



# CEMENT & BUILDING MATERIALS REVIEW

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المؤتمر والمعرض العربي الدولي الثاني والعترون لصناعة الإسمنت

Maritim Jolie Ville - مركز المؤتمرات الدولي

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22<sup>nd</sup> Arab International Cement Conference and Exhibition

International Congress Center - Maritim Jolie Ville

**Sharm el Sheikh, Egypt**

14 - 16 November 2017



# Cement and Building Materials Review

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International News

New Products

Technical Articles

Diary Dates

Editor-in-Chief

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## CONTRIBUTIONS

- *The Magazine editorial staff welcome the contribution of experts to enrich the contents of the magazine .*
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# Arab News

## Arab News

### Algeria

#### Algeria to stop importing cement in 2017

Minister of Industry and Mining has said that Algeria will stop importing cement in 2017. He made the comments at a visit to the China Triumph International Engineering (CTIEC) cement plant being built at Adrar. "The year 2017 will mark the end of cement imports in Algeria, with the commissioning of all cement plants across the country, whose total annual production capacity is expected to reach 6Mt," the Minister said. He added that industrial projects will allow the country to achieve self-sufficiency in cement and begin to export it.

#### Global Cement News

#### GICA shows its ambitions for 2017

GICA announced it will ramp up its production capacity to 13.2Mt of cement, with the second line of the Aïn El Kebira cement plant (Setif) entering production in 2017.

#### Daily cement

#### GICA to start producing oil well cement

Groupe Industriel des Ciments d'Algérie (GICA), the government-owned cement producer, has launched the certification process of its oil well cement ahead of plans to produce the product itself. A sample batch of 300t was produced in November 2016. Rabah Guessoum, the chief executive officer of GICA, said that the cement will be produced at the company's Setif plant and sold to Sonatrach group and foreign oil

companies. A national demand of around 300,000t/yr is anticipated.

#### Global Cement News

#### New cement plants in Relizane and Djelfa

Djelfa plant will have joint-venture with Chinese partner.

CILAS, a joint venture between Lafarge Algeria, holding a 49% stake, and Souakri Group with a 51% stake, will officially inaugurate its Biskra cement plant in January 2017.

#### Daily Cement

#### Algerian investors to buy ASEC Algeria for US\$60m

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

#### Global Cement News

#### New Cement Production Unit Inaugurated in Constantine

A new cement production plant located in the industrial area of Benbadis, about 20 Km southeast of Constantine, was inaugurated last December.

#### Daily Cement

## Egypt

### Egyptian government sells three cement licences

The Industrial Development Authority (IDA) has tendered three licences to build new cement plants to El Sewedy Cement, South Valley Cement and Cement Egypt. The licences were sold for a total of US\$28m. IDA chairman said that the three cement plants built using the new licences will have a total production capacity of 6Mt/yr. The new capacity is intended to support local infrastructure projects including the construction of a proposed new capital city.

### Global Cement News

### Greenfield cement plants to be setup in New Valley

The cement plants will produce white and gray cement

### Cemweek

### Government aims cement sector to increase alternative fuel use by 30%

Minister of Industry and Foreign announced that the Ministry has completed a study on “interest earned from using alternative fuel sources, an alternative to fossil fuel, for cement plants' production in Egypt”.

### Arabian Cement invests in new plant

The cement plant will begin operation in Q42017

### Cemweek

### Arabian Cement's Board ratifies EUR 7 million power saving plan

Arabian Cement Company's Board of Directors approved a power saving plan worth €7 million.

### Daily Cement

### Fives upgrades vertical ball mill and grinding plant for Suez Cement

Fives has delivered to Suez Cement Co. (Italcementi Group) a new FCB TSV™ Classifier in order to modernize a vertical ball mill and optimize the operation of the solid fuel grinding plant.

## Iraq

### China Machinery Engineering to build cement plant in Iraq

China Machinery Engineering Corporation has signed a US\$250m deal to build a cement plant at Qarachog. Once operational the unit will produce 6000t/day of clinker. The scope of the contract includes project design, supply, civil construction, installation, training and commissioning. Once construction starts the project will take 22 months to complete.

### Global Cement News

## Jordan

### Lafarge Jordan to start building 15MW solar power unit in 2017

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

### Global Cement News

## Kuwait

### Kuwait Cement invests in ecofriendly cement

The company burned used tires as fuel.

### Cemweek

## Morocco

### Domestic cement sales in 2016 down

The Ministry of Housing published its statistical data on the country's domestic cement sales during 2016, which declined by 0.7%.

### Daily Cement

### Global Oil Shale Group To Build Cement Plant In Tarfaya

Global Oil Shale (GOS), a company focused on development of oil shale projects, will shift to cement production amid the global decline in hydrocarbon prices.

### Daily Cement

### LafargeHolcim, ArcelorMittal, Evonik and Solvay form partnership to reduce carbon emissions across industries

LafargeHolcim, ArcelorMittal, Evonik and Solvay have formed a Low Carbon Technology Partnerships Initiative across the steel, cement and chemicals industries. This new partnership will look at the potential synergies that exist between the manufacturing processes of these three energy intensive sectors, and how these synergies could be harnessed to reduce CO<sub>2</sub> emissions.

As a first step, and following preliminary research, the innovative partnership will produce a study with the technical support of Arthur D Little to identify potential ways to valorize industrial off-gases and other by-products from their manufacturing processes to produce goods with a lower carbon footprint than through the fossil path. The preliminary research has already allowed identification of significant potential in



selected trans-sector pathways.

The study is aimed at bringing a fact-based overview of carbon and energy sources from industrial off-gases (first at a European level), and evaluating the technical, environmental and economic feasibility of different Carbon Capture and Usage (CCU) pathways and their potential.

Initial findings from the first step already underway suggest that deploying cross-sector carbon capture and reuse opportunities on an industrial scale could reduce up to 3 GT/yr or 7% of global anthropogenic CO<sub>2</sub> emissions. Existing conversion technologies that could be deployed across the three sectors could utilise by-products in the off-gases to create building materials, organic chemicals and fuel. Increased availability and greater access to renewable energy sources would significantly boost net carbon reduction efforts by those three sectors, within a supportive legislative framework. Cross sector carbon capture and reuse should also result in job creation, to be further investigated.

The study, carried out at European level, is building the ground for similar investigation extended at global level and paves the way for identifying and assessing industrial scale projects on CCU at the interface between the sectors.

“Concrete offers the highest level of life-cycle sustainability performance and we are continuously developing new products and solutions for a low carbon society. This new ambitious partnership will support our mission to cut our net emissions per ton of cement by 40% towards 2030 (versus 1990) and to develop and further deploy low carbon solutions for the construction sector. But to make this a reality, we will need an enabling regulatory framework and support for innovation,” said Bernard Mathieu, Head Group Sustainable Development of LafargeHolcim.

## Global Cement News

### LafargeHolcim Morocco increases capital

LafargeHolcim Morocco will increase its capital, in the light of its merger with Lafarge Cementos.

## Daily Cement

### Oman

### Government Transfers Majority Stake in Oman Cement To Oman Investment Fund

Oman Cement Company (OCOI), listed on the Muscat Stock Exchange, announced it has received a letter from the Ministry of Finance regarding the transfer of

the Government's stake in the company onto Oman Investment Fund.

## Daily Cement

### Qatar

### Qatar Primary Materials Company inaugurates Bulk Materials Handling System

On December 8, 2016, Qatar Primary Materials Company (QPMC) celebrated the inauguration of the Qatar-owned Bulk Materials Handling System (BMHS) which has been successfully developed under the supervision and management of QPMC.

### Saudi Arabia

### Export tariff expected to hit Saudi Arabian cement profits

New legislation requiring cement exporters to pay tariffs of up to US\$35/t is expected to reduce profits. The new import tax is also expected to compound problems for exporters created by restrictions linked to the gradual lifting of a ban on exports. Cement producers are expected to be encouraged to focus on domestic sales instead.

## Global Cement News

### Local companies' cement and clinker inventories rise in 2016

Local manufacturers' inventories of cement and clinker have increased since the beginning of 2016, amid low demand.

## Daily Cement

### City Cement Company upgrades production capacity

City Cement Company announced it has started trial operations, following the project.

## Daily Cement

### Eastern Province Cement to start trial run of new mill in 1H17

Eastern Province Cement Co. announced that the trial operations of its new cement mill are expected to start during the first half of 2017.

## Daily Cement

### GAS Arabian Services to supply gas for Yamama Cement plant

Yamama Cement Co. announced that it has a special agreement with GAS Arabian Services Company to supply fuel for the cement manufacturer's new plant.

## Daily Cement

**Saudi Industrial Development Fund  
Finances Yamama Cement Company**

Yamama Cement Company announced that it has signed a financing agreement with the Saudi Industrial Development Fund.

**Daily Cement**

**Sudan**

**Cement market faces struggles**

The productivity of the sector is declining steadily

**Cemweek**

**Syria**

**Hama Cement to enter maintenance works**

Hama will refurbish its kiln number 3.

**Tunisia**

**New cement plant in Tunisia to open in 2018**

A new 1Mt/yr cement plant in Sidi Bouzid is set to open in 2018. The project is budgeted at US\$220m.

**UAE**

**Union Cement waste heat recovery project recognised by Dubai Carbon Centre of Excellence**

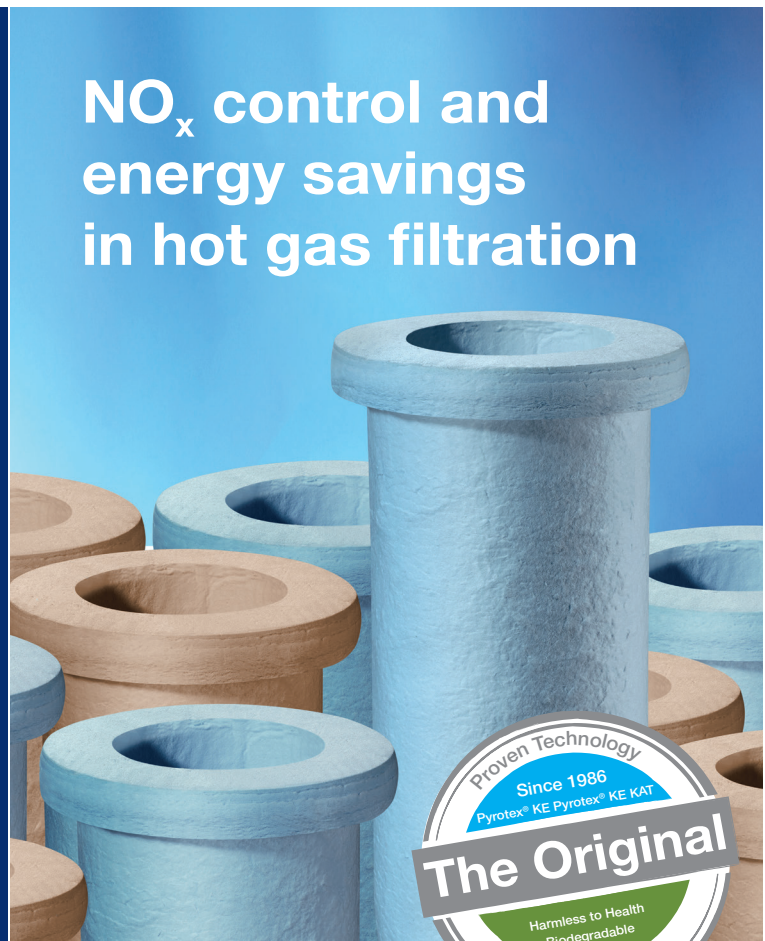
Union Cement's waste heat recovery project has been recognised by Dubai Carbon Centre of Excellence (DCCE) for reducing CO<sub>2</sub> emissions in the emirate in 2016.

**Yemen**

**Yemen: National Cement Company's plant resumes operations**

The plant was closed for repair works

**Cemweek**



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## VDZ Training courses for the cement industry 2017

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#### Topics:

- Heating up and operating the kiln
- Operation of the raw, cement and coal mills
- Optimising production
- Managing process disturbances and special situations



### Cement manufacturing course

Module 1: 08 May – 02 June 2017

Module 2: 25 September – 20 October 2017

Training centre near Duesseldorf, Germany

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- All main production steps from quarry to dispatch
- Material technology, emissions abatement
- BAT, production optimisation, energy efficiency
- Operational case studies
- Simulator training
- Maintenance, refractories, safety at work
- Visit of cement plant and VDZ's laboratories



### Plant maintenance and refractories course

19 – 23 June 2017

Cement plant in Germany

#### Topics:

- Theoretical and practical maintenance inspection and measurement solutions
- Open gear lubrication and its application
- Online machinery diagnostic and vibration analysis
- Inalienability of non-distortion testing (NDT) and analysis
- Refractory material and installation



### Process operator training

4 – 22 September 2017

VDZ's premises, Duesseldorf, Germany

#### Topics:

- All main production steps from quarry to dispatch
- Material technology
- Emissions abatement
- Simulator training
- Cement plant visit



For further information and booking visit [www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)

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# 14.

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Frugal Innovation: A way that creating high-quality products with limited resources

#### Sub-themes

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Using of Alternative Fuel and Alternative Raw Material  
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Use of Renewable Energy

#### Registration and Floor Plan

<https://www.tcma.org.tr/ENG/index.php>

tekniks@tcma.org.tr



## AUMUND and SWEIDAN open Spare Parts Stock in Riyadh with AUMUND Supervisor on site

**In continuation of the valued partnership, AUMUND Fördertechnik GmbH, Germany, and SWEIDAN Industrial Services, Riyadh, are keen to announce the opening of the new Spare Parts Stock at the Riyadh Warehouse to be at full disposal with parts instantly available, this is of particular importance in a case of emergency to get the machine running again. Additionally, a local AUMUND Supervisor is available to support the customers.**



The new SWEIDAN and AUMUND warehouse at Riyadh

AUMUND ensures a high level of After Sales Service along with top quality products. For onsite services local AUMUND supervisors are at any time ready to assist the customers for whatever reason: Troubleshooting, technical advice, installation supervision, preventive maintenance service PREMÁS® and equipment inspection.

### About the AUMUND Group

The AUMUND Group is active worldwide. The conveying and storage specialists have special expertise at their disposal when dealing with bulk materials. With their high degree of individuality, both its technically sophisticated as well as innovative products have contributed to the AUMUND Group today being a market leader in many areas of conveying and storage technology. The manufacturing companies AUMUND Förder-technik GmbH (Rheinberg, Germany), SCHADE Lagertechnik GmbH (Gelsenkirchen, Germany), SAMSON Materials Handling Ltd. (Ely, England), as well as AUMUND Logistic GmbH (Rheinberg, Germany) are consolidated under the umbrella of the AUMUND Group. In conjunction with the headquarters of the manufacturing companies, the global conveying and storage technology business is

spearheaded through a total of ten locations in Asia, Europe, North and South America and a total of five warehouses in Germany, USA, Brazil, Hong Kong and Riyadh.

### About Sweidan

Sweidan Industrial Services is a focused service company that provides innovative solutions to achieve customer satisfaction by meeting and exceeding their expectations; utilizing the latest available technologies with the best practices.

Sweidan forged strategic partnerships and business association with leading global companies and agents, to provide the best products and solutions to a significant number of industries, ranging from cement to petro-chemicals.

Sweidan diverse products and services; which are carefully selected and studied provide a range of options and intuitive support systems, along with the services that are delivered through Sweidan high-skilled technical team.

Sweidan has established its presence in the Middle East region, specifically Saudi Arabia and Jordan, and expanded to Oman, Iraq and UAE markets, in order to gain an insight on the real market needs.

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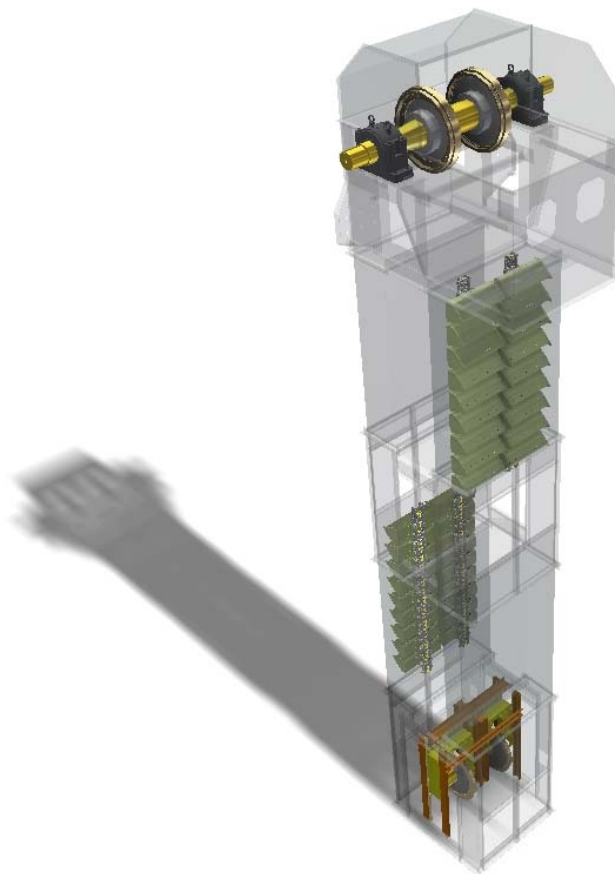
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## Clinker conveying equipment for two new lines

# Yamama Saudi Cement Company counts on AUMUND machines

**Yamama Saudi Cement Company, one of the biggest cement producers in Saudi Arabia, will start up two turnkey clinker production lines in 2018 at a new site to the south west of the capital city, Riyadh. The two lines, with a combined capacity of 20,000 t/d, are being built by thyssenkrupp Industrial Solutions, a subsidiary of thyssenkrupp. In 2016, AUMUND Fördertechnik GmbH won the order to supply the clinker conveying equipment for both lines.**



AUMUND Double bucket elevator (Graphic AUMUND)

The large supply package for Yamama Saudi Cement Company includes 29 chain bucket elevators and 18 belt bucket elevators, in heavy-duty and lighter designs, for these two lines in the Gulf. For raw meal, AUMUND belt bucket elevators will be used. Filter dust will be conveyed by AUMUND chain bucket elevators optimal designed for low capacity.

Two AUMUND double chain bucket elevators with a capacity of 2,300 t/h were ordered per line as recirculating bucket elevators in the cement mill. Double chain bucket elevators are specially designed by AUMUND for capacities above 1,300 t/h, by combining two standard central chain bucket elevators. Both bucket strands run over the same drive shaft which is held by pillow block bearings and driven by double drive units. The symmetrical distribution of weight means that the chain and drive shaft will have long lifetimes. There is no mechanical connection between the two bucket strands. The chain wheels and tension shafts have separate bearings so that any lengthening of a chain that might occur after a long running time can be adjusted independently of the other.

The supply package for the two lines also includes six AUMUND pan conveyors as well as various flat gates, silo discharge gates, telescopic chutes and cleaning conveyors.

“We won the order among other things because of AUMUND’s expertise in advising on concept and design”, says AUMUND MD, Robert Gruss happily, when speaking of the trust of the customer. “Our strategy is to put our focus on a close relationship with our customers, accompanying them from the initial planning stages right through until after commissioning, and it is gratifying to reap the rewards.”

## 108 Machines for greenfield project in Egypt **AUMUND equipment for six new clinker production lines in Beni Suef**

June 2016, Sinoma International Engineering announced that its subsidiary, Chengdu Design & Research Institute of Building Materials Industry (CDI) had signed a contract with the Egyptian government to build six production lines for clinker of 6,000 tpd each, in Beni Suef. AUMUND Fördertechnik GmbH, in close cooperation with its Chinese subsidiary AUMUND Beijing, has now won the order to supply the clinker conveying equipment for the project.

for each of the six lines.

The new greenfield project in Beni Suef is to be fully completed within the next three years. The pilot phase of the new production lines is due to start as early as December 2017.

AUMUND Fördertechnik will supply these 108 Machines to Egypt in three deliveries, between April and June 2017.



AUMUND Bucket Elevator type BWG  
(©AUMUND)



AUMUND Pan Conveyor type KZB  
(©AUMUND)

Egypt, with a capacity of 70 million tonnes, is one of the world's biggest producers of clinker. Around 52 - 54 million tonnes of cement are consumed annually in Egypt. The identical lines will each be equipped by AUMUND with four BWG belt bucket elevators, with capacities up to 650 t/h and three BWZ chain bucket elevators (up to 550 t/h).

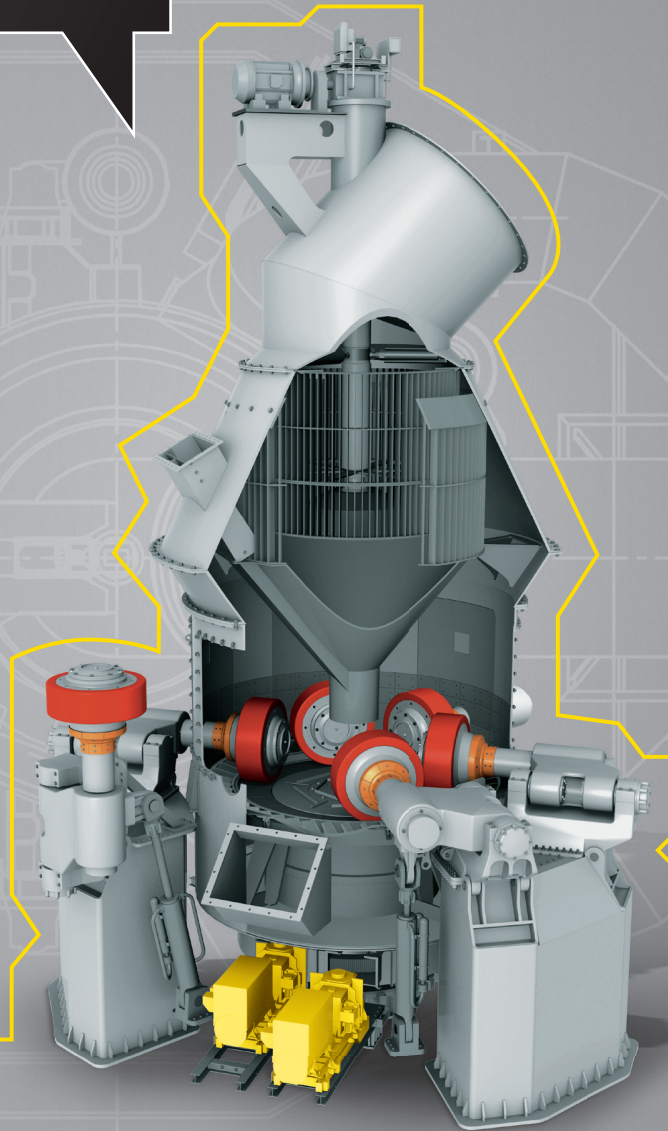
The machinery package also includes four BWG-L belt bucket elevators (170 t/h) one BWZ-L chain bucket elevator (80 t/h) as well as six pan conveyors (375 t/h),

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## VORTEX APPOINTS IBC AS NEW UAE AGENT

Vortex Global Limited, a solids and bulk handling Components Company, announces the appointment of Integrated Business Corporation (IBC) as its new agent in United Arab Emirates, Oman, and Kuwait. IBC is a portal company who utilises local knowledge of developing projects to integrate global partners into the local Omani market.

"IBC's aim is to be one of the top companies for agreements to hold business licenses to expand in Oman and UAE," Rey Acurantes, IBC Business Development Manager says. "We are able to mobilise within these regions at short notice and provide service for our global clients who wish to invest in these countries. We like to develop tailored sustainable solutions that integrate quality systems into the culture and practices of an organisation."

The UAE is currently diversifying its sources of income as oil prices continue to lower across the globe. The Ministry of Economy hope to increase the manufacturing industry sectors to absorb the financial shock of the current oil prices. Projects in base metals, chemicals, food and beverages, machinery, rubber and plastics, cement, glass, and wood are planned to help the UAE economy

"IBC is able to easily identify the challenges of the market in Oman and the Emirates," says Laurence Millington, Vortex Director of International Business. "Being a dry bulk components company, this is an exceptionally good time to enter the Middle Eastern markets. IBC has the expertise to get us there."

About IBC:

IBC, the portal to business in the Middle East, specialises in introducing international brands to the local market in the Middle East giving them unparalleled business opportunities both with private and government sectors. IBC's vision is to improve the business infrastructure and introduce new fields of business to the local and regional market.

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Web: [www.ibcarabia.org](http://www.ibcarabia.org)  
For more information: [VortexGlobal.com](http://VortexGlobal.com)

## VPIstruments launches new website

VPIstruments is proud to announce the launch of its new website: [www.vpinstruments.com](http://www.vpinstruments.com). The producer of energy management solutions has worked hard on giving the site a new "look & feel", adding more features and more functionality.

This website is a dynamic forum that will change constantly. VPIstruments will add process related information, customer cases and educational videos to offer visitors a variety of information on how they can save money on their compressed air and how they can elevate their energy management to a higher level.

Customers are able to login and have access to information catered to their needs, prospects can enter inquiries and search on products or process related features.

VPIstruments provides real-time insight into the consumption of compressed air and technical gases. The equipment shows where, when and how much the usage is. The innovative and user-friendly meters and monitoring equipment guarantee substantial savings. The web-based software of the VPVision monitoring system is the cornerstone of any energy management system with ISO 50001 certification. Investments in products by VPIstruments very quickly pay for themselves.

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## SCHADE Stockyard Equipment in the Cement Industry



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### **RAK Ceramics installs a new “industrial gem” with Sacmi in Bangladesh**

*Advanced technology and plant engineering for a new facility that will be producing a full complement of porcelain tiles. Sacmi reinforces its strong partnership with one of the world’s largest ceramics’ manufacturers.*

One of the largest ceramics’ brands in the world, RAK Ceramics produces 110 million square metres of tiles, 5 million pieces of sanitaryware, 24 million pieces of porcelain tableware and 600,000 pieces of faucets per year at its 17 state-of-the-art plants across the United Arab Emirates, India, Bangladesh and Iran. At its production facility in Bangladesh, **RAK Ceramics** recently started up an all-new plant, an industrial gem producing **12,500 square metres of tiles a day**, all fully controlled with **Sacmi technology**.

