old cement plant stands today as part of Di Matteo's modern facility.



Right: Dr Luigi Di Matteo (right) and Dr Dominik Aufderheide (left) in discussion focusing on continuous improvement of the fabricated machines.



Far right: A HoverBELT for alternative fuels at a cement plant in Turkey.



Above: ODM-WeighTUBE® together with the ODM-GravitAS control system.

Since it won the Münsterland Innovation Prize in 2011, more than 200 ODM-WeighTUBE® have been installed, predominantly for problematic bulk materials like RDF or biomass. At the same time the company also introduced its innovative open-source ODM-GravitAS controller platform for high precision dosing applications.

Modular MultiFUEL installations for AF

Di Matteo also developed a modular fuel installation concept for feeding and conveying plants, which has proven its applicability in a wide range of installations all over the world. It has already been adopted by many cement producers as the cornerstone of their co-processing projects. In Figure 8 an example of the modular MultiFUEL system from Di Matteo is shown. Here two trailers connected to ODM-Dock-



Above: ODM-MultiFUEL concept, with reception of material by ODM-DockingSTATION(s).

ingSTATIONS (below) can be used as intermediate storage bins for the reception of the material, which is then transported by an ODM-TKF drag chain conveyor to a preparation and dosing tower. Here it is possible to integrate machinery for the separation of oversized particles (e.g. ODM-DiscSCREEN) or metallic parts (ODM-MAS) as well as an ODM-WeighTUBE®. Finally a rotary injector (ODM-IZS) realises the transition to a pneumatic conveying line.

Conclusion

Di Matteo has developed from a steelworks' sub-supplier into an innovative and leading group company. Pioneering work in the field of material-flow analysis has led to expertise in the fields of alternative fuel use, silo technologies and conveying technologies, underlining the leading position of Di Matteo today.

Considering the additional capacity enabled by its new production plant in Beckum, Di Matteo will extend its portfolio of 'Made in Germany' products as well as its services for its clients in the 2020s and well beyond.



Above: Preparation and dosing tower with ODM-DiscSCREEN and ODM-WeighTUBE®.

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UNTHA shredding technology

CENOSA boosts waste-derived fuel production by 700%

Cementos del Norte SA (CENOSA), active on Honduras' north coast since 1958, is no stranger to the co-processing of waste to produce alternative fuels. In fact, as part of the company's goal to become the most sustainable cement business in central America, the firm has produced refuse-derived fuels (RDF) since 2007. As demand for landfill diversion strategies has increased throughout Honduras, so too has interest in CENOSA's alternative fuel production capabilities. This has now prompted a major investment in a new state-of-the-art facility to help transform the country's resource agenda...

In 2011 the Honduran Ministry of National Resources and Environment (SERNA) published new waste reduction, recycling, reuse and recovery guidance. Co-processing and energy recovery from waste fuels are now closely governed in the country, under Chapter VIII of the Law for Integral Waste Management. Input materials permitted for co-processing include packaging materials, fabrics, plastics, foam polystyrene, sawdust contaminated with fats or oils, paperboard, mattresses and pallets. However, corrosive materials, medical waste and explosive or radioactive wastes cannot be used.

The production of refuse-derived fuels (RDF) is therefore a carefully considered and tightly controlled business operation for CENOSA, from the initial collection and transportation of wastes through to the treatment methodologies that follow. The company

has built up its RDF production expertise since 2007 and holds a leading position in this field in Honduras.

An expanding operation

With landfill capacity in Honduras in short supply and CENOSA's environmental stance becoming stronger by the year, the business decided to build a new US\$3.5m facility to boost its alternative fuel production potential.

Capable of receiving and processing pre-sorted complex waste from the industrial sector and municipalities, the 1961m² Cortés plant with 3325m³ storage capacity took 14 months to come to fruition and relied on a global collaboration between OHL Spain, Austrian-headquartered shredding specialist UNTHA, UK-based Samson and Firefly AB from Sweden. With the potential to handle 24,000t/yr of

Right: Inside the newly-upgraded Cortés RDF production plant in Honduras.





waste, it was crucial that the very best processing technology was procured for this complex job.

"We had a big vision for this facility and built it with overcapacity," explains Jorge Alberto de Jesus Bueso, head of environmental management and alternative fuels at CENOSA. "Municipalities in Honduras no longer have the capacity to receive large volumes of industrial waste, particularly special residues, at high volumes. Nor can they take potentially hazardous materials from the textiles sector and other industries."

A solution with UNTHA at the centre

Following rigorous research, CENOSA chose to invest in the UNTHA XR3000C waste shredder with 1000mm rotor, a solution that has already been installed at hundreds of sites worldwide. Impressed with the low energy consumption of the electrically-driven machine, it soon became clear that the ongoing running cost of the shredder would greatly reduce CENOSA's payback period. Recent calculations show that CENOSA's operational shredding cost was previously US\$34.00/t, inclusive of labour, vehicles and energy. The XR has now cut this to just US\$13.88/t.

Currently configured to process 8t/hr of waste down to an homogeneous 60mm fuel, the XR also presents a notable uplift in capacity from the 1t/hr capability CENOSA previously had. When running at a typical 8hr/day, the operational savings could reach over US\$1200/day.

"We currently estimate that our entire project investment could have paid for itself in only 3.5 years," continues Jorge. "We've specifically selected hard-wearing, long-lasting technology that should support our mission much further into the future. The system has robust foreign object protection mechanisms in place, is easy to maintain and can process a variety of materials with ease."

The conveyor-fed shredding line can handle textile waste, clothing, contaminated rags, plastics, construction timber, cardboard, agrowaste, pallets, tyres, rubber conveyors and foam.

"This was an ambitious project, but we are extremely proud of bringing the facility online," continues Jorge. "We're prolonging Honduras' landfill capacity, while reducing the country's reliance on fossil fuels and decreasing CO₂ levels due to the biogenic carbon content of the waste. Now, we need more waste producers to come forward to help us make a real difference in the target of implementing a complete residue managing system."

CENOSA's RDF kiln feed system was installed in 2010, prior to the alternative fuel production process coming online. This has since been modified to optimise the efficiency and security of the line. The firm's medium-term goal is to reach a thermal substitution rate of 30%.

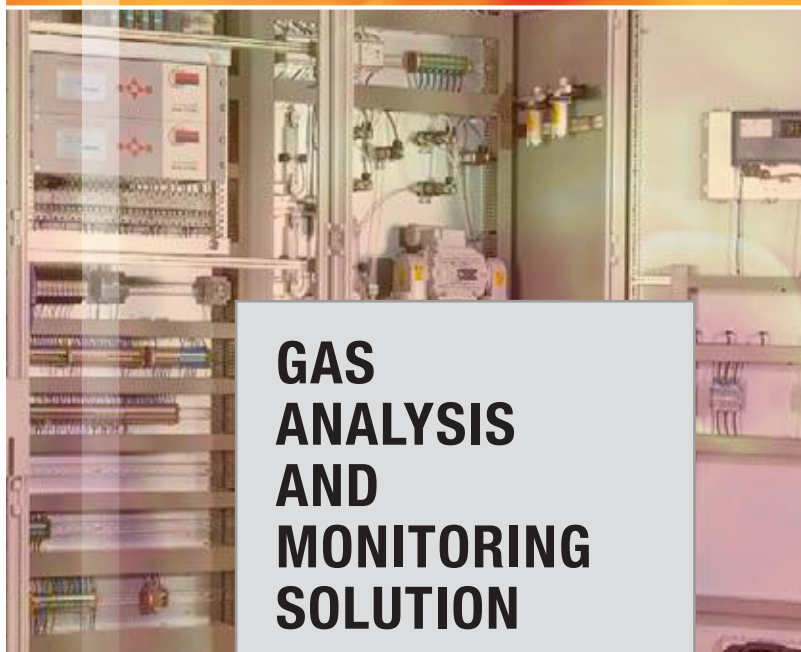


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Alejandro Torres Molina, VisionTIR

Total thermographic monitoring of rotary kilns

Kiln operators must have access to reliable temperature data to successfully optimise the cement production process, avoid damage and meet emissions limits. An efficient and reliable option is to use thermal camera-based monitoring systems to meet all of these requirements simultaneously.

Right: A VisionTIR RKS300 temperature monitoring system.

VisionTIR's RKS300 thermal camera-based kiln monitoring system, which provides real-time inspection of the entire kiln for the early detection of hot and cold spots, has been installed in many different industrial plants with rotary kilns in recent years. However, it is not possible for this system to observe what is happening *inside* the burning zone, the stability of which influences many operating parameters, not least the plant's thermal efficiency and output.

To enable this functionality, VisionTIR has developed the ProTIR system. This provides radiometric thermal images with temperature information for each pixel from inside the kiln to deliver operational efficiency improvement, flame shape optimisation, energy efficiency saving and emissions compliance.

Consequently, it is now possible to meet increasingly stringent requirements in production, reliability and emissions by combining both systems. The RKS300 system monitors the kiln shell surface to prevent damage and the ProTIR system monitors the burner zone and the combustion process.

Mexican case-study

VisionTIR has recently installed the RKS300 and ProTIR systems at a plant in Mexico. Both systems include radiometric infrared cameras to offer complete temperature monitoring and visualisation of kiln and burner zone.

Right: A VisionTIR ProTIR temperature monitoring system.



After analysis of the customer's requirements, VisionTIR installed the RKS300 system to monitor all of the kiln shell length in real time, achieving a high pixel resolution. Due to this, the system detects a higher number of hot-spots than the previous scanner system, and with greater accuracy than before.

By giving the highest resolution and real time inspection, RKS300 reduces the cost of maintenance due to damage and unscheduled downtime. To withstand the aggressive environment that surrounds the system in an industrial plant, the RKS300 is protected by a housing that resists adverse conditions thanks to an air purge and an internal temperature control device. This keeps the thermal camera clean within an optimum temperature window.

In addition, protected by a rugged protective housing and using a high-performance water cooling system, the ProTIR system resists up to 2200°C while providing real radiometric images of the burning zone at the highest resolution. This solution provides a wide temperature range for monitoring at 450-1800°C. The ProTIR software provides accurate data analysis along with automated alarm outputs and control for 24/7 monitoring, to instantly alert the user of any problems. Both solutions are integrated with the plant's supervisory control and data acquisition system via open platform communication protocols. This ensures that all kiln control systems installed at the plant have accurate and constant data from the camera system in real time.





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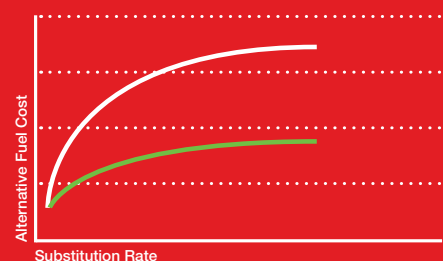
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Heather Harding, Bricking Solutions

Brick by brick

Effective refractory lining starts with quality brick installation. Minimising air gaps and interlocking rings or loose bricks extends the life of kiln lining and can drastically reduce unscheduled or emergency maintenance. This translates to savings of tens of thousands of Euros or Dollars. More and more refractory contractors are using bricking machines to achieve high-quality installation as efficiently as possible. These machines offer a variety of productivity- and safety-enhancing features over traditional methods.

Right: A bricking machine's arches hold each brick firmly against the kiln shell until the key brick is installed, ensuring a tight fit. This quality installation can extend the life of the kiln lining by as much as 25%.

Refractory issues, such as spiraling and twisting, account for as much as 50% of unscheduled outages and are almost always tied to the installation approach. Many older, traditional installation methods have inherent design issues that limit the likelihood of achieving a quality product. These methods require kiln rotation, making it difficult to maintain radial alignment of the brickwork, a critical factor for a stable brick lining. Improperly aligned brickwork can't uniformly absorb the pressure from vertical refractory, leading to premature failure. Rotating the kiln also leaves a large amount of unkeyed brick positioned straight up, while the keying section is at the kiln's springline. Even if the keying is perfect, gravity will cause the unkeyed brickwork to sag, increasing the potential for catastrophic brick ring



collapse. This is not only time-intensive and costly to rectify, it's also a major safety concern. In addition, traditional installation methods run a high risk of rings interlocking with adjacent rings. This results in a domino effect of failing brickrings, as well as air gaps left between the brickwork and shell.

A bricking machine's arches hold each brick firmly against the kiln shell until the key brick is installed, ensuring a tight fit and eliminating the risk of sagging. A hydraulic jack holds the unkeyed ring when moving the machine's arch system and provides ample outward pressure in the keying section for tight keying. Pneumatic cylinders are not released until the keying is complete, ensuring proper compressive forces. The master valve retracts or extends all cylinders simultaneously to allow the arch to advance to the next row. The resulting high quality of installation can extend the life of the kiln lining by as much as 25%.

Unique design features, such as cut-away sections, further increase efficiency and productivity. The cut-away section in the front arch provides both ease-

Right: Once installed, the bricking machine offers a mobile working platform capable of supporting as many as three pallets of bricks, depending on model, the personnel working on it and their tools.





of-installation and visibility. It allows key masons an unobstructed area to place the key bricks. Some bricking machine designs do not include an opening in the arch, so installers have to find ways to reach around the arch, reducing speed of installation and, potentially, quality. The cut-away section also allows key masons to see the previously keyed ring and use it as a guideline, enabling discovery of bricking errors sooner when all pneumatic cylinders are released to check for sagging.

Maximum productivity


In addition to improved quality, bricking machines can significantly speed up the refractory installation process, saving thousands of Dollars or Euros in labour with just a single use. The time savings begin with machine setup. A bricking machine constructed of strong, lightweight, modular aluminium can be installed in just 60-90 minutes with an experienced crew. Alternative bricking machines made up of mostly heavy steel components can take 6-8hr, resulting in a full shift of lost revenue in setup alone.

Once installed, the bricking machine offers a mobile working platform capable of supporting as many as three pallets of bricks. Pneumatic cylinders on the arch raise the bricks into place against the kiln shell. The arch is supported by a cart and a rail system, allowing movement along the length of the platform scaffold. Newer bricking machines incorporate double arches, allowing masons to install a second ring of brick while the first is being keyed, further accelerating installation.

Increased worker safety

No refractory installation analysis would be complete without a review of safety. While safety might not make a plant money, it can certainly *save* money when it comes to lost work, employee claims and rising insurance costs. As bricking machines let the pneumatic cylinders do the work rather than the bricking team, employees are less likely to become fatigued, a critical factor in major accidents. In addition, the reduction of manual labour reduces the likelihood of repetitive stress injuries.

Coming full circle

High-quality installation has a positive impact on the longevity and performance of refractory lining. This, in turn, ends up saving an operation thousands of Euros or Dollars. Refractory maintenance is unavoidable but an experienced crew with the right equipment can minimise scheduled downtime and virtually eliminate the installation mistakes that could lead to emergency maintenance. Offering improved brickwork quality, faster installation and enhanced safety, a bricking machine brings the greatest impact on overall installation efficiency. 

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Robert Becker, robecco GmbH

Preventative explosion protection upgrade

In 2018 the Cementos Argos Rio Claro plant in Colombia decided to modernise its complete explosion protection system to bring state-of-the-art protection to its existing coal mill plant. The customer selected robecco's proven solutions to handle the task...

The Rio Claro plant selected ATEX-compliant monitoring and control equipment for its coal plant protection upgrade, namely robecco's state-of-the-art gas analyser systems and a robecco secure centre (RSC) full automatic inert control system with functionality control.

After an inspection of the plant and a study of the new design of the coal grinding and coal storage silos, robecco started to design the equipment in mid-2018, with manufacturing during the second half of that year. Commissioning and handover of the equipment took place in June 2019.

Safety concept

The robecco GAS system at the Rio Claro plant monitors gas at eight measuring points; the coal mill, two bag filters and five fine coal dust silos. The extractive gas measurements are divided into continuous and sequential measurements methods. All points measure CO and O₂ at the same time.

The robecco gas analyser (RGA), robecco sample probes (RSP) and robecco sample lines (RSL) were used for the gas analyser system. Engineering, design and installation of the entire system was realised in accordance with the European ATEX guidelines.

The fully-automatic RSC inert control unit was supplied as an intelligent interface between the gas analyser system and the CO₂ inerting system. The RSC controls all parameters of the gas analyser sys-



Right: One of the new sample probes at the Rio Claro plant.

tem, coal mill temperature sensors, CO₂ inerting system, valves and flaps of the entire coal grinding process.