Successful testing and production at the new plant began in Q1 2016 and this latest plant is dedicated to the manufacture of technical porcelain floor tiles and wall tiles for the thriving local market. The added capacity brings the total output of RAK Ceramics’ Bangladesh operations to **25,000 square metres a day**, thus reinforcing its leadership position locally in the **quality ceramic products** sector.

The new production facility – located 60 km from the capital Dhaka – consists of an **MMC 092 modular mill**, designed to provide **energy savings of up to 40%** compared to traditional drum mills. Downstream is an **ATI 110 spray dryer**, also engineered and supplied by the Sacmi Impianti division, flanked by two MTD 340 mills.

The heart of the plant is the pressing department. This consists of no less than **three PH 5000L presses** (with an inter-column clearance of 1750 mm) that feed into two five-channel **EMS** driers with an effective load width of **2850 mm** and a length of 22.4 metres. RAK Ceramics has chosen this type of high tonnage press, together with very high-performing driers, in order to focus on manufacturing **all the variants of medium-large porcelain tiles** (technical and glazed) that are in high market demand.

Sacmi has also supplied **two inkjet digital decoration machines** developed and built by **Intesa**; these join numerous other decorating solutions already supplied to the RAK Group and there are now **a total of 14 Sacmi-Intesa decoration machines installed in their plants worldwide**.

To demonstrate its capacity to act not just as a machine supplier but also – and above all – an **all-round partner for the implementation of “turnkey” systems and services**, covering everything from development of the graphic image to production and storage of the decorated slab, Sacmi has also provided RAK Ceramics’ Bangladesh production facility with **2 sorting lines** designed by **Nuova Fima**, the group brand specialising in the design of automated end-of-line solutions. Completing the order there is, upstream, the necessary plant for the department where **glaze grinding** and concentrated colour preparation take place. For the firing department, Sacmi has supplied an all-new **153.3-metre single-channel FCC 2950 kiln** equipped with advanced **systems that recover cooling air** and then channel it towards the combustion zone to optimise and reduce gas consumption.

The completion of this installation in Bangladesh reinforces the **long-standing partnership between Sacmi Imola and RAK Ceramics**, which involves not only the Group’s many production facilities on several different continents but also their other core businesses of sanitaryware and tableware (**RAK Porcelain**).



**SIMAN NEWS**

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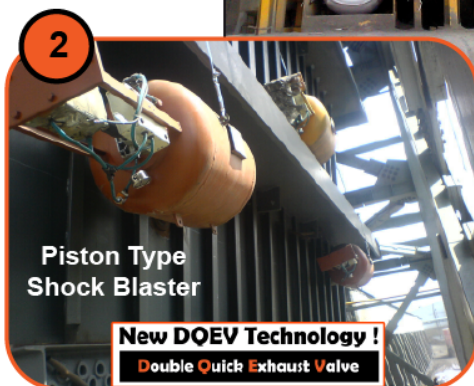
Complete Directory Of Iran Cement Factories & Engineering Companies

IRAN Cement Industry Capabilities and Equipments Production in SimanKhabar.ir

**SK Automatic Big Bag Filling Station With Lifting System**



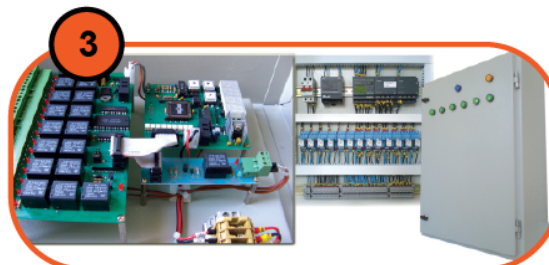
**SK Cement Packer**



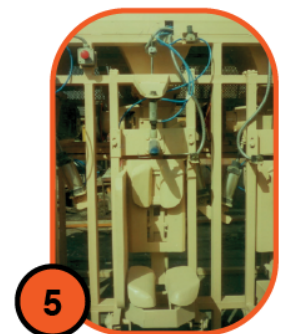
**Piston Type Shock Blaster**

**New DOEV Technology !**  
Double Quick Exhaust Valve

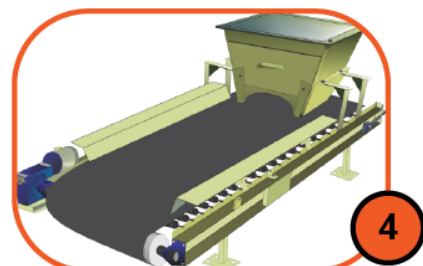
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# THE “PARIS AGREEMENT” ON CLIMATE CHANGE: AN OPPORTUNITY FOR CEMENT SECTOR TO FURTHER REDUCE ITS CO<sub>2</sub> EMISSIONS

By: Philippe Fonta, Managing Director  
Cement Sustainability Initiative (CSI)  
World Business Council for Sustainable Development (WBCSD)

## **INTRODUCTION: A VOLUNTARY SECTORAL APPROACH**

Carbon emissions is an important sustainability issue for the cement industry as global cement manufacture accounts for about five percent of all man-made CO<sub>2</sub> emissions: about 60% of these emissions come from the raw materials used in the manufacturing process of cement, the basic chemical de-carbonation of limestone into lime releasing CO<sub>2</sub> whereas about 40% of these emissions come from the energy required to ensure the above chemical reaction and to heat the materials to a temperature of about 1450°C.

Aware of the challenges of the sector, some leading companies decided in 1999 to voluntarily cooperate in mitigating their CO<sub>2</sub> emissions and fighting against climate change, convinced that a collective approach would scale up the sector's improvements.

They then created the Cement Sustainability Initiative (CSI), a voluntary worldwide initiative under the auspices of the World Business Council for Sustainable Development (WBCSD) to collectively tackle the issue of climate change amongst other sustainability issues at stake for the sector. In order to be able to exchange information and best practices, while operating under the strict compliance of existing national and international anti-trust laws, the CSI established a robust governance structure with regular legal review of its operations.

In addition to this voluntary initiative, the CSI has been advocating for supporting policies and incentives to enable the sector implement the technical solutions at a scale and speed that is necessary to meet the challenges of climate change. For instance, the CSI has been advocating for on a long-term, universal climate agreement to enable the private sector to undertake appropriate long-term investments, and has been promoting the development of regulatory and financial incentives for innovative low-carbon cements.

## **THE PARIS AGREEMENT: A SIGNAL OF HOPE**

Over the past decades, most people agree that the process of UN negotiations was long and unsuccessful, moreover with regards to the challenge of climate change and the urgency to solve it. The limited success of the Kyoto Protocol, adopted in 1997 and only entering into force in 2005 was the perfect illustrative example of this lack of commitment. In the run-up of the Paris meeting, in 2015, the most sceptical people were pointing out that the meeting was the COP21<sup>1</sup>, i.e. the 21st meeting of that kind and that up until now, the results had always been disappointing.

However, in the various preparatory meetings of the COP21, every person involved could feel a different atmosphere, and although nobody would dare to say it openly, there was good hope to reach an agreement in Paris; one of the reasons why this relative optimism was present is because for the first time in the UNFCCC process, various stakeholders were sharing information, expertise and wishes. For the first time in history, the business was invited in the zone where the negotiations were happening and was not reduced to having side-events and meetings in another hotel at the over side of the city.

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<sup>1</sup> COP21 is the twenty-first session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris from 30 November to 13 December 2015

Then, only two weeks before the beginning of the COP21, terrorist attacks struck the city of Paris, challenging the possibility to maintain the COP21 in Paris as scheduled, and if so, suggesting that head of states and governments would be more focused on immediate safety and security issues rather than on climate change ones that appear for some of them as being of a more longer-term horizon.

Despite the difficult environment, an international multilateral, legally-binding agreement, known as the “Paris Agreement”, was officially adopted by 195 Parties on 12 December 2015 at COP21.



#### Adoption of the Paris Agreement on December 12, 2015

This agreement is a clear signal of hope and it also sets the framework for enhanced cooperation between the different stakeholders (States called Parties and non-party stakeholders being the private business companies as well as the civil society and non-governmental organisations).

Aiming at maintaining the global temperature increase well below the 2°C above the pre-industrial levels, pursuing efforts to limit the temperature increase to 1.5 °C above these levels, the Paris agreement targets a complete decarbonation of the economy by the end of the XXIst Century. It is an ambitious and balanced agreement, which defines commitments for all States based on their own impact on climate change through their own CO<sub>2</sub> emissions. Contrary to the preceding Kyoto Protocol, the Paris agreement does not have a fixed and limited period of implementation but it sets a permanent regime with regular updates for reporting and adjusting the ambitions defined by the different Parties. As such, it is a bottom-up approach, built on the Parties’ objectives of emissions reductions: it becomes obvious that the different Parties will ask the various sectors of the economy to report their emissions in order for them to consolidate their national stocktake (global volume of emissions) and be able to adjust their Nationally Determined Contributions (NDCs) with more ambitious targets. It will then be essential for the various sectors to be able to measure and report these emissions and, as requested for the Parties, to have these emissions reports verified and validated by an independent third party. Cooperation between states and non-state stakeholders will be more than ever essential, and some sectors like the cement sector, through CSI, have a long experience on reporting their emissions and having them verified by an independent third party.

Having these emission levels verified by an independent third party and the Parties committed to a regular update of their global stocktake and associated ambitions makes of the Paris agreement a legally binding text, which was a condition of success for this agreement.

Based on the Nationally Determined Contributions (NDC), the agreement is considered as successful as it sets the basis for implementing solutions, reinforcing the role and action of economic stakeholders and setting up a financial and technological package, essentially to help the developing countries.

**CSI MEMBERS ARE FULLY PREPARED TO THE NEW REGULATION**

Contrary to the Kyoto Protocol, the Paris Agreement entered into force on 4 November 2016<sup>2</sup>, only 10 months after its formal adoption. This accelerated ratification process, a “first” in United Nations history, demonstrates a clear change in the Parties’ commitment, reflecting the urgency for all stakeholders to fight against climate change and its impacts.

Members of the Cement Sustainability Initiative (CSI) welcome this historic moment and are ready for its implementation, having voluntarily established an independently verified database of CO<sub>2</sub> emissions. In 2001, CSI companies developed a common “Energy and CO<sub>2</sub> emissions” reporting protocol for the cement sector, based on the reference GHG protocol elaborated by the WBCSD and the World Resources Institute (WRI). This protocol (in its third version since 2011) ensures that all CSI members report their CO<sub>2</sub> emissions, using the same methodology, to a centralized database, called “Getting the Numbers Right” (GNR).

The GNR database, managed by an independent third party to comply with anti-trust regulations, is the most comprehensive database of independently verified CO<sub>2</sub> emissions that any industrial sector has ever established. This year is the 10th consecutive reporting year, bringing a robust performance tracking of the sector over a significant period of time. Showing a continuous reduction in CO<sub>2</sub> emissions, it also enables companies to define their future reduction targets and pilot their individual performance.

This process, a requirement for CSI membership, is fully consistent with the framework defined in the “Paris agreement” by which Parties must regularly report their CO<sub>2</sub> emissions, verified by independent third parties and adjust their Nationally Determined Contributions (NDC) with more ambitious objectives accordingly.

**GNR PROJECT  
Reporting CO2**



Select a region :

Glossary: definition of the main indicators of the project

Synthesis: number of plants, number of contributors, coverage

Download Excel report

**Production**

<b>8TG</b>	Total production volumes of clinker Grey clinker	t clinker
<b>8TGK</b>	Total production volumes of clinker Grey cement - by kiln type	t clinker
<b>8TGK%</b>	Total production volumes of clinker Grey cement - by kiln type (%)	% clinker
<b>21TGWcm</b>	Total production volumes of cement Grey and white cement	t cement
<b>21TGWct</b>	Total production volumes of cementitious products Grey and white cementitious products	t cementitious products
<b>21TGWce</b>	Total production volumes of cement equivalent Grey and white cement equivalent	t cement

**CO2 emissions**

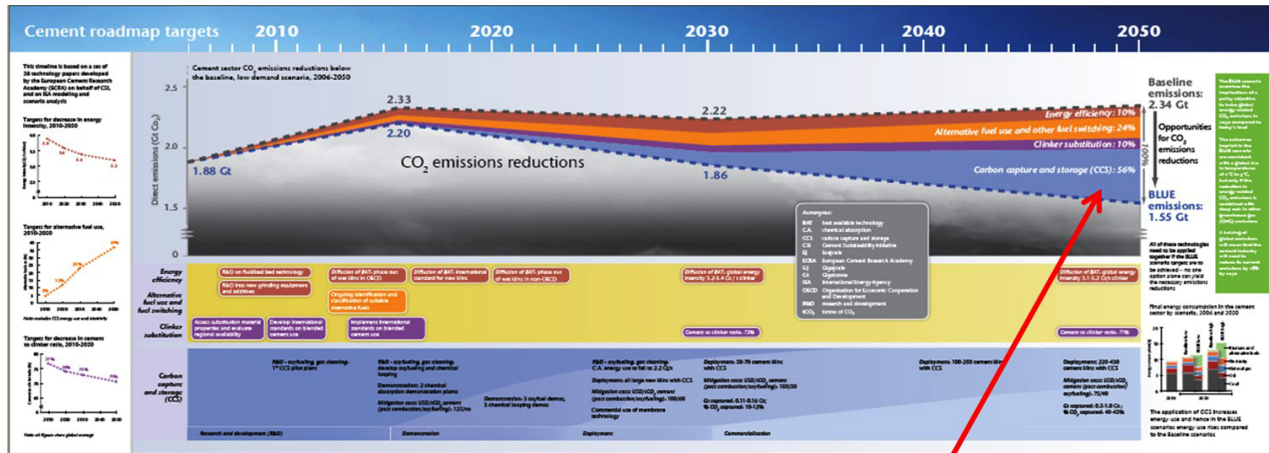
<b>59cTGW</b>	Total gross CO2 emissions excluding CO2 from on-site power generation - Grey and white cement	t CO2
<b>59cTGK</b>	Total gross CO2 emissions excluding CO2 from on-site power generation - Grey cement - by kiln type	t CO2
<b>59cTGK%</b>	Total gross CO2 emissions excluding CO2 from on-site power generation - Grey cement - by kiln type	% CO2

**GNR database, accessible at <http://www.wbcscement.org/GNR-2014/index.html>**

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

**THE NEED FOR ENHANCED COLLABORATION**

The Paris agreement emphasizes the need for enhancing cooperation between Parties and non-Party stakeholders. Once again, the CSI and its members had identified this trend and anticipated its implementation. As early as 2009, the WBCSD and the International Energy Agency (IEA) issued the very first sectoral Low Carbon Technology Roadmap, paving the way for other sectors to follow. Based on robust technology papers developed by the European Cement Research Academy (ECRA), this roadmap identifies the available and developing technologies, including breakthrough advancements and evaluates their potential and their needed implementation level to remain within the 2°C temperature increase above the pre-industrial levels, the key commitment of the Paris agreement.



Published by IEA/WBCSD 2009

**Emissions reduction levers:**

- Energy efficiency
- Alternative fuels
- Clinker substitution
- CCS

**2009 WBCSD/IEA Low Carbon Cement Technology Roadmap,**

Available at <http://www.wbcscement.org/index.php/key-issues/climate-protection/technology-roadmap>

Scaling-up the implementation of these technologies is essential to match the potential identified by the roadmap. Moreover, developing regional technology roadmaps (India, Brazil, Latin America...) to better fit to the local contexts will enable to better assess the potential of each technology by enhancing the granularity of the evaluation and also by involving local experts and stakeholders. Once some regional roadmaps have been developed, their results can be incorporated into a revision of the Global Roadmap. Based on revised and new Technology Papers, a complete update of the Low Carbon Cement Technology Roadmap is planned for 2017

Beyond the tremendous efforts already being undertaken by our cement companies worldwide, through the collaborative approach of CSI, we believe that further action is needed. In the preparation of the COP21 in Paris, we established a shared statement of ambition, by which CO<sub>2</sub> emissions should be reduced in the range of 20 to 25% by 2030 compared to business as usual, an average emission rate equivalent to the emissions of the best-in-class CSI company 2020 targets.

To move forward towards this aspirational goal, we, CEOs of the cement companies supporting this ambition, invite the whole sector to join and set-up the following action plan:

1. Enhance the coverage of the sector’s CO<sub>2</sub> emissions and energy consumption database, with a specific focus on China (about 60% of cement worldwide production).
2. Enhance overall energy efficiency of the cement manufacturing process.
3. Scale-up the collection, availability and usage of good quality alternative fuels and raw materials, including relevant waste from other sectors in a circular economy approach.
4. Further reduce the clinker content in cement to minimize the share of the energy-intensive



part of the process.






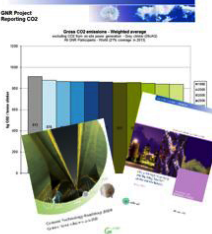

5. Develop new cements with reduced net CO<sub>2</sub> emissions over the full life cycle.
6. Engage the full building and infrastructure value chain in local markets to identify and maximize the avoided emissions by usage of cement and concrete products.
7. Evaluate cross-sectoral initiatives, particularly on the opportunity to capture, use and store carbon (CCS-U).

## Low Carbon Technology Partnership Initiative (LCTPi) – Cement

A **WBCSD**-led movement as the voice of business on sustainability issues

- Building up towards the **UNFCCC COP21 meeting in Paris** (Dec 2015)
- Elaborating sectoral statement of ambition and an action plan of technical solutions to reduce CO<sub>2</sub> emissions through partnerships
- The **CSI** is coordinating input from the **cement sector**

**Ambition: Scale up emission reduction in the range of 20 to 25% CO<sub>2</sub> in 2030 compared to business as usual**

<p>Enhancing <b>energy efficiency</b> of the cement manufacturing process</p> 	<p>Reducing <b>clinker / cement ratio</b></p> 	<p>Engaging the full value chain to maximize <b>avoided emissions</b> by usage of concrete</p> 	<p>Evaluating <b>cross-sectoral initiatives</b> to up capture, use &amp; storage of carbon</p> 
 <p>Scaling up use of <b>alternative fuels</b></p>	 <p>Scaling up coverage and implementation of the <b>CSI tools</b> (GNR, technology roadmaps) globally, with a focus on China</p>	 <p>Developing <b>new cement clinkers</b> with lower energy &amp; calcination requirements</p>	

**Key partners:** International Energy Agency (IEA), International Finance Corporation (IFC), national trade associations

### Cement Low Carbon Technology Partnership initiative (LCTPi)

#### TRADITIONAL SOLUTIONS

As identified in the 2009 WBCSD-CSI Low-carbon Cement Technology Roadmap and reinforced during the overall reflexion undertaken through the LCTPi process in the run-up of the Paris COP21 meeting, traditional technical solutions such as enhancing energy efficiency, reducing clinker/cement ratio and scaling up the use of alternative fuels have been identified again as levers to reduce the impact of the cement sector on climate change.

For instance, to increase electrical and thermal efficiency in cement plants, the following actions need to be implemented:

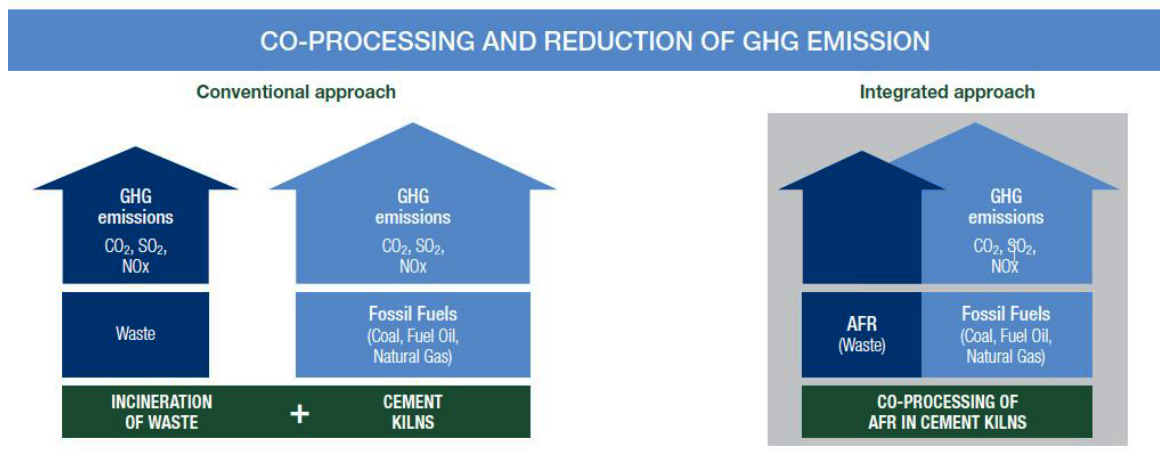
- Appropriate and regular training to ensure that plants are operated and maintained in order to ensure the optimum efficiency in operations;
- Increase use and production of renewable energy including waste heat recovery (WHR);
- A significant increase in Research and Development (R&D) over the long term is needed within the cement industry. Investment along the whole chain of innovation, from college level training to industrial-scale innovations, must come from academia, the industry, equipment suppliers and governments;
- Creation of public-private partnerships to help minimize technological risks and create options to increase energy efficiency or reduce CO<sub>2</sub> emissions;
- Phase-out inefficient long-dry kilns and wet production processes in both developed and developing countries;
- Develop and implement international standards for energy efficiency and CO<sub>2</sub> emissions in the cement industry;
- Share best practice policies for the promotion of energy efficiency and CO<sub>2</sub> emissions reductions in the cement industry; and
- Conduct regular energy audits;
- Have standard measurement and verification (M&V) procedure, cement companies and technology suppliers must work together to agree upon the standard mechanism of replacement (for instance, fan replacement) or retrofits.

In addition, to further reduce the clinker content in cement the following actions need to be implemented:

- R&D in processing techniques. Documented assessment of substitution material properties is needed to understand and communicate which substitute are best fitted for which intended applications.
- Cross-sectoral collaboration. Develop and cross-reference roadmaps for different industries which are linked to the cement industry by the production of clinker substitutes. This will enable forecasting of the effects of mitigation technologies in one industry impacting mitigation potential in other industries.
- Develop best practice guidelines and increase acceptance. Independent environmental impact studies (EIS) on the use of key substitution materials by the cement and other industries to show where to achieve the highest potential emissions reductions.
- R&D into processing techniques for potential clinker substitutes that cannot currently be used due to quality constraints.
- Promote international training events with national standardization bodies and accreditation institutes to exchange experiences on substitution, concrete standards, long-term concrete performance of new cements, and environmental and economic impacts.
- Consider standards that allow the use of blended cements and concrete with high recycled content.
- Establish hierarchy for recycled content in new building code - mandatory codes.

Finally, with regards to scaling-up the collection, availability, pre-treatment and usage of quality alternative fuels and raw materials (including waste from other sectors in a circular economy concept), the following actions need to be implemented:

- Promotion of co-processing in cement kilns in developing countries, for instance partnering with United Nations Industrial Development Organization (UNIDO), and enabling widespread expertise in using alternative fuels;
- Partner with other industrial sectors to raise the availability of suitable waste streams for the cement industry;
- Review and potentially update regional, national and local level legislation to ensure the use of alternative fuels and biomass is incentivized by policy;
- Develop resource use indicators, possibly partnering with World Resources Forum (WRF);
- Promotion of social acceptance, diffusion of the CSI coprocessing and stakeholder engagement guidelines and ensuring operators follow common sets of guidelines on alternative fuel use to guarantee adequate processes, e.g. providing induction and retraining, documenting and monitoring, for employees and contractors;
- Organize workshops aiming at sharing knowledge and showcasing best practices in the usage of alternative fuels (e.g. CSI Forum 2012 in China); and
- Develop inventories and categorize waste streams needed in some countries.







**source: The European Cement Association (CEMBUREAU)**

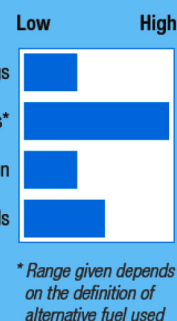
All these solutions will only be possible with a clear cooperation between the different stakeholders, whether they are from the private sector, the policy-makers and the financial community. For instance, in some countries, the authority applies the legislation for waste incinerators to cement kilns conducting co-processing activities. The temperature, residence time and level of final residues clearly demonstrate that a cement kiln has operating conditions and constraints far different than the ones of incinerators. Through proper discussion, mutual knowledge sharing and understanding, we can expect that a scaling up in usage of alternative fuels and raw materials could happen and deliver the potential that was highlighted in the low-carbon cement technology roadmap. A table of the different stakeholders and where their involvement is expected is given below.

**Partner roles**

**Potential impacts**

item/partner	industry	industry suppliers	governments (including local municipalities)	universities	research institutes	
best practice	x	x				Energy savings 
technology research	x \$	x \$	\$	x	x	CO <sub>2</sub> savings* 
technology diffusion	x \$	x \$	\$			Cement production 
institutional structure	x	x	x	x	x	Investment needs 
performance data	x					

x = leadership role and direct involvement required  
 \$ = funding source



**Partners roles and potential impacts on the scale-up of alternative fuels and raw materials usage**

**NEW SOLUTIONS**

Beyond the traditional technologies identified as soon as 2009 through the development of the first sectoral low-carbon technology roadmap for cement, some new technologies that were not evaluated through the above-mentioned roadmap need to be properly assessed to provide the complete picture of the sector’s potential. One of the avenues is to develop new cement clinkers with lower energy and calcination requirements and new cements that sequester CO<sub>2</sub> through a carbonization reaction while hardening; the following actions will be implemented:

- R&D in processing techniques. Documented assessment of potential to lower raw material costs for belite-calcium sulfoaluminate-ferrite clinkers. Further development of this class of materials to make them more competitive in cost to OPC;
- Sectors collaboration. Develop incentives for the concrete products industry which has little or no CO<sub>2</sub> emissions to enable adoption of new technologies that have the potential for mitigating CO<sub>2</sub> emissions from the cement industry;
- Develop best practice guidelines and increase acceptance. Independent EIS on the use of low clinker cements by the cement and other industries to show where to achieve the highest potential emissions reductions;
- Join new cements and cementitious materials research initiatives, e.g. École polytechnique fédérale de Lausanne (EPFL) 2) & UNEP SBCI initiative ;
- Wide promotion of alternative sources of funding for low carbon technologies in the cement industry, including export credit agencies and multilateral development banks (e.g., Climate

Investment Funds 3) administered by the World Bank Group, International Finance Corporation (IFC) 4), European Bank for Reconstruction and Development (EBRD) 5), European Investment Bank 6) and energy services companies.

- R&D into totally new classes of cement clinkers with the potential for lower energy and lower calcination emissions; and
- Promote international training events with national standardization bodies and accreditation institutes to exchange experiences on new types of cements, concrete standards, long-term concrete performance of new cements, and environmental and economic impacts.

Additionally, it will be essential to engage the full building and infrastructure value chain in local markets and maximize the avoided emissions by use of innovative cement and concrete products. On that purpose, it will be necessary to increasingly base the selection of building materials and solutions on an assessment of impacts over the full life-cycle of buildings and infrastructure projects, covering extraction of raw materials, processing, transportation, construction, use phase and end-of-life (demolition / reuse) (cradle-to-grave / cradle-to-cradle); the following actions need to be implemented:

- Enhance and expand the benefits that concrete brings in terms of mitigation and adaptation, increase the associated awareness and knowledge about it;
- Support customers in their striving to implement more sustainable projects by providing expertise and consultancy;
- Support actively the use of life cycle assessment (LCA) methodologies, including but not limited to:
  - o Constructive participation in the development of LCA-related standards, methodologies, tools, and best practices;
  - o Provision of Environmental Production Declarations (EPDs) for concrete and other building products as key quantitative input for a meaningful impact assessment over the full life cycle of buildings and structures;
  - o Increased use of LCA techniques for internal decision making (e.g. selection of technologies, processes, fuels, materials etc.);
- Develop a common methodology and a simplified life-cycle framework for buildings and materials;
- Identify breakthrough cooperation opportunities, at cross-sectoral level, to evaluate the complete life-cycle of the products from other sectors, including the possibilities that some outcomes of one sector could be inputs for other sector in a full circular economy approach; and
- Promote concrete pavements and demonstrate the avoided emissions over asphalt.

Finally, the industry believes that the different sectors having an interest in carbon capture technologies and their applications should consider working together and this potential will certainly materialise only if each and every sector mutualise their knowledge and potential for the benefit of the collectiveness.

To evaluate cross-sectoral initiatives, particularly on the opportunity to capture, use and store carbon at scale, the following actions will be implemented:

- Identify costs and benefits of Carbon Capture and Utilisation (CC&U) for the cement and steel sectors, transforming CO<sub>2</sub> and CO into fuels and other applications thanks to the chemical sector's solutions;
- Measure the CO<sub>2</sub> emissions from manufacturing processes and products;
- Cooperate with the proactive energy-intensive sectors to facilitate the implementation of existing and breakthrough technologies identified through this initiative, a cooperation with the LCTPi on CCS could be envisaged;
- Promote appropriate regulatory framework and financial incentives mechanisms;
- Expand efforts by government and industry to educate and inform the public and key stakeholders about CCS / U; and
- Investigate linkages into existing or integrated networks and opportunities for cluster activities in industrial zones. Enhance the collaboration by building local and global partnerships benefiting from the synergies between the various actors, scale up the implementation of business solutions to build a low-carbon society.

### **CONCLUSION**

Clearly there is a world “Before Paris” and a world “After Paris”.

The Paris agreement has now entered into force, faster than any similar UN treaty, agreement or protocol. But more importantly, it is supported by the most progressive stakeholders of the business economy who have understood that the interest for working on climate change mitigation and adaptation makes also good business sense.

CSI will continue scaling-up its activities through its collaborative platform, partnering with the sector's various trade and industry associations and expanding the coverage of its activities through additional members and the enhanced deployment of its tools.

On 13 & 14 December, 2016, the CSI convened cement companies and a broad range of stakeholders to Madrid, for its annual Forum, to share the achievements reached in the first year after Paris and the next milestones of its global action plan on climate change, including enhanced energy efficiency and use of alternative fuels, reducing the clinker to cement ratio, identify and measure the avoided emissions throughout the value chain by using innovative concrete, the development of new cements and concrete and the carbon capture and utilization or storage opportunities.

This type of Forum shall be multiplied in various regions and countries to solicit higher interest and contribute to scaling up the activities and positive impact of CSI, through increased membership and improved performance of all its members

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**WORLD  
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# Potentials to improve performance and optimise the cost of cement production

**By: Martin Schneider // VDZ, Germany**

## **Abstract**

In addition to the everyday challenges of plant operation, the production process has to be constantly checked with regard to its operating efficiency and competitiveness. A detailed analysis based on a technical review reveals measures to reduce the specific energy demand, improve capacity utilisation or identify corresponding bottlenecks. This outcome can lead to a significant reduction in production costs while also positively influencing energy and resource efficiency.

VDZ energy efficiency analysis services are designed to identify potential energy savings in the cement production process and to improve the energy efficiency of the whole production line. Plant energy data are benchmarked against the VDZ database and BAT, allowing a fair and neutral assessment of fuel and electric energy efficiency. This results in an optimisation strategy to reach specific targets (e.g. clinker production rate, cost reduction), taking into account the need to ensure the consistency and uniformity of the product chemistry throughout the process. If required, solutions for emission reductions are proposed and the maintenance strategy is also reviewed. Finally, the potentials for cost reduction are identified.

Since the implementation of the measures proposed relies on skilled workforces, a performance review can be accompanied by corresponding training with a dedicated focus on the various subprocesses in the cement plant.

## **Introduction**

In addition to the everyday challenges of running a plant, the production process has to be constantly checked with regard to economy of operation and competitiveness. If necessary, the equipment has to be upgraded to be future-compatible by incorporating the latest technological developments or spare parts. Technical reviews, bottleneck analysis and process optimisation can significantly contribute to good plant efficiency and a good cost structure. This also includes the development of adequate key performance indicators and subsequent benchmarking. In addition, the right fuel mix, based on the characteristics of the fuels and their regional availability are of high importance. This has all to be seen against the background of good cement quality, which requires not only good laboratory expertise but well trained employees at the plant. VDZ has been a good partner to cement producers worldwide for many years to evaluate their plant performance and if necessary improve it.

## **Thermal energy efficiency**

Most of the fuel energy used in cement production is required for burning the cement clinker. Only a small amount of thermal energy is employed for drying other cement main constituents such as blast furnace slag. The principal raw materials are limestone marl and clay. The raw materials are burnt at temperatures of between 1 400 and 1 450 °C for the production of cement clinker with its characteristic properties. Due to the fact that a high-temperature process is necessary to satisfy the product requirements, the cement industry is one of the most energy-intensive branches. It has always made efforts to reduce its energy requirement with a view to cutting the high fuel energy costs involved.

The energy demand of a plant can be assessed in various ways, depending on the starting condition and the improvement potential. Already some 20 years ago, VDZ developed its kiln test to create a reliable basis for the optimisation of individual system components, operation and cement quality, and the reduction of emission levels. The objective of balances of volatile, e. g. alkali, chlorine and sulphur, and nonvolatile compounds is the assessment of material cycles and coating formation. The utilisation of alternative fuels, for instance, usually entails higher chlorine input into the kiln system, which in some cases results in malfunctions due to increased coating formation in the kiln inlet section and the lower cyclone stages. A schematic description of the parameters to be measured is shown in figure 1.

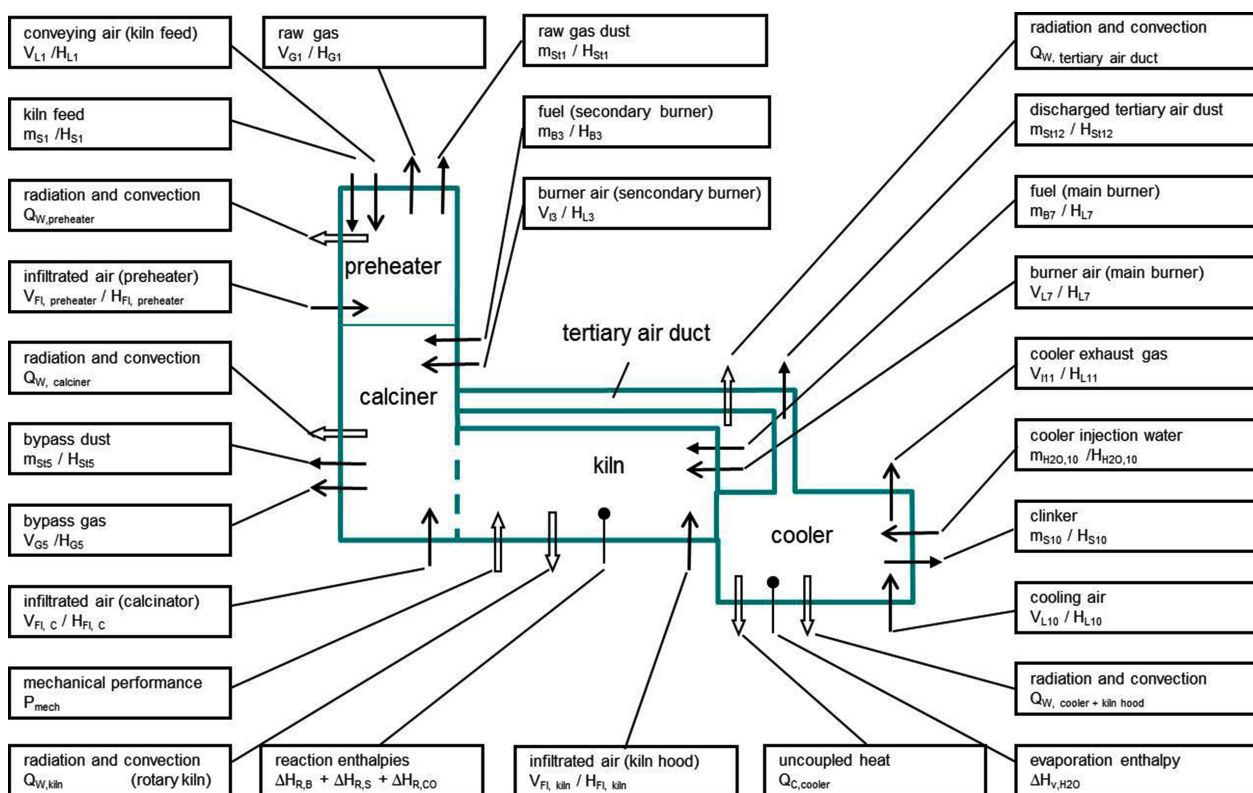
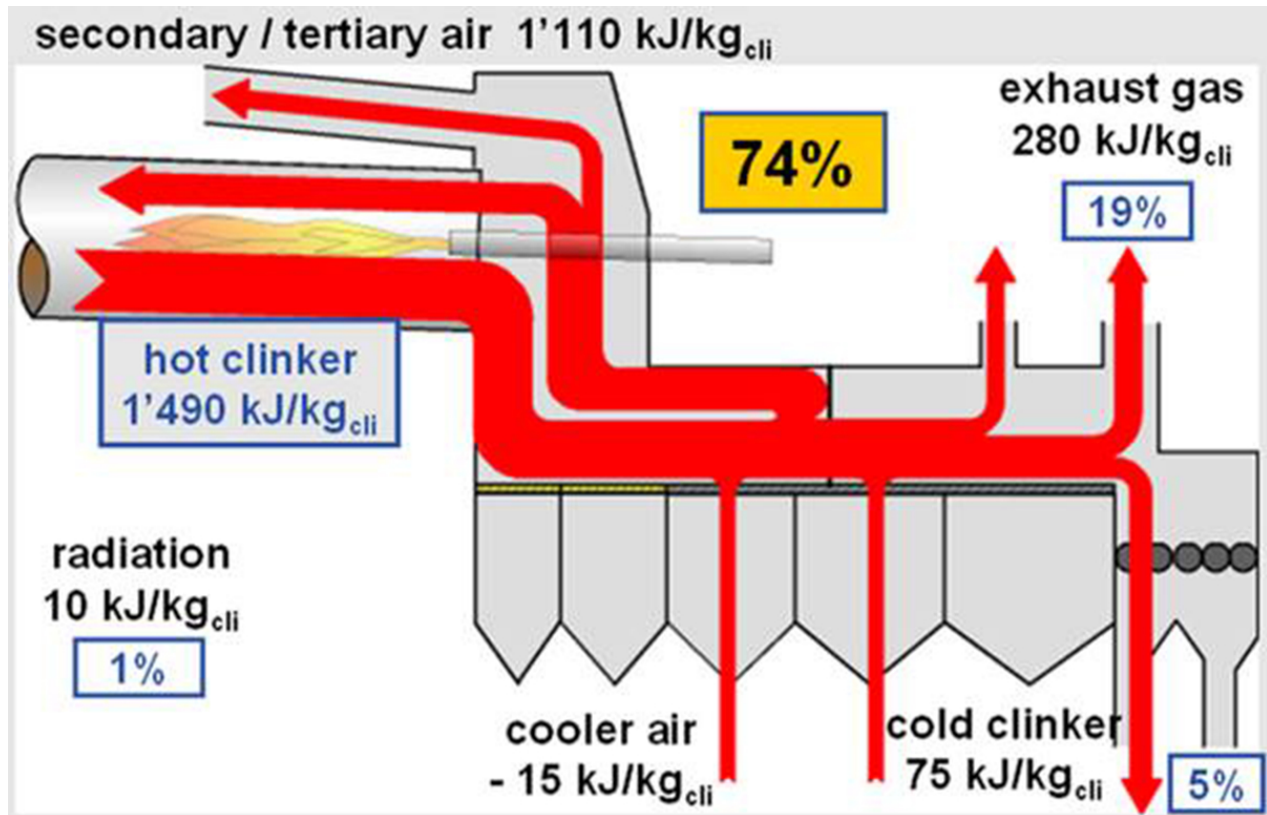


Figure 1: Energy balance of the full rotary kiln

A kiln trial, aiming at the investigation of material cycles, provides reliable data for the design or the upgrading of a bypass system. Balance investigations for trace elements can be carried out in order to obtain more knowledge about the behaviour of heavy metals in the kiln plant. The heat recuperation of clinker coolers is influenced by the cooler operation, cooler exit air and secondary air and at precalciner kilns by tertiary air. The degree of heat recuperation affects the fuel energy consumption and energy balance of the complete kiln line. Therefore, the determination of cooler efficiency may result in optimising the operational mode or in modifying the cooler technology. Figure 2 shows the result of such an assessment and enables a dedicated improvement plan. This can also help the decision to replace the cooler, since cooler technology has always been crucial to improving the energy efficiency of clinker burning. It is well known that fourth generation clinker coolers are widely available and new proposals have been made to further enhance the recuperation rate. This might ultimately result in waste



heat from the cooler with a sufficiently high temperature for even the on-site generation of electricity. To what degree this is possible and under what cost considerations recommendable depends on the specific situation in the plant but also on the local electricity market and energy policies.



**Figure 2: Assessment of the clinker cooler efficiency**

VDZ's assessment of the energy performance is based on key performance indicators derived from VDZ's data base. The approach is based on BAT (Best Available Technology) which takes into account the kiln design (capacity and type) and in addition the substitution rate of alternative fuels. Figure 3 gives an overview of a number of kilns which have been analysed by VDZ in recent years. While 3,000 kJ/kg can be seen as the energy consumption under performance conditions, the annual average for a BAT kiln of 3,000 t/d capacity is in the range of 3,160 to 3,320 kJ/kg of clinker. This refers to the use of coal as fuel – depending on the substitution rate of alternative fuels the consumption slightly increases.

It is well known in the cement industry that false air intrusion significantly increases the energy consumption of a kiln. As a result the reduction of the intrusion beyond today's levels by optimising the current sealings becomes even more important for overall energy efficiency. In order to reduce false air ingress the focus should be on non-permanent joints and on how these should be designed in order to fulfil the requirements of the respective sealing locations most comprehensively. Therefore, sealing locations such as the kiln inlet, kiln outlet, inspection doors, pokeholes, pendulum flap boxes, feed ports and rotary feeder and also control devices have to be examined. To determine the actual ingress of false air through the sealing locations of a clinker production the formula for the Poisseuille flow is used, taking into account the pressure difference between both sides of the sealing, the dimensions and geometrical properties of the sealing gap and also the temperature and viscosity of the involved gases. The calculation identifies the false air ingress of a conventional clinker production line, operated conventionally and equipped with state-of-the-art sealing technology.

An example of such an examination identified the kiln inlet sealing, the tertiary air (TA) slide damper, pendulum flap boxes, poke holes and specifically the inspection doors in the upper preheater tower as the major contributors to false air intrusion as shown in table 1. These doors by themselves provide approximately one third of the total false air because of the high differential pressure against which they have to seal. Accordingly, these identified sealing locations provide the biggest potential for false air reduction. According to the location and nature of the sealing, the prevalent specifics create requirements and side conditions of different importance for each of the

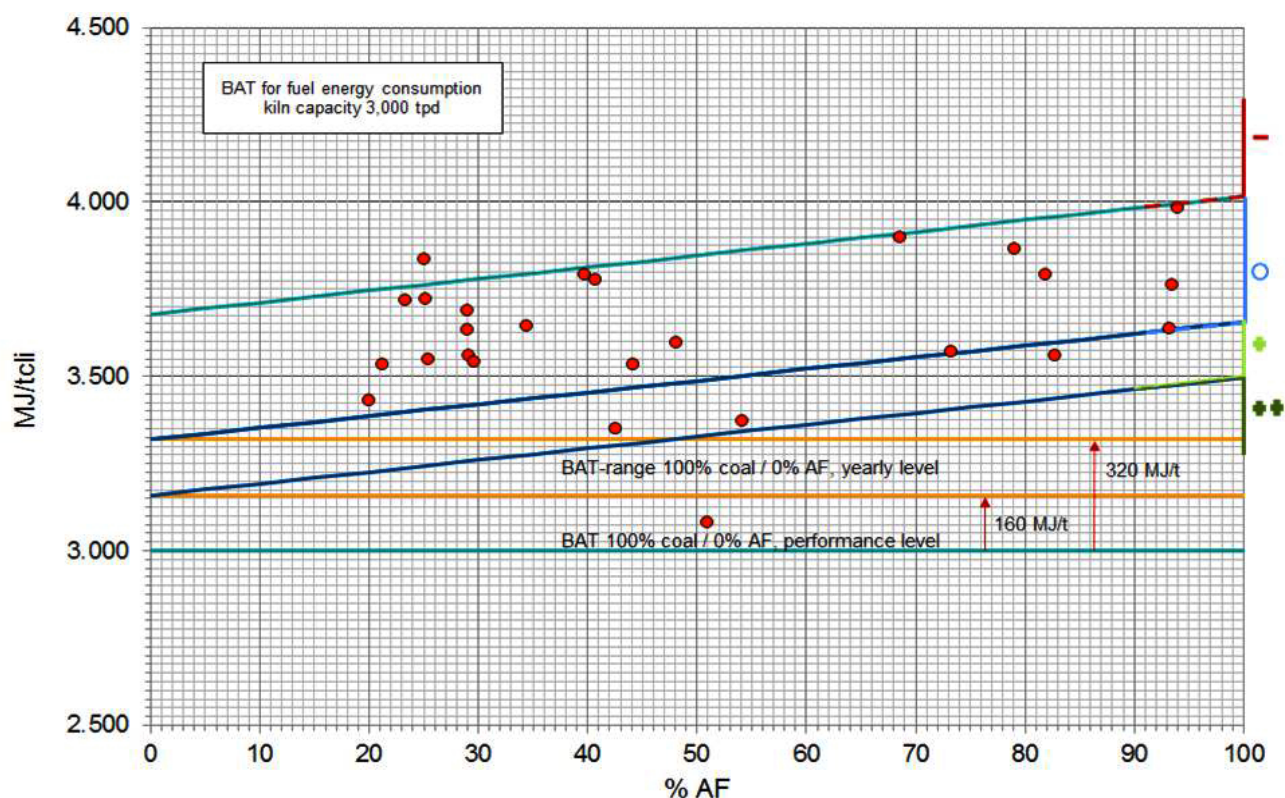


Figure 3: VDZ’s approach for assessment of fuel energy efficiency

sealing locations which should be taken into account for the development of concepts and designs for improved sealing solutions. The optimisation measures based on this analysis resulted in a false air reduction from 15 % as the reference level before optimisation to 8 % after optimisation. Subsequent cost savings were due to the reduction of the power supply to the main fan by 14 % and a reduction of fuel consumption by a minimum of 2 % in the long term average. Energy costs were reduced by 110,000 €/y correspondingly. Taking into account expenditures for improved maintenance of 35,000 €/y, the net annual savings were roughly 75,000 €/y.

Sealing location	Percentage of false air ingress
Kiln outlet	2 %
Kiln inlet	11 %
TA slide damper	10 %
Inspection doors, -20 mbar	7 %
Inspection doors, -40 mbar	35 %
Poke holes	9 %
Rotary feeder	7 %
Pendulum flap boxes	19 %

Table 1: False air ingress at different locations

**Alternative fuels**

The cement industry can make a valuable contribution towards the increased use of suitable resources. Moreover, the clinker burning process offers a unique opportunity for the simultaneous recovery of energy and the recycling of resources. Concerning the product quality, the ash content and the actual composition of the ashes play a very decisive role. In this context, once again sulphur and chlorine have to be taken into account. Moreover, the burning behaviour can at least indirectly influence the product quality. Material which is going to be fed via the main burner should be burned completely before falling down onto the clinker in the kiln. In such cases, the quality could be affected by local reducing conditions in the kiln.

For the production process the combustibility as well as the size and the shape of fuel particles are very important. Moreover, the moisture content and the calorific value have to be taken into consideration. Additionally, the chlorine and sulphur content play a decisive role in the production process. The feeding behaviour and questions related to the storage of the materials on site also have to be carefully considered. From an environmental point of view, the content of heavy metals such as mercury, thallium and cadmium is a particularly important aspect.

An example of the use of alternative fuels and its development is shown for the Germany cement industry in figure 4. Figure 5 shows the fraction of the various waste streams. The use of alternative fuels depends first of all on the local conditions, in particular the waste management in the country and region in question. In most cases however, a specific pretreatment of the waste intake material has to be carried out in order to provide a suitable alternative fuel for the clinker burning process. Over the past years, the cement industry has developed suitable pretreatment procedures, often in cooperation with waste management companies. These comprehensive and sophisticated processes allow even mixed waste streams to be converted into high quality alternative fuels. In this context, it is very advantageous if quality control and testing procedures are incorporated directly into the waste pretreatment procedures.

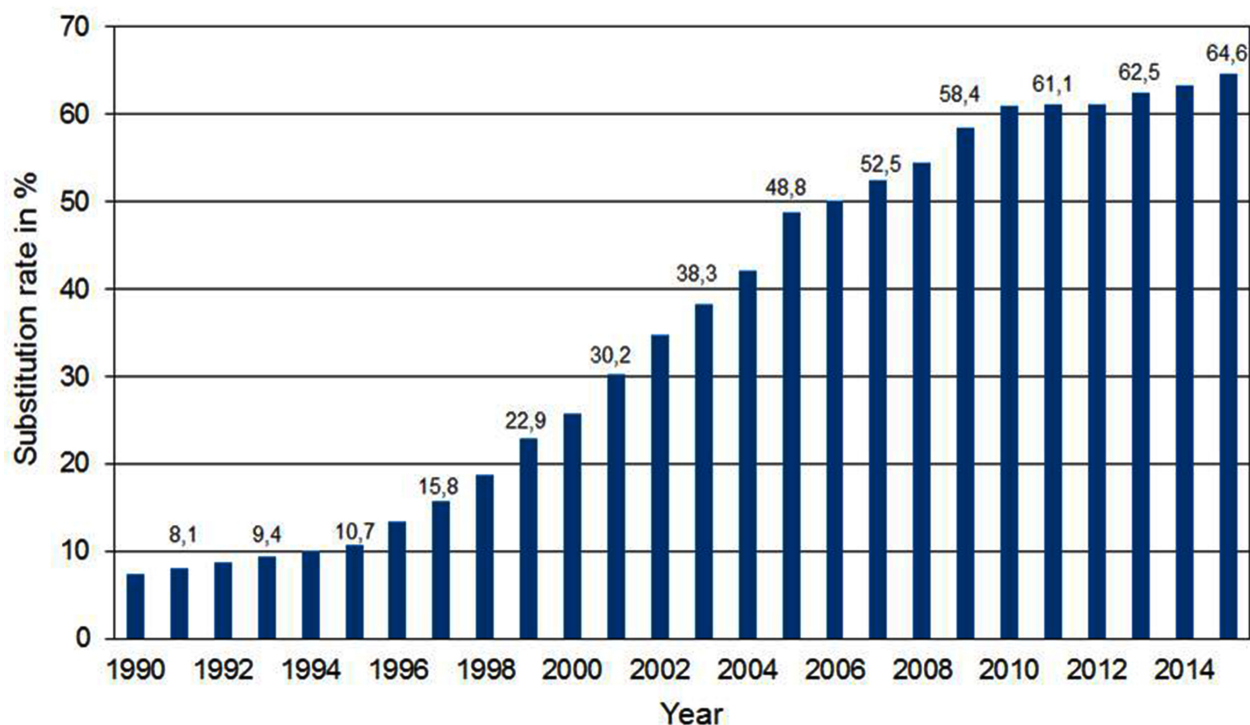


Figure 4: Development of alternative fuels in the German cement industry

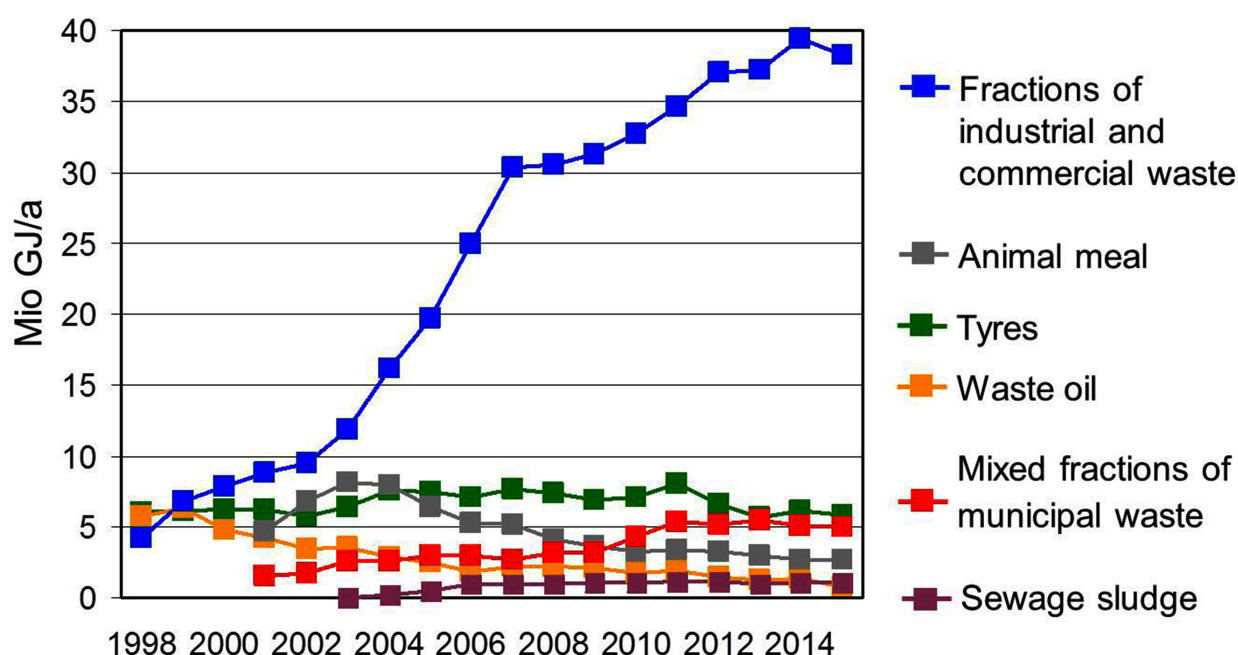


Figure 5: Substitution rate for selective alternative fuels in Germany

#### Quality control and laboratory reviews

Quality control of cement has a long tradition in the cement industry worldwide. Already in the 19th century the first standards for cement were published. Since those early days many further developments have taken place and techniques for quality control have also been improved. Traditional physical and chemical methods are still used, particularly as reference methods for quality control. Nevertheless, modern online and inline analysis has become more and more established. The cement industry realised very early that standardised rules are not only helpful for customers, but also for suppliers to ensure the quality of cement and thereby the safety and durability of construction works. Examples of modern automated analysis in cement plants are X-ray fluorescence analysis (XRF) and X-ray diffraction (XRD) combined with the Rietveld method. XRF is applied for the chemical analysis of, for example, cement and its constituents, in particular clinker. XRF and XRD can both be implemented as classical online methods in cement plants: Samples are automatically taken in the process and sent to a central laboratory, for example using a pneumatic tube, for further preparation and analysis. The whole procedure is much faster and needs less manpower than traditional wet chemistry or clinker microscopy. A direct process control is possible although there is still a minor loss of time between the sampling and the availability of the results.