In the event of abnormal operational occurrences or CO / temperature alarms, the inerting process is automatically triggered to reduce the oxygen concentration below the limiting oxygen levels. This procedure prevents explosions and fires across the coal grinding system. State-of-the-art features support the operator to ensure that the system maintains high availability. The preventative explosion protection system interfaces with the main operator room, which enables the operator to monitor and operate the system in remote control mode.

Summary

With this new state of the art preventative explosion protection system the plant will benefit with a certified total safety system according to ATEX and CEN 15281 guidelines. Systematic and reasonable monitoring and control for the CO₂ emergency inerting process is realised to bring the coal grinding process to a high level safety standard. This will lead to fewer production stops and high availability of the cement manufacturing process.



Below: The Cementos Argos Rio Claro plant in Antioquia, Colombia.



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Interview by Peter Edwards, Global Cement Magazine

Stay cool!

Hartmut Meyer has 30 years' experience working with clinker coolers. In 2017 he founded Hartmut Meyer Clinker Cooler Consulting (HM CCC) to share his knowledge as widely as possible within the global cement sector. Here he takes us into the heart of the cooler...



Above: Hartmut Meyer founded HM CCC in 2017.

Global Cement (GC): Why did you set up HM CCC?

Hartmut Meyer (HM): I established HM CCC in October 2017 to share my clinker cooler expertise as widely as possible within the cement sector. This knowledge was gained from 27 years working exclusively with coolers. For 17 years I was on the supplier side in research and development at Claudius Peters. After that I spent 10 years as a cooler expert at Holcim (later LafargeHolcim).

GC: What does HM CCC do?

HM: HM CCC's main activity is conducting independent assessments, optimisations and modernisations of clinker coolers for cement producers large and small. The aims will depend on the project but often include: lower operational costs, improved cooler efficiency and higher reliability. Clients also come to request assistance with tenders for cooler replacements, establishing desired cooler specifications and during commissioning. In the future this could be extended to advising on greenfield projects, but this opportunity has not arisen yet. HM CCC also trains plant operators and teams at cement plants worldwide, with courses of up to a week in duration.

GC: What are the most common issues that clients present to HM CCC?

HM: The most common issues include air tightness issues, which cause efficiency losses, and poor reliability. Almost everyone wants to lower their operational costs at the same time. There's usually a combination of issues that warrant attention, so a holistic approach is required.

GC: How does HM CCC help clients achieve these different aims?

HM: The client and HM CCC jointly carry out assessments of the current situation and compare to benchmarks to identify the bottlenecks in the cooler and the best ways to deal with them. Cooler process data and logs of cooler-related kiln stops should also be provided or can be collected during a site visit. There's no room for secrets. The key to solving problems is effective communication.

GC: What is HM CCC's methodology?

HM: There are four 'Golden Rules' to effective cooler operation. The first Golden Rule is simply: **Keep the clinker on the grate.** This means that good gap management is essential. In a grate cooler, the plates are properly treated to handle the high temperature of the clinker. The main casing below the grate, however, is only made of mild steel and can only withstand temperatures up to 200°C. Clinker falling through the grate not only damages the casing but limits the clinker bed and heat recuperation.

The second Golden Rule is: **Keep the cooler tight.** The cooler is divided into compartments and they must be well separated in terms of air flow. The first compartment starts at 1450°C and the last compartment finishes at 100°C. The pressure drop in each compartment is different and it is absolutely vital to maintain good internal air-tightness between compartments. Otherwise the air will just rush to the exhaust and cooling will be badly affected.

The third Golden Rule is: **Keep the clinker bed open.** This highlights the need to ensure good fluidisation characteristics on the static inlet section (SIS). In the SIS we want good mixing to avoid agglomerates. There are liquid clinker phases down to 1250°C

Below: The static inlet section is the most important part of the cooler.





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Above: A good example of minimised gaps on the grate.

so the surface of the clinker has to be cooled below this temperature rapidly to avoid sticky lumps.

Only once the first three Golden Rules have been 'obeyed' can we work on the fourth. This is the fundamental philosophy behind good cooler management: **Keep the grate speed low.** Coolers are most effective when they are loaded up with clinker and there is a high retention time.

Unfortunately, the need to run slow goes against human instinct. We are hard-wired to be impatient, which is really unhelpful when it comes to effective cooler control. Good performance should be very easy to achieve when following the four Golden Rules but, as many plants compromise on at least one of them, their cooler performance will be limited. It's a matter of discipline.

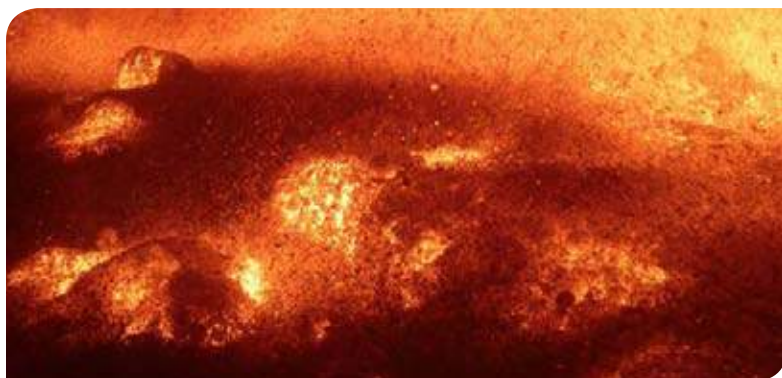
GC: What do clients value most in their coolers?

HM: Reliability. Stoppages cost money.

GC: Where does clinker outlet temperature rank in their list of priorities?

HM: Of course the cooler's main aim is to cool the clinker to an ideal level and this is very important to all clients. However, I would argue that, when you optimise a clinker cooler according to the four Golden Rules, you cannot fail to make cool clinker consistently with good reliability. It really is an holistic process. When one element is out of place, everything else will be out of place.

Below: Agglomerates that have formed due to insufficient air. Agglomerates don't have to be 'snowmen' to be a problem. They can be 'pizzas' or 'cakes', which are hard for the cooler to digest.



GC: What design issues do you commonly uncover?

HM: The cooler really is a plant within a plant and often it gets overlooked. Everything starts at the SIS. If this is not set up correctly, the rest of the cooler will suffer. Common issues include incorrect plate slopes and insufficient surface area in the SIS. Horseshoes will frequently be the wrong size and/or shape and air-blasters will often need to be added and/or relocated.

Often it's the case that the SIS is totally overloaded. I have seen SIS loads from 300t/day/m² up to 1500t/day/m², while the guide value for SIS area load is 650t/day/m². Sometimes I even find that there's no SIS at all. I spend a lot of time looking at the SIS to ensure it can do its job properly. It is the most important part of a grate cooler but, in my experience, around 90% are configured incorrectly.

GC: What are the biggest issues on the grate?

HM: Very often there are limitations that restrict the loading that the grate elements can accommodate, which means that the cooler is forced to operate with a lower-than-optimum clinker bed. Typical alterations to rectify this might include new grate elements, new fans, or larger grate drives that can handle higher loads.

Low clinker beds are undesirable. It is crucial to load up the cooler as much as possible. With a 300mm bed, the material has a retention time of 15 minutes at a typical cooler loading of 45t/day/m². At a depth of 600mm it is 30 minutes. At 900mm, the target value for efficient coolers, it is 45 minutes. At these higher retention times, the clinker cannot fail to be cool by the time it heads to the silos.

I have often seen bad situations downstream from the cooler when the retention time is too low. The clinker comes out too hot and overheats the conveyors and cement mills.

GC: Given that you have only four Golden Rules, would you say that operators are sometimes guilty of 'overthinking' their coolers?

HM: At times, yes. Some producers are prone to fiddling with their coolers too much when a back-to-basics approach will invariably give a better result. Some producers are also surprisingly good at explaining away poor cooler performance because it helps them mitigate other issues in the plant. I've lost count of the number of times I've heard that running the cooler slowly, i.e. loading it with a lot of clinker, will overload the crushers, mills, buffer bins, you name it. This is not the case. If you have a 6000t/day kiln and mills that can deal with 6000t/day, it doesn't matter whether or not there is a clinker bed of 300mm, 600mm or 900mm, assuming of course that the bed depth is constant over time.

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Above: Kiln hood area with clinker cooler and fans.

GC: What are some of the nightmares you have seen on-site?

HM: An unexpected and prolonged kiln stop is a nightmare for every cement plant. The main root causes for cooler failures are air losses, for example fan failures that result in burnt grate plates or deformed grate

structures. Another cause is cooler overfilling, either in the cooler throat or in front of the crusher. Absent or incorrect signals, staff ignoring alarms and overwriting of interlocks are the main reasons behind these incidents. Cooler control and interlocks are essential to minimise these nightmares. An advanced solution, for example, would be the automatic handling of over-filling situations.

GC: Do you have a personal 'favourite' cooler?

HM: I'm in favour of aeration systems with low empty grate pressure drop and short chambers in the recuperation zone. This enables perfect air distribution in combination with high clinker bed operation, which results in low electrical power consumption. Furthermore, a high clinker bed improves cooler reliability and facilitates cooler control.

GC: Which cooler technologies are becoming more prevalent and which are losing out?

HM: Clinker cooler technology should be simple and solid. Conventional grate coolers are equipped with hundreds of grate plates and other small parts that are vulnerable to failure. They need intensive maintenance. Grate and side sealing plates are the main wear parts on these types of coolers.

A major reliability push took place when the single grate plate concept was replaced by movable lanes with dead gravel filling, which provides a kind of autogeneous wear protection. Using this principle more than 90% of the top grate line surface is gravel and the hot clinker moves on the gravel layer with minor contact to the steel structure. On conventional grate coolers 100% of the metal (grate plate) surface is directly exposed to the hot clinker. The forgiveness of lane coolers has improved. Lane service lifetime of more than 15 years has already been achieved.

GC: Do you ever optimise satellite coolers?

HM: There's only one way to optimise a satellite cooler: Rip it up and start again with a grate!

GC: How have alternative fuels affected the demands placed on coolers?

HM: Alternative fuels introduce significant process fluctuations into the cement manufacturing process. For high substitution rates, the cooler therefore needs to be configured so that it is as forgiving as possible. A damping effect of kiln fluctuations is realised by high clinker bed operation. Cooler control and interlocks are important to ensure that the equipment isn't damaged.

GC: What new features do you expect to see in clinker coolers of the 2020s and beyond?

HM: Clinker cooler suppliers went through a massive burst of innovation in the 20 years between 1990 and 2010. First the IKN pendulum cooler was introduced. Then came the fashion of air beam aeration technology, now a thing of the past, followed by the new cooler generation with aeration bottom and walking floor technology like the Crossbar, Polytrack, ETA, Pyrofloor, Delta, Smart Glider and Shuttle coolers. However, since 2010 there has been relatively little movement. I'm not particularly optimistic that this will change in the period to 2030.

GC: Why has innovation stopped?

HM: I think it's down to cost. Your readers will be familiar with the intense cost pressure of running a cement plant and staff contribute enormously to that. The same is true at suppliers, especially in Europe. It is my impression that cost pressures are now so intense that research and development activities, certainly at cooler OEMs, have been drastically scaled back.

GC: Would you say that HM CCC is now innovating in the gap left by the suppliers?

HM: There is an increasing trend to outsourcing technical expertise at the major producers and suppliers, so there was a natural opening for a consultant. Thankfully for me, people cost cement producers money, but ineffective clinker coolers cost them more!

GC: What can cement producers do after they have met the fourth Golden Rule. Is there a fifth?

HM: There is a fifth Golden Rule, but it's unofficial: **Stay Cool!** This is kind of a joke but it speaks to the fundamentals of handling clinker coolers and, I think, life in general. We should all slow down more!

GC: Thank you very much for your time today.

HM: You are very welcome indeed!



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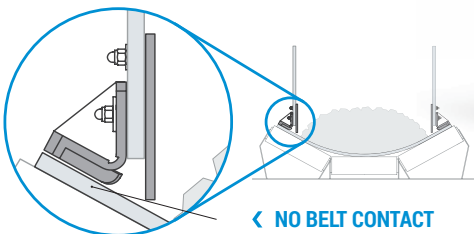
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From dust'til none

At most transfer points material spillage and dust generation cause significant work and long-term additional costs for cement, lime and gypsum producers, as well as the wear and tear of conventional sealing solutions. However, with the contactless sealing AirScrape®, ScrapeTec offers a solution that is convincing more and more customers. Rump & Salzmann Gipswerk Uehrde GmbH & Co KG, which operates a dolomite quarry in Uehrde, Germany, has been one of the company's customers from the very beginning.

The transfer point between the rotary crusher at Rump & Salzmann Gipswerk's quarry and a conveyor belt had given the company issues for some years. Uwe Schridde, company Operations Manager, explains, "We struggled regularly with problems relating to dust and material loss at this transfer point, with spillages in the tonne range. Material had to be recovered, with great effort and cost. In addition, there was frequent maintenance work on the seals at the transfer point. We simply accepted the wear on the conveyor belts caused by the friction of the sealing solutions at the time. We knew of no other way."

A special kind of seal

In 2013, however, Rump & Salzmann made its first contact with ScrapeTec Trading GmbH from Kamp-Lintfort. Owner Wilfried Dünwald had developed

the AirScrape skirting system on the basis of his decades of mining experience. The principle: The skirting uses the air flow generated by the belt movement. It is mounted at the side of the transfer point with an air gap of approximately 1-2mm above the belt. The AirScrape is fitted with lamellas that create a Venturi effect, i.e. an air suction from the outside to the inside. Dust and fine material cannot escape.

Another advantage is the special arrangement of the lamellas: Coarse material is pushed back into the middle of the belt. Material spills, as had occurred in the past at the transfer point, can thus be completely avoided. ScrapeTec integrated the AirScrape solution into the transfer point at Rump & Salzmann and the result convinced those responsible at the client from the first test run onwards.

Right: The AirScrape installed between the rotary crusher and conveyor belt at Rump & Salzmann Gipswerk's quarry in Uehrde, Germany.





More workflow, lower costs

In the long term, Rump & Salzmann really appreciates the advantages of using the AirScape skirting. The usual spills have been avoided and, with them, the extensive cleaning work and associated costs. Maintenance work on the side seals is also a thing of the past, as the AirScape system is maintenance-free. This means that the conveyor belts do not have to come to a standstill during the maintenance work, as would otherwise be the case. In the meantime, the AirScape skirting has been in use for seven years at Rump & Salzmann in Uehrde, where an important advantage has become apparent. The AirScape solution used by Rump & Salzmann in Uehrde at the transfer point is still in reliable use today. The dust generation has been reduced to zero.

Due to the principle of the AirScape, completely contactless operation is possible. There is no friction between skirting and belt. This increases the service life of the conveyor belts used with AirScape many times over and minimises the high investment costs for new belts. Furthermore, only undamaged belts without grooves can be effectively cleaned by scrapers. The reduction of dust through the use of the AirScape increases the service life of all system components, including, for example, the belt pulleys. Overall, the AirScape's mode of operation also decreases conveyor system energy costs. The lack of friction automatically reduces the energy requirement.

Adding up all of the costs mentioned, such as material spillage, cleaning, maintenance, belt downtime, belt replacement and energy costs, gives a number to compare with the cost of implementing the AirScape skirting system. This cost-benefit advantage has now convinced many companies. ScrapeTec's references include cement companies such as LafargeHolcim as well as companies in other sectors. The AirScape is used at transfer points all over the world and has proven its efficiency, even under the harshest climatic conditions.

The DustScape

Since 2016, ScrapeTec Trading GmbH has also offered its DustScape solution in addition to the AirScape - a robust transfer cover made of highly resilient filter cloth material. The air passes through and the dust is retained. This device supported Rump & Salzmann's decision to equip further transfer points with solutions from ScrapeTec.



Left: DustScape with contact-free AirScape sealing.

Focus on transfer points

"It makes me quite proud that a product I developed has been in daily use at Rump & Salzmann for so many years now and still does what we promised it would back then," says developer Wilfried Dünwald, who founded ScrapeTec Trading GmbH in 2013. "The patented AirScape was, so to speak, our first baby. All the products that followed always arose from the needs that we discovered during our work or that our customers expressed. It is exciting to always be able to find a solution. In the meantime, we have discovered that you can get more out of transfer points than you used to think. As an engineer and miner, I am of course primarily interested in the technical side. However, in the meantime our products also convince those responsible for occupational health and safety. That makes me happy and keeps me motivated."