It goes without saying that the analytical performance to determine the relevant parameters to operate the cement plant is crucial. VDZ's approach to ensure best laboratory operation is based on a review to evaluate the laboratory methods used for production and quality control purposes. The deliverables are a comparison of the test methods with best laboratory practice (incl. standards, reference materials and methods, Round Robin tests), the exposure of deficiencies in the currently used methods, and the elaboration of corrective and improvement measures. For this, the methods are reviewed with regard to standard requirements (as laid down in the respective standards) and state-of-the-art methodology. The audit includes an on-site visit by an experienced lab auditor, the organisation and evaluation of comparative tests and a comprehensive technical report with recommendations for the lab performance improvement (e. g. reproducibility and repeatability).

Figure 6 shows the impact of such a review. A reference raw material sample of known composition and LSF was analysed by the plant lab regularly once per week. The picture shows that the analytical bias led to an apparent variation of up to 1 % in the LSF of the raw meal. A lab review led to some new measures in sample preparation and calibration of the XRF and also in monitoring the XRF performance daily. After this, the weekly analyses of the reference sample only showed a very low bias, and results were very close to the reference data.

## Laboratory review to lower LSF standard deviation

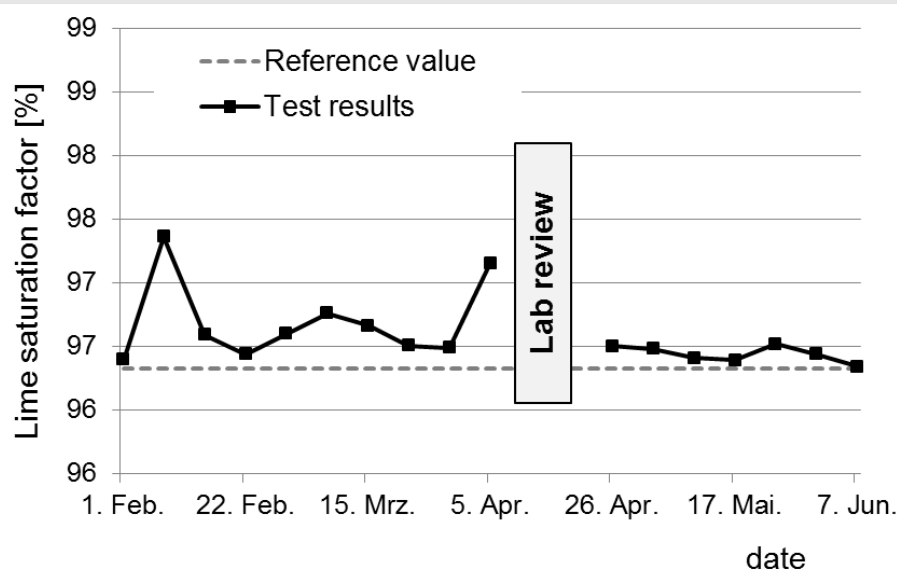


Figure 6: Laboratory review to lower LSF standard deviation

### Grinding

Comminution processes account for up to 70 per cent of the electric energy demand in cement manufacture. The majority of this requirement is needed for the finish grinding of the cement. Taking into account the ongoing diversification of the cement product range driven by the substitution of clinker by other main constituents, and also the strong increase in capacity in some markets, plus the continuously rising product fineness in other markets, this energy demand as well as the complexity of given grinding tasks is expected to rise further. Therefore, it is increasingly important to take care of the condition and the efficient operation of grinding equipment. While the replacement of an entire mill system may enable cement producers to save costs, such substitution also represents a sizeable capital investment. Therefore, the optimisation of existing mills is often a less expensive option with good potential to improve energy efficiency. A detailed analysis based on a technical audit can reveal measures to reduce the specific energy demand, improve capacity utilisation or identify corresponding bottlenecks. In this context, technical audits or process investigations for mills are valuable tools for mill optimisation. VDZ has gathered experience in numerous mill audits with a technical focus all over the world. The development of an ideal optimisation strategy is complex and different for every mill system. Not only the process technology has to be taken into account, but also the mechanical condition, product properties and investment cost.

Ball mills are used worldwide and have to be constantly checked with respect to their energy efficiency and product quality. Before complex and expensive measures are discussed, the mill's basic parameters have to be examined. The material filling degree is a good starting point. It is controlled by the diaphragm. Ball and material samples help understand ball classification and size reduction along the grinding path (photo 1). Figure 7 shows the outcome of a successful grinding audit with respect to the fineness of the cement along the grinding path, in this particular case showing insufficient stress intensity due to deformed balls and scrap metal.

In particular during a two-day process investigation, detailed evaluations cannot always be performed. In this case, the steps for further in-depth evaluation are also part of the final report. The first approaches normally include measures that can be applied without any or with only low investment costs, e.g. changes of operational parameters, slight modifications of the ball charge. Based on this, more sophisticated measures are suggested that can lead to higher investment costs e.g. the exchange of diaphragms and liners or the complete substitution of the ball charge. The general long-term strategy for optimisation should be developed in close cooperation with the plant personnel.



Photo 1: Ball mill review and sampling

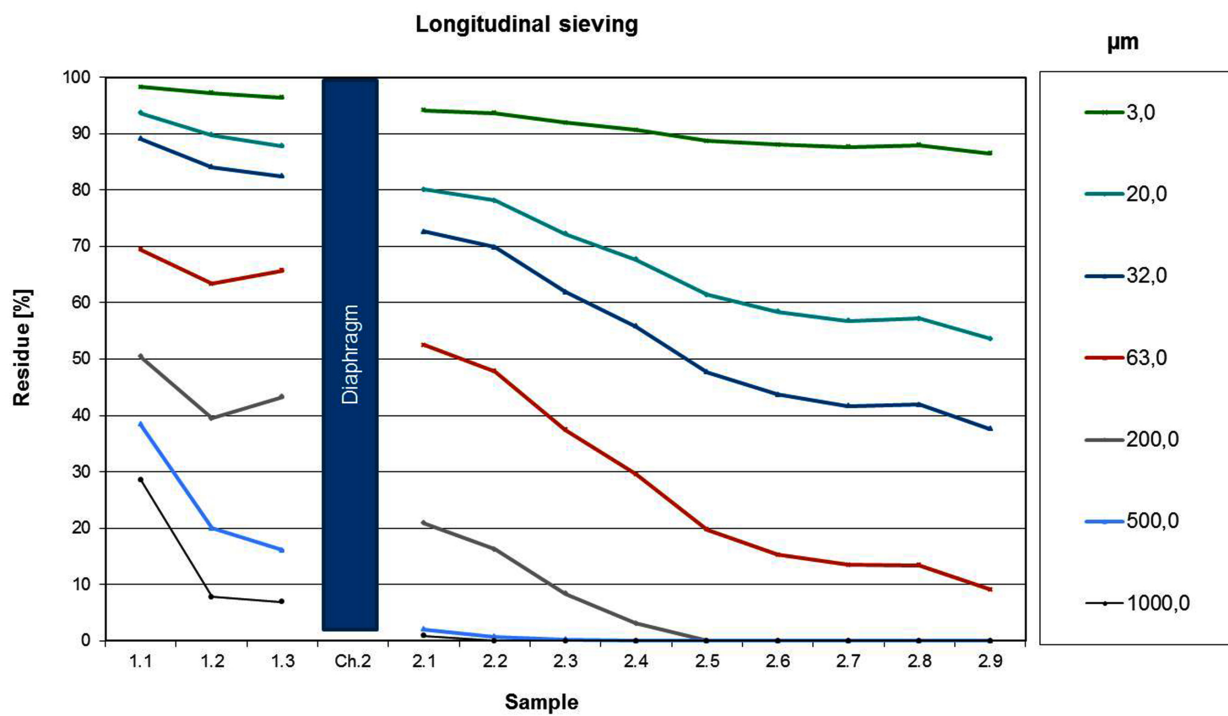


Figure 7: Longitudinal sieving results

**Training**

The processes involved in modern cement works are complex and highly automated. Technical innovation, the use of alternative fuels, cutting-edge environmental technologies and growing productivity have, in recent years, greatly increased requirements in terms of qualifications and flexibility for employees in the cement industry, whose work is being influenced more and more by technical progress. Without such advances it would be virtually impossible to run the high-tech plants found in this sector. The training and development of highly qualified staff and the continual improvement of employee skills are therefore key factors for success for many companies in industrialised countries and emerging economies. For growth markets the greatest challenges are undoubtedly the enormous increase in production, improvements in manufacturing processes and energy efficiency, and the switch to cutting-edge technology. Training programmes must be implemented to further educate workforces in order to operate production systems safely and efficiently. Engineers, control room operators and foremen need additional training at an advanced level to handle challenges like energy efficiency, alternative fuels, environmental technology and leadership. Typical examples of vocational training provided for the cement industry are VDZ training courses which can be adapted to the customer’s special needs, and VDZ online courses which comprise more than 30 modules on different topics from quarry to dispatch. Figure 8 shows a screenshot of a rotary kiln animation from one of the VDZ online courses which helps the participants learn and better understand the processes taking place inside the kiln.

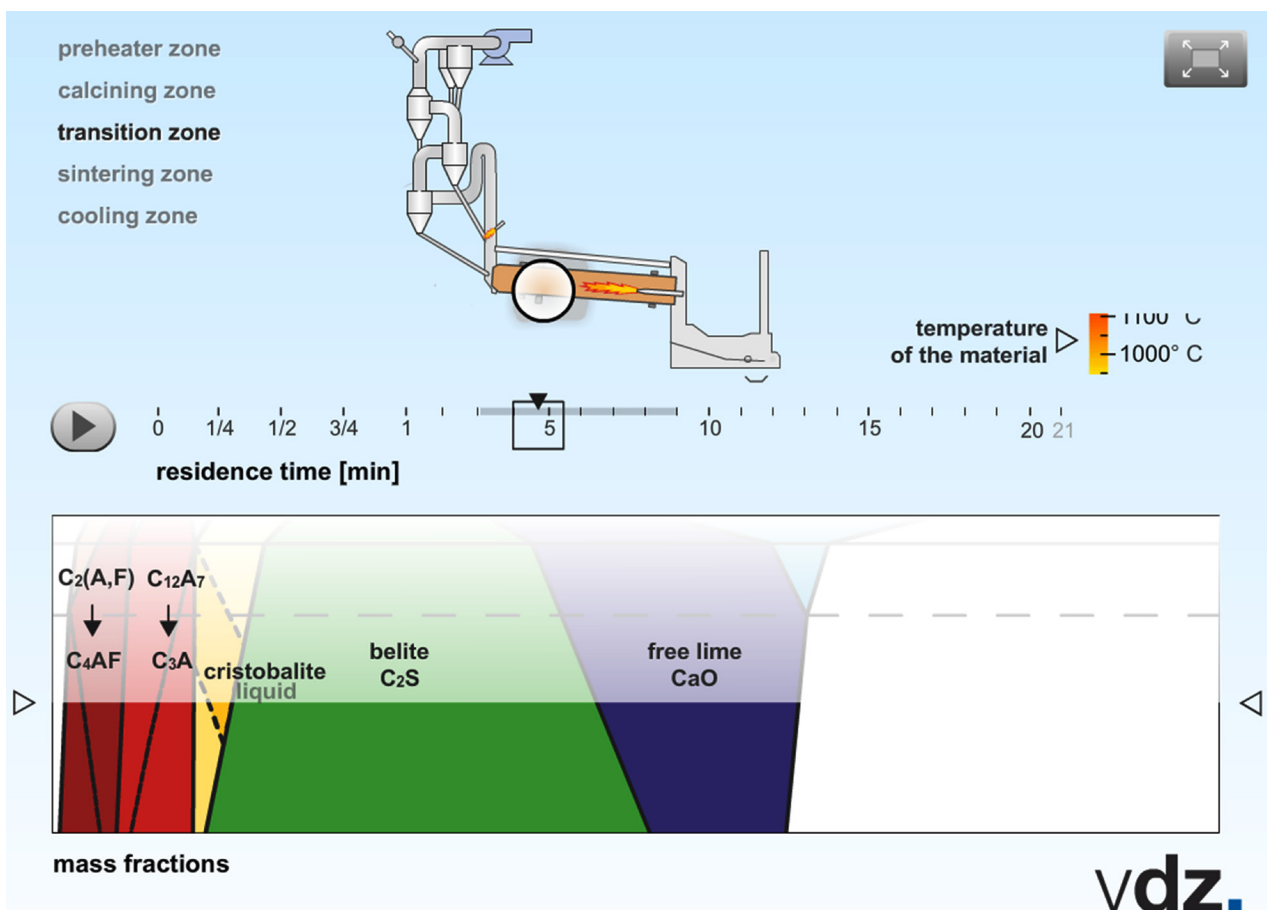


Figure 8: Animation of the burning process in the rotary kiln

**Conclusion**

The optimisation of cement plant operation with respect to energy consumption and energy efficiency can be achieved by technical reviews and subsequent performance assessments. Kiln trials are a good base to determine the gas and material flows and the corresponding enthalpies. Optimisation measures also include among many other aspects the examination of false air ingress. Training customised to suit the needs of the plant is crucial for well-trained employees, and laboratory audits can have a significant impact on correct analyses, which are important for the plant operation.

# The role of the cement industry in developing recycling projects

**By: Dirk Lechtenberg, Managing Director - MVW Lechtenberg Projektentwicklungs- und Beteiligungsgesellschaft mbH, Germany**

Many countries not only in the Arab world still lack the required infrastructure for collecting or treating municipal solid wastes. Therefore, particularly in developing countries, the cement industry establishes recycling projects. Dirk Lechtenberg, Managing Director of the well-known German based MVW Lechtenberg, describes recycling projects initiated by various cement plants in Egypt and gives some background about how cement groups can force the use of alternative fuels, especially refuse-derived-fuels.

Due to the political changes in recent years, Egypt is facing a major challenge in its energy policies. As one of the country's most important industries, the cement sector needs to adapt its overall energy use and consumption to suit these developments. With the rising cost of fossil fuels and their decreasing availability, the cement industry has looked into the use of alternative fuels and boosted energy efficiency in its overall processes. While the use of alternative fuels such as refuse-derived fuels or biomass derived fuels is a common practice in developed countries, where the infrastructure for the collection and processing of such wastes, raw materials and fuels is available, it first needs to be developed in Egypt.

Whereas in 1987 the average thermal substitution rate in the German cement industry was 4.1 per cent, the continuous use of various waste-derived alternative fuels then followed to achieve a level of 63.4 per cent or approximately 3.1 million tonnes by 2014.

In Egypt, where infrastructure of this type does not yet exist, the cement industry has the opportunity to support society by implementing an environmentally friendly waste management concept, in which the use of refuse-derived fuels (RDF) can be a significant driver of the waste management system. The first RDF production facility in a cement plant was inaugurated by the former Environment Minister, Laila Eskander, in February 2014 and by Suez Cement (Italcementi) with a five million euro investment. As waste processing

companies or cement plants in Egypt do not get paid for their services, these projects have to be financed purely by the separated recyclables and by the produced RDF, which replace fossil fuels such as coal or natural gas that would otherwise have to be purchased. Meanwhile, several cement plants in Egypt, such as LafargeHolcim, Titan, National Cement, Arabian Cement Company, Beni Suef and others are working hard on developing supply chains and the required technical equipment for the production of refuse-derived fuels, as well as systems for reception, storage, dosing, feeding and environmental control.

National Cement announced a tender for its project at the end of July, while Arabian Cement Company has formed a special entity focusing on the preparation of alternative fuels. Evolve Investments & Projects Management, with the support of MVW Lechtenberg, will concentrate on several projects for the production of alternative fuels as a subsidiary of Arabian Cement Company.

Lafarge Industrial Ecology (Ecocem) has signed two major contracts to manage and operate existing refuse-derived fuel (RDF) platforms in Suez and Qalyubeya in Egypt. Ecocem has already added a new production line to the Suez platform and plans an additional line within one year of signing its contract with the governorate. The plant will produce 42,000 tonnes of RDF per year and the investment will total 1.66 million US dollars.

Ecocem has also already added an extra line to the Qalyubeya plant, in addition to renovating one production line. The company's future investments in the governorate will increase the RDF production capacity by 32,000 tonnes to 280,000 tonnes per year. Both investments at the Qalyubeya plant were funded by GIZ and the Bill and Melinda Gates Foundation with a total investment of one million US dollars. Lafarge Egypt and Ecocem have implemented numerous projects over the past three years in order to increase the use of alternative fuels and aimed to achieve an



average fuel substitution rate of 25 per cent by the end of 2015. More than 260,000 tonnes of waste have been processed as fuels in Lafarge's Sokhna plant since 2013, an equivalent of 100,000 tonnes of fossil fuels.

ASEC (Quena Cement) has signed a contract with Grupo SPR from Spain to install a processing facility. Grupo SPR was also awarded a contract for a compact RDF plant in Qena, Egypt. This plant was delivered by Grupo SPR in 2015 and designed for the purpose of preparing and obtaining a material with a high calorific value from municipal solid waste (MSW) to substitute fossil fuels. The plant has a throughput capacity of 25 t/h of MSW. The main equipment includes a bag opener/SPR 2200 -55 pre-shredder, a magnetic separator and a disc screen, which facilitates in-feed and the correct separation of the various fractions.

MVW Lechtenberg also supported the well-known Reliance Group, a Cairo based service provider, which has already two modern RDF installations in operation: In Port Said and Ismailia with each a capacity of 30- 40 tons input per hour. With new equipment from Germany, Reliance is able to produce a high quality RDF.

In all of these plants, a simple basic concept has been implemented: In a first step, organic wastes are separated for further preparation as compost. The separation of recyclables such as glass, metals, some plastics (PET) and some cardboard is done manually. Finally, the high calorific value fraction, which consists mainly of non-recyclable small paper / cardboard / plastics, , etc., is treated via ballistic separation/air classifiers to separate foreign particles (such as stones) and shredded into a defined grain size for feeding into the precalciners or kilns of the cement plants.

#### **New technologies for processing wet and mixed municipal solid wastes**

By introducing proven technologies for the production of high grade compost and further separation of the organic fractions, it is even possible to process and use more than 80% of the incoming mixed municipal solid wastes.

In a pilot plant, which is installed in a German cement plant, MVW Lechtenberg is testing now a new technology which can dry, separate and shred mixed and pre-shredded municipal solid waste in one step, using cooler gases. A simple technology for reducing the contaminant content of any and all, delivered and received fractions now enables online preparation upstream of the kiln, including kiln-control stabilization. Arriving by walking-floor trailer, the pre shredded waste is fed continuously to a receiving and dosing station, where the alternative fuel is de-compacted. By

way of a conveying and weighing system, the RDF is pneumatically transferred to the so called "SI-TRO-ZER" unit. There, the continuous flow of RDF material is freed of contaminants and simultaneously dried and reduced to the desired particle size in an ascending stream of hot exhaust air from the clinker cooler. Then, the entrained air from pneumatic handling is expelled from the ready-processed RDF, which is then blown into the kiln's burners. The extracted contaminants are collected separately and can be returned to the recycling company, for example.



**Picture: The new "SI-TRO-ZER" Technology**

This new technology is even using less energy per processed / shredded ton of waste as any other known shredding technology in this field.

#### **Potential waste recycling quantities for the cement industry in Egypt**

At this point, it is helpful to assess the potential RDF demand of Egypt's cement industry. We calculated the potential amount of RDF from MSW and agricultural waste based on the following considerations:

- MSW generation: 21 million tonnes per year
- Percentage of materials useable for RDF according to MVW Lechtenberg's sorting tests on several landfill sites during 2014: 20.8 per cent, i.e. 4.16 million tonnes per year
- Net calorific value, depending on waste

- composition and quantity of RDF to be produced, between 3,500 kcal/kg and 4,500 kcal/kg
- Grey clinker production capacity: 58 million tonnes per year
- Assumed specific fuel energy consumption: 850 kcal/kg clinker

The Egyptian cement industry would achieve a thermal substitution rate of approximately 30 - 38% by co-firing 4.16 million tonnes of RDF, thus consuming approximately 1.8 to 2.3 billion m<sup>3</sup> less natural gas per year.

Kiln Production			Fuel Consumption						
Daily Production [ tpd ]	Production Rate [ tph ]	Clinker Production [ tpy ]	Calorific Cons. [ KCal/kg Clk ]	Total [ % ]	[ tph ]	[ tpy ]	[ KCal/kg Coal ]	[ KCal/kg RDF ]	
3.500	146	1.000.000	900	100	21	152.419	6.200	4.000	
				Precalciner	60	13	91.452		
				Kiln	40	8	60.968		

Kiln Operation		
[ hrs ]	[ days ]	[ hpd ]
7.200	310	24
Revenue per ton cement [ \$ / t ]		
Coal Cost [ \$ / t ]	105	
RDF Cost [ \$ / t ]	35	

SUBSTITUTION of RDF								
Kiln is in operation with nominal capacity								
	Calorific Value		RDF Substitution				Equivalent to Coal	
	Burner [ % ]	Total line [ % ]	t/h	t/day	t/year	[ \$ / y ]	tpy	[ \$ ]
Substitutionrate Precalciner in %	<b>50%</b>	<b>30,0%</b>	9,8	236	73.238	2.563.313	47.250	4.961.250
Substitutionrate Main Burner in %	<b>20%</b>	<b>8,0%</b>	2,6	63	19.530	683.550	12.600	1.323.000
Substitutionrate all Burner in %		<b>38,0%</b>	12,5	299	92.768	3.246.863	59.850	6.284.250
							Savings from Substitution RDF	3.037.388

**Table: Savings of using RDF in a 1 million ton clinker production facility in Egypt**

### Summary and next steps

The cement industry has become a reliable partner to the waste management sector. The use of refuse-derived fuels for clinker burning is considered to be the Best Available Technique (BAT) and has contributed towards maintaining the competitiveness of the local cement industry as well as conserving natural resources. Especially for the cement industry in the Arab world with its modern and usually big rotary kilns, there is a huge potential to provide sustainable waste management solutions to the municipalities.

MVW Lechtenberg is currently providing assistance to cement plants and waste management companies in various member countries of the Arab Union for Cement and Building Materials (AUCBM). E.g. in Lebanon, MVW Lechtenberg provides assistance to the new operator of the waste management facilities in Beirut, processing approx. 3,000 tonnes of municipal solid waste per day. Such project can provide more than 50% of the thermal energy needs in the Lebanese cement industry.

Secured by long-term contracts for the waste recycling with municipalities, the cement industry can secure local alternative fuel sources, avoiding the use of fossil fuels with its negative climate and financial impacts. At the same time, new jobs can be created.

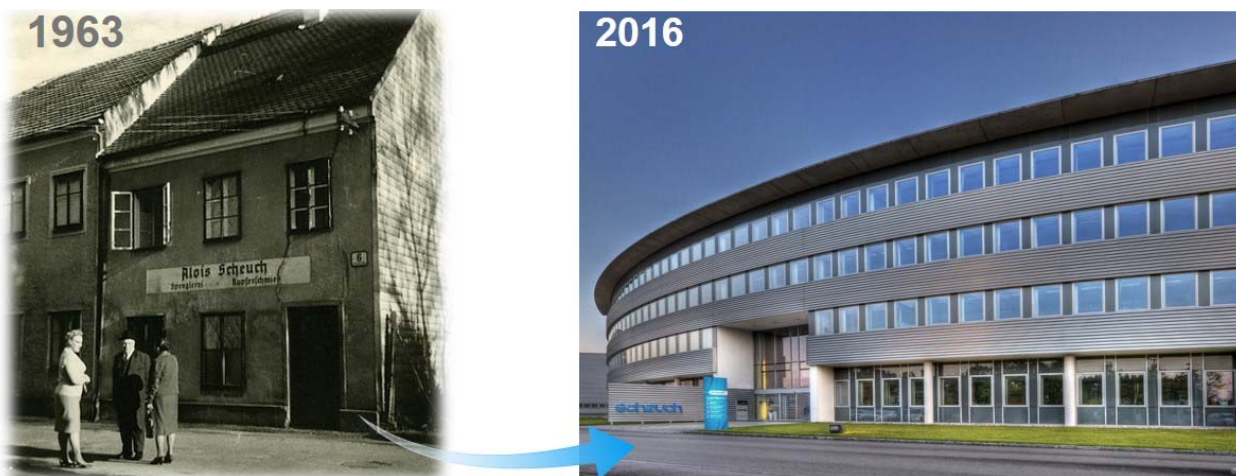


## INNOVATIVE TECHNOLOGIES FOR EMISSIONS CONTROL

By: Ruggero Baldi, Sales Manager

### SCHEUCH GMBH COMPANY PRESENTATION

As an international market leader in the ventilation and environmental technology sector, Scheuch GmbH always keeps up to date with the latest industry technology. Innovative air and environmental technology for industrial applications has been Scheuch's stock in trade for over 50 years now. Whether the solutions involve extraction, dedusting, conveying, flue gas purification or plant manufacturing, Scheuch is a leading expert with a pole position on the market in numerous sectors, and offers its customers application-specific, high-quality solutions to their air and environmental technology issues.



Nowadays Scheuch company have more than 1'000 employees, 600 located in Austria and more than 400 over different countries.

### Products/Technologies

Scheuch GmbH designs and manufactures filter equipment and gas cleaning systems for various industries, including Minerals Industry (lime, cement, gypsum), Wood Processing Industry and Wood Based Panel Industry (saw-mills, furniture industry, OSB/MDF/HDF board production), Utilities (waste incineration, biomass combustion, chip-driers) and the Metals Industries (ferrous- and non-ferrous metals, metal fabrication).

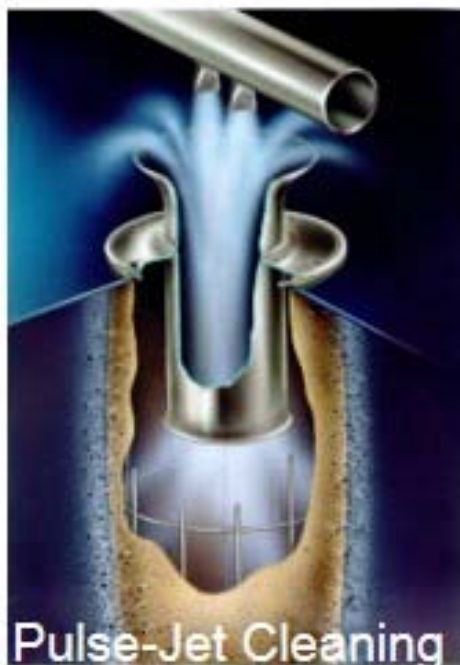
### Scheuch Production Sites

Scheuch is producing its equipment from own workshop that are located in Austria and Slovakia, total area = 15 football fields.



### IMPULS JET-FILTER SYSTEM

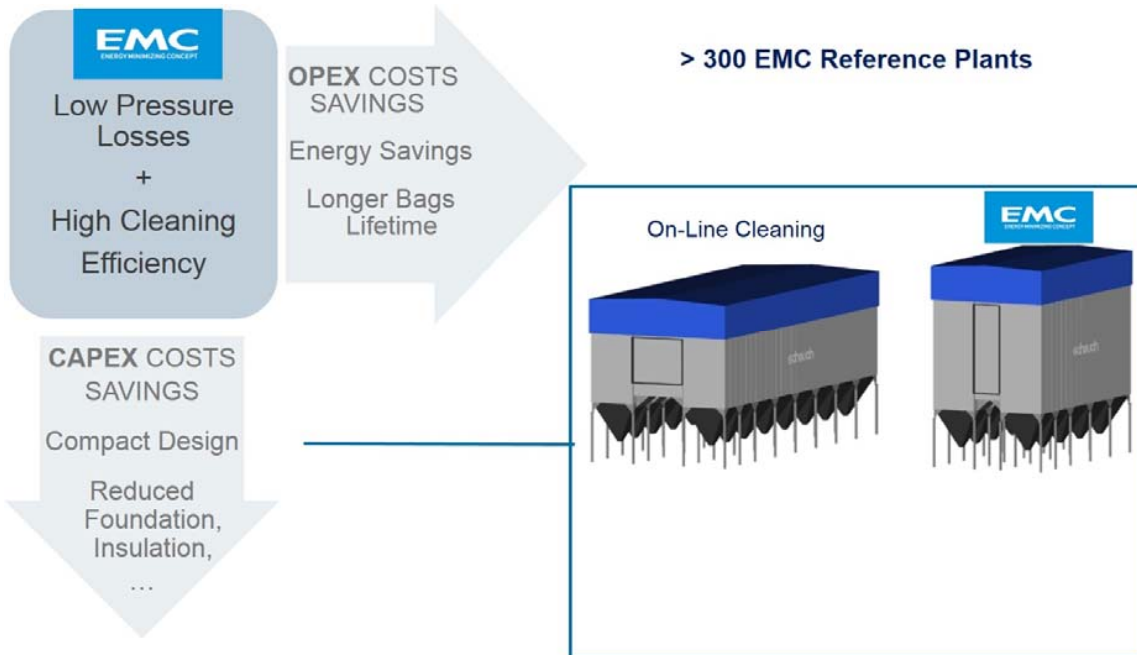
The application spectrum for IMPULS filters ranges from dedusting in the wood processing, wood based panel, metals and industrial mineral industries to the filtration of process and hot gases in, for example, the cement industry and the separation of contaminants (sorption process) when cleaning flue gases generated by combustion processes. In order to ensure the high degree of flexibility necessary to create pinpoint designs for the most diverse applications, the entire filter program is designed as a modular system consisting of five model lines. Large-scale filtration plants are generated using parametric variant modelling. The parameterization of design types increases flexibility with respect to dimensioning, design, metal thickness, etc. Consequently, customerspecific designs can be realized without additional expense, something that could be previously done only by creating a costly special design.



**IMPULS**  
PULSE JET-FILTER SYSTEM

**EMC ENERGY MINIMIZING CONCEPT**

In the last ten years, Scheuch’s EMC filter technology has revolutionized the dedusting process in the cement industry. The technology was able to set new standards with respect to bag length, pressure loss, cleaning pressure and the service life of filter bags. The result has manifested itself in a significant reduction of life cycle costs (LCC). The patented EMC concept is absolutely unique and is considered to be the Best Available Technology (BAT) for process filters – also when compared to electrostatic and reverse-air filters. The use of 8-meter long filter bags (EMC 8M) has since become the industry standard and 10-meter long filter bags (EMC 10M) are already in use with filtration systems with rated capacities of more than 1.000,000 m3/h.



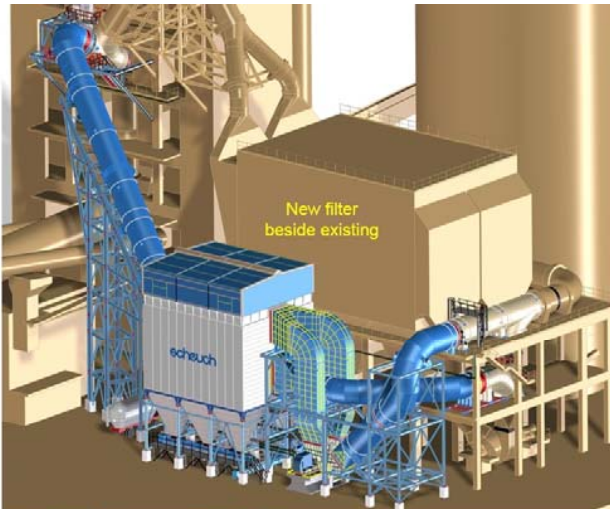
**EMC ENERGY MINIMIZING CONCEPT – CASE STUDY, ARABIAN CEMENT CO (KSA)**

ACC Arabian Cement Company awarded Scheuch for replacement of full set of process filters for their cement production plant in Rabigh (Saudi Arabia), Kiln-Raw Mill and Bypass filters for line #5 and #6.

Main performance values guaranteed to Arabian Cement Company:

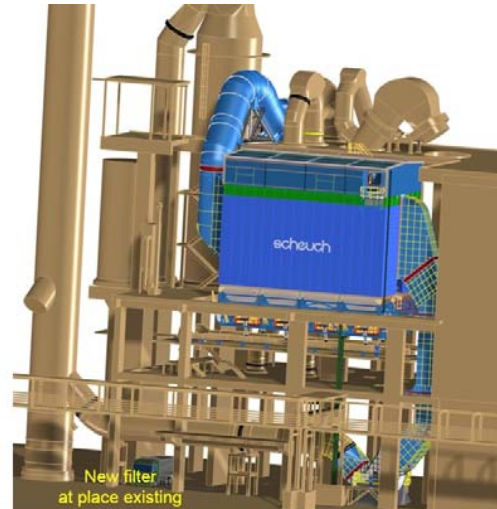
- Dust emissions at stack <math>< 5 \text{ mg/Nm}^3 \text{ @10\%O}\_2</math>
- Filtering bags lifetime > 5 years from start-up

Scheuch EMC filters have been installed successfully on December 2016 to replace old ESPs electrostatic-precipitators, the project was executed on turn-key basis by Scheuch.



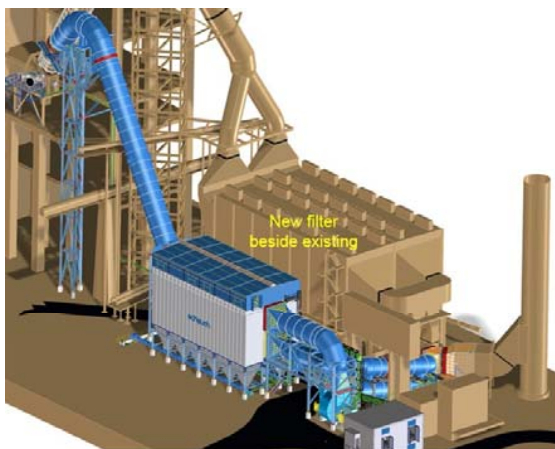
#### Line 5 / Bypass EMC Filter

Design Flow 596.660 Am<sup>3</sup>/h @ 230 °C  
 Filtering Surface 11.197 m<sup>2</sup>  
 2.160 Bags L=10m / Fibreglass+PTFE Membrane  
 Cleaning Press. 2-3 Bar



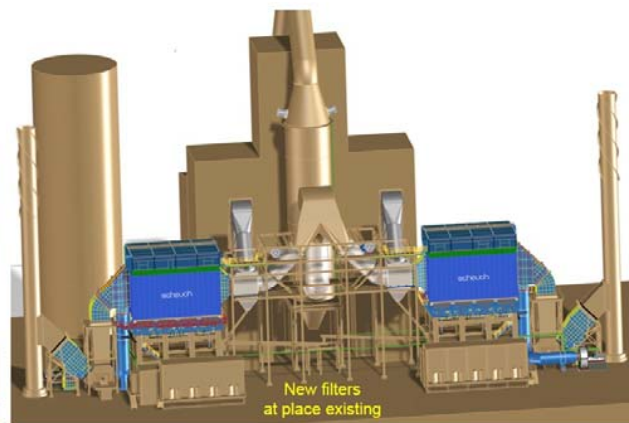
#### Line 5 / Kiln-RM EMC Filter

Design Flow 860.000 Am<sup>3</sup>/h @ 230 °C  
 Filtering Surface 14.929 m<sup>2</sup>  
 2.880 Bags L=10m / Fibreglass+PTFE Membrane  
 Cleaning Press. 2-3 Bar



#### Line 6 / Bypass EMC Filter

Design Flow 1.150.000 Am<sup>3</sup>/h @ 230 °C  
 Filtering Surface 22.3937 m<sup>2</sup>  
 4.320 Bags L=10m / Fibreglass+PTFE Membrane  
 Cleaning Press. 2-3 Bar



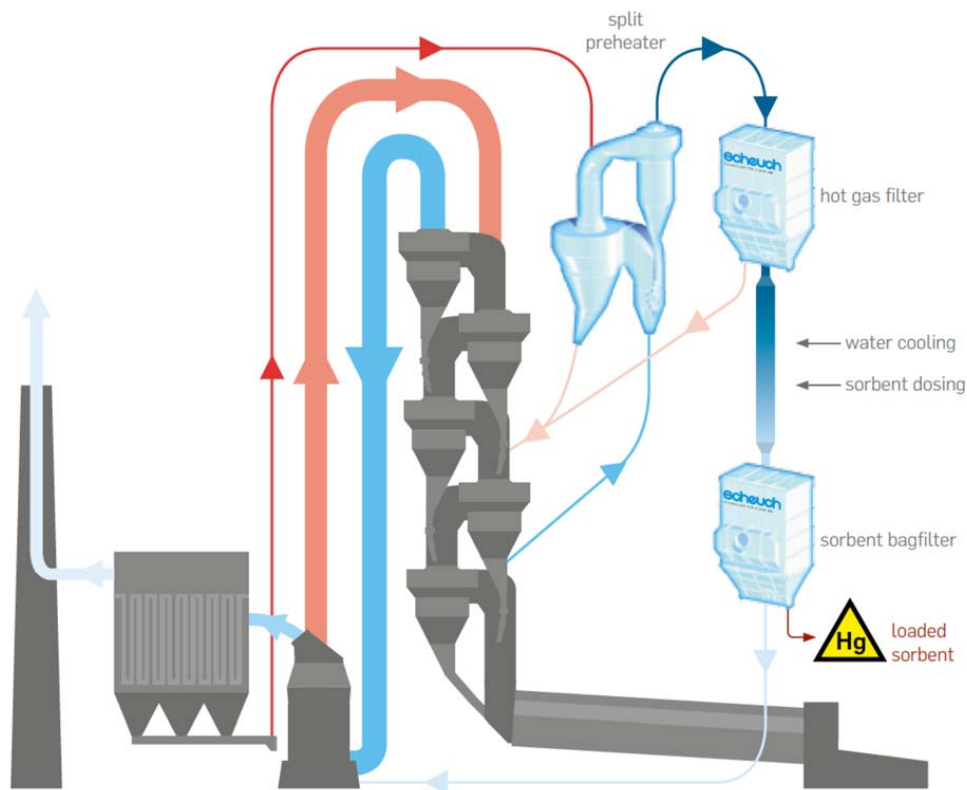
#### Line 6 / 2 x Kiln-RM EMC Filter

Design Flow 2 x 932.000 Am<sup>3</sup>/h @ 230 °C  
 Filtering Surface 2 x 14.929 m<sup>2</sup>  
 2 x 2.880 Bags L=10m / Fibreglass+PTFE Membrane  
 Cleaning Press. 2-3 Bar

### X-MERCURY SPLIT PREHEATER SYSTEM

The cement industry has been identified as second largest gaseous emission source of mercury just behind the conventional combustion of coal in thermal power and heating plants as well as in heating systems. Due to the health effects of mercury exposure, industrial and commercial uses are regulated in many countries worldwide. Mercury is treated as an occupational hazard: A challenge the cement industry is facing every single day – since mercury is present in raw materials and/or in the fuel used in the combustion process..

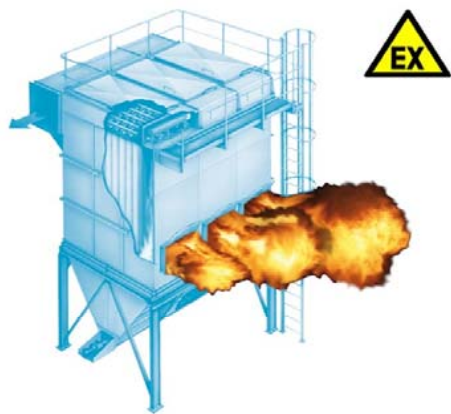
As the reduction of mercury emissions in the cement industry is either linked to high operating costs for fuel and raw material cleaning, flue gas sorbents, or investment costs for flue gas treatment systems, it has been decided to propose a new system combining low investment costs as well as lowest operating costs and minimized ecological footprint.



The Xmercury split preheater system implemented in the existing system.

**EXPLOSION-PROOF FILTERS FOR ALTERNATIVE FUELS APPLICATION**

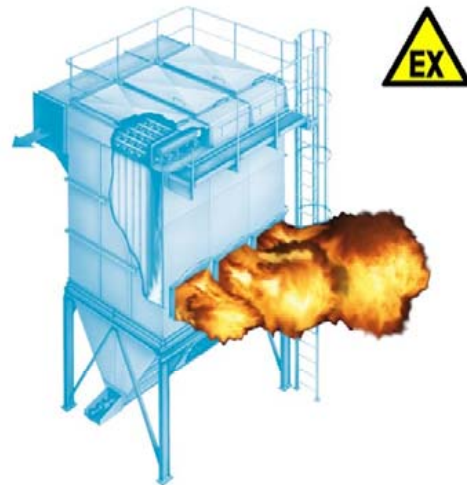
Safety certification issued by an independent, recognized institute is required for equipment with an elevated hazard potential. Self-evaluation and a CE Declaration of Conformity by the manufacturer are no longer sufficient. The effectiveness of our explosion protection concepts with respect to pressure venting, decoupling and risks in external areas were verified and confirmed for the first time for an overall system under practical operating conditions by FSA, a recognized German testing authority. It includes the ATEX-compliant, certified Implementation by Scheuch as well as low flame ranges. More than 30 real-world tests provide the assurance of “real safety” in the case of an explosive event.



- Design of filters for explosive atmosphere**
- ATEX (ATmosphere EXplosive) Compliance
  - Specific design criteria
  - Isolating dampers at filter inlet / outlet
  - Fire extinguishing by water / CO<sub>2</sub> injection
  - Flame control flaps

Among several application in explosive environment, alternative fuels systems are more and more present in the daily life of industrial production plants providing an economical solution to fuel costs.

Scheuch developed special design and equipment to be applied for ventilation and dedusting of alternative fuels systems.



**Design of filters for explosive atmosphere**

- ATEX (ATmosphere EXplosive) Compliance
- Specific design criteria
- Isolating dampers at filter inlet / outlet
- Fire extinguishing by water / CO<sub>2</sub> injection
- Flame control flaps

Dedusting RDF transport system



**Scheuch GmbH**  
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 4971 Aurolzmünster  
 AUSTRIA



# Key factors for the successful use of alternative fuels<sup>1)</sup>

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## Summary:

Although alternative fuels (AFs) have been used in the cement industry for more than 30 years there has so far been no systematic and analytical approach for the successful handling of these materials. Through ignorance and lack of experience the same mistakes are therefore made time and again in the design of new plants. DI MATTEO Förderanlagen GmbH & Co. KG from Beckum in Westphalia has carried out some pioneering work in the field of handling alternative fuels and, among other things, has also developed measuring procedures and investigative methods for evaluating the mechanical characteristics of these bulk materials that are often characterized by extreme properties. The SCC system described here is a systematic, modular and forward-looking tool that can be valuable for successful realization of plants for handling alternative fuels. The SCC (Seven Stage Concept) system differentiates between seven handling stages, beginning with the reception of the AF material in the cement plant and ending with its combustion in the rotary kiln. DI MATTEO contributes a great deal of mechanical equipment to the SCC system. The company has become particularly well known through its tubular weighing system – the WeighTUBE® – for which DI MATTEO received an award. The tubular weighing system consists of a tubular screw conveyor that is fed via an agitator and to which is attached a weigh tube. This rests on dynamic load cells and carries out the weighing so that the AF material can, for example, be transferred to a pneumatic conveyor for onward transport to the rotary kiln burner. DI MATTEO can point to numerous completed systems in the cement industry, both in Germany and abroad.

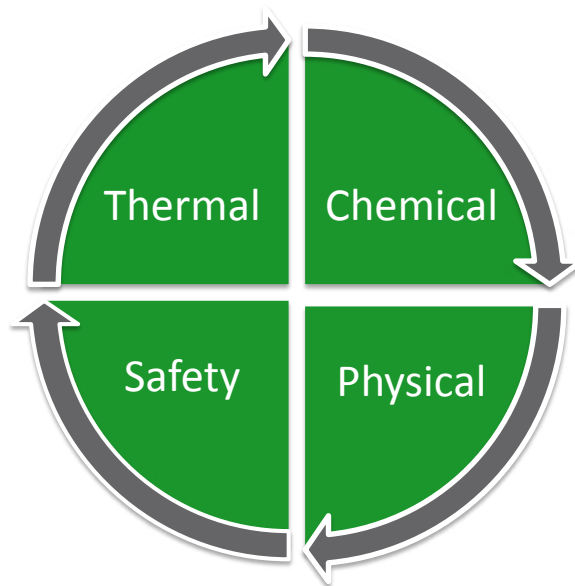
## 1 Introduction

For the majority of cement plants, both in Europe and around the world, the use of solid alternative fuels, referred to below as AFs, is of considerable importance for cost-effective and sustainable plant operation. In general, the efforts are now no longer looking just to achieve a low thermal substitution rate but are aimed at sustainable improvement in availability and raising the substitution rate to 100 % to achieve long-term cost and competitive advantages. In fact, there have already been many years of experience with the use of numerous alternative fuels, sometimes of widely differing types, such as the fuels known by the abbreviations SBS, RDF, SRF, MSW, containing industrial and municipal waste, biomass, fluff, etc. However, there are very often still substantial problems with the handling of these materials. Problems are often caused by lack of understanding of the relevant bulk material properties or through the use of unsuitable plant components for the particular application. Solid alternative fuels differ substantially from conventional classical bulk materials [4, 5]. A fundamental understanding of the bulk material properties is just as much an essential requirement for optimum and successful handling as the choice of the correct plant components.

## 2 Characterization of AFs

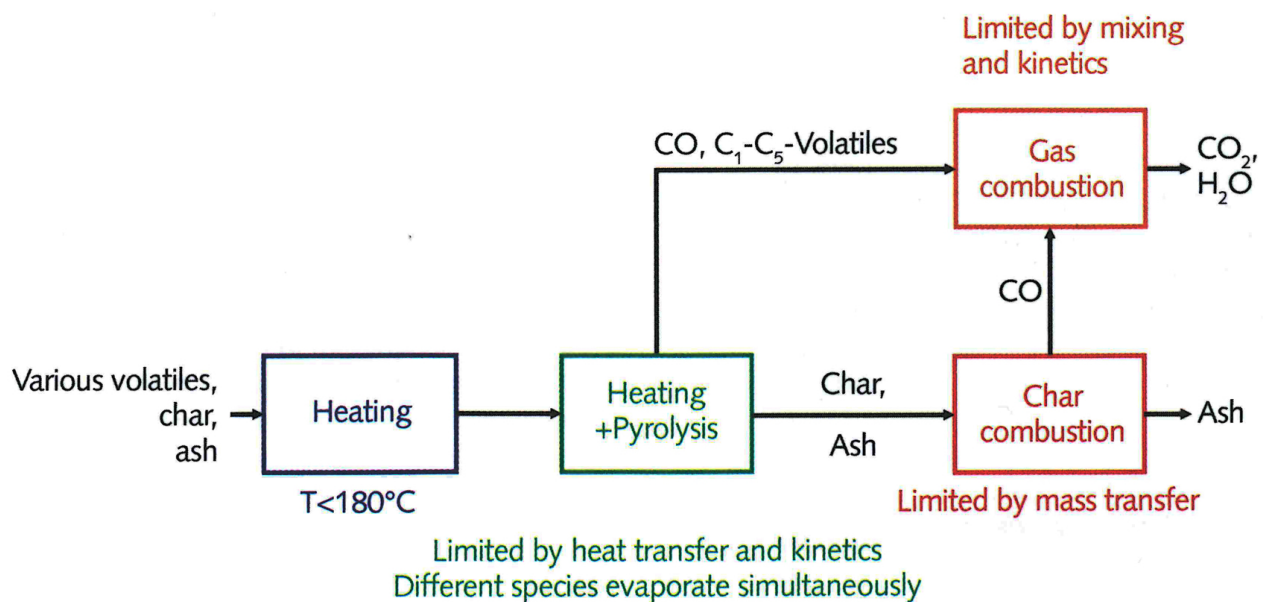
Accurate knowledge not only of the physical bulk material properties but also of the chemical and thermal properties is important for comprehensive characterization of AFs (Fig. 1). This article examines the physical properties as these are relevant for the thermal utilization of AFs in rotary cement kilns [6, 7].

<sup>1)</sup>Di Matteo, L.: *Systematic classification and modularization of handling systems for alternative fuels*, *Cement International* (2015) No. 2, pp. 54 - 61



**Fig. 1: Categories for comprehensive characterization of AFs**

Analytical characterization of AFs should always be considered against the background of their thermal utilization in rotary cement kilns. For all alternative fuels the thermal utilization, i.e. the combustion of AF in the main burner or kiln inlet or in the calciner, takes place basically as shown in the diagram in Fig. 2.



**Fig. 2: Sequence of combustion during conversion of solid alternative fuels [8]**

Against this background it is clear that optimum combustion can only be achieved if the fuel is introduced into the process with the largest possible specific surface area and with the parameters required by the combustion process. However, this means that the material to be burnt must not be compacted or compressed during the preceding handling as this causes substantial disruption to the kinetics of the burning process and can retard them. Some important physical properties of selected AFs are listed in Table 1. Because of different production processes and process engineering handling stages this can only provide indicative information that must be checked and verified in the specific instance as otherwise considerable discrepancies may occur. It must also always be borne in mind that the bulk material properties of AFs are not constant over time. For example, the bulk density can, depending on the type and duration of storage, change substantially due to the action of external forces during the storage of AF.