Sustainable clean work

The immense reduction of dust by the AirScape is not only an economic factor, but also an important factor for operational health and safety, as well as for environmental protection. The company Masanes in Spain, for example, was able to radically reduce dust generation through the use of AirScape - and thus also the risks to employees that had previously been exposed to significant dust loads. As far as environmental protection is concerned, dust reduction reduces overall emissions and extraction systems consume less energy and can be used more efficiently. Finally, minimising the wear and tear of plant components conserves resources in the long term. 🌍



AUMUND Group

AUMUND commits to quality with in-house chains

AUMUND Fördertechnik GmbH is a global player with decades of experience as an international producer of machines and major components for the cement sector, including chain bucket elevators. A bucket elevator chain, as the absolute mainstay of the chain bucket elevator, has a particularly significant role to play. This is why AUMUND has given its in-house research and development team its highest priority mandate ever...

Right: A glimpse inside the TILEMANN (AUMUND Group) production facility in Essen, North Rhine Westphalia, Germany.

Source: AUMUND.

AUMUND Fördertechnik has given its in-house research and development team its highest priority mandate so far: to make new chain developments and improvements. This is due to the fact that the demands placed on bucket elevator chains are continually increasing. In-house chain manufacture gives AUMUND independence from outside suppliers and total ownership of control and quality of its chains, enabling it to rapidly bring to market new developments and improvements in chains, alongside its standard portfolio.

On the face of it, the bucket elevator chains of 2020 barely look different from those of 2005. However, with bucket elevator chains the 'inner values' are more important. This is why AUMUND uses innovative materials which enable ever-increasing tensile strength and, importantly for tall bucket elevators, an ever-decreasing weight component. AUMUND's drive to quality has now been enhanced via the acquisition of TILEMANN Ketten & Komponenten.

Introducing TILEMANN

TILEMANN Ketten & Komponenten has produced bucket elevator, reclaimer and conveyor chains as well as specialised components, for more than 100 years with a tradition of utmost precision and



process reliability. Now that this specialist manufacturer with its modern manufacturing machinery and more than 25,000 references in high-quality chains and key components belongs to the AUMUND Group, AUMUND Fördertechnik has its own source. TILEMANN will also supply SCHADE Lagertechnik GmbH and SAMSON Materials Handling Ltd, both AUMUND Group companies.

In its production process TILEMANN favours improved heat treatment methods and optimised manufacturing and assembly procedures. One example is continuous monitoring of the press-in pressure of the bolts during assembly, in order to confirm that the fit is exactly within the specified range. This creates an optimum interaction of the chain with the drive and tensioning segments. Process checks are carried out at shorter intervals all the time, and documentation is issued in more and more detail, facilitating exact trace of chain supply.

Further investment in the 2020s

To keep up this rate of modernisation, AUMUND invested several million Euros in manufacturing at TILEMANN during 2019. In doing so, it has optimised the production process and increased its productivity. In order to meet the increased demand in the market for chains and to further decrease lead times for customers, AUMUND is planning further investment in production by expanding the factory facilities over the course of 2020.



Below: External view of the TILEMANN (AUMUND Group) production facility in Essen, North Rhine Westphalia, Germany.

Source: AUMUND.



UK: Breedon to buy 49 ready-mix plants from Cemex

Cemex has entered a conditional agreement with Breedon Group for the divestment of certain UK assets, including 49 ready-mix plants, 28 aggregate quarries and a cement terminal for Euro211m including Breedon Group's assumption of a Euro27.3m lease liability. Cemex UK retains the 1.2Mt/yr Rugby cement plant in Warwickshire. Breedon Group CEO Pat Ward said, "We expect the deal to be accretive to both earnings and free cash flow in the first full year, with a positive ongoing impact on the cash generation of the enlarged Group." Cemex CEO Fernando Gonzalez said that the transaction, "Further rebalances our portfolio into our core markets, enhances our profitability and enables us to continue to focus on deleveraging."

The businesses being handed over also include concrete products operations, depots and asphalt plants and fall under all six of Breedon Group's regional divisions. Ward has said that the acquisitions will



significantly enlarge the group's footprint in under-represented divisions, with the cement terminal being the Leith terminal in Scotland, a region in which the company currently has no terminals to receive cement produced at its 1.5Mt/yr integrated Hope cement plant in Derbyshire. Breedon Group will seek to hire employees working on the operations from Cemex and expects to bring its total UK personnel to 3600 people as a result. It says its mineral reserves will exceed 1.0Bnt.

Cemex UK retains 259 concrete plants and 36 aggregates quarries and dredging operations. Cemex said it 'will retain a substantial integrated business in the UK encompassing cement production.'

UK: Cemfree silo for Mick George

Mick George Concrete (MGC) has installed a dedicated 100t silo for the low-CO₂ cement product Cemfree, at its batching plant in Cambridgeshire for supply to its existing customer base in East Anglia and the East Midlands regions of England. It is the first ready-mix concrete supplier in the region to stock Cemfree in this way.

Cemfree is an ultra-low-carbon cement produced by Cambridgeshire-based building materials company DB Group (Holdings) Ltd. The product can achieve embodied CO₂ savings of up to 80% when used to replace ordinary Portland cement (OPC) in concrete production.

One of the first contracts for the Cemfree silo to fulfil will be with Highways England for upgrades to the A14 Huntingdon to Cambridge improvement scheme. Cemfree will be used to produce kerb backing, drainage, mass fill and signage elements. Mick George, the exclusive ready-mix supplier to the project, will supply 500m³ of Cemfree to the A14 project.



MGC's Managing Director Michael George, said, "Due to an increased corporate emphasis on CO₂ reduction targets, there is more environmental consideration in construction build designs. We have a strong reputation for developing cutting-edge solutions and niche products. Cemfree represented an opportunity to do both simultaneously."

Thailand: SCG joint venture with BIMObject

Siam Cement Group's concrete and aggregates division SCC Concrete Products and Aggregates (CPAC) has entered into a joint venture agreement with Swedish digitisation specialist BIMObject for the formation of BIMObject Thailand Co., Ltd. (BIMObject TH) on a 51:49 basis in favour of CPAC. This will provide building information modelling (BIM) - a service platform for use in conceptual design, material selection, and construction simulation of customers' projects. Siam Cement Group president and CEO Roongrote Rangsiyopash said, "This is in line with SCC's strategic plan to extend its breadth of innovative construction solutions."

Germany: Paving the way

Dyckerhoff has paved the 3700m² road outside the limestone quarry at its 0.4Mt/yr integrated Geseke plant in North Rhine-Westphalia with a concrete blend containing PKZ Doppel N cement produced at the Geseke plant. Dyckerhoff made the decision to pave the road 'to minimise dust emissions, especially in prolonged dry spells.' It says the concrete's low water content and good compression strength give the road a rating of 50N/mm².



Contents

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South Korea: Maerz lime kilns come online

Maerz has reported the successful installation of two Maerz PFR lime kilns with capacities of 200t/day and 300t/day at Daesung MDI in South Korea, which were commissioned on 19 October 2019. The company also installed a 150t/day E2 two-shaft lime kiln at Easternbulk Lime Products Private Ltd in July 2019. Three further new plants with Maerz kilns are scheduled to enter operation in 2020 in China, Mexico and Russia.



Above: The opening of Daesung MDI's new lime kilns in October 2019.

India: Gebr. Pfeiffer wins UltraTech contract

Germany's Gebr. Pfeiffer has won a supply contract with UltraTech for one MVR 6000 C-6 mill that can grind up to 370t/hr of mixed cements or 225t/hr of granulated blast furnace slag. This is the 17th mill of its type in India. Gebr. Pfeiffer (India) Pvt. Ltd. will commission the mill in early 2021.

Oman: Alsahawa now taking bids for Duqm plant

Alsahawa Cement Company (ACC), the newly-founded Oman Cement Company (OCC) subsidiary, will operate the group's upcoming Duqm cement plant, for which an engineering, procurement and construction (EPC) contract tender has been issued. Bidding is due to close on 27 February 2020.

The new facility will include a coal-fired power plant and waste heat recovery (WHR) power plant. OCC Chief Executive Officer Salim Abdullah Al Hajiri described the commissioning of the 1.7Mt/yr integrated plant as a 'reverse integration' process, whereby the plant will initially grind clinker produced at other OCC cement plants. This will start in September 2021 before the plant upgrades to fully integrated cement production in March 2022.



Japan: Coconut power for Taiheiyo plant

Ofunato biomass power plant began generating electricity on 1 January 2020. The 75MW plant is the result of a 65:35 partnership between Taiheiyo Cement and electrical engineering firm Elex formed in July 2016, with a total investment of US\$36.5m. It will primarily burn coconut matter to provide electricity for sale and supply to Taiheiyo Cement's 1.9Mt/yr integrated Ofunato plant. Taiheiyo Cement says that it will generate 520,000MWh/yr, replacing fossil fuels responsible for 0.3Mt/yr of CO₂ emissions.

US: New belt cleaner from Martin Engineering

A new conveyor belt cleaner has been designed with an innovative method of holding the urethane blade in place without the need to mill any slots for holding pins. Combining the benefits of previous designs into one product, the QC1+TM Belt Cleaner from Martin Engineering can be cut to length to fit virtually any application, reducing the need for customers to stock multiple blade sizes to accommodate different belt widths. Operators simply trim the blade to the desired size from the stock 2.74m (9ft) length to match the material path, slide in the blade holders and lock them in position. The new blade can be retrofitted to virtually any Martin main frame, as well as to most competing designs.





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Belgium: Cembureau to re-evaluate targets in line with European Green Deal

Cembureau, the European Cement Association, says it will undertake a review of the targets set out in its 2050 Low Carbon Roadmap (2013/2018) in order to align the industry's efforts with the carbon neutrality objectives contained in the European Green Deal published in December 2019. Following this reassessment, the association says it will publish a revised low-carbon roadmap setting out the key role of cement and concrete in the circular economy and a path to achieving carbon neutrality along its value chain in Europe by 2050. Cembureau expects the revised roadmap to be published in early spring 2020.

"As an industry we are determined to ensure that we play our part in helping Europe to meet its emissions reduction targets. With concrete, our industry has a sustainable building material that is uniquely positioned as an essential enabler of the transition to a carbon neutral society," said Cembureau's president Raoul de Parisot.



Switzerland: LafargeHolcim's CO₂ targets independently verified

The Science-Based Targets Initiative (SBTI), a joint initiative of CDP, the United Nations Global Compact (UNGC), the World Resources Institute (WRI) and WWF, has described Switzerland-based LafargeHolcim's CO₂ reduction targets as 'adequate' and 'consistent with efforts agreed upon at the COP21 World Climate Conference in Paris.' These are aimed at preventing global temperatures from rising by 2°C.

LafargeHolcim has committed to a 10% reduction in emissions from kiln and pre-heater fuel to 520kg of CO₂ per tonne of cement by 2030 compared to 576kg/t in 2018. Over the same period it will reduce its indirect emissions from electricity consumption by 65%.

Germany: 100% CCS aim for Schwenk

Four of Europe's leading cement producers have partnered to found and operate a 100% carbon capture and storage (CCS) plant at Schwenk Zement's 1.0Mt/yr Mergelstetten plant in southern Germany. HeidelbergCement has announced that the catch4climate project will enter operation in 2020.

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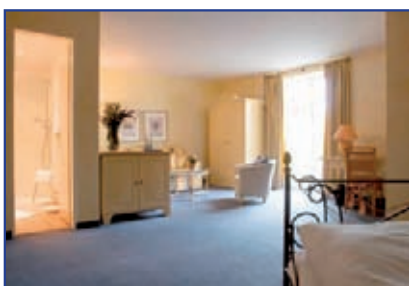
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Turkey: Akçansa reports record exports

Sabançi Holding and HeidelbergCement joint subsidiary Akçansa achieved an undisclosed Turkish record figure for nine-month cement exports over the period ending 30 September 2019. The exports included 1Mt of clinker. Akçansa general manager Umat Zenar said, "We achieved a 46% increase in our port capacity utilisation rate," in attributing the growth to its logistics advantage over competitors and effective port management.

Russia: New kiln for Kavkazcement

Eurocement subsidiary Kavkazcement has installed and commissioned a dry kiln to replace its reserve kiln at its plant in the Republic of Karachay-Cherkessia. The new kiln is part of a Euro5.79m investment which will increase the current 3.1Mt/yr integrated plant's capacity by over 40% to 4.4Mt/yr when commissioned in mid-2020. Oleg Lopatin, Kavkazcement director general, said, "A significant increase in the plant's workload was made possible by the high demand for our cements."



Austria: New plant for RHI Magnesita

RHI Magnesita has published details of a planned raw materials plant in Austria. The company will spend Euro40m in the construction of the Dolomite Resource Centre Europe for the processing of raw local dolomite into sintered dolomite for use in refractory products at Hochfilz in the state of Tyrol. State Governor Günther Platter and French ambassador to Austria François Saint-Paul joined local folkloric figures Krampus and Saint Nikolaus in breaking ground at the site of the future plant, which will be the source of dolomite for all RHI Magnesita European operations from 2021. The plant is part of a raft of projects totalling Euro300m in additional investments by the Austria-based refractory products manufacturer in 2020.



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Spain: Cement production and consumption fall again...

Total cement consumption in Spain fell to 1.1Mt in November 2019, down by 8.3% from 1.2Mt in previous November 2018. CIC Architecture and Sustainability Online has reported that this was 2019's third month to show a decrease compared to 2018 figures, and the sharpest year-on-year decline so far. The year-on-year decrease for the 11 months to 30 November 2019 was 6.8%.

Production failed to show growth, with imports bridging the supply gap. Clinker alone has grown by over 100% to imports of 0.5Mt in the same 11 months from over 0.2Mt in the corresponding period of 2018. Exports, which have declined over 30 consecutive months, fell by 30% year-on-year in November 2019 to under 0.5Mt from over 0.6Mt one year previously. This brings the decline for the year so far to 22% year-on-year to 5.8Mt from 7.4Mt in the first 11 months of 2018. Oficemen president Víctor García Brosa explained that energy prices were a contributing factor to Spain's production problems. He said that electricity is '27% more expensive than in Germany or France.'



Spain: Terminal deal for Cemex

The Port Authority of Gijón granted Cemex España a 30-year concession for use of 2480m² of the El Musel terminal for unloading, storage and bagging on 20 December 2019, subject to the Mexican company's use of the facilities for a minimum of 50,000t/yr of cement and derived products for the first two years of the arrangement, 0.1Mt/yr for the subsequent three years, and 0.15Mt/yr thereafter. La Nueva España newspaper has reported that Cemex España applied for the concession in February 2019. Its plans consist of a Euro5.0m investment in a development including two 6000t-capacity silos, a 44m crane and bagging facilities. Cemex España will take an estimated 10 months to complete the works from beginning the project in early 2020.

Spain: LafargeHolcim joins AEPC

Asociación Española de Pavimentos Continuos (AEPC), the body which represents manufacturers and maintainers of cement-based and other related flooring, has welcomed LafargeHolcim Spain as a new member. AEPC states its aims as 'promoting and demanding the highest levels of safety, quality and integrity in all paving sector activities.'

LafargeHolcim Spain operates an installed capacity of over 7.0Mt/yr across five integrated plants. In 2019 it announced an investment of Euro20m in upgrades aimed at reducing its net carbon dioxide (CO₂) emissions by 90,000t/yr by the end of 2022.

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Hungary: Bypass upgrade for Lafarge Kiralyagyháza

Lafarge Cement Hungary has announced plans to upgrade clinker production at its 1.0Mt/yr Kiralyagyháza integrated plant with a Euro1.79m investment in chlorine bypass technology, which uses powdered limestone to remove chlorine and 10% of the carbon dioxide (CO₂) from gases released in clinker production, which will then be used in clinker cooling. There will be a corresponding increase in the rate of alternative fuel (AF) substitution in the plant's kilns, with an AF fuel store expansion in early 2020 set to raise AF usage from 60% to 80%.



UK: Quinn and NBG extend deal

Quinn has announced that it will proceed with the exclusive supply of its Master Grade cement to the UK-based wholesale builders' merchant National Buying Group (NBG) until the end of 2021, extending the term of the companies' 2018 agreement. "Our partnership with NGB has made a significant contribution to the success of our bagged cement range, so we're delighted to agree an extension to our exclusivity deal with NBG for supply to their merchant members," said Lee Gillman, Quinn's Great Britain Sales and Marketing Director. Quinn's bagged range also consists of Premium Grade and General Purpose cement.

Ireland: Sean Quinn moves to buy up land

Mr Sean Quinn has bought 'substantial' tracts of limestone-rich land in Cavan and Fermanagh on 99-year leases, giving him sole extraction rights, over the past three and half years since his final severance with Quinn Industrial Holdings in mid-2016, according to the Sunday Times. The purchases may have been aimed at strengthening his position in his campaign to re-attain control over the company. The company has stated that it has succeeded in supplementing its on-site limestone supply with material from further afield. "These materials are of a higher quality," said a Quinn Industrial Holding spokesperson.