Typical data's		Comparison	Europe		Middle East	
		Coal	Biomass	RDF	Biomass	RDF
Bulk density	kg/m <sup>3</sup>	500 - 800	270 - 590	80 - 230	70 - 180	80 - 220
Moisture	%	< 15	< 35	2	< 10	< 20
Particle size (2D)	mm	< 1	< 200	< 50	< 100	< 50
Compressibility index	-	1,0 - 1,2	1,2 - 3,0	2,5 - 4,0	5,0 - 8,0	3,0 - 5,5
Flow properties	-	free flowing ...	bad flowing, fibrous, affinity for arching, time consolidating			
Explosion and fire requirements	-	yes	to be evaluated individually, in general to be considered			

**Tab 1: Examples of physical bulk material properties for selected AFs**

In general, the following physical bulk material parameters are of fundamental interest:

- Bulk density
- Particle size distribution
- Wall friction angle
- Internal material friction
- Horizontal stress behavior
- Consolidation with time
- Compressibility
- Explosion parameters

These bulk material parameters cannot be determined with the familiar available methods so DI MATTEO has developed suitable methods of measurement and measuring equipment with which the requisite physical bulk material properties can be determined. It is now possible, for example, to measure the compressibility behaviour as well as the time consolidation in the plant's own research centre with measuring equipment developed in-house.

**3 Frequent problems in the utilization of AF**

Problems that occur frequently during the handling of AF will be indicated below using the examples of storage and metering. Intermediate storage in operational plants is unavoidable when using large quantities of material. Various aspects have to be considered when choosing a suitable storage system. Defining a requirement profile for a fuel store basically gives rise to two categories (Table 2).

Operator's requirements	Requirements relating to the bulk material
<ul style="list-style-type: none"> <li>• Simple and reliable plant technology</li> <li>• High level of availability</li> <li>• Low maintenance and operating costs</li> <li>• Homogenization of the fuel, as usually from different suppliers</li> <li>• Scope of investment to be as efficient as possible</li> <li>• Largest possible storage volume (matched to size of investment), adequate for several days' self-sufficiency</li> <li>• Flexibility with respect to changing bulk material properties (security of investment)</li> </ul>	<ul style="list-style-type: none"> <li>• Avoidance of time consolidation</li> <li>• Avoidance of compression through own weight, therefore restricted store height</li> <li>• Avoidance of addition compaction by the discharge system</li> <li>• FIFO principle (first in – first out)</li> <li>• Homogenization to reverse changes to the bulk material cause by storage</li> <li>• Avoidance of spontaneous combustion</li> <li>• Consideration of the explosion and fire risks</li> </ul>

**Tab. 2: Requirements for a storage system for AFs**

The familiar types of storage used for other conventional bulk materials are also theoretically possible for storing AFs [4, 5]. However, experience shows that because of the specific bulk material properties of AFs, which can change greatly over the storage time, only a few types of storage can be used successfully. The different types of storage can be classified meaningfully using the outline in Fig. 3. When the types of storage listed in Fig. 3 are considered in the light of the specific bulk material requirements given in Table 2 it is advantageous for large silo volumes to aim for the FIFO principle to avoid time consolidation and compression of the AF. As an example, the use of a LUC loading and unloading reclaiming system will be compared with a MOV moving floor system. Both systems are produced and installed by DI MATTEO. However, the advantages and disadvantages of the respective systems should always be weighed against one another for the particular application.

When a LUC loading and unloading reclaiming system is used the material is deposited as shown in Fig. 4. Depending on the silo size/store height, storage time and the properties of the AF, such as particle texture, particle size and moisture, the material consolidates mainly in the lower region just through its own weight. In this system the AF is reclaimed from the top so that the material that is deposited first is reclaimed last. This storage and extraction system operates on the LIFO principle (last-in-first-out). Problems caused by the system that have negative effects on the combustion process can therefore be expected with an AF with a high moisture content and long storage times.

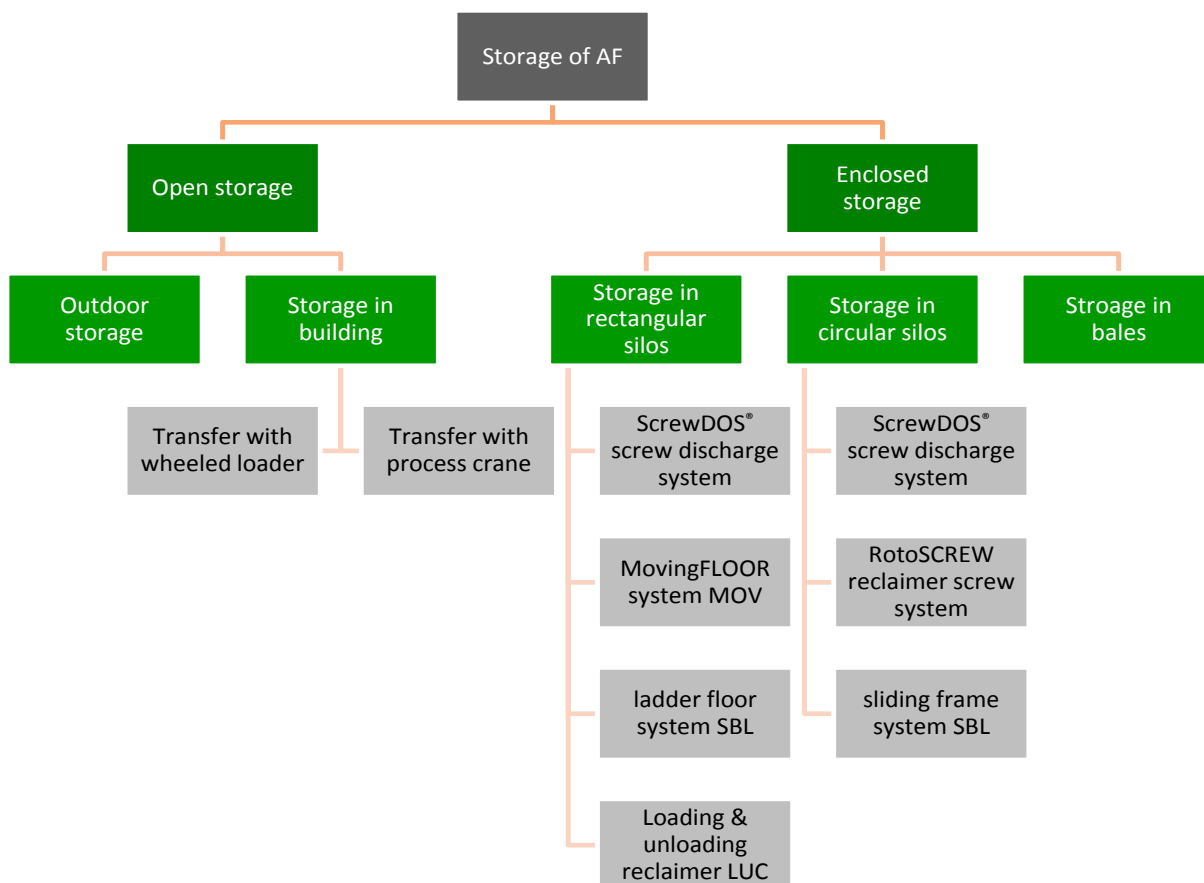


Fig 3: Classification of the principal types of storage for AFs

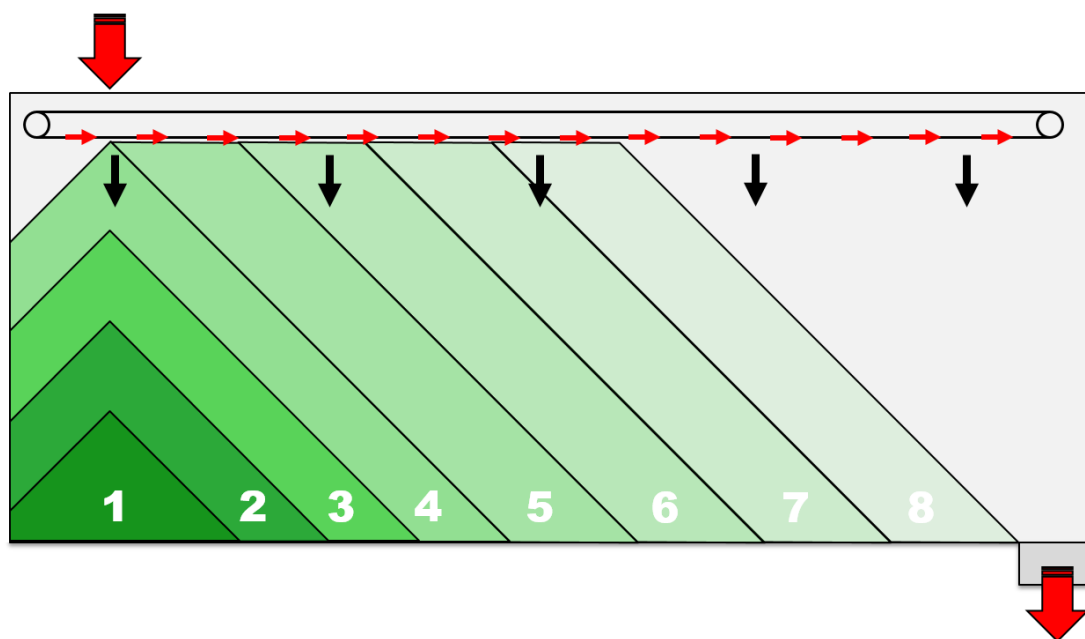
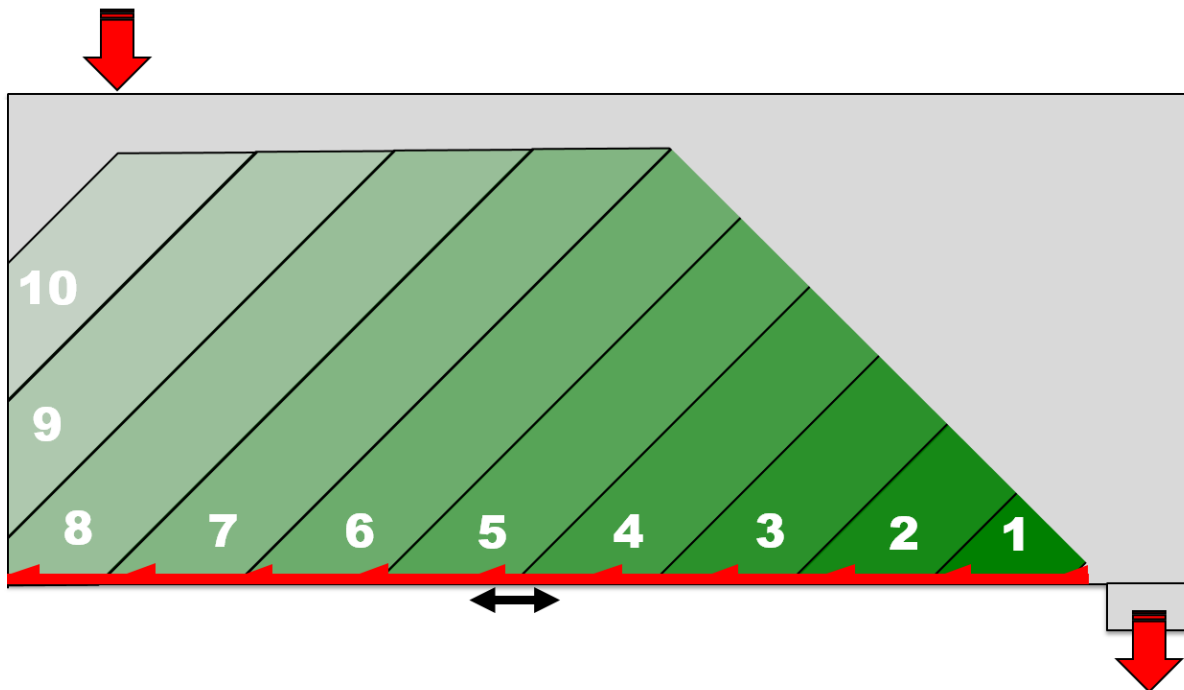


Fig 4: Material flow in a rectangular silo with LUC loading and unloading reclaimer



**Fig 5: Material flow in a rectangular silo with MOV flat moving floor discharge system**

Fig. 5 shows the material flow for the MOV moving floor system. Depending on the silo size/store height, the storage time and the properties of the AF material, consolidation can also occur here in the lower region. In contrast to the use of a LUC loading and unloading reclaiming, the extraction in the MOV moving floor system is produced by the horizontal movement of the entire volume of material in the direction of the outlet. This corresponds to the FIFO principle (first-in-first-out) and means that material flow problems caused by the system are not to be expected, even when using an AF material with high moisture content and long storage times. Furthermore, thorough mixing of different material layers occurs in the outlet area, which leads to better homogeneity of the AF material and assists the subsequent combustion process.

Operator' requirements	Requirements relating to the bulk material
<ul style="list-style-type: none"> <li>• Simple and reliable plant technology</li> <li>• Low maintenance and operating costs</li> <li>• High level of availability</li> <li>• High metering accuracy</li> <li>• Compact shape</li> <li>• Scope of investment to be as efficient as possible</li> <li>• Flexibility with respect to changing bulk material properties (security of investment)</li> </ul>	<ul style="list-style-type: none"> <li>• Avoidance of additional compaction by the metering system</li> <li>• Destruction of occasional agglomerates</li> <li>• Homogenization wherever possible</li> <li>• Consideration of the explosion and fire risks</li> <li>• Enclosed structure for Health and Safety</li> <li>• Suitability for widest possible range of AFs, e.g. very lightweight AF</li> </ul>

**Tab. 3: Requirements for metering systems for AFs**

Different aspects from those that occur during storage play a role during metering of AF (Table 3). For example, it is now expected that a metering system for AF should be enclosed to meet the current Health and Safety requirements. The metering system must also be suitable for the greatest possible range of AF materials with widely varied properties. The well-known belt weighfeeder and the weighing screw conveyor are compared below with the novel WeighTUBE® tubular weighing system. All three systems are produced and installed by DI MATTEO. The advantages and disadvantages of the respective systems should be known and taken into account when decisions are made about their use.

The metering systems shown in Fig. 6 – the belt weighfeeder (Fig. 6a) and the weighing screw (Fig. 6b) – are still used. The belt weighfeeder is the correct choice if it is a question of metering AF that is very coarse or has a large surface area, such as shredded tyres or SRF for firing the calciner. Regardless of the particular detailed design, the disadvantage is that the belt weighfeeder is, in principle, an open system. The weighing screw (Fig. 6b), in which the entire screw is supported on load cells, is now an outdated weighing system that is completely unsuitable for reliable metering of lightweight AF materials with bulk densities of less than 500 kg/m<sup>3</sup>. As a rule AFs always involve bulk materials that have some very corrosive and abrasive properties, so this requires the use of mechanically robust machines. The use of a weighing screw entails the problem that the very high tare weight of the machine is contrasted with the relatively low net weight of the AF material. In practice, this means that when a weighing screw is used it can only operate as a volumetric metering system.



**Fig 6: Well-known metering systems; a) Belt weighfeeder, b) Weighing screw**

Against the background of the two metering systems described above, DI MATTEO decided to develop a metering system that combines the advantages of the two metering systems shown in Figs. 6a and 6b. This resulted in the WeighTUBE® tubular weigher (Fig. 7). This involves a fully enclosed system that has solved the problem of the unfavourable tare/net weight ratio in that only a short section of the casing is weighed on load cells. The structural arrangement of the feed hopper, the agitator and the metering screw avoids any compaction of the material and also ensures that any agglomerates that may be present are destroyed, which is an advantage for the subsequent thermal utilization of the AF material. The novel WeighTUBE® tubular weighing system has already proved successful in many applications around the world for metering AFs as well as conventional bulk materials [10–13].

#### **4 The SCC system – systematic classification of plants for handling AFs**

As already indicated above, there are usually several alternative solutions for handling AFs. The problem is that the choice of the wrong plant component for the particular task at the design stage can mean the failure of the entire investment or, at the least, cause considerable worsening of the expected return on investment. DI MATTEO has therefore developed the SCC – a Seven Stage Concept (Fig. 8).



Fig 7: The novel patented ODM WeighTUBE® tubular weighing system

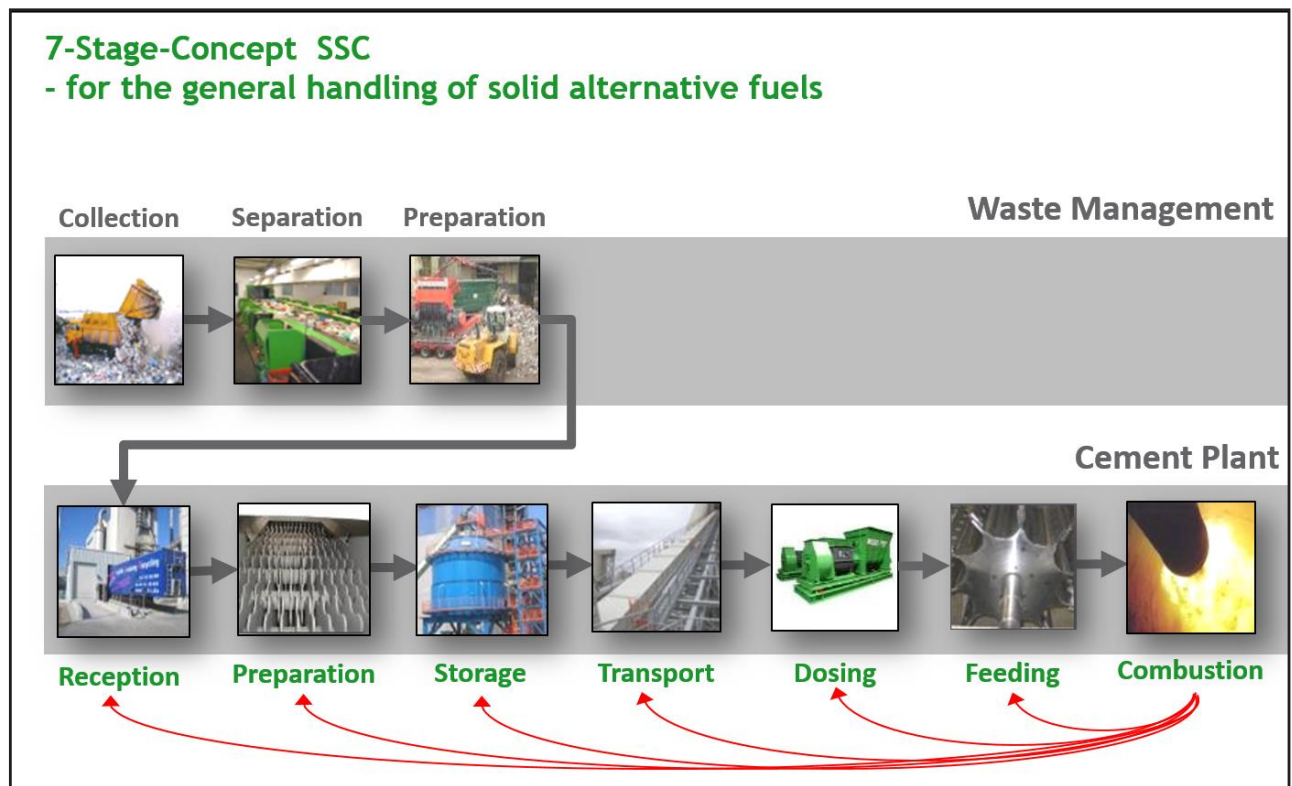


Fig 8: The SSC system – systematic classification of plants for handling AFs



Every plant for thermal utilization of AF can basically be subdivided into seven stages:

- 1) Reception
- 2) Preparation (e.g. protective screening)
- 3) Storage
- 4) Transport
- 5) Metering
- 6) Feeding to the kiln process
- 7) Combustion

Depending on the given or expected physical properties of the AF there are several alternatives available for technical implementation of each stage. During the systematic and purely analytical development of a complete plant for handling AF the optimum plant design for the individual client is worked out with the aid of appropriate choices. The most important aspect in the choice of plant components is the consideration of the ultimate thermal utilization of the AF from the point of view of avoiding compaction and formation of agglomerates that are detrimental to combustion.

This approach offers several advantages over haphazard and unsystematic plant design:

- Only tried and tested plant components are permitted in the SCC system.
- The advantages and disadvantages and the limits of use for the different AFs are laid down for each plant component so that the use of plant components for the wrong tasks is avoided.
- Because of a wide product portfolio all the current and proven alternative plant components for solving the particular problem can be offered without bias within the framework of the SCC system.
- As a modular system the SCC system offers the opportunity for ongoing systematic extension by the addition of new plant components. The individually optimized plant design can be given a modular configuration with maximum flexibility for the client.
- All plant modules are designed, manufactured and installed by DI MATTEO so that the client obtains everything from a single source

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# “Multi-fuel Systems are the Future”

Alternative fuel expert Thomas Jennewein from FLSmidth Pfister talks about trends in secondary fuels

By: FLSmidth Pfister GmbH / Germany

Interview with Thomas Jennewein, Expert for Alternative Fuels

One doesn't have to be a prophet to predict that oil and gas prices will rise again in a medium-term perspective. These primary energy sources release carbon dioxide when combusted. And carbon dioxide is known to be climate-damaging. In the cement production branch the application of alternative fuels (AF) is perceived as crucial – under the aspect of decreasing of CO<sub>2</sub> emissions as well as under the aspect of the return on investment. Thomas Jennewein, expert for alternative fuels at weighing and dosing specialist FLSmidth Pfister, is commenting on his current findings on this market.



1. From small to huge: Thomas Jennewein shows Pfister rotor weighfeeders for alternative fuels set up for different, individual demands

- In comparison to heating with primary energy sources, the use of AF poses a challenge. In which way?

When you remember that coal or lignite as well as oil and gas have been used since the beginning of the industrial age as an energy source, you'll understand that their processing is optimized and these fossil fuels are therefore available in homogenised forms. Also

they are momentarily very cheap. Furthermore their material properties like handling ability and calorific value are fairly steady all year round.

This is quite different with alternative fuels whose origin is considerably different. The predominant portion in AF before processing is rubbish. It's an undefined material mixture which would have been collected most likely on a landfill in former times. In most cases only several processing steps make an AF from this garbage. Considering that the cement industry usually obtains its AF from a number of different suppliers, it's no surprise that their flow behaviour changes from charge to charge. Humidity and bulk density also vary substantially. On account of the origin of the fuel unfortunately foreign bodies can also never be fully excluded.



2. A selection of alternativ fuels: chunky, powderous, fluffy, light, heavy. the variety is large

- How can this challenge be met?

Generally speaking dosing systems have to be able to handle different levels of humidity and density as well as a varying level of quality even of the same material. You have to keep in mind that recycling companies inevitably also produce different qualities today from

tomorrow. When shredding, the blades wear out which of course influences the cut results. All this adds up to an initial position which cannot be solved by customary weighfeeders which are used for dosing of uniform bulk goods. On account of the extreme inhomogeneity of the AF we have learned that we need really "multi-fuel capable" weighfeeders. With the rotor weighfeeder Pfister® TRW-S (the 'S' refers to secondary fuels) we developed such a device. Why is it "multi-fuel"? Its pre-hopper is mounted directly at the inlet to the rotor weighfeeder and is equipped with a stirrer to prevent adhesion of the secondary fuel, loosens and homogenizes it at the same time. Its rotor consists of an ideal number of big rotor chambers and is constructed very robust. It resembles a round drag chain conveyor but is especially configured for dosing of diverse AFs. With the prospective control, ProsCon®, which is implemented in all Pfister® rotor weighfeeders, the system reacts to variations in flow density or changes its flow behaviour even before material is discharged. So the material is fed into the firing process with extremely high constancy.



3. Thomas Jennewein shows two extremes of AF: On the left a very light AF (mixture of wood chips and rubber) which might be used in a calciner; on the right an AF (RDF mixture of plastic, paper and shredded carpet) which might be used for a main burner

• **What can the cement industry do to improve the quality of AFs?**

Though the fuel suppliers are taken on board with checks and audits with regard to particle sizes, chlorine content and calorific results as well as humidity and granularity this often times is not enough. In spite of these measures most cement makers additionally employ an oversize and a magnetic separator to guarantee the quality of the material. Foreign bodies can still not be fully excluded. Hence, receiving, feeding and weighfeeder systems should be employed which do not have narrow gaps and whose engines are equipped with an overload protection.



4. For perfect handling of AF the homogenisation bins of Pfister rotorweighfeeders are equipped with stirrers like this.

• **Are there any AFs which are suited better than others?**

In my opinion this question cannot be answered in general. First of all the goal of any cement manufacturer is to produce clinker with a satisfactory quality. So not only the calorific value/price ratio is of interest, but also the chemical properties of the fuels related to the respective raw material. To reach a high substitution rate, several different alternative fuels are in use within a cement plant. Meanwhile many cement plants are able to apply 10 or even more AFs. Which AF is used then depends on the respective availability or the cost/performance ratio, but also on the chemical composition of the fuel.

• **How does the market for dosing systems for alternative fuels present itself, momentarily?**

At the moment the market is difficult because of the low oil price. To start firing with AF now, means that a plant first has to invest in alterations, e.g. in the building of

storage, transport, dosing and in the modification of the combustion process. Previously, these investments had to be amortized over less than ten years, then less than five. In the meantime the pressure has clearly become greater.

On the other hand, the whole business branch has committed to a considerable reduction of the CO<sub>2</sub> output. An important step to achieve this is the use of AFs. In this connection I would like to point out that from the decision to use AFs and the final implementation several years can easily pass by: This is due to necessary approvals, investment planning and the organisation of the fuel supply.



5. In this installation rotor weighfeeder Pfister® TRW-S is utilized for feeding fluffy and dusty alternative fuels with a feed rate of 8 t/h. Above the red rotor weighfeeder an homogenization bin is installed.

#### Can you identify any trends in employing AFs in the cement industry?

At first sight there are two opposing trends: Some cement plants are using more and more grounded fluff. This fuel has a very short burning time and is thus suitable for application at the main burner. Here, the substitution rate could be increased further in a

number of plants. Because this dried fluff shows a high proportion of dust, ATEX conform and pressure-proof dosing systems should be employed. Because of the high calorific value and the low bulk density, I can only advise to use highly precise dosing systems to guarantee stable fuel processing.