Austria: w&p donates robot

W&p Zement has announced that it has donated an ABB robotic arm from a laboratory at its 0.8Mt/yr Wietersdorf plant to the mechatronics department of Klagenfurt Higher Technical College. The company replaced the 10kg-capacity, 1.55m armature with a fully automated POLAB cement laboratory as part of an upgrade for Industry 4.0. w&p Zement Wietersdorf operations manager Florian Salzer said, "We are pleased that the robot will continue to be of use, increasing the quality of technical training and thus laying the foundation for training tomorrow's top specialists." He said that the equipment is in perfect condition because of the low weight of samples for which it was used.

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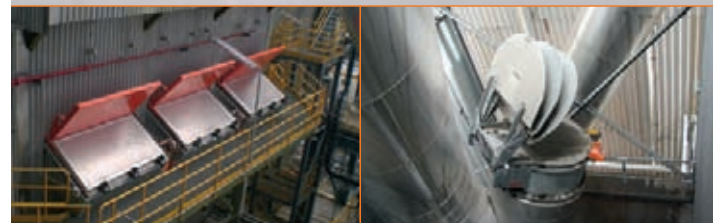
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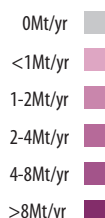
Jacob Winskell, Global Cement Magazine

Zement in Germany



Munich, Germany, hosts the upcoming *Global CemBoards Conference & Exhibition* on 21 - 22 January 2020 and the *Global CemProcess Conference and Exhibition* on 26 - 27 May 2020. Here, *Global Cement Magazine* reviews the cement situation in Germany at the start of the fourth decade after reunification.

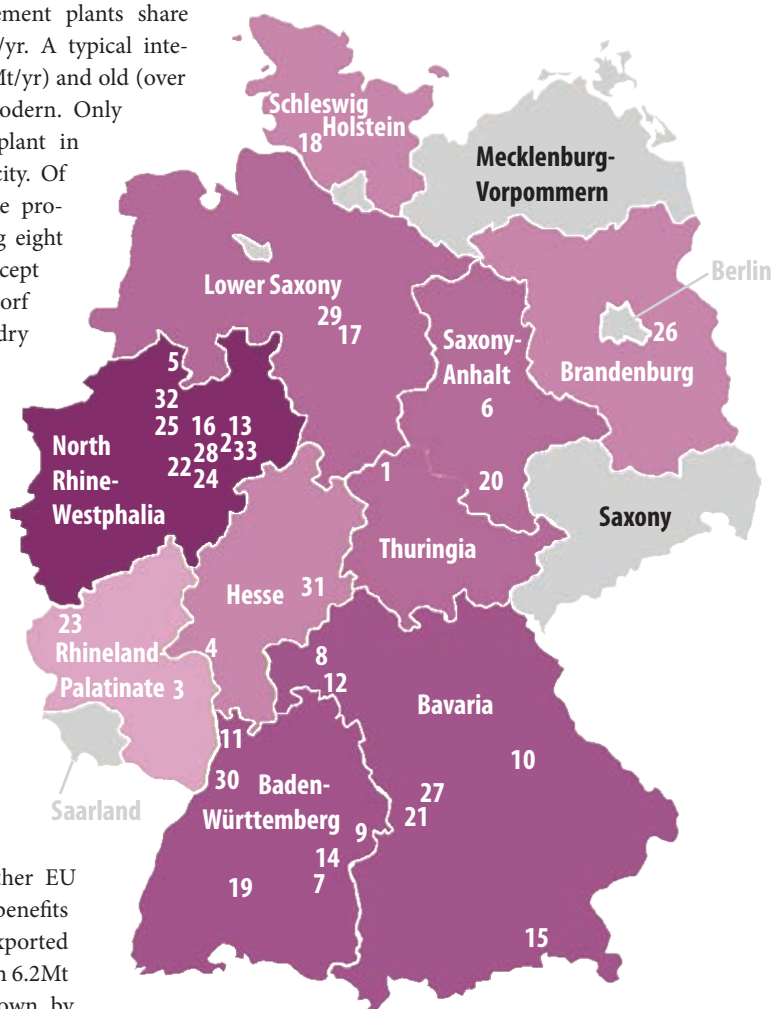
Right - Figure 1: German federal states by integrated cement production capacity.
Source: *Global Cement Directory 2020*.



Germany's 33 integrated cement plants share a total capacity of 32.6Mt/yr. A typical integrated plant is small (under 1.0Mt/yr) and old (over 50 years), though extremely modern. Only Dyckerhoff's 2.4Mt/yr Deuna plant in Thuringia exceeds 2Mt/yr capacity. Of the 33 plants, 25 operate single production lines and the remaining eight operate two lines each. All except LafargeHolcim's 1.5Mt/yr Lägerdorf plant produce clinker using the dry process. Figure 1 shows the location of integrated plants in Germany. Additionally, there are 18 grinding plants in the country. Its world-leading cement equipment industry makes Germany self-sufficient both in covering its current demand for cement and equipping itself with home-grown technology; a claim which can only be matched by China.

International trade

Germany enjoys free movement of goods between itself and other EU member states. This chiefly benefits producers: in 2018, the nation exported 6.3Mt of cement, up by 1.6% from 6.2Mt in 2017. It imported 1.5Mt, down by 3.8% from 1.6Mt in 2017.¹



Above - Figure 1: German cement plants map. **1.** Deuna Zement GmbH (Dyckerhoff), Deuna, 2.4Mt/yr. **2.** Dyckerhoff GmbH (Buzzi Unicem), Geseke, 0.4Mt/yr. **3.** Dyckerhoff GmbH (Buzzi Unicem), Gölheim, 0.8Mt/yr. **4.** Dyckerhoff GmbH (Buzzi Unicem), Wiesbaden, 1.2Mt/yr. **5.** Dyckerhoff GmbH (Buzzi Unicem), Lengerich, 1.77Mt/yr. **6.** Schwenk Zement KG, Bernburg, 0.86Mt/yr. **7.** Schwenk Zement KG, Allmendingen, 1.0Mt/yr. **8.** Schwenk Zement KG, Karlstadt, 1.2Mt/yr. **9.** Schwenk Zement KG, Mergelstetten, 1.0Mt/yr. **10.** HeidelbergCement AG, Burglengenfeld, 1.1Mt/yr. **11.** HeidelbergCement AG, Leimen, 0.8Mt/yr. **12.** HeidelbergCement AG, Lengfurt, 1.0Mt/yr.

13. HeidelbergCement AG, Paderborn, 0.4Mt/yr. **14.** HeidelbergCement AG, Schelklingen, 1.5Mt/yr. **15.** Südbayerisches Portland-Zementwerk Gebr. Wiesböck & Co. GmbH (Rohrdorfer Group), Rohrdorf, 0.9Mt/yr. **16.** Phoenix Zementwerke Krogbeumker GmbH & Co. KG, Beckum, 0.5Mt/yr. **17.** Holcim (Deutschland) GmbH (LafargeHolcim), Höver, 1.7Mt/yr. **18.** Holcim (Deutschland) GmbH (LafargeHolcim), Lägerdorf, 1.5Mt/yr. **19.** Holcim (Süddeutschland) GmbH (LafargeHolcim), Dotternhausen, 1.1Mt/yr. **20.** Opterra Zement GmbH (CRH), Karsdorf, 1.4Mt/yr. **21.** Märker Zement GmbH, Harburg, 1.0Mt/yr. **22.** Thomas Zement GmbH & Co. KG, Erwitte, 0.55Mt/yr.

23. Portlandzementwerk Wotan H Schneider KG, Üxheim, 0.15Mt/yr. **24.** Portlandzement Wittekind Hugo Miebach Söhne KG, Erwitte, 1.0Mt/yr. **25.** Holcim WestZement GmbH (LafargeHolcim), Beckum, 0.95Mt/yr. **26.** Cemex Zement GmbH, Rüdersdorf, 1.9Mt/yr. **27.** Solnhofen Portland-Zementwerke GmbH & Co. KG, Solnhofen, 0.42Mt/yr. **28.** Spenner GmbH & Co. KG, Erwitte, 1.0Mt/yr. **29.** HeidelbergCement AG, Hannover, 0.7Mt/yr. **30.** Opterra Wössingen GmbH (CRH), Wössingen, 0.7Mt/yr. **31.** Zement und Kalkwerke Otterbein GmbH & Co. KG, Großenludermus, 0.2Mt/yr. **32.** HeidelbergCement AG, Ennigerloh, 1.0Mt/yr. **33.** HeidelbergCement AG, Geseke, 0.9Mt/yr.



Emissions and sustainability

The German Cement Producers' Association (VDZ) oversees its members' efforts towards reducing their impact on the environment. Over the three years to 31 December 2017, producers invested over Euro0.5bn in upgrades aimed at increasing efficiency.¹

In accordance with the German Waste Management and Sorting Act, producers are increasing the share of constituents other than clinker in their cement, with a special emphasis on industrial by-product utilisation. In 2018 power plants provided the German cement sector with 0.26Mt of flue gas desulphurisation (FGD) gypsum, while iron and steel production yielded 7.70Mt of granulated blast furnace slag (GBFS) in addition to contaminated ore, ferric dusts and fly ash.¹

Changing fuels is another way in which producers are altering the input to their kilns to conserve resources, dispose of waste and cut CO₂ emissions. Germany is a leading force in alternative fuel (AF) substitution, with producers having achieved 68% in 2018¹. That year, plants in Germany burned 3.60Mt of AF, consisting of 1.98Mt (55%) of commercial and industrial waste, 0.63Mt (18%) of sewage sludge, 0.28Mt (7.8%) of unsorted municipal waste, 0.20Mt (5.4%) of tyres and 0.16Mt (4.6%) of animal matter, in addition to other materials such as oil sludge and organic residues.

Production

We will follow the *Global Cement Directory 2020* in analysing Germany's integrated cement production, with breakdowns of capacity by state (Figure 1 and Table 1) and producer (Figure 2). We will also refer to grinding plants in relation to states and producers.

By state

Three federal states dominate production. Baden-Württemberg, Bavaria and North Rhine-Westphalia combine 19.8Mt/yr of integrated production capacity - 61% of the national total. Within the first two this is evenly spread, while all of North Rhine-Westphalia's integrated plants lie in the eastern region (Westphalia-Lippe), with four dedicated grinding plants located

in the central Rhine-Ruhr conurbation. The three city-states of Berlin and the Free Hanseatic Cities of Bremen and Hamburg have no integrated cement plants, although Switzerland-based LafargeHolcim subsidiary Holcim (Deutschland) GmbH produces cement from clinker at its slag plant in Bremen and Zementwerk Berlin GmbH & Co. KG, a subsidiary of Spennert Zement, operates in the capital.

Federal State	Capacity (Mt/yr)
North Rhine-Westphalia	8.47
Bavaria	5.62
Baden-Württemberg	4.20
Lower Saxony	2.40
Thuringia	2.40
Saxony-Anhalt	2.26
Brandenburg	1.90
Schleswig-Holstein	1.50
Hesse	1.40
Rhineland-Palatinate	0.95

Three further states have no integrated cement plants. Coal-producing Saarland, Germany's smallest state, sources its cement from neighbouring France and Luxembourg, as well as from other German states. Of the remaining two, Mecklenburg-Vorpommern is Germany's most sparsely populated and second-smallest state in terms of population, whilst Saxony is sixth-largest, with two cities with populations over 500,000. What they have in common is that they were both part of the former German Democratic Republic (GDR).

Figure 1 may seem to indicate a disproportionate concentration of cement production within the Federal Republic's pre-1990 borders. In fact, the opposite is true. The five former-GDR states have a combined population of 13.6m (16% of the population of Germany) and share an integrated capacity of 6.56Mt/yr (20%). This gives the former East a *per-capita* capacity of 482kg/yr compared to the West's 380kg/yr.

Above: An open-cast limestone quarry in North Rhine-Westphalia.

Left - Table 1: German federal states by integrated cement production capacity. **Source:** *Global Cement Directory 2020*.



Right: Restoration underway at a HeidelbergCement quarry, Germany. **Source:** HeidelbergCement.de.

The explanation for this has to do with plant size. The average capacity of an eastern plant is 1.64Mt/yr, compared to 0.90Mt/yr in the West. Germany's two largest plants - Dyckerhoff subsidiary Deuna Zement GmbH's 2.4Mt/yr Deuna plant and Mexico-based Cemex's 1.9Mt/yr Rüdersdorf plant are located in the former GDR states of Thuringia and Brandenburg.

A couple of factors determine the locations of cement plants in Germany:

1 - Natural resources: The German cement industry grew up cheek-by-jowl with lime production and every integrated plant is built upon the limestone it processes, with most having a dedicated quarry. The northwestern plants are situated on marine limestone from the Cretaceous period, while a band of plants in the South crosses the Jurassic limestone hills of Württemberg and western Bavaria. The remainder lie mostly on Triassic *Muschenkalk* deposits. The oldest rock, from the *Massenkalk* formation, is transported by Beumer conveyor from limestone quarry to Portlandzementwerk Wotan H Schneider KG's 0.15Mt/yr Üxheim plant in the Rhineland-Palatinate, where it is used to produce nine different cements.

2 - Population: Germany's cement plants generally lie between 50km and 100km of major population centres, though there are some inner-city plants such as Dyckerhoff's 0.4Mt/yr Amöneburg plant in Wiesbaden, Hesse, and the 1.0Mt/yr Portlandzement Wittekind Hugo Miebach Söhne KG plant, 1.0Mt/yr Spenner GmbH & Co. KG plant and 0.55Mt/yr Thomas Zement GmbH & Co. KG plant which combine to make Erwitte, North Rhine-Westphalia, (population 16,000) a 2.55Mt/yr cement town with a *per-capita* capacity of 159,000kg/yr.



By producer

Seven multinationals with 27.8Mt/yr - 85% of Germany's total integrated cement capacity - and eight independent plants with 4.82Mt/yr altogether (15%) share Germany's 32.6Mt/yr domestic capacity (Figure 2).

17.2Mt/yr (53%) of this capacity is held by companies that are ultimately German-owned. Of the four German names in the 'multinational' category, three remain German-owned: Rohrdorfer Group - the smallest - Schwenk Zement and the largest domestic producer: HeidelbergCement.

HeidelbergCement

HeidelbergCement and Italy-based subsidiary Italcementi operate integrated cement plants in 48 countries through majority stakes in private and state-sector projects on all six continents where cement is manufactured. The company takes its name from the university town of Heidelberg on the River Neckar in Baden-Württemberg, where cement was first produced at a former textiles mill by a former brewer, Johann Schifferdecker, in 1874. The company, which would become HeidelbergCement AG, opened the Leimen cement plant in 1896.

Right: Roadbuilding in Thuringia.





In 2020, HeidelbergCement AG owns and operates eight integrated cement plants in its home country. The largest is its 1.5Mt/yr Schelklingen plant in Baden-Württemberg. Schelklingen, which has produced cement since 1903, tragically made *Global Cement* news in September 2018 for the deaths of two contractors during construction work on the plant's storage facilities.

The 108-year-old Burglengenfeld, Bavaria, plant, acquired by HeidelbergCement AG in 1948, received a new kiln line in April 2018, for which it contracted IKN for engineering, supply and installation. Its capacity is 1.1Mt/yr. The plant will also be visited by delegates attending the 3rd *Global CemProcess Conference & Exhibition* in May 2020.

HeidelbergCement AG has used its Lengfurt, Bavaria, plant, acquired in 1922, for numerous innovations. It has a capacity of 1.0Mt/yr, with KHD kiln lines and an Ormat waste heat recovery (WHR) plant. In 2015, it achieved 100% AF substitution.

The company's other 1.0Mt/yr integrated plant is located in Ennigerloh, North Rhine-Westphalia. The remaining four range between 0.4Mt/yr (Paderborn) and 0.9Mt/yr (Geseke) in capacity.

Three grinding plants complete HeidelbergCement AG's operations in Germany. These are located in Königs Wusterhausen, Brandenburg, Mainz, Rhineland Palatinate, and Hanover, Lower Saxony.

Dyckerhoff

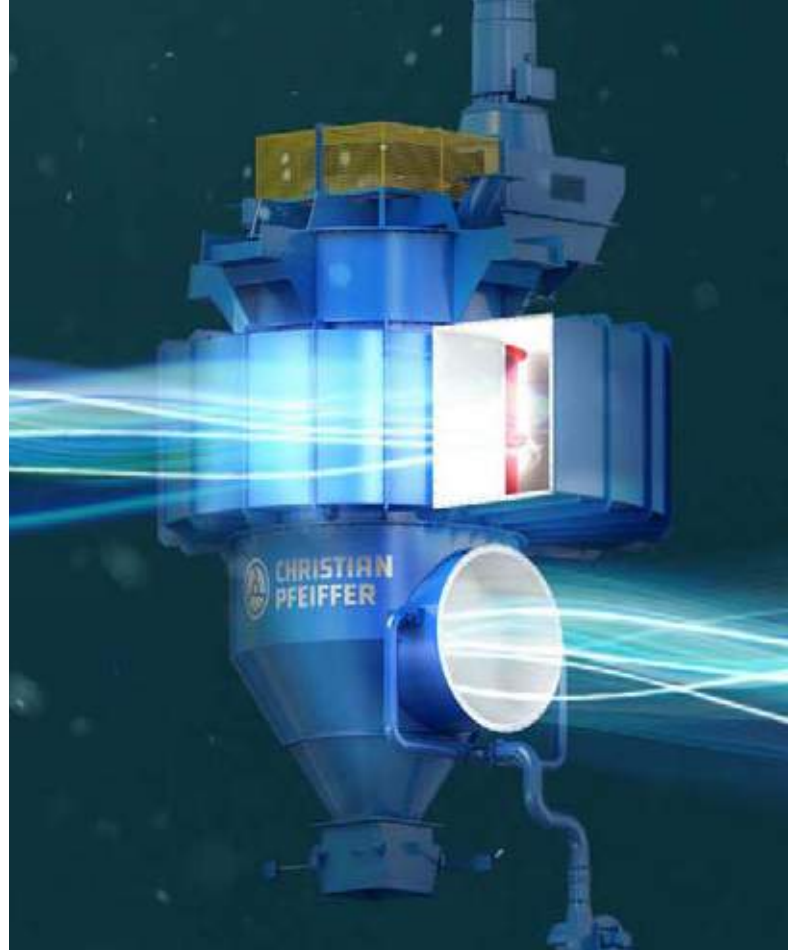
Italy-based Buzzi Unicem subsidiary Dyckerhoff was founded in 1864 in Amöneburg, now in the city of Wiesbaden, where it retains its original plant, as well as its headquarters.

In addition to the 1.2Mt/yr Amöneburg plant, Dyckerhoff GmbH owns four further integrated cement plants across the country.

Dyckerhoff subsidiary Deuna Zement GmbH, which was acquired in 1975, operates the 2.4Mt/yr Deuna cement plant in Thuringia. In August 2019, it signed a contract with Austria-based Lindner for the supply and installation of a four-shredder refuse-derived fuel (RDF) production line in partnership with B+T Group, which will provide mostly pre-sorted non-recyclable post-consumer packaging and rubber and textile waste to process for use in Deuna's kilns at a rate of 720t/day.

Dyckerhoff GmbH's 1.77Mt/yr Lengerich, North Rhine-Westphalia, has a line dedicated to producing oil well cement for export, while the 0.8Mt/yr Gölheim, Rhineland-Palatinate, plant grinds coal on the side. The 0.4Mt/yr Dyckerhoff Geseke plant in North Rhine-Westphalia received a new quarry road on 10 January 2020. (See Page 39).

Two Dyckerhoff grinding facilities serve the German market: the Neuss plant in North Rhine-Westphalia produces white cement, while the company uses the Neuwied, Rhineland-Palatinate, plant to produce oil well cement.



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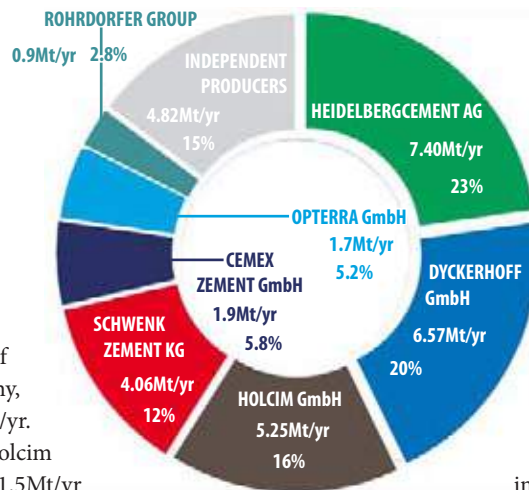
Right - Figure 2: German producers' shares of domestic integrated cement production capacity. **Source:** *Global Cement Directory 2020*.

LafargeHolcim

World number two producer LafargeHolcim has three active subsidiaries in Germany. Holcim (Deutschland) GmbH operates the two largest plants. Its Höver cement plant outside the city of Hanover, Lower Saxony, has a capacity of 1.7Mt/yr. In December 2018, Holcim (Deutschland) GmbH's 1.5Mt/yr Lägerdorf cement plant won a Chamber of Industry and Commerce (IHK) training award for its attention to worker development and focus on young people, of which 40 were in training there at that time.

Holcim (Süddeutschland) GmbH is responsible for production at the 1.1Mt/yr Dotternhausen plant in Baden-Württemberg's Zollernalb district, which has been the subject of a legal dispute since June 2019 over the use of glass in cement production which a Zollernalb resident claims may contain contaminants responsible for a rise in ammonia, dioxin and toxic heavy metal levels locally.

Holcim WestZement GmbH acquired the 0.95Mt/yr Beckum-Kollenbach plant from Cemex WestZement GmbH in January 2015. Cement production in Beckum, in northern North Rhine-Westphalia, dates back to 1827, and the Beckum-Kollenbach plant neighbours an independent cement producer, Phoenix Zementwerke Krogbeumker, and numerous cement technology suppliers.



Holcim WestZement operates a 1.0Mt/yr grinding plant, the Duisburg-Schwelgern slag plant. Holcim Hüttenzement's 1.0Mt/yr Hüttenzement slag plant in Duisburg was also acquired from Cemex in 2015.

Schwenk Zement

Ulm-based Schwenk Zement KG, incorporated in 1847, is number four in Germany in terms of integrated cement production capacity.

Schwenk Zement acquired Cemex's Baltic and Nordic operations, including the latter's 1.7Mt/yr integrated Broceni plant in Latvia and its 38% stake in the 1.8Mt/yr integrated Akmenės plant in Lithuania. The sale of Schwenk Zement's Namibian subsidiary Ohorongo cement, through which it owned its only integrated plant outside of Europe, to China-based West China Cement was concluded on 3 January 2020.

On home soil, Schwenk Zement KG operates four integrated plants, the largest of which is its 1.2Mt/yr Karlstadt plant in Bavaria. Schwenk Zement KG's 1.0Mt/yr Mergelstetten plant in Baden-Württemberg is the subject of a carbon capture and storage (CCS) project as the result of a partnership between the company, Buzzi Unicem-Dyckerhoff, HeidelbergCement and France-based Vicat. The project is Europe's first 100% CCS study at a cement plant.

Schwenk Zement KG also operates a 1.0Mt/yr cement plant in Allmendingen, Baden-Württemberg

Right - Figure 3: German monthly cement deliveries in 2018 (whole year) and 2019 (to June). **Source:** VDZ.





and a 0.86Mt/yr cement plant in Bernburg, Saxony-Anhalt.

Cemex

Cemex Zement GmbH's cement production centres on Rüdersdorf, 50km east of Berlin in Brandenburg, where its integrated plant produces 1.9Mt/yr of cement. When Rüdersdorf's grinding mills are at clinker capacity, Cemex is able to rely on its grinding plant in nearby Eisenhüttenstadt. In May 2019, Cemex Zement GmbH sold its North and North-West regional aggregates and ready-mix operations to GP Günter Papenburg for a reported Euro87m.

So far in 2020, Cemex has divested itself of some UK assets, including a minority of its aggregates and ready-mix operations and a cement terminal, however the scale and concentration of operations at Rüdersdorf and Eisenhüttenstadt give the impression of an asset which will not be exchanged without substantial consideration, though Cemex cement divestments continue globally. In its third quarter results, Cemex noted large infrastructure projects in Germany as a key source of value in its Europe region.

Opterra

Ireland-based CRH subsidiary Opterra Zement GmbH's integrated production is split between two integrated plants. The 1.4Mt/yr Karsdorf, Saxony-Anhalt, plant, was due for sale to Schwenk Zement KG in March 2017, but was retained and underwent a Euro23m upgrade to install a selective catalytic reduction (SCR) unit to its emissions systems in July 2018.

Both Opterra Zement GmbH's integrated Wössingen, Baden-Württemberg, plant and Sötenich, North Rhine-Westphalia, grinding plant operate capacities of 0.3Mt/yr.

Rohrdorfer Group

Rohrdorfer Group operates integrated cement plants on both sides of the Austria-Germany border. Its flagship plant, the integrated 0.9Mt/yr Südbayerisches Portland Zementwerk, is Germany's southernmost plant.

Other producers

A total of seven other companies each operate a single integrated cement plant in Germany. Of these, Märker Zement GmbH, Spenner Zement GmbH and Thomas Gruppe Zement GmbH & Co. KG also each operate a grinding plant. Five further independent producers operate single grinding plants.

Looking forward

2019 was a normal year in German cement production, with no new plants and steady deliveries as compared to 2018 (Figure 3). Stability would appear to be the defining German cement trend, and one which is set to continue.

¹VDZ, 'Zementindustrie Umweltdaten' August 2019.



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Brazil: First sales increase since 2014

Brazil has reported a growth in annual sales volumes for the first time since 2014. Producers sold 54.5Mt of cement in 2019, up by 3.5% from 52.8Mt in 2018 and exceeding SNIC president Paulo Camillo Penna's January 2019 forecast of 3.0% growth. Penna has now predicted a 3.6% increase to 56.5Mt in 2020. Valor newspaper has reported that Penna bases his assumption on favourable interest rates and low inflation of the Brazilian Real as well as the government's implementation of anticipated industrial policies favourable to production.

Argentina: Cement sales fall in 2019

The total volume of Argentine cement sold in 2019 was 11.1Mt – down by 6.1% year-on-year from 11.8Mt in 2018. The year's economic recession and currency devaluation hit December 2019's sales especially hard, with just 0.74Mt sold, of which 0.11Mt was exported. Esmerk Latin American News has reported that Argentina was self-sufficient for cement in 2019, with no imports during the year.

Bolivia: Oruro plant reopens

Empresa Minera Industrial's 0.1Mt/yr integrated cement plant has resumed operations across both of its dry lines following a fuel shortage. Tinformas has reported that a natural gas shortage caused the suspension of operations in November 2019 following an attack on a pipeline.

Mexico: Solar power for GCC

Grupo Cementos de Chihuahua (GCC) has signed a 15-year power supply agreement with a Mexico-based solar energy provider. The Awareness Times newspaper has reported that 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, which enters force on 1 January 2021, will save GCC US\$2.5m/yr and cut 0.3Mt of CO₂ emissions throughout its duration.



US: Another North American CCS project

Holcim US's 1.9Mt/yr Portland cement plant in Colorado has become the latest site to 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 take for safe storage underground. The study will assess the financial viability and design requirements of such an installation on a permanent basis.

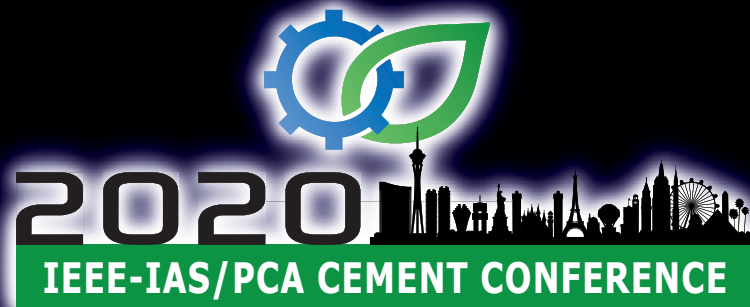


US: Eagle deal cleared for take-off

Eagle Materials has received clearance from the Federal Trade Commission for its November 2019 acquisition of Kosmos Cement, which operates the 1.7Mt/yr integrated Louisville plant in Kentucky, as well as raw materials reserves and seven cement terminals, from Mexico-based Cemex and Italian Buzzi Unicem for US\$665m. Eagle Materials board chair Mike Nicolais said the acquisition was 'timely in light of our plans to separate our Heavy Materials and Light Materials businesses into two independent, publicly traded corporations.' It will pay using existing funds and a loan withdrawn for the purpose.

US: Alleged 'unlawful piles' at Sesco

The attorney's office of Harris County in Texas filed a lawsuit against Sesco for alleged public safety and environmental violations following multiple complaints to the Harris County Pollution Control Board about dust. Piles of debris in an outdoor area of Sesco's Houston cement terminal may have caused high dust levels in and around the facility and high pH levels in water located nearby. Houston Business Journal conjectured that the stockpiles might consist of surplus cement being stored unlawfully. Sesco stands accused of operating two silos and three hoppers without proper environmental clearance. Inspections in 2019 uncovered set cement in storm drains at the facility.



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Brazil: RHI Magnesita invests heavily

Refractory products supplier RHI Magnesita has announced a raft of investments totalling Euro300m in addition to its annual Euro120m maintenance expenditure. The investment will cover projects in all its operating regions, including a new raw materials plant in Austria and 'significant' expansions to its Contagem complex in Brazil and Cuttack non-basic brick plant in India. It further stated that it will 'build secondary raw material sorting, cleaning and production capabilities' to absorb waste streams.

US: Argos plants receive WHC certificates

The Wildlife Habitat Council (WHC) has awarded Conservation Certificates to Cementos Argos' 1.5Mt/yr integrated Newberry plant in Florida and 0.6Mt/yr Atlanta grinding plant in Georgia. Cementos Argos has installed a bat roost at the Newberry plant and planted bee and butterfly gardens with bird boxes for year-round resident bluebirds. The company said that the certification signals its 'long-term commitment to managing quality habitats for wildlife.'

US: Energy Stars for Buzzi Unicem plants



The Environmental Protection Agency has awarded 2019 Energy Star Certification to Buzzi Unicem's Chattanooga, Tennessee and Festus, Missouri plants and Alamo Cement Company's San Antonio, Texas plant for achieving Energy Performance Indicator scores of over 75 and over three years' satisfactory environmental compliance. This places the plants in the top quarter of 'similar facilities' for energy efficiency nationwide.

Canada: New CEO for McInnis

McInnis Cement appointed Baudouin Nizet as its President CEO with immediate effect on 7 January 2020. He succeeds Jean Moreau, who had been Interim President and CEO since mid-2018.

Nizet's career in the cement industry includes working at CRH Canada and Holcim Canada as Senior Vice President for Quebec and the Atlantic Region from 2006 to 2013 in Montreal, then in Toronto as president and CEO from 2013 to 2017.

McInnis Cement has also appointed Alex Wojciechowski as its chief operating officer. Wojciechowski holds over 30 years of experience as a manager in the cement industry in Canada and in the US. He has held various positions ranging from Maintenance Manager to Plant Manager to Industrial Manager. His expertise covers both cement operations and constructing and commissioning industrial equipment investment projects.

Mexico: Two Fives project updates

France's Fives has issued an update on the two raw meal grinding plants it is supplying to Cruz Azul's Hidalgo and Oaxaca Lagunas cement plants.

Construction work at the Oaxaca Lagunas plant started in August 2018. Mechanical erection of the raw materials feeding equipment and the FCB Horomill grinding circuit started in July 2019. Electrical installation is currently in progress. The raw meal grinding unit is scheduled to be operational by the end of March 2020.

Construction work at the Hidalgo plant started in December 2018. Mechanical erection started at the end of August 2019 and electrical erection works began in December 2019. First raw meal production is scheduled by the end of May 2020.

Both orders 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 6500 mm and an FCB Aerodecantor.

US: Concrete road rage

A cement truck travelling on a busy road in Wilmington, Massachusetts, dumped part of its load onto another vehicle, the driver of which the truck driver had 'gotten into an argument' with. According to the Boston Globe newspaper, the offending truck sped away, but police identified the driver through the cement company. They have charged him with negligent operation of a motor vehicle, assault and battery with a dangerous weapon, two counts of malicious destruction of property, leaving the scene of a crash that caused property damage, a marked lanes violation and disorderly conduct.



Above: The kiln at McInnis Cement. Source: McInnis Cement website.

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Don Ingrassano, Roanoke Cement Company, Titan America LLC

Cement plant tours as a relationship builder

Architects, engineers and other specifiers are key audiences for the cement industry. We must consistently carve out time to share information with them about our products, facilities, environmental initiatives and our people. Plant tours are a great way to do this...