At the calciner there is a contrary trend: Some cement plants try to apply extremely coarse fuels. Though this reduces the effort for preparation and thus makes the use of the fuel apparently more lucrative, but it clearly shows a bigger challenge for fuel storage, transport and the dosing process itself. Plus, without bigger rebuilding this trend is limited. The retention time – this is the period between inserting the material in a modern calciner to its complete burn out – is only between 8 to 10 seconds. If only one pre-shredding device is employed so called “burning chambers” are necessary. But these mostly necessitate extensive rebuildings at the calciner.

It's in the nature of things that when applying only one shredding-step, big particle sizes remain more often. To be able to nevertheless guarantee smooth and trouble-free operation, conveying and weighing systems are necessary, which allow these big chunks to pass without blocking.

#### • What's your recommendation to the cement plant operators with regard to the use of AF?

The installation of multi-fuel systems is clearly the trend. With small AF substitution rates a simple dosing system might be enough as compared to a more costly rotor weighfeeder. But, indeed, the question is why not investing in something absolutely decent, capable and future-oriented right from the beginning as the cement industry aims to higher AF substitution rates anyway. These can never be satisfyingly handled by volumetric

dosing devices. If an investment has to be made in a few years anyway, isn't it more clever to invest in the right system from the beginning as for example in the gravimetric Pfister® rotor weightfeeder TRW-S? These devices are multi-fuel per se and are able to handle a larger range of materials with different flow behaviour. Considering that the quality, availability and the prices of AF are constantly changing this is an important aspect for cement plant operators.

## A TEC Rocket Mill® RM 2.50 double starts operation in Austria



After seven month of engineering, construction works and installation on-site A TEC's Rocket Mill® was commissioned on 07.11.2016 in Wiener Neustadt.

### Highly caloric residue-derived fuels

To optimize the production of highly caloric residue-derived fuels for the cement industry the Austrian company .A.S.A. installed A TEC's Rocket Mill® RM 2.50 double in their treatment plant in Wiener Neustadt.

Pre-sorted and shredded household and commercial waste with a bulk density ranging from 100 - 300 kg/m<sup>3</sup> can be grinded down to a size of 15mm – 50% is smaller than 5mm – in only one step (depending on the size of the sieves). The material has excellent ignition properties due to a change of physical properties (higher specific surface). Subsequently it is used by cement manufacturers from the region. Mainly produced by A TEC Plant Construction in Eberstein the mill has a capacity of 7- 40 t/h and for different output size useable and is equipped with two grinding

chambers which can be independently loaded. Each one has a main drive with 315kW. Due to the grinding technology an additional drying effect of approx.10 % is given.

The mill convinces not only with its excellent output material it's also easy to maintain (no knives) and insusceptible against extraneous material and heavy items.

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## High-performance grinding down into the nano range!

Now available for sample quantities up to 450 ml and a max. feed size up to 10 mm – with premium performance, usability and safety!



Planetary Mill  
PULVERISETTE 6 *premium line*

With two grinding stations, we have developed the NEW FRITSCH **Planetary Mill PULVERISETTE 6 *premium line*** as the ‘big sister’ to the PULVERISETTE 7 *premium line*: Your ideal mill for fast wet and dry grinding of hard, medium-hard, soft, brittle and moist samples as well as for mechanical alloying, mixing and homogenising of larger sample quantities with reliable results down into the nano range – and an absolutely secure automatic clamping of the bowls by the mill.

**Your advantages with the **Planetary Mill PULVERISETTE 6 *premium line***:**

- ⊕ Extra strong 2.2 kW drive power and extremely high centrifugal acceleration up to 64 g and up to 800 rpm (rotational speed of the bowl 1600 rpm)
- ⊕ Motor-driven ServoLOCK clamping of the grinding bowls
- ⊕ Safe and user-independent reproducible clamping
- ⊕ 2 grinding stations for grinding bowls 160 ml, 250 ml and 500 ml volume
- ⊕ Intuitive touchscreen operation with colour display

### Grinding has never been safer

With the completely brand new ServoLOCK clamping of the grinding bowls and the automatic check of the fastening of the bowls inside the mill, man and machine are optimally protected. In the event of impermissible operating states, the machine blocks the start of a grinding – and if an imbalance occurs it automatically shuts off. It doesn’t get any safer than this. Just insert the grinding bowl – start – done!



Safely guided insertion of the grinding bowl

### FRITSCH *premium* advantage: Safely guided insertion

The grinding bowl is simply inserted in the PULVERISETTE 6 *premium line* from the front into the holder. Correct positioning is automatically ensured by a practical guide. The PULVERISETTE 6 *premium line* does not start until both bowls are correctly inserted and prevents due to bowl detection via RFID chip, the setting of too high speeds depending on the bowl material used.

**Your advantage:** guaranteed constant, reliable results – incorrect operation impossible.



Easy closing of the clamp,  
automatic locking via ServoLock

**FRITSCH *premium* advantage: Motor-driven grinding bowl clamping**

The revolutionary ServoLOCK is activated with a single hand motion by pressing down the clamp. It is automatically locked by the machine via ServoLOCK instead of manually. A LED light shows that the bowl is correctly inserted and clamped.

**Your advantage:** extremely safe and easy operation with reproducible, user-independent clamping at any time – without screwing or other manual fastening.

**FRITSCH *premium* advantage: Intuitive user navigation**

The PULVERISETTE 6 *premium line* is operated via the adjustable, ergonomically arranged touchscreen with high-resolution and logical menu structure in multiple languages and practical plain-text user navigation for fast and easy operation. Here you enter the variable rotational speed and define the grinding time. You can programme interval and pause times using the minutes and seconds timer and can save up to 10 programmes.

**Test the FRITSCH Planetary Mill PULVERISETTE 6 *premium line*!**

Send us your most difficult sample – we will carry out a complimentary **sample grinding** for you. Compare for yourself!

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## **BEUMER Customer Support ensures reliable intralogistic processes: Always supportive**

For BEUMER Group, Customer Support is much more than just a service. While it was once enough to "simply" prevent or quickly solve malfunctions and machine downtimes, the intralogistics provider has now significantly extended this service. Approximately 1,000 employees worldwide now work for this business segment. They take care of the customer, starting with the first project discussion, up until the system is in operation. Customer support comprises different types of agreements. With its Residential Service, the group assumes, for example, the responsibility to provide trouble-free operation on site, even for the long-term.

What makes for a good relationship between the user and the supplier? For Kornelius Thimm, the answer is simple. "We have customers that have been loyal to us for decades. This is certainly based on mutual trust," the Director of Customer Support at BEUMER Group is convinced. Because our systems and machines run reliably. His colleagues take care to ensure a high level of system availability for the entire running time. "Our customers know that we would never leave them out in the rain," adds Kornelius Thimm.

As an international manufacturing leader in intralogistics providing customised system solutions in the fields of conveying, loading, palletising, packaging, sortation and distribution technology, BEUMER Group knows the particular challenges posed by the customers. Its clients have ever increasing demands on machine availability and, therefore, on customer support. This is why BEUMER Group has developed and extended its customer support and established it as a business segment in its own right. Due to its global positioning, the group has consistently optimised and extended this segment

with specifically trained employees during the last few years. "We're not only providing service products, we really take care," emphasises Kornelius Thimm. This becomes more and more important to users from different industries. It is not always only about preventing malfunctions and machine breakdowns, which would lead to long downtimes. No matter what industry, companies have to meet the ever increasing market demands and improve the capacity of the equipment, for example. "And we take care of this," the service director promises.

### **Customised like a tailor-made suit**

Customer Support offers different types of agreements. They are matched individually to the respective needs of the customer, and the service intervals as well as the response times are agreed by contract. BEUMER employees develop the concepts individually with the customer, and adjust them so they meet exactly their requirements. In the event of a system standstill, qualified Customer Support technicians arrive quickly on site to prevent long downtimes. Customer Support offers around-the-clock telephone support every day of the year worldwide, helping further reduce downtime to a minimum. The technicians perform remote analyses, indicate corrective measures and offer quick and reliable solutions to correct any malfunction. The systems can be put quickly back in service. Additionally, we will also find the cause for the malfunction to prevent it from happening again.

### **The whole is greater than the sum of its parts**

One component of Customer Support is spare parts logistics. If customers decide to use this service, the service employees check the wear parts and spare parts at regular intervals and provide the supplies for the entire service life of the machine. "Already

when selling the new system, we advise the customer which spare parts to keep in stock," says Kornelius Thimm. "In case of parts for machine types that are to be discontinued, we inform the customer in time and consult them regarding replacement or exchange possibilities." Personal contacts offer technical support for all inquiries. During the maintenance of the machines, the customer support employees check whether or not there are parts to be replaced. If spare parts are required, BEUMER Group provides a quick delivery.

### Customised employee trainings

In order for the machines to run for the maximum operating time, users need to be trained at regular intervals. The performance of the machines also depends on maintenance and on how they are operated by the customer personnel. The employees who work with the machines are brought up to date, and new employees are introduced to the systems. Training is required for the initial installation, as well as a follow-up several months after the system has been running. At this time, the customer has the opportunity to ask questions related to their specific needs. "The training programmes are tailor-made for the customer and their systems", Kornelius Thimm points out. The users' expertise is maintained through the technical consultation by our Customer Support employees.

Customer Support offers basic trainings up to continuing education. They are tailor-made to meet the customers needs and are held for machines and systems of BEUMER Group as well as of other manufacturers. This is how the group ensures high health and safety standards. Experienced specialists impart detailed knowledge and structured procedures for successful maintenance and for the operation of the systems. This is particularly important for machine operators, because mechanics and control technology is becoming increasingly elaborate and sophisticated.

In order to meet future performance and technology requirements, BEUMER Customer Support employees ensure that the machines are always up-to-date. "We make sure that the machines are comprehensively modernised," says Kornelius Thimm. This means higher performance and availability, minimised energy consumption, more ergonomic working conditions, new functions and a better overall system

utilisation. For this, the employees can update or upgrade the systems.

### Sharing your accountability

A particularly important part of this business segment is the Residential Service. Customers can hand over the responsibility to BEUMER Group for availability, performance and economic efficiency of their filling, palletising and packaging technology, but also for sortation and distribution systems in logistic centres and airports. BEUMER Group employees carry out the maintenance with profound logistical and technical expertise, ensuring high levels of machine efficiency. If required, BEUMER Group appoints a team of specialists which will ensure proper operation and availability of the entire system on site.

BEUMER Group believes that the customer should have access to a Customer Support technician that originates from the same cultural background and speaks the same language. "For this reason we cannot just send colleagues from Beckum to Singapore", says Thimm. Successful customer support requires an understanding of the mentality of the customer: How is the customer positioned? What are his goals and how does he want to develop in the future? These questions require tactfulness and cultural know-how.

Logistics providers offer services for reliable filling, palletising and efficient packaging of products. This can sometimes involve overcoming considerable difficulties, because the products can have very different characteristics. Yet they have to be consistently handled safely and gently throughout the entire process chain. In addition, they need to be able to react to the continually increasing throughput rates of the installations and machines. Another demand to be met: the control, regulation and clear representation of the complete material flow. Kornelius Thimm knows that "if the service provider does not meet all these requirements, a competitor will do it". Customer Support employees make sure that the customer's systems are always perfectly adapted to their tasks, and that all processes run smoothly. They also carry out preventive maintenance, as well as other measures such as applying protective coatings or installing warning devices. Kornelius Thimm adds: "We also develop and implement concepts which enable a long-term and trouble-free operation of the buildings."



**Picture 1: The highly qualified personnel of the BEUMER Customer Support offers technical support and machine maintenance world-wide.**



**Picture 2: When necessary, the technicians arrive quickly on site to prevent long downtimes.**



Picture 3: Customers can hand over to BEUMER Group the complete responsibility for availability, performance and economic efficiency of their systems.



Picture 4: The whole is greater than the sum of its parts: Customer Support offers different agreements that are matched individually to the respective needs of the customer.

## Siemens extends high-voltage motor portfolio to include new series up to 70 MW

- **The new Simotics HV HP high-voltage motor series covers a power range of up to 70 megawatt**
- **Flexible, modular concept suitable for wide-ranging applications with exceptionally high power requirement**
- **Short delivery periods and reduced planning and engineering effort help speed up project completion**
- **Optimized design minimizes vibrations and noise**

With its new high-voltage motor series Simotics HV HP, Siemens is now able to cover an extended power range of up to 70 megawatt (MW). Its flexible modular concept makes this series ideal for precisely tailored solutions in all kinds of industrial applications in the high power range. The new series benefits from short delivery periods and helps minimize the work involved in planning and engineering, speeding up project completion and bringing forward overall plant commissioning. These high-voltage motors can be used for a wide range of applications in fields as diverse as ship building, power plant technology, and the oil, gas, metal and fiber industries.

The reduced planning and engineering input required is due to integration into the Siemens standard tools which now permit simple, rapid selection and configuration up to 70 MW. The design is implemented using Siemens PLM software, which allows data generated to also be used for plant planning. The use of standardized interfaces and the simple, compact concept make for easier plant integration. In terms of its structure, the system benefits from an optimized base frame which not only reduces noise and vibrations to a minimum but also makes the motor

exceptionally robust and able to cope with extreme ambient conditions, helping to maximize the availability of the overall plant. Overall availability also benefits from integration into condition monitoring systems, a service-friendly design and simplified spare

part procurement due to a high degree of component standardization. An added bonus is the extensive scope for system testing to ensure the optimum interaction of Simotics HV HP and Sinamics medium-voltage converters within an Integrated Drive System (IDS).

All the models of the Simotics HV HP series are available as synchronous or induction motors, in a high- or low-temperature version, with gas and dust explosion protection and with a wide variety of cooling methods. Simotics HV HP complies with a wide number of industry and country-specific certification requirements such as API, TR CU, CSA and NEMA.

With Simotics HV, Siemens covers a power range of up to 100 MW and beyond. All its high-voltage motors are available in a varied choice of configurations. By providing scope for selecting different cooling systems and protection ratings, as well as suitability for use in aggressive and potentially explosive atmospheres, the series affords an extreme degree of flexibility. The HV family is also characterized by its extreme reliability and long service life.

A flexible modular concept enables precisely tailored solutions in all kinds of industrial applications in the high power range: With the new Simotics HV HP high-voltage motor series, Siemens is now able to cover an extended power range of up to 70 MW.



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## Effective protection for electric motors and loads

- **High-performance Simatic ET 200SP motor starter with new versions and functions**
- **Now particularly powerful with four adjustment ranges up to 5.5 kilowatts**
- **New fail-safe versions for a wide range of switching and monitoring tasks**
- **New functions, such as motor blocking protection and Quick Stop, for greater throughput, productivity and availability**

The Simatic ET 200SP motor starter protects electric motors and loads. Siemens has designed it for higher performance, and added new versions and functions. Four adjustment ranges up to 5.5 kilowatts now make the motor starter particularly powerful. With the new fail-safe versions, there is now a wide range of standard and fail-safe motor starters for switching and monitoring tasks in logistics and production plants and on production machines and machine tools. New functions, such as motor blocking protection and Quick Stop, not only protect motors but also increase the throughput, productivity and availability of plants.

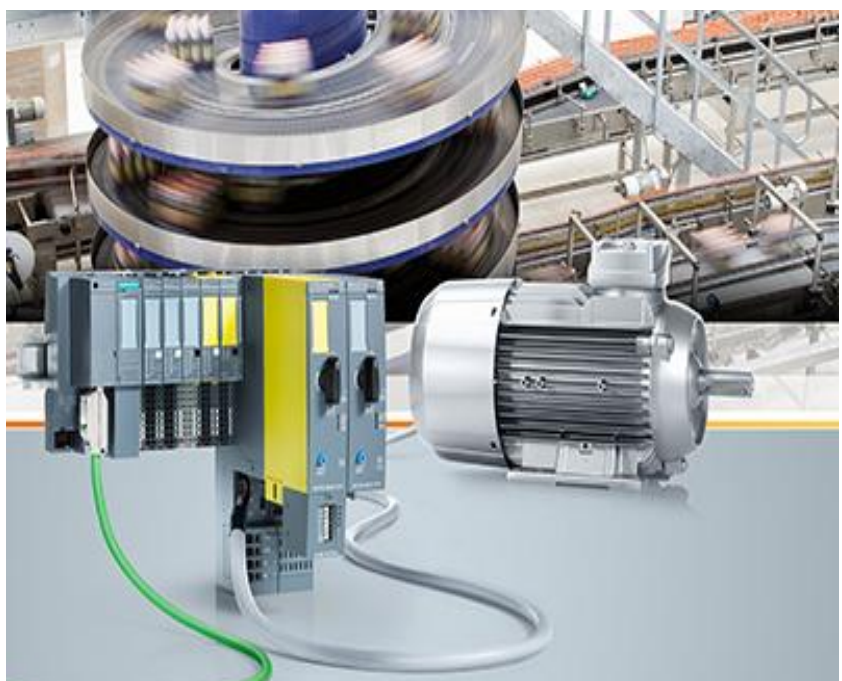
The powerful, compact Simatic ET 200SP motor starter saves space in the control cabinet and offers versatile control, switching, starting and monitoring functionalities. It reliably protects 1 and 3-phase motors against overload and short circuit when starting. The current values can also be used for energy management functions. Thanks to push-in technology, no tools are required for connecting the motor starters. Parameters are easily assigned with the TIA Portal engineering tool and the starters are connected to a controller without any programming effort. Any faults can be easily found and corrected

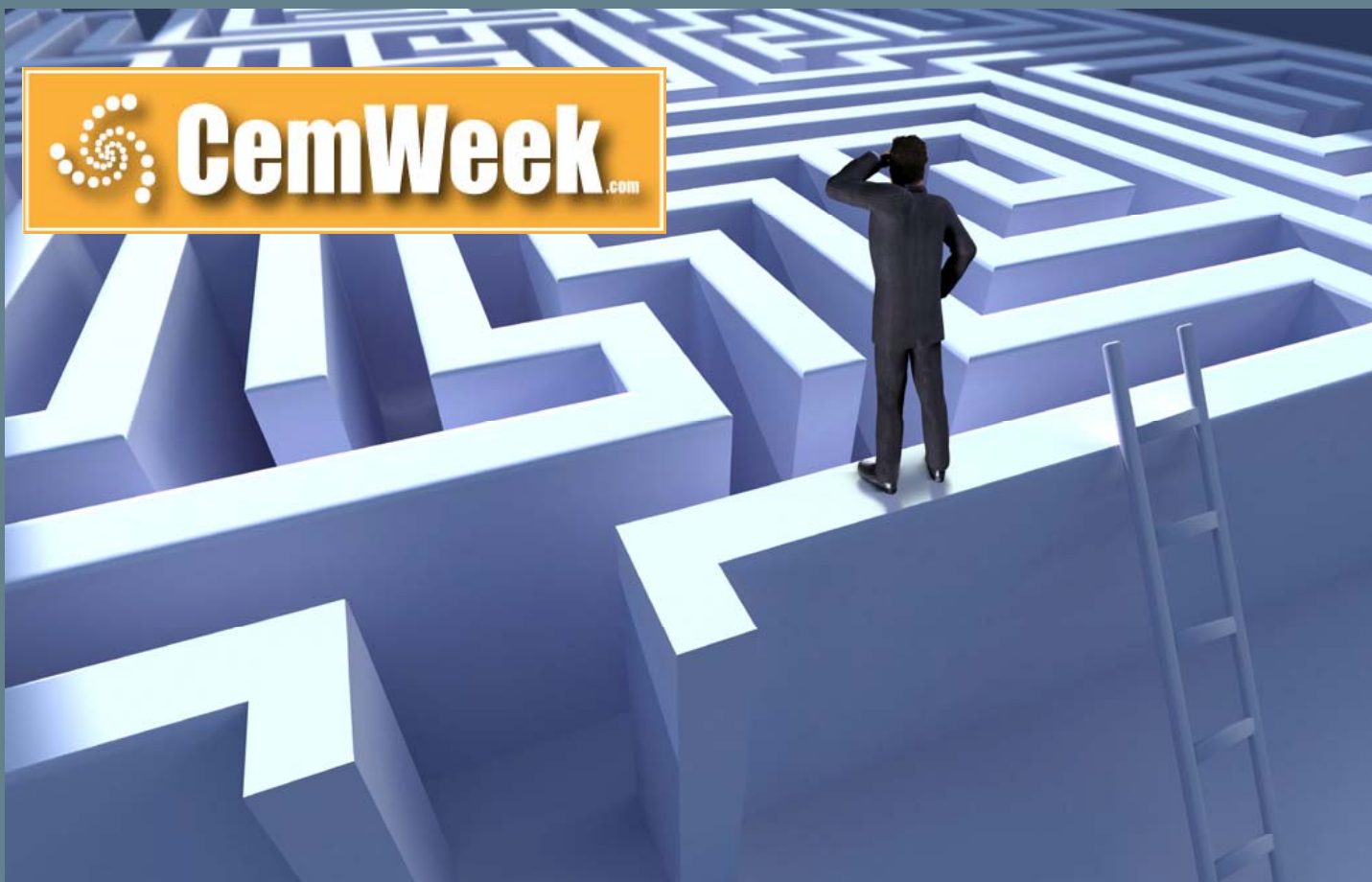
by a multitude of diagnostic options, such as residual current detection and LED displays.

The Simatic ET 200SP motor starter safely switches off motors in two ways: The Sirius 3SK safety relay, which separates standard and safety engineering, is used for locally limited applications. For system-wide, integrated automation solutions, the safety-oriented F-CPU of Simatic controllers are used.

New functions include Quick Stop and motor blocking protection. The Quick Stop function stops conveyed goods precisely, which increases throughput and productivity. The motor blocking protection function switches off the plant quickly in the event of a mechanical blockage, such as when a tool gets wedged in the conveyor belt. This protects the motors and increases plant availability.

The Simatic ET 200SP motor starter protects electric motors and loads. Siemens has designed it for higher performance, and added new versions and functions. Four adjustment ranges up to 5.5 kilowatts now make the motor starter particularly powerful.





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## First tablet PC from Siemens: Rugged and geared for industrial applications

- First tablet PC from Siemens for mobile industrial applications
- The Simatic ITP1000 industrial tablet PC is currently the fastest tablet PC on the market
- High-performance chip set with practical industrial functions for demanding tasks and graphic applications in industry
- TPM 2.0 security to protect system and data

Siemens has brought a tablet PC onto the market for the first time. The Simatic ITP1000 industrial tablet PC is currently the fastest tablet PC on the market. It has a projective-capacitive 10.1-inch Multitouch display, the latest Intel Core i5 Skylake processor technology, and the Trusted Platform Module. Designed for industrial use, the Simatic ITP1000 is especially suitable for service, production, measuring and testing, as well as for operator control and monitoring. The new industrial tablet PC supports Windows 7 and Windows 10. With many different interfaces and well-thought-out product features, the Simatic ITP1000 is versatile, can be used everywhere, and can be integrated in both new and existing plant concepts. With long-term availability of components, as with all Simatic PCs, the new Simatic ITP1000 tablet PC can be used for many years.

To handle challenging tasks, a high-performance chip set with the latest Intel Skylake CPU technology is used in the Simatic ITP1000 industrial tablet PC. The DDR4 RAM can be upgraded up to 16 gigabytes, and a 256 or 512-gigabyte SSD (Solid State Drive) can also be added to the device. Even customized automation tasks can be handled flexibly with the practical industrial functions – such as RFID (Radio Frequency Identification), a bar code reader, camera, and six freely programmable function buttons. This is also supported by a wide range of interfaces – such as Bluetooth, WAN, 1-gigabit LAN, serial RS 232 DC-in, miniDP, SD card slot, 1 USB type C and 2 USB 3.0 ports. The PC has an integrated TPM 2.0 module to protect the system and data, and a Kensington lock to prevent theft. An optional docking station with a port replicator that has been designed for practical one-hand docking enables the new tablet PC from Siemens to be used as a complete workstation with an external monitor.

Typical service applications for the Simatic ITP1000 industrial tablet PC are instructional films for simple maintenance tasks, location-related service information, and remote access to plants. In the fields of measuring and testing, the uses of the new tablet PC include mechatronic simulations, such as those for minimizing the noise emitted by automobiles

and aircraft, as well as measuring energy consumption, flow and temperature. Applications for production include films for training new employees, mobile assembly stations, quality management, order-picking scales, and driverless transport systems. With operator control and monitoring, the Simatic ITP1000 is suitable for location-related tasks, such as indoor navigation, SmartAccess to panels, and web-based visualization. Office applications, such as Excel for evaluating production data, complete the wide range of possible applications for the new industrial tablet PCs from Siemens.

**Background information:**

The new Simatic ITP1000 industrial tablet PC is part of the Siemens portfolio of Simatic industrial PCs. This includes the scalable product lines of box, panel and rack PCs, supplemented by additional versions for special applications. The Simatic IPC range – from the compact fanless embedded device to the powerful, expandable high-end IPC – is specifically designed for industrial applications. For mobile automation engineering, users also employ the ready-to-run, rugged Simatic Field PG industrial programming device.

Siemens has brought a tablet PC onto the market for the first time. The Simatic ITP1000 industrial tablet PC is currently the fastest tablet PC on the market. It has a projective-capacitive 10.1-inch Multitouch display, the latest Intel Core i5 Skylake processor technology, and the Trusted Platform Module.



### The “perfect wave”: Intesa wins over ceramic industry with the new DHD Dimatix

Ten machines sold since the start of the year in the Italian ceramic district: new technology confirms all the quality and reliability-related plus-points in the ceramic product digital decoration field

On the market since January 2016, the new DHD 3.0 Dimatix wet digital decorator, produced by Sacmi-Intesa, has proved to be a hit with the Italian ceramic industry. In just a few months some ten machines have been sold and installed. Some of them were first-time orders while others were repeat purchases by customers who, after putting the first machine into production, immediately decided to order others - a clear sign of their immense satisfaction with the machines' performance in terms of print quality and manufacturing efficiency.

GoldArt, Fondovalle, Gardenia Orchidea, Marazzi and ABK have all acknowledged and greatly appreciated the advantages of this new printer, which draws on Sacmi-Intesa's unparalleled experience and know-how in designing and producing machines and plants for the digital decoration of ceramics.

Ultra-high print quality and resolution is ensured by the new control software developed by Sacmi-Intesa's engineers. This optimises the Dimatix technology and results in the simple, clean, efficient mechanical design of all machine components, ensuring the DHD 3.0 operates under perfectly clean conditions at all times.