Above: Don Ingrassano, Vice President of Sales - Cement & Aggregates at Titan America.

When I began working for Roanoke Cement Company (RCC), I made a point of meeting specifiers in order to learn about their issues and what our role in solving them might be. In Roanoke Steve Sunderman was a key contact. An architect, Sunderman serves as a LEED AP Building Design & Construction auditor, involved in the US Green Building Council (USGBC) since 2004. He helped RCC forge a relationship with the USGBC's Virginia Chapter, which has proven invaluable. The group advocates tirelessly for green building practices, offering continuing education credits for architects and engineers in the process. All US cement plants should consider joining their local USGBC Chapter. Similar organisations operate globally.

Visit planning

Plant visits are a crucial tool to help show the cement production process in its best light and build on pre-existing relationships. When Sunderman was contacted by Donna Wilgus, Project Manager - Community for Virginia and Maryland at the USGBC, expressing its interest in a tour of the Roanoke plant, he quickly notified RCC. A date was set for 5 November 2019, which allowed for more than a month to prepare.

RCC assembled a team comprising several commercial team members, a technical services engineer, a public relations representative, environmental engineer, executive administrator, a process manager and myself. The team met weekly online to coordi-

nate and assign tasks including: transportation, food, parking, meeting place, presentations, plant sites, messaging and logistics.

A detailed tour plan was decided upon using two buses. This approach would allow for easy coverage of the 50-acre site and the opportunity for RCC to present key information to delegates as they moved around the plant. Communications were developed to demonstrate to the USGBC registrants how the Roanoke Cement plant works towards CO₂, waste, and emissions reductions across its campus and how that translates into process and products with lower environmental impacts.

The USGBC was eager to promote the tour. About three weeks prior to the event, an aerial photo of the plant, a description of the tour and biographies of the speakers were sent out. The USGBC also posted the tour on the regional website and emailed its local members.

Visit execution

Lindsey Layman, Environmental Engineer at RCC, greeted the group with an introduction of how cement is manufactured and shipped, and provided an overview of tour highlights. Steve Sunderman presented and highlighted the many uses of cement in concrete and addressed attributes like durability and sustainability.

The visit itself began with a trip up to the quarry, where RCC demonstrated that high quality cement products begin in the quarry. On the way, RCC provided a history of the plant highlighting its operational origins in the 1950s, its four previous kilns and nine finish mills. Highlighting third-party recognition as the first cement company to become ISO50001 certified, the plant's Gold GBCI True Waste Certification and 13 consecutive years of EPA Energy Star awards, was an essential part of the tour.

After the quarry, the buses visited the plant's apple orchard. A certified habitat area by the Wildlife

Opposite page: Registrants were able to visit the Roanoke plant's trout pond (shown) and orchard, as well as the main plant itself.

Below: The Roanoke Cement plant campus is in the Roanoke Valley.





Habitat Council, one tree was planted for each employee in 2007. RCC employees keep bees in the hives within the orchard.

Next, the tour visited the preheater tower. Here RCC displayed the plant's modernisation journey. The plant now operates a six-stage system with 40% higher process efficiency than the previous system used in the 1990s. The next stop was the plant's 3500t/day kiln. This stop provided opportunity to discuss the plant's alternative fuel sources such as sawdust and tyre chips, which reduce the plant's CO₂ emissions by avoiding the use of fossil fuels.

Further down the road, the tour visited the additives and tyre wash area where RCC took the time to discuss its reuse of by-products, including fly ash and cement kiln dust in its core products, thus diverting these from landfill. The truck wash removes materials from the truck tyres to prevent fugitive emissions. That material is also recycled.

Registrants were then taken to a reclaimed former quarry that has been converted to a thriving trout pond, established along with the local Trout Unlimited chapter. Registrants were able to view and feed the fish from a dock built over the pond.

Finally, the tour reached the plant's state-of-the-art packaging plant. Here RCC informed registrants about Type 1L cement, which is part of RCC's work towards lower CO₂ emissions and greenhouse gases.

Visit reaction

"The group was excited to see a behind-the-scenes look at Roanoke Cement and learn about the newest Type 1L cement being manufactured to reduce carbon," said Kim Lombard, American Institute of Architects member, LEED Fellow & Fitwel Ambassador. "The development of a more sustainable process positions Roanoke Cement as a leader in the industry. We are happy to have the plant in our community."

The USGBC found the tour to be a meaningful next step in its relationship with RCC. "Through outreach and education, we are working on behalf of our members to advance a greener, more resilient and more prosperous future," said Donna Wilgus, USGBC Project Manager Community for Virginia and Maryland. "It was a great event and learning experience and the staff members were so welcoming!"



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India: Capacity to hit 500Mt/yr in 2020

Integrated cement and grinding plants expansions by companies including Dalmia Bharat, JK Cement and Aditya Birla subsidiary UltraTech of an additional 23Mt/yr are set to bring India's total installed cement capacity to 508Mt/yr by the end of 2020. The Business Standard newspaper has reported that steady prices year-on-year and 'softening input costs' have facilitated the expansions in spite of a 'flattish trend in industry-wide volume growth.'



India: Lobbying for sack tax reduction

The Confederation of Indian Industry (CII) has lobbied the government in its Pre-Budget Memorandum 2020-21 over customs duties. The body is suggesting a reduction on the customs duty on packaging for use in bagging cement to 5% from 10%. There is currently no import tax on cement and duties of 5% and below on various clinker constituents.

India: UltraTech gets WHR clearance

The state government of Maharashtra has granted Aditya Birla Group subsidiary UltraTech Cement environmental clearance for a planned 16MW waste heat recovery (WHR) generator at its 3.6Mt/yr integrated Awarpur plant in Chandrapur district. Projects Today has reported that the state's Environmental Impact Assessment Authority has also cleared the company's plan to expand its Korpana coal-fired power plant in Chandrapur to 15MW from 10MW. The producer will place orders for construction contracts during February 2020.

India: Dalmia plans to be debated

Dalmia Bharat has successfully lobbied the Sundargarh, Orisha district government to request the inclusion of the company's proposed 446 acre expansion to its Lanjiberna limestone and dolomite mine in the agenda of a village meeting in Kukuda, in which public opinion and suggestions will be recorded. The New India Express Newspaper has reported that, due to the special status of Kukuda as a Scheduled Tribal area, the village meeting forms a necessary preliminary step prior to district government permission of the planned works.

In October 2018, villagers in nearby Jhagarpur successfully blocked construction of Dalmia Bharat's proposed Industrial Training Institute. The Lanjiberna mine will serve Dalmia Bharat's 2.3Mt/yr integrated Rajgangpur plant, which was completed in 2019 at a cost of US\$281m and awaits commissioning.

Iran: Exports rise by a fifth

Cement producers in Iran reported growth of 22% year-on-year in exports of cement and clinker over the eight months between 21 March 2019 and 21 November 2019 to 11.4Mt from 9.34Mt. The Financial Tribune newspaper has reported that 37 countries received Iranian cement and/or clinker over the period. The leading importers of cement were Afghanistan, Uzbekistan, Pakistan, Kazakhstan and Russia. Clinker markets included Iraq, the UAE and China.



Uzbekistan: Construction of Chinese-backed plant begins

Chinese investors have announced the launch of a 0.9Mt/yr integrated cement plant in the Fergana region of Uzbekistan as a result of a total investment of US\$113m. Trend News has reported that a second phase of work beginning in May 2020 will further increase the cement plant's production capacity. This is one of five upcoming Chinese-owned integrated plants in Uzbekistan, with a shared capacity of 6.0Mt/yr.

China: Plants close to protect lake

Three cement plants in Dali, Yunnan province with a combined capacity of 5.0Mt/yr have ceased all functions except the packaging of existing cement in order to stop polluting the area around Erhai Lake.



Vietnam: Immense production and exports in 2019

Vietnamese cement producers increased their output of cement by 7.9% year-on-year to 96.5Mt in 2019. Volumes in December 2019 were 8.7Mt, up by 12% from 7.8Mt in December 2018. Vietnam News Brief Service has reported that in 2019, 34Mt of cement and clinker was exported from Vietnam, a rise of 6.3% year-on-year from 32.0Mt in 2018. The total value of exports was US\$1.39bn, up by 11% from US\$1.25bn in 2018.

Additionally, Tan Thang Cement has announced that it will commission its 2.0Mt integrated Nghe An cement plant in 2020. Its total investment in the plant, which is installed with equipment from Bedeschi, Lilama and Vinaconex, is US\$211m. Việt Nam News has reported that this will help raise the total number of Vietnamese cement production lines to 86 in 2020, with a combined installed capacity of 106Mt/yr.

Georgia: New plant on the horizon

Germany-based engineering, management and consultancy firm Sustained Visions has announced its appointment by German Cement Georgia for provision of concept development and project management services at its upcoming Kaspi plant. German Cement Georgia plans to commission the plant in early 2020.

Australia: Refratechnik acquires QMAG

German refractory producer Refratechnik has acquired Queensland Magnesite (QMAG). The acquisition adds 300,000Mt/yr of magnesium oxide to Refratechnik's supply of raw materials. The company said, "With a common focus on performance excellence, we will deliver greater value to our customers."

Kazakhstan: New plant to start in March 2020

The government of the Almaty region in eastern Kazakhstan has announced that the construction of the Kerbulak cement plant, which began in May 2018, ended 2019 at 97% completion. The government and a Singaporean private company have installed preheaters, crushers, raw materials warehouses and a 25MW substation. The launch date of the plant is in March 2020. Of its 1.2Mt/yr cement yield, 80% will be sold on the domestic market, with 20% leaving Kazakhstan for Mongolia and neighbouring countries, including China.

Bangladesh: Exports wane

Producers exported US\$5.03m-worth of cement and clinker from Bangladesh in the six months to 31 December 2019 - down by 13% from US\$5.75m in the corresponding period of 2018 and 1.6% below the government's target of US\$5.11m. Recipients of Bangladeshi cement and clinker included India, Myanmar, Nepal, the Maldives and Sri Lanka.



Pakistan: Production growth continues

Cement producers' second-half cement volumes in 2019 rose by 6.5% year-on-year to 24.8Mt from 23.2Mt in the second half of 2018. Domestic consumption grew by just 3.5% between the two periods under comparison to 20.4Mt from 19.7Mt, causing exports to rise by 22% year-on-year to 4.38Mt in 2019's second half from 3.56Mt one year previously. The Nation newspaper projected Pakistan's total volumes in the financial year ending 30 June 2020 of 47Mt/yr against an installed capacity of 60Mt/yr.

Pakistan: Residents' petition rejected

The Peshawar High Court has rejected a petition by local residents to prevent the construction of a US\$245m cement plant in Haripur by the Military Frontier Works Organisation. The Balochistan Times has reported that the project will entail the relocation of people from an area of 0.66km² and the felling of 'thousands of trees.' The Supreme Court gave a preliminary hearing to the case on 2 December 2019.

Pakistan: Flurry of applications

The end of 2019 has seen a flurry of 13 proposals for the construction of new plants and one proposed upgrade submitted to different government departments across Pakistan's five Punjabi districts. The Balochistan Times has reported that Punjab Minister for Trade and Industries Mian Aslam Iqbal stressed the need for cement companies to provide plans for minimal water use in order to receive clearance.


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South Africa: Producers 'crippled' by imports

Morag Evans, the chief executive officer (CEO) of Databuild, which provides information about the construction sector in South Africa, has said that local cement manufacturers are being 'severely' undermined by cheap imports from countries such as China, Vietnam and Pakistan. She added that the government's failure to stem the influx of these products could have a severe detrimental impact on an already struggling industry.

"In an industry already in the grips of a severe downturn owing to the decline in infrastructure development, not only are these imports negatively impacting the competitiveness of our local



manufacturers, but independent studies have shown the quality of these international products to be inferior," said Evans.

She also cited quality concerns with imported cement, mentioning a study conducted by local manufacturer PPC. It found that, from 14 products tested from 10 different producers, most were either over or underweight and were also of inconsistent quality.

Evans has supported the Concrete Institute's lobbying for a 45% import tariff on cement imports. However, she acknowledges that such a move could raise the price of cement and increase inflation in the general economy.

Algeria: Exports ramp up in face of overcapacity

Algeria sold cement and clinker worth US\$59.3m in the first 11 months of 2019, a 42% increase compared to the same period of 2018. The country's 40Mt/yr capacity cement industry serves a domestic demand of 22Mt/yr. Algeria Press Service has reported that Algeria's key trade partners for exported cement were sub-Saharan African nations, according to former Minister for Trade Saïd Djellab.



Above: The Port of Oran, Algeria.

Togo: Cimtogo grinding plant to triple capacity

HeidelbergCement has announced plans to bring the capacity of its subsidiary Cimtogo's grinding plant in Lomé up to 1.6Mt/yr from 0.6Mt/yr at an investment of Euro27m. Agencé Ecofin has reported that this will bring the German group's total investment in Cimtogo to Euro225m since its acquisition in 2012.

Saudi Arabia: Sales rise in December 2019

Cement producers in Saudi Arabia sold 4.7Mt of cement in December 2019, representing a year-on-year increase of 24%. The figure exceeded November 2019's sales of 4.3Mt by 9.3%.

Namibia: New buyer signs Schwenk Namibia deal

China-based West China Cement concluded a sale and purchase agreement for Germany-based Schwenk Zement subsidiary Schwenk Namibia for US\$104m on 3 January 2020. The Namibian newspaper has reported that the deal is awaiting clearance from the relevant authorities. Schwenk Namibia holds a 70% stake in Ohorongo Cement. Singaporean authorities stopped the sale of Schwenk Namibia to Singaporean-based International Cement Group (ICG) in September 2019 due to the latter's inability to cover the losses of the Namibian company.

Gabon: Production rises 21%

Gabon produced 0.42Mt in 2019, exceeding production figures for 2018 of 0.33Mt by 21%. Sales were US\$50.6m, up by 16% from US\$42.5m. Direct newspaper attributed the growth to both domestic producers, reporting that CimGabon has improved the efficient use of production equipment, while CIMAF also ramped up its production rate.

Kenya: EAPCC defaults on loan repayments

East Africa Portland Cement Company (EAPCC) has defaulted on contractual loan repayments to KCB Bank after auditors PricewaterhouseCoopers reported that the Kenyan company made a loss of US\$28.0m in the 12 months to 30 June 2019. During this period EAPCC produced just 0.3Mt of cement against an installed capacity of 1.3Mt/yr.



Egypt: Tourah taking offers

Germany-based HeidelbergCement subsidiary Egyptian Tourah Portland Cement has said that it will accept offers for some items proposed for sale under auction of equipment from its decommissioned 1.0Mt/yr Tourah plant in Tura near Cairo, from which it expects to raise a total of Euro1.71m. The company said it had received 'several bids.' It stopped production in June 2019 due to its inability to cover its ongoing costs.



Egypt: South Valley suffers

South Valley Cement's sales in the nine months to 30 September 2019 were Euro19.2m, a decrease of 47% year-on-year from Euro36.5m in the corresponding period of 2018. It lost Euro9.68m in the period compared to Euro0.94m in the same three quarters of 2018, representing a 940% increase in its loss.

Burkina Faso: Cim Metal director Knighted

The government has appointed Abdul Rahim, director general of Cim Metal subsidiaries Cimfaso and Cimasso a knight of the Order of Merit of Commerce and Industry for his contributions to domestic cement production.

Cimfaso operates a 1.2Mt/yr integrated plant and a 2.0Mt/yr grinding plant in Burkina Faso's capital of Ouagadougou, while Cimasso operates one 2.6Mt grinding plant in the second city of Bobo-Dioulasso.

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DRC: Chinese cement reaches far into Africa

Chinese-based Sinotrans has exported 800t of cement on the 1344km railway journey from Cimenfort's 0.4Mt/yr Lobito grinding plant in Angola to the Democratic Republic of Congo (DRC). Angola Press Agency has reported that the cement was ground from clinker produced in China. Cimenfort sales coordinator Francisco Idelfrides suggested that the cement company may look to expand its production capacity in 2020. He said it sold 0.3Mt of cement in eastern Angola and the DRC in 2019.

Nigeria: New Dangote CEO

Dangote Cement has appointed Michel Puchercos as its new chief executive officer (CEO) and group managing director. He succeeds Joseph Makoju, who retired at the end of January 2020.

Puchercos holds over 20 years of experience in the cement industry, having served in various roles at Lafarge including president and CEO of Lafarge Halla Cement, Director of Strategy and Systems at Lafarge Gypsum and CEO of Bamburi Cement in Kenya, Hima Cement in Uganda and chairman at Mbeya Cement in Tanzania. His last appointment was as the Group Managing Director and Country CEO of Lafarge Africa.



Peter Edwards, *Global Cement Magazine*

Cement in the Levant

The Levant is a region in the eastern Mediterranean that encompasses Cyprus, Israel, Jordan, Lebanon, Palestine and Syria. *Global Cement* turns its attention to this varied and often tumultuous region ahead of the *Global CemFuels Conference & Exhibition* in Paphos, Cyprus on 19-20 February 2020...

Right - Figure 1: Active and former cement plants on the island of Cyprus.

Source: *Global Cement Directory 2020*.

1. Vassiliko Cement, 2.5Mt/yr.
2. Boğaz Endüstri ve Madencilik, 0.2Mt/yr.
3. The Cyprus Cement Co, 0.4Mt/yr. (Closed 2014).

The Levant' has been defined in a number of ways over the years. Ultimately derived from the Latin 'Levante' meaning 'rising' - in relation to the sun rising in the east - the term was previously used to encompass all Mediterranean coastal lands east of Italy. The term was refined to the seven territories covered in this review during the 20th Century. The region's countries share a number of cultural, linguistic and culinary traits, but are also bisected by several bitter and long-standing territorial disputes, often associated with ongoing conflict and bouts of war.

Cyprus



The island of Cyprus is the third-largest island in the Mediterranean. A maritime crossroads between Europe, the Middle East and Africa, it has long been a melting pot of cultures. Greek and Turkish populations lived side-by-side in the newly-formed Cypriot Republic after the UK ceded control of the island in 1960, but the rivalry between Greece and Turkey led to a disastrous breakdown in relations in 1974. A military confrontation began when Turkey invaded the north of the island to counter a Greek-sponsored coup. Despite the coup being reversed shortly afterwards, Turkish forces remained and are



still in position 46 years later. The Turkish Republic of Northern Cyprus (TRNC), which is not recognised by any country other than Turkey, remains in *de-facto* control of the north of the island, while the Cypriot Republic is theoretically in control of both the north and south. To complicate matters, the UK retains two sovereign air-bases on Cyprus, meaning that three nations have a territorial interest on the island.

Cement sector

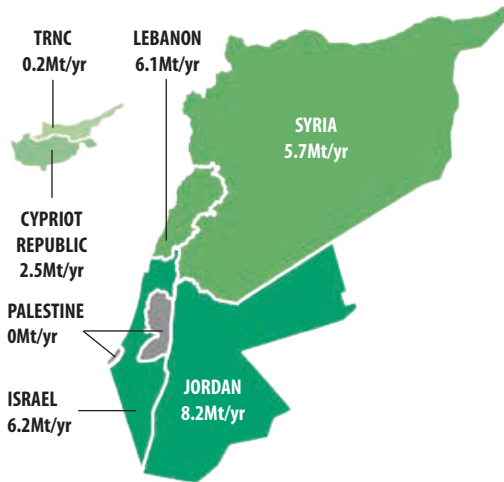
There is cement production capacity in both of the main parts of Cyprus (Figure 1). Vassiliko Cement operates a 2.0Mt/yr integrated plant in the Cypriot Republic operated by local firm Vassiliko Cement. The company was established in 1963, with first cement made in 1967. In 2007 the decision was taken to upgrade the plant with the construction of a new clinker line, bringing its capacity to 2.5Mt/yr. Read more about the plant on Page 66.

The island's other cement plant, a 0.2Mt/yr grinding plant, is located in the TRNC. The plant, located in Boğaz, is operated by the LafargeHolcim subsidiary Boğaz Endüstri ve Madencilik (BEM). LafargeHolcim precursor firm Holcim acquired BEM in 2003.

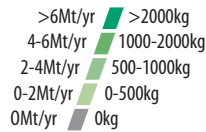
Cyprus previously had a third producer, Cyprus Cement, which operated a 0.4Mt/yr integrated plant in Moni from 1951 to 2014. Its parent company Galatariotis Group announced that it had dismantled the plant in April 2014. It has since set about the redevelopment of the former plant's 1.1 million m² and 1.4km-long coastline.



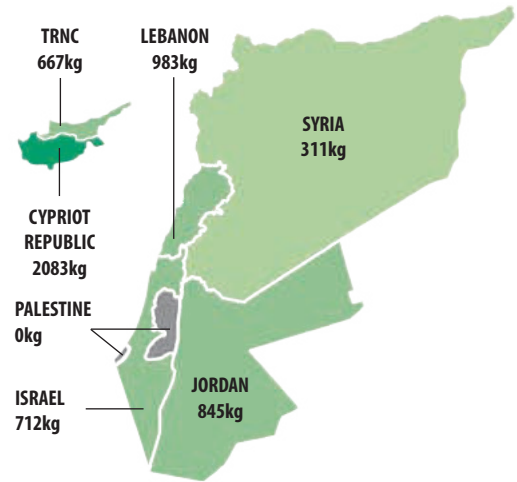
Right: BEM is the only cement producer in the TRNC.
Source: BEM website.



Left - Figure 2:
Active cement capacities of the Levant countries.
Source: Global Cement Directory 2020.



Right - Figure 3:
Per-capita cement capacities of the Levant countries.
Source: Global Cement Directory 2020 & World Bank Data Indicators.



Israel

The modern State of Israel was established in 1948 when the UK ceded control of Palestine after the Second World War. As the area has sites sacred to the world's three largest religions, Jewish and Arab areas were designated by the UN in an attempt to limit conflict. In its early years Israel saw a huge influx of formerly persecuted Jewish populations from across Europe and the Middle East, many of whom sought a better life in Israel. The state was involved in numerous wars with its Arab neighbours in the second half of the 20th Century and ongoing tension/conflict with Palestine (West Bank & Gaza Strip) remain a constant feature in the region's politics.



subsidiary. Nesher operates two plants. Its main plant is the two-kiln 5.0Mt/yr integrated plant in Ramla, around 20km south west of Tel Aviv. It was established in the 1950s to help deal with Israel's rapid immigration phase and underwent massive investment in the 1990s.

A 1.2Mt/yr grinding plant operates at Nesher, the site of the company's first plant. The site has been active since 1925, when the site was home to what Nesher claims was the first cement plant in the Middle East.

From its two sites Nesher supplies cement to all areas of Israel, as well as to the Palestinian authorities in Gaza and the West Bank.

Left - Figure 4: Cement plants in Israel.
Source: Global Cement Directory 2020.

1. Nesher Israel Cement Enterprises, Ramla, 5.0Mt/yr.
2. Nesher Israel Cement Enterprises, Nesher, 1.2Mt/yr.

Cement sector

Israel has a single cement producer in the form of Nesher Israel Cement Enterprises, which was established in 1923 (Figure 4). The company is locally-owned by Clal Industries via its Mashav sub-



Jordan

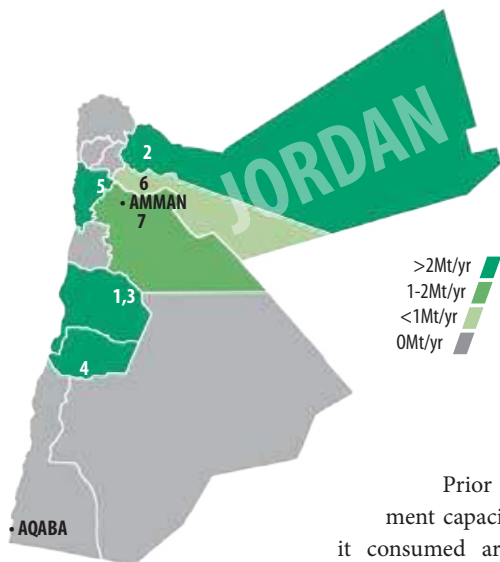


The Hashemite Kingdom of Jordan is a parliamentary constitutional monarchy that gained its independence from the UK (as Transjordan) in 1946. Its central location in the Middle East, combined with its relative political stability compared to its immediate neighbours, has led to it having a leading role in the region, especially as a haven for those fleeing regional conflicts, notably Palestinians and Syrians. This has put extreme pressure on Jordan's resources. It lacks water and is not blessed with the oil reserves commonly found in the region.

Cement sector

Jordan has the largest cement sector in the Levant group of countries, with six active integrated plants, one of which produces white cement. These share the capacity to make 8.2Mt/yr of cement (Figure 5) and are located in the fertile west of Jordan close to the River Jordan. They are mainly operated by local companies, although LafargeHolcim holds a 50.28% share in The Jordan Cement Company (JCC), which runs a 2.0Mt/yr facility at Rashadiyah. JCC also has a mothballed 2.0Mt/yr plant at Fuheis and a terminal at Aqaba, Jordan's only port.

Left: Nesher Israel Cement Enterprises' Ramla plant at dusk.
Source: Nesher Israel Cement Industries website.



Above - Figure 5: Cement plants in Jordan. Governorates are colour-coded by cement capacity. All plants are integrated facilities. **Source:** Global Cement Directory 2020.

1. Manaseer Cement Industry, 1.1Mt/yr.
2. Cementra, 2.4Mt/yr.
3. Qatrana Cement, 1.6Mt/yr.
4. The Jordan Cement Co (50.28% LafargeHolcim), 2.0Mt/yr.
5. The Jordan Cement Co (50.28% LafargeHolcim), 2.0Mt/yr (Mothballed).
6. Arab White Cement Co, 0.1Mt/yr.
7. Northern Cement Co, 1.0Mt/yr.

Right - Figure 6: Cement plants in Lebanon. All plants are integrated facilities. **Source:** Global Cement Directory 2020.

1. Holcim Liban (LafargeHolcim), 2.4Mt/yr. 2.2Mt/yr Grey. 0.2Mt/yr White.
2. Cimenterie Nationale, 2.4Mt/yr.
3. Ciment de Sibline, (50.5% SECIL), 1.2Mt/yr.

Prior to 1999, most Jordanian cement capacity was state-owned. In 2000 it consumed around 2.5Mt/yr of cement, mostly made by JCC. Cement production grew to 3.6Mt/yr in the early 2000s and stabilised at around 4.0Mt/yr by 2010. A dip to only 2.8Mt in 2011 due to the Arab Spring preceded a rise to 4.5Mt/yr in 2016, before levels fell back to 4.0Mt/yr in 2019. Given that new entrants poured into the market in the mid to late 2000s, there is now severe overcapacity. This has hampered export opportunities in a region already saturated with cement. Production costs in neighbouring countries are lower than in Jordan, in part due to Jordan's lack of domestic fuel sources.

Exports are also complicated by logistics. Located on the Red Sea, Jordan's only port at Aqaba is 220-400km from cement production sites in the north. Such is the pressure of this situation that JCC reported a loss of US\$87m in the first nine months of 2019. It has mothballed its Fuheis plant for much of the past five years.



Lebanon

Lebanon, officially the Lebanese Republic, gained independence from France in 1943 and has since experienced a tumultuous existence, including occupation by Syria (1976 - 2005) and civil war (1975 - 1990). Despite this, Lebanon has been able to carve out a position as a regional centre for trade. Pressures relating to the presence of Syrian refugees and an ongoing border dispute with Israel continue to hamper political stability, as do popular protests against economic stagnation and rising taxes, which ran from October to December 2019. After a period of relative calm, these restarted on 14 January 2020.



Above: Manaseer Cement was established in 2008. **Source:** Manaseer Industrial Complex website.

Below: One of Cimenterie Nationale's three preheater towers. **Source:** Cimenterie Nationale website.



Cement sector

Lebanon is home to three integrated cement plants that share a total of 6.0Mt/yr of capacity (Figure 6). The largest is operated by Holcim Liban, a part of LafargeHolcim. The site that its 2.2Mt/yr plant occupies in Chekka was home to the first cement plant in Lebanon, built by Société des Ciments Libanais (SCL) in 1931. The plant's initial capacity was just 160t/day (~51,000t/yr). Holderbank (later Holcim / LafargeHolcim) took control of SCL in 1934, with a second 330t/day kiln added in 1935. Further wet kilns were added in 1949 (330t/day) and 1951 (480t/day), taking the plant to a capacity of 0.42Mt/yr. SCL replaced its first kiln with a 900t/day model in the mid 1950s, taking the plant to 2000t/day (0.65Mt/yr). By the late 1970s the plant reached a capacity of 1.7Mt/yr via the addition of two more wet kilns and conversion of others to semi-wet production, but a 5800t/dry process line replaced all of these in 1997, taking capacity to 2.2Mt/yr. The plant can also make 0.2Mt/yr of white cement.

Also in Chekka is Lebanon's second-largest cement plant, operated by Cimenterie Nationale. The 1.7Mt/yr integrated plant was established in 1953 with a single wet kiln. Two additional wet kilns were commissioned in 1957 and 1967 before a conversion to dry process technology came in 1974. At this point the plant could make around 0.75Mt/yr of clinker.

In 1998 the Cimenterie Nationale plant doubled its capacity by the installation of a new 0.75Mt/yr kiln, taking its clinker capacity to 1.5Mt/yr. Further upgrades in 2007 took its capacity to 2.4Mt/yr.

Lebanon's third and final cement plant is the 1.2Mt/yr Ciment de Sibline plant in Sibline. The plant was commissioned in 1987 with a 800t/day (0.25Mt/yr) kiln. It upgraded the plant by adding a 2400t/day (0.77Mt/yr) kiln, completed in 1998. Line 1 was upgraded in 2012 to take the plant to a capacity of 1.2Mt/yr. This line now uses 40% alternative fuels. Since 2002 the Portuguese group SECIL has been a major shareholder in Ciments de Sibline. It has been the majority shareholder (50.5%) since 2007. SECIL is also present in the Lebanese ready-mixed concrete market through its subsidiary Soime.

Palestine



The State of Palestine comprises two areas of land, the West Bank and Gaza Strip, both designated as Arab areas by the UN when the State of Israel was formed in 1948. There has been significant conflict with Israel over the past seven decades that have massively stunted the territories' economic development. Israeli settlements in the West Bank, variously called illegal by the UN, have stoked significant anger among Palestinians, with armed groups, most notably Hamas, launching attacks in Israel. Israel has replied with force and has previously blockaded the Gaza Strip. This seemingly intractable situation shows no sign of being resolved, despite an increase in support for a two-state solution in both communities in the early 2000s. Palestine was recognised by 193 member states of the UN at the end of 2019.

Cement sector

With no cement production capacity of its own, Palestine is supplied with around 80% of its cement by Israel's Neshor Cement. The Gaza Strip also imports cement from Egypt, while the West Bank imports from Jordan.

Discussions regarding a cement plant in Palestine have been taking place since at least 2014, when India's Holtec won a tender to carry out a feasibility study into a US\$300m, 5000t/day integrated plant in the West Bank from The Palestinian Commercial Services Company (PCSC). At the time it had been expected that the plant would be up and running by 2018, but it has so far not transpired. Also in the offing was a 1.3Mt/yr grinding plant in Bethlehem, proposed by Sanad South Cement Grinding & Filling in late 2016. As of mid-2019 this development was meeting with resistance from local residents. It will be interesting to see if either, or indeed both, of these projects come to fruition in the 2020s or remain stuck on the drawing board. A cement plant in Palestine would shift a decades old dynamic in cement trade in the territories' favour.



Syria

The modern-day Syrian Arab Republic was established following the departure of the French in 1936. It was blighted in its early years by armed conflicts, both internal and external, before a coup by the Ba'ath Party in 1961. Today Ba'ath control continues under Bashar al-Assad, who assumed power in 2000 following the death of his father.


Since 2011 Syria has been infamous on the global stage for its complex multi-faceted civil war, which began as part of the 'Arab Spring' uprisings. Active parties included, but were not limited to, government forces, opposition militia, external sponsors and jihadist forces, including the Islamic State group. Between 2012 and 2017 IS controlled large swathes of territory in Iraq and Syria, but its areas have since been significantly reduced.

Cement sector

Global Cement is indebted to contributor Eng. Jaber Khedr for the following up-to-date information on the Syrian cement sector. In the years running up to 2011 Syria had 11 active cement plants with a total of 8.0Mt/yr of cement capacity, with demand at around 10Mt/yr. However, the armed conflict in Syria has led to major disruption to infrastructure, including catastrophic damage to several cement plants. Six plants are now capable of making cement and five remain closed after the war. There are also two cement plants under construction, expected to come online in 2021-2022.

The total capacity of the active plants is 5.7Mt/yr. When combined with the closed plants the potential capacity rises to 11.8Mt/yr. The two new plants, when commissioned, will add a further 7.7Mt/yr of capacity, as shown in Table 1.

As the government seeks to re-build its war-torn country, cement will have a vital role to play. Investors are anticipated to re-enter Syria enthusiastically to repair damaged plants and upgrade others.

More information will be released by *Global Cement* in the future by way of a special report on Syria. Details will be released in due course. 

Below - Table 1: Cement plants in Syria.
Source: Eng. Jaber Khedr.

Prod = In production.
Stop War = Stopped due to war.
U/C = Under construction.

Company	Location	Capacity (Mt/yr)	Status
Adra Cement	Damascus	0.8	Prod
Syrian Cement	Hama	1.4	Prod
Tartous Cement	Tartous	1.3	Prod
Military Housing	Aleppo	0.3	Prod
Al Rastan Cement	Homs	0.1	Prod
Al Badia Cement	Damascus	1.5	Prod
Al Arabia Cement	Aleppo	0.8	Stop War
Al Meslmiah Cement	Aleppo	0.2	Stop War
Gorish Cement	Raqa	0.8	Stop War
Lafarge	Raqa	3.0	Stop War
United Company	Damascus	4.5	U/C
North Star Cement	Damascus	3.2	U/C
TOTAL ACTIVE		5.4	
TOTAL STOPPED DUE TO WAR		6.4	
TOTAL ACTIVE & STOPPED		11.8	
TOTAL UNDER CONSTRUCTION		7.7	
GRAND TOTAL (ALL)		19.5	



Vassiliko Cement

Plant report: Vassiliko Cement, Cyprus

Here we introduce Vassiliko Cement, Cyprus' only integrated cement plant, ahead of the field trip by delegates of the *Global CemFuels Conference & Exhibition* on 21 February 2020...

Vassiliko Cement Works was established as a clinker and cement producer in 1963. Its first production plant became fully operational in 1967. Acknowledging the advantages of its proximity to the sea, the company constructed Vassiliko port in 1984. This offers not only the possibility to optimally serve its international customers but also the company itself with respect to the import of fuels and raw materials. The port is also used for special cargoes to serve third parties, including oil products, scrap metals, animal feed, etc. This was further developed to constitute an industrial hub of the energy centre for the companies that already had activities in the region and for those relocating. The company has been listed in the Cyprus Stock Exchange since 1996.

Cyprus' only clinker producer

Vassiliko Cement Works is one of the largest heavy industries in Cyprus, with ongoing efforts towards development across all levels of its business operations. With continued upgrades and investment, the plant seeks to always apply the most state-of-the-art and environment-friendly technological improvements. The continued quality improvement of its

products has been adopted as a fundamental principle of the company's operation, in order to achieve the optimum experience for its customers.

Large upgrade

In 2007 after 40 years of operation, it became obvious that to have an operational horizon for another 40 years, the plant should be renovated and replaced by a new, ultra-modern clinker production line. The initial investment amounted to Euro180m and the plant was completed and became operational in the summer of 2011. The production plant was further upgraded with new investments in recent years. The primary objective of these is to optimise its environmental performance, product quality and energy efficiency, while lowering costs.

The new cutting-edge technology production line enables the company to improve its environmental performance, cut down on production costs and upgrade its throughput capacity. The existing clinker production capacity, which stands at 2.0Mt/yr, is the largest single integrated production line in Europe. With a capacity higher than the domestic needs, the company also focuses strongly on the international export activity, with shipments primarily to the Mediterranean Basin.

Alternative fuels boost

In 2014 the new alternative fuels supply system was set in operation; alternative fuels substitute the conventional fossil fuels at a rate that has reached 50%. Vassiliko Cement's aim is to increase the percentage of alternative fuels use beyond 60%, further promoting the commitment of the business organisation towards lowering its CO₂ emissions and contributing further to the circular economy. Through these efforts there has been a reduction in CO₂ emissions per tonne of clinker of more than 30% since 2005.

To attain this target, a specialised division has been created, constantly researching, developing and accessing different qualities and properties of alternative fuel streams to ensure an optimum blend that can effectively deploy and replace conventional fossil fuels.

Below: Overview of the Vassiliko Cement site.



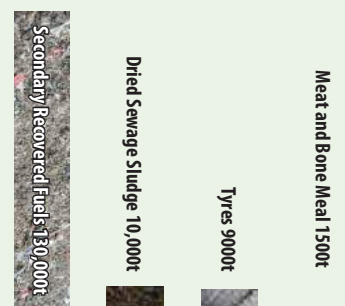
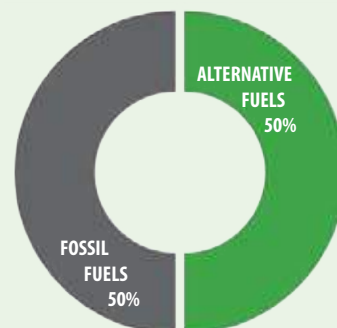
Plant profile - Vassiliko Cement

Location:	Mari, Cyprus
Raw material crusher	1200t/hr
Raw mill:	Loesche vertical roller mill • LM60.4 • 520t/hr
Kiln:	CBMI 2-string, 5-stage calciner kiln • 6000t/day
Cement mills:	2 x Loesche Vertical roller mills 1 x LM53.3+3, 180t/hr & 1 x LM35.2+2, 70t/hr 1 ball mill for composite cement (32.5 R)
Alternative fuel feeding system:	Di Matteo



Alternative fuels

Vassiliko Cement is a major user of alternative fuels, with a thermal substitution rate of 50% in 2019.



Going solar

An equally essential project for the company is its new 8MWh photovoltaic plant, which is now in its final stages of completion in a former quarry. The solar plant is set to be the largest in Cyprus and will yield many benefits both for the company itself as well as for the country in general. It will approximately cover 10% of the company's power needs, while at the same time making better use of the former quarry area. In addition, the solar farm will contribute to the national goals of Cyprus for 2020. It will represent 4% of the total electricity generation capacity of the island's renewable energy sources, saving thousands of tons of CO₂ emissions per year.

Progressive philosophy

Vassiliko Cement plant takes pride in never being complacent. On the contrary, it constantly tries out new materials, new procedures, through continued experimentation, research and development and always envisaging a better future.

What is its goal? To rank amongst the 10% of the best industries of its kind worldwide in the key indicators, even to become the benchmark in some indicators. It will remain a sustainable company, steadfast to its upward trend in our quality product.

The environmental compliance and the relevant best practices and actions as well as the sustainable development constitute equally important elements

for Vassiliko Cement as well as the improvement of financial performance for its shareholders.

Looking out for its own

Corporate Social Responsibility (CSR) constitutes one of Vassiliko's corporate principles. CSR is underpinned on the mindset governing the company's business activity through initiatives aimed at upgrading living conditions, culture and the environment.

Above: The plant used 50% alternative fuels in 2019, predominantly SRF.

Above left: The 2.0Mt/yr kiln at Vassiliko Cement is the largest single line in Europe.

Below: The plant's main office building.





Right: Inspecting the kiln and its huge bank of cooling fans.

Right centre: The plant's Health and Safety Manager Maria Evdokimou.

Far right: Grinding Mill Operator Christos Georgiou.



The employees and management at Vassiliko Cement share a common vision, in which they should develop all their activities adhering to the code of ethics and in a socially responsible way, minimising any negative impact, as they are all members of the same society requiring greater sensitivity and cooperation. Having incorporated sustainable development goals (SDGs) into its strategy, the company takes bold and transformational steps ahead towards a sustainable and resilient path. In order to respond to its corporate values and principles, it is in constant dialogue with its social partners.

Following the upgrade of its operational performance, the company invested in its human resources management. At present, the headcount is 253 full-time employees, with most of its non-basic operations outsourced. Cyprus is a small country with few large industries, which causes some problems in recruiting specialised graduate engineers with high professional qualifications. The company therefore focuses on recruiting people with a well evidenced

academic background who are trained internally. In addition to this, it carries out a series of continuous training programs and skills upgrades for all of its employees, and makes the provision for their participation in international seminars.

Keeping in touch with local stakeholders

Transparency is Vassiliko Cement's key philosophy in the way it operates. It cooperates closely with local communities, organising regular contact forums with the members of local towns and villages, discussing issues of their concern, their needs and worries in order to reach an agreement on the way that the company responds to their needs through its actions.

All of the company's activities and plans, as well as the way of interacting with all interested parties, centre around its corporate vision, which is to excel as a successful company based on its principles, emanating from the concepts of respect and social contribution.



Right: The plant's port allows for easy exports outside of Cyprus.



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India: Indian cement prices have risen so far in 2020. "Prices have increased by about US\$0.14/bag (50kg), 3% up from December 2019, in most parts of the country, according to our channel checks," said Amit Murarka of Motilal Oswal Financial Services Ltd in a report on 9 January 2020.

Some cement producers increased their prices by US\$0.21-0.35/bag in Gujarat in early January 2020, according to Cogenesis. JK Lakshmi Cement announced a US\$0.35/bag rise, while Sanghi Industries increased the price of its cement by US\$0.21-0.28/bag as 'demand was on an upswing.' UltraTech Cement had earlier raised its prices by US\$0.21/bag.

A senior industry representative said that non-trade prices had risen from US\$4.02/bag to around US\$4.30-4.37/bag. Prices for trade (retail) have risen by a similar margin to US\$4.51-4.65/bag.

Egypt: Ordinary Portland Cement prices as of 16 January 2020: Arabian Cement (Al Mosalah) = US\$49.51/t; Arabian Cement (Al Nasr) = US\$48.69/t; Cemex (Al Muhandis) = US\$51.22/t; Cemex (Al Fahd) = US\$48.56/t; Minya Portland Cement (Minya) = US\$48.88/t; Minya Cement (Horus) = US\$48.56/t; Elnahda Cement (Al Sakhras) = US\$48.69/t; Lafarge (Al Makhous) = US\$48.69/t; Medcom Aswan Cement (Aswan) = US\$48.57/t; Arish Cement (Alaskary) = US\$48.72/t; Sinai Cement = US\$47.89/t; Suez Cement = US\$48.64/t; Helwan Cement = US\$49.28/t; Misr Beni Suef (Masr Beni Suef) = US\$50.54/t; El Sewedy Cement = US\$49.59/t; Misr Cement Qena = US\$48.33/t; Al Watania Company for Cement = US\$48.83/t.

White cement prices as of 16 January 2020: Sinai White Cement (Alabid Elada) = US\$157.93/t; Sinai White Cement (Super Sinai) = US\$155.39/t; El Menya Cement (Super Royal) = US\$153.75/t; El Menya Cement (Royal Elada) = US\$150.97/t; Menya Helwan Cement = US\$153.50/t.

Do you have your finger on the cement price pulse where you are?
If so, *Global Cement Magazine* needs you!

Contact: Peter Edwards
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Here *Global Cement Magazine* presents its monthly review of global cement prices, in US\$ for easy comparison. Additional price information is only available to subscribers to *Global Cement Magazine*. Subscribe on Page 72. In this issue subscribers receive information from other countries not shown here.

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

Blended cement prices as of 16 January 2020: Sinai Cement (Al Nakheel) = US\$45.16/t; El Minya Cement (Royal) = US\$45.16/t; Helwan Cement (Al Waha) = US\$45.67/t.

Sulphate-resistant cement prices as of 12 August 2019: Cemex (Al Mukawem) = US\$52.11/t; Minya Portland Cement (Asec Sea Water) = US\$51.16/t; Lafarge (Kahger Albehar) = US\$51.79/t; Suez Cement (Al Suez Sea Water) = US\$51.16/t; El Sewedy Cement = US\$51.67/t.

Zambia: The Competition and Consumer Protection Commission (CCPC) of Zambia announced on 10 January 2020 that it had begun an investigation into a sudden price rise in the domestic cement market, most recently by Lafarge Zambia, which raised prices by around 20% to US\$6.89/bag (50kg) from US\$5.74/bag in December 2019.

CCPC released a statement stating, "CCPC advises that it has been actively monitoring prices of cement over six months. Our surveillance has revealed that a bag of cement is currently trading at US\$6.54-6.90/bag. The commission is concerned with the collective and synchronised increase in the price of cement. However, the commission is alive to the fact that the prices of electricity and fuel have increased and will take due consideration of these factors in its investigations."



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The end of demand?

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



It has been said that supply creates its own demand, and if you were to build a cement plant in the middle of nowhere, as sometimes happens, then the locals would start to use more cement. On the other hand, demand creates its own supply, in the capitalist system at least. Profit-seekers will always provide a good or service if a profit can be made.

But what if demand were to cease? What happens when there is no demand for a good or service? Let me give you an example. Early in the morning, walking near the Pyramids in Giza, I was approached by a gentleman who was riding a camel and leading another. He asked me if I wanted a ride on his lovely camel, "Only ten dollars," he said. I replied that I wasn't interested. He modified his offer: "Okay mister, five dollars." I came to the point: "I am not interested to ride on your camel even if it was free. In fact," I went on, "I would not ride your camel even if you *paid* me ten dollars." There was obviously no profit in this deal for him. He got the message and went away like a good capitalist, riding on his camel, looking for another gullible tourist and better margins. There was no demand for his service, from me, anyway, at any price. If all tourists had the same response, he would soon be out of business, since camels are hungry beasts and costly to maintain properly, and he would have to find some other line of work.

There's a well-reviewed film, and book, called 'Children of men,' depicting a world which suddenly became infertile two decades previously. After that time, midwives, baby food manufacturers, baby-carriage makers, kindergarten owners and eventually teachers would all have become progressively obsolete, as children, teenagers and students all grew up into the adult world without being replaced. As depicted in the film, it was a nightmare world. Just such a situation, of births dwindling towards a rate where the population plummets, has been reported in China.¹ In fact, China's population is set to fall by 400million by 2100.² Arguably a similar situation, where the Black Death reduced Europe's population by a third, led to revolution.³

What would happen if demand for cement worldwide were to dwindle and cease? Could we be looking at a world without concrete, a world without concrete trucks, concrete specifiers, architects and civil engineers using concrete, and a world with progressively fewer concrete buildings, bridges and other structures? To anyone who says that it will never happen, I say, look at asbestos, look at horse-drawn carriages, look at lamp-

lighters, coal fired power stations and FGD gypsum, tobacco consumption, mangles, sexist jokes, landlines, plastic bags, cash, diesel cars, modems, fax machines, film cameras, telephone directories and even watches. All of these things have either gone, been legislated out of existence or are (again, arguably) on their way out.

In the same way, in a carbon-constrained world, CO₂-intensive Ordinary Portland Cement could yet become a thing of the past. Our own forecast is for the clinker factor to reduce from 70% now to a global average of 50% in 2050. However, in a world where there is an accelerating awareness of environmental degradation and now nightly reminders of some of the catastrophic effects of global warming, there is the possibility that the cement industry will be obliged to become net-CO₂-zero itself by 2050 or even earlier. What if global carbon taxes of Euro/\$200/t of CO₂ mean that concrete producers use as little OPC as possible, down to an equivalent of perhaps 50kg per tonne of concrete (compared to 250kg now), just using it as an activator for lower-CO₂ cementitious materials like fly ash and slag. That would look like an 80% drop in demand from today's levels... and we are already in a global clinker over-supply situation!

This 'Demand Crisis' in the cement industry might well happen, but one of the main uncertainties is the timescale over which it might occur. The longer the process, the more time the cement industry will have to adapt to its new role as a provider of zero-CO₂ cementitious solutions.

This is not all bad news. The equipment that will be required to make the new cementitious binders will require equipment modifications that will keep the engineering companies busy for years. The whole green revolution will need to be financed, keeping the bankers, insurers, lawyers and other experts in fees. The cement companies should be able to pass on higher costs to customers, for their new-and-improved eco-friendly cement and concrete products. Who knows, the new binders might even cost less to produce, improving profit margins at the same time as saving the planet. See? Every cloud has a silver lining!

1 <https://www.theguardian.com/world/2020/jan/17/chinas-birthrate-falls-to-lowest-level-despite-push-for-more-babies>

2 <https://www.weforum.org/agenda/2018/02/these-will-be-the-worlds-most-populated-countries-by-2100/>

3 <https://www.bbvaopenmind.com/en/humanities/sociology/the-black-death-turning-point-and-end-of-the-middle-ages/>





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Features: Interview: Jerry Lewis - IBM, Concrete quality, Novel cement standards
Technical: Lime, Silos, Logistics, Loading/Unloading Conveying, Maintenance, Gypsum for cement

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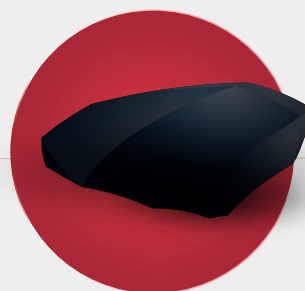
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