No lines or droplets, cleaning times broadly within the market standard plus a software architecture specifically designed to control latest-generation inks and glazes. These, then, are the defining traits of the

Sacmi system: “open” by definition, it grants the customer huge freedom of choice with regard to the raw materials fed to the decorator.

Moreover, the DHD 3.0 Dimatix stands out on account of an innovative mechanical concept and specially designed software that ensures perfect piloting of the head as a function of customer-proposed inks and glazes.

Development work done in the company's labs to create perfect “wave forms” lets the head perform controlled, extremely efficient material application, providing solutions specifically designed to make the most of ceramic product aesthetic potential and the latest design trends.

What makes the difference is – from a production efficiency standpoint – an autonomy that is decidedly better than anything attainable with analogous solutions, as the machine can operate well beyond 4 hours before any automatic head and nozzle cleaning tasks are required.

Thanks to work carried out by the Sacmi-Intesa lab, the customer can also enjoy a total guarantee on compatibility between inks and internal machine components. Sacmi-Intesa also proposes the DHD 3.0 solution (in the DHD 1806 version) integrated on the new Sacmi CONTINUA+ line for the production of large ceramic slabs. Visitors to the Tecnargilla fair in Rimini will have a great opportunity to see it in action from 26 to 30 September. Just the first step, then, for a recently developed technology that is set to win over more and more customers within both the Italian and international ceramic industry.



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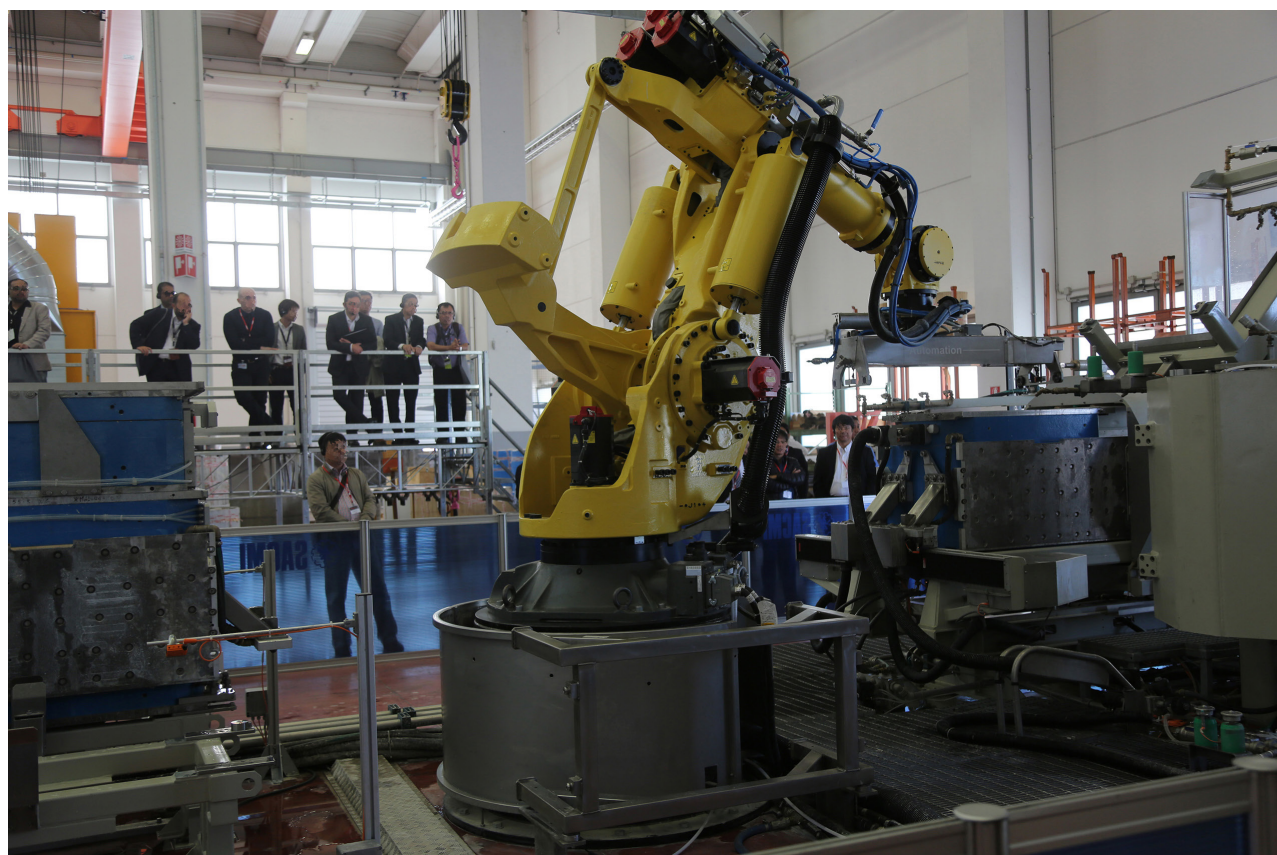
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# CEMENTTECH

## Smart, robotized, 3D: Sanitaryware 4.0, the Sacmi way

“What drives us?” What guides us, then, on the way towards the future of ceramic sanitaryware? This was the theme of a very special day. On 26 September 2016 - simultaneously with the start of the international Tecnargilla fair in Rimini - over 140 client company managers and representatives from 40 countries visited both the factory and the research facility at Imola to find out more about the latest Group-developed sanitaryware industry solutions.

"Events such as these are essential", stated Daniele Coralli, the Division's General Manager, "as they let customers see the machines in action and fully appreciate the importance of new features and technical characteristics. They also promote networking between top-flight international companies, allowing for comparison and a heightened understanding of the latest developments in technology, plant engineering and market trends".



### **Robotics, the final frontier**

A leading protagonist at Tecnargilla in Rimini with cutting-edge solutions that explore the new frontier of collaborative robotics, Sacmi decided to show international customers the significant improvements made to the AVI high pressure casting cell; this was previewed at the last edition of the Rimini fair and this time was showcased with a major process automation upgrade. The latest version of the casting module - designed to handle WCs with stick-on rims using moulds with between 4 and 7 parts - requires, in fact, no worker intervention. All casting, mould handling and mould replacement tasks are performed by anthropomorphic robots, with changeover times now cut to under 15 minutes, with the user able to manage two distinct casting modules in parallel with just one robot. In essence, this solution is the best response to the sanitaryware market's natural need for flexibility: in every instance, the changeover time is shorter than the cycle time, thus eliminating downtimes, boosting process repeatability and quality and making work easier (the operator never has to physically enter the casting cell as all casting and mould changeover tasks can be conveniently managed via the user-friendly interface).

“Automation in sanitaryware”, explains Daniele Coralli, “is a dual frontier. On the one hand, Sacmi has developed ever-more advanced integrated production centres in which the robot plays a pivotal role, handling every aspect of production, eliminating any need for manual intervention, raising product quality and, last but not least, improving workplace safety. On the other, Sacmi is exploring the new frontier of collaborative robotics in which robots work should-to-shoulder with personnel, ‘borrowing’ solutions already used extensively in other sectors such as the automotive industry”. One of these - which participants at the special day in Imola later had the opportunity to see in action during the Rimini-held Tecnargilla fair - was recently included in the Sacmi Sanitaryware Division's plant engineering range. Equipped with cutting-edge safety systems, the robot that Sacmi uses for sanitaryware applications is built by the industry-leading multinational Fanuc and is designed to help workers handle the fired pieces to be inspected. Thanks to its outstanding ability to work alongside people, the robot can dynamically control all product handling, eliminating repetitive, tiring or awkward tasks and thus bringing the industry into line with the latest European directives on ergonomics in the workplace.



### **Large sinks and console washbasins. Sacmi presents the new ADI**

Something entirely new for 2016 that visitors to Sacmi Imola had the opportunity to see first-hand during their morning factory visit was the new ADI casting cell, designed to cast sinks and large console washbasins. With this unit the robot controls all the casting and mould opening/clamping tasks while mould replacement is handled by two workers in under 15 minutes (in complete safety and with the aid of a simple forklift), an approach dictated by the high weight of the moulds, sometimes heavier than 1,000 kg each. This solution offers outstanding flexibility as it is compatible with existing moulds already produced by Sacmi for the established ALS, ADS and ADM units. As with the AVI cell, mould replacement tasks – while requiring some manual intervention - can be completed in a time less than or equal to that of the production cycle, with a single robot able to handle up to three different casting modules; alternatively the integrated casting centre can, on request, be equipped with a latest-generation

Sacmi pre-dryer (FPV or FPL depending on whether mono or multi-mould cells are used) capable of reducing residual moisture by up to 35% and thus providing pieces already mature enough to be transported and placed on carts before they're sent on for final drying and firing.

Elegant designer washbasins - manufactured 'live' for visitors inside the same robotized casting centre - are, then, the result of the innovative ALV, a solution specially designed to produce such items, which need to be cast horizontally. In this case the ALV module - which also has changeover times lower than actual casting times - was coupled with the ADI but can, in principle, be configured in the robotized casting centre any way producers see fit.

### **Modelling and 3D scanning for total process digitalization**

At Sacmi (which, in over 30 years of doing business in the industry has developed and marketed some 30 complete plants, 280 WC casting systems, 170 washbasin and shower tray casting systems, 51 driers, 1,040 robotized glazing solutions plus 375 kilns and 6,228 moulds, all over the globe), 2016 marks the beginning, via advanced product and mould design solutions, of 3D digital modelling. This, then, was the common thread running through the various solutions shown to visitors during the special visit to the sanitaryware R&D lab: from digitization of the designer's preliminary drawing (followed by perfect digital reproduction of the piece, then



physical prototyping using a 3D printer) to advanced mould design software. The mould - usually finished on site - can be refined further via a real-time, error-free scanning solution that records, to an accuracy of one thousandth of a millimetre, all the modifications that will then be replicated on the die.

All-new GAS (glaze application scanning) technology is taking us in a similar direction: this advanced software makes the glaze spraying cone both visible and measurable, simulating all process parameters and allowing further reduction of overspray. It also provides feedback control of line operation (via real-time interception of any changes in glaze rheology, glaze nozzle clogging etc.).

### **Robotized glazing, the present speaks smart**

GAS is only the latest new product in a sector - Sacmi-brand robotized sanitaryware glazing - that saw, in 2016, the extraordinary success of the new GDA 80 (Gaiotto Diaphragm Automatic Gun) needleless glazing gun. The

latter has become extremely popular on the market (a good 110 solutions have recently been supplied) as it eliminates the need for maintenance while simultaneously boosting quality and process repeatability. Alongside this, Sacmi has gone a stage further with robotized glazing solutions (implemented on the latest Gaiotto GA-OL robot series) by introducing, as early as 2014, a new 'smart' software release for off-line robot programming: this feature revolutionises the way the production process is conceived as it allows the operator to program glazing recipes in advance on the PC - thus modelling gun trajectories and setting all the spraying parameters - and eliminate the downtimes that stem from the need to reprogramme the robot during size changeovers. Once executed, the programme can, in fact, be simulated and optimised without having to intervene directly on the line; programs executed in self-learning mode can also be imported to modify and optimise them.

**“Zero downtimes”, quality and energy for the industry: this is Sanitaryware 4.0**

This, then, is how Sacmi (which during the second part of that special day on 26 September took clients on a guided tour of another example of regional excellence, the Lamborghini factory in Sant'Agata Bolognese) is developing and, indeed, putting into practice Industry 4.0 principles within the sanitaryware industry. Automation, improved worker skill sets, digitization and quality control capable of acting retroactively on the process are all being used alongside new consumption optimisation systems. And that means all consumption: in terms of energy



(30% lower overall), of course, but also in terms of wasted time (slashed by over 65% thanks to elimination of the downtimes associated with synchronization of casting and mould changeover and reduced storage and handling requirements thanks to utilisation of advanced pre-dryers etc.); lastly, compared to traditional solutions, processing residues are 25% lower, offering direct advantages in terms of process efficiency and lower disposal costs.

Sacmi also sees Sanitaryware 4.0 - and has done for several years - as the development and provision of advanced after-sales services, supplied via its worldwide sales and spare parts network. That same goal is also, and above all, achieved via the cutting-edge remote support software installed on the machines; this allows customers, wherever they may be in the world, to count on the real-time support of specialised Sacmi technicians to fix all the most common problems. Sacmi, in fact, provides customers with customised solutions right from the design stage and carries on providing close support throughout the working life of machine and plant.



# DIARY DATES

## DIARY DATES

### CEMENT

Cement Business & Industry Conference and Exhibition

Date : 15 - 16 February 2017

Venue: Sao Paulo, Brazil

For more information please contact:

Ms. Beatrice Ene, Client Development & Marketing Director (International)

**Tel: +1 203 987 5212**

**Email: [be@gmiforum.com](mailto:be@gmiforum.com)**

**[www.gmiforum.com](http://www.gmiforum.com)**

Cemtech Middle East & Africa 2017

Date: 19 - 22 February 2017

Venue: Dubai, UAE

**Tel.: +44 1306 740 363**

**Fax: +44 1306 740 660**

**Email: [info@cemtech.com](mailto:info@cemtech.com)**

**[www.Cemtech.com/MEA2017](http://www.Cemtech.com/MEA2017)**

VDZ Training course: Simulator training

Date: 20 - 24 February 2017

Venue: VDZ's premises, Düsseldorf, Germany

For more information please visit:

**[www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)**

INTERCEM Dubai

Date : 06 - 08 March 2017

Venue: Dubai, UAE

For more information please visit:

**[www.intercem.com](http://www.intercem.com)**

2<sup>nd</sup> Global SynGyp Conference & Exhibition on wet scrubbers and synthetic gypsum

Date : 30 - 31 March 2017

Venue: Lindner Congress Hotel, Düsseldorf, Germany

For more information please visit: <http://>

**[www.globalgypsum.com/conferences/global-syngyp/introduction](http://www.globalgypsum.com/conferences/global-syngyp/introduction)**

1<sup>st</sup> Global CemProcess Conference and Exhibition  
Process optimization, de-bottlenecking, production maximization and troubleshooting

Date : 24 - 25 April 2017

Venue: London, UK

For more information please contact:

Pro Global Media Ltd

**Tel: +44 1372 743837**

**Fax: +44 1372 743838**

**[www.Global-CemProcess.com](http://www.Global-CemProcess.com)**

BusinessCem Moscow 2017

Date : 24 - 26 April 2017

Venue: Moscow, Russia

For more information please contact:

BusinessCem Media

**Tel.: +7 499 977 4968**

**Fax: +7 499 977 4495**

**Email: [valev@businesscem.msk.ru](mailto:valev@businesscem.msk.ru)**

**[http:// www.businesscem.ru](http://www.businesscem.ru)**

Cement & Concrete Exhibition 2017

Date : 30 April - 03 May 2017

Venue: Riyadh International Convention and Exhibition Center, Riyadh, Kingdom of Saudi Arabia

For more information, please contact:

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**Tel: +20 2 2270 35 84 /5**

**Mobile: +20 10 96662964**

**Fax: +20 2 2270 35 86**

**E-mail: [lama@arabiangerman.com](mailto:lama@arabiangerman.com)**

**<http://www.arabiangerman.com>**

CW SUMMIT DUBAI 2017

Date : 17 - 18 May 2017

Venue: Dubai, UAE

For more information, please visit:

**<http://www.gmiforum.com/cw-summit?view=event&id=56&catid=11>**



## THE TECHNICAL JOURNAL FOR THE CEMENT INDUSTRY

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ThyssenKrupp Polysius

www.verlagbt.de

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VERLAG  BAU+TECHNIK

12<sup>th</sup> Global Slag Conference, Exhibition & Awards

Date : 18 - 19 May 2017

Venue: Düsseldorf, Germany

For more information please contact:

Pro Global Media Ltd

**Tel: +44 1372 743837**

**Fax: +44 1372 743838**

For more information please visit:

**[www.globalslag.com](http://www.globalslag.com)**

VDZ Training: Cement manufacturing course -  
Module 1

Date : 08 May - 02 June 2017

Venue: VDZ's premises, Düsseldorf, Germany

For more information please visit: **[www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)**

2017 China International Cement Industry Exhibition

Date : 10 - 12 May 2017

Venue: Nanjing, China

**Email: [jinx@ccpitbm.org](mailto:jinx@ccpitbm.org)**

For more information please visit:

**[www.cementtech.org](http://www.cementtech.org)**

IV International Business Meeting

White Nights: Cement. Concrete. Dry Mixtures

Date : 17 - 19 May 2017

Venue: Grand Hotel Europe, St. Petersburg, Russia

For more information please visit:

**[www.white-nights.info](http://www.white-nights.info)**

VDZ Training: Plant maintenance and refractories  
course

Date : 19 - 23 June 2017

Venue: VDZ's premises, Düsseldorf, Germany

For more information please visit:

**[www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)**

VDZ Training: Process operator training

Date : 04 - 22 September 2017

Venue: VDZ's premises, Düsseldorf, Germany

For more information please visit:

**[www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)**

VDZ Training: Cement manufacturing course -  
Module 2

Date : 25 September - 20 October 2017

Venue: VDZ's premises, Düsseldorf, Germany

For more information please visit:

**[www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)**

14<sup>th</sup> TCMB International Technical Seminar &  
Exhibition

Main theme: "Sustainable Environment & Energy"

Date : 10 - 13 October 2017

Venue: Kaya Palazzo Golf Resort, Belek, Antalya,  
Turkey

For more information please click:

**<http://www.tcma.org.tr/ENG>**

Cement.Concrete.Dry mixtures 2017

Date : 29 September - 01 December 2017

Venue: Moscow, Russia

**Email: [a.sidorova@alitinform.ru](mailto:a.sidorova@alitinform.ru)**

**For more information please visit:**

**[www.infocem.info/eng](http://www.infocem.info/eng)**

15<sup>th</sup> International Congress on the Chemistry of  
Cement (ICCC 2019)

Date : 16 - 20 September 2019

Venue: Prague, Czech Republic

For more information please click:

**<http://www.iccc2019.org>**

## CERAMIC

Glasspex India

Date: 23 - 25 February 2017

Venue: New Delhi, India

For more information, please visit:

**[www.glasspex.com](http://www.glasspex.com)**

Indian Ceramics & Ceramics Asia

Date: 01 - 03 March 2017

Venue: Ahmedabad, India

For more information, please visit:

**[www.indian-ceramics.com](http://www.indian-ceramics.com)**

Glassman South America

Date: 29 - 30 March 2017

Venue: Buenos Aires, Argentina

For more information, please visit:

**[www.glassmanevents.com/south-america](http://www.glassmanevents.com/south-america)**

## 11th **global** **cemfuels** CONFERENCE & EXHIBITION 2017

[CemFuels.com](http://CemFuels.com)



BARCELONA, SPAIN • 2-3 FEBRUARY 2017

The *Global CemFuels Conference* has established itself as the largest specialised annual alternative fuels conference in the world. The 11th *Global CemFuels* event in Barcelona will showcase the best alternative fuels projects and equipment from the cement industry in Europe and from around the world. 200-plus delegates from over 40 countries are expected to attend, including a strong South American contingent.

## 1st **global** **cemprocess** CONFERENCE & EXHIBITION 2017

[Global-CemProcess.com](http://Global-CemProcess.com)

LONDON, UK • 24-25 APRIL 2017

*Global CemProcess* is the new cement industry conference that looks at process optimisation, de-bottlenecking, maximising production and troubleshooting. The event will take place in London, the easy-to-access world city with direct transport links to over 300 global cities, and will include a field trip to Hanson Cement's Ketton plant in Rutland.



## 12th **global** **slag** CONFERENCE & EXHIBITION 2017

[globalslag.com](http://globalslag.com)



DÜSSELDORF, GERMANY • 18-19 MAY 2017

The 12th *Global Slag Conference* will take place in Düsseldorf, Germany in May 2017. The conference will allow all attendees to maximise their profits from slag, both ferrous and non-ferrous, will keep them up-to-date with state-of-the-art processes and will provide extensive networking and business opportunities.

## GENERAL

### BUILDEXPO West Africa 2017

Date : 22 - 25 February 2017

Venue: Dakar, Senegal

For more information please contact:

Sophia David, Marketing coordinator

International Trade Promotion

**Tel: + 91 8551918436**

**Email: intltradepromoters@gmail.com**

### Iran BuildEx - Iran International Exhibition of Building & Construction Industry

Date : 25 - 28 February 2017

Venue: Tehran, Iran

For more information please contact:

Serhan PUL, International Sales Director

**Email: serhan.pul@pyramidsfair.com**

**Tel: +90 216 575 28 28 Ext: 233**

### Buildafro Kenya 2017

Date : 03 - 05 March 2017

Venue: Nairobi – Kenya

**Email: inquiry@mxmexpos.info**

### Effectively Managing Risk Service Contracts

Date : 15 - 16 March 2017

Venue: Kuala Lumpur, Malaysia

For more information please contact:

Trueventus

Mr. John Karras

**Tel: +603 2775 0001**

**Fax: +603 2775 0005**

**Email: johnk@trueventus.com**

### Urban Distribution Hub Development Conference

Date : 15 - 16 March 2017

Venue: Singapore

For more information please contact:

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**Fax: +603 2775 0005**

**Email: johnk@trueventus.com**

### Uganda Trade Expo 2017

Date : 18 - 20 March 2017

Venue: Kampala, Uganda

For more information please contact:

Bright Exhibitions

**Tel: +971 6 5378331 Ext 127**

**Mob: +971 52 6474522**

**Email: info@brightfairs.net**

**www.bright-fairs.com**

### 7<sup>th</sup> Antalya City Planning & Technologies Fair and Local Government Symposium

Date : 23 - 26 March 2017

Venue: Antalya, Turkey

**Tel: +90 216 575 28 28**

**Email: info@pyramidsfair.com**

### 7<sup>th</sup> Annual Shopping Malls Summit

Date : 29 - 30 March 2017

Venue: Bangkok, Thailand

For more information please contact:

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**Fax: +603 2775 0005**

**Email: johnk@trueventus.com**

### The 2<sup>nd</sup> Global SynGyp Conference & Exhibition

Date : 30 - 31 March 2017

Venue: Düsseldorf, Germany

For more information, please visit:

**www.globalgypsum.com**

### 6<sup>th</sup> International Drymix Mortar Conference IDMMC Six

Date : 03 - 04 April 2017

Venue: Nuremberg, Germany

For more information, please visit:

**www.drymix.info**

### 2<sup>nd</sup> Annual Mixed-Use Development Australia

Date : 03 - 04 April 2017

Venue: Brisbane, Australia

For more information please contact:

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**Email: caseyl@trueventus.com**

# Cemtech MEA 2017

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- The Cemtech exhibition, running parallel to the conference, providing a space for delegates to network and interact with a range of technology suppliers
- Extended technical programme: tour of local cement plant
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For more details, programme updates and registration, see:

**[www.Cemtech.com/MEA2017](http://www.Cemtech.com/MEA2017)**

European Coatings Congress, Construction Chemical Session

Date : 04 April 2017

Venue: Nürnberg, Germany

For more information, please visit:

**[www.european-coatings.com/Events/European-Coatings-Show-Conference-2017](http://www.european-coatings.com/Events/European-Coatings-Show-Conference-2017)**

25<sup>th</sup> International Mining Congress and Exhibition of Turkey

Date : 11 - 14 April 2017

Venue: Antalya, Turkey

**Email: [imcet.maden@maden.org.tr](mailto:imcet.maden@maden.org.tr)**

**For more information, please visit:**

**[www.imcet.org.tr](http://www.imcet.org.tr)**

Calculating the Durability and Fatigue of Mechanical Equipment

Date : 19 - 20 April 2017

Venue: Kuala Lumpur, Malaysia

For more information please contact:

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**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

Responding to Disruptive Innovation

Date : 26 - 27 April 2017

Venue: Goodwood Park Hotel, Singapore

For more information please contact:

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**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

5<sup>th</sup> Annual Township Development Conference

Date : 26 - 27 April 2017

Venue: Manila, Philippines

For more information please contact:

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**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

Calculating the Durability and Fatigue of Mechanical Equipment Training Course

Date : 26 - 27 April 2017

Venue: Bangkok, Thailand

For more information please contact:

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**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

Design-Build, Epc, P3 - Construction Project Delivery Solutions for the 21<sup>st</sup> Century

Date : 26 - 27 April 2017

Venue: Bangkok, Thailand

For more information please contact:

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**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

Irexpo

Date : May 2017

Venue: Tabriz, Iran

**Tel: +90 212 273 18 18**

**Email: [info@irexpo.net](mailto:info@irexpo.net)**

**[www.irexpo.net](http://www.irexpo.net)**

6<sup>th</sup> Annual Modular & Precast Conference

Date : 03 - 05 May 2017

Venue: Bangkok, Thailand

For more information please contact:

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**Tel: +603 2775 0001**

**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

IE expo 2017

Date : 04 - 06 May 2017

Venue: Shanghai New International Expo Centre, China

For more information please visit:

**[www.ie-expo.com](http://www.ie-expo.com)**

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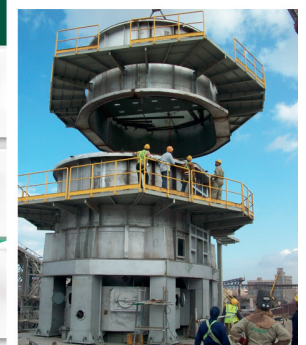
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06



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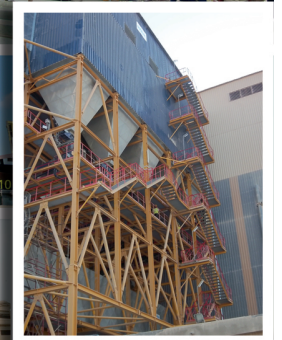
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Email : imc@intermaint.com.eg Web site : [www.intermaint.net](http://www.intermaint.net)

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Fax. : +966 11 2916798  
Mobile : +966 505194064  
E-mail : hesham@intermaint.net



THINKING FOR TOMORROW



Asphalt Mix Design

Date : 10 - 11 May 2017

Venue: Makati, Philippines

For more information please contact:

Trueventus

Casey Lee

**Tel: +603 2775 0067**

**Fax: +603 2775 0055**

**Email: caseyl@trueventus.com**

Argus Mediterranean Solid Fuels 2017

Date : 06 - 08 June 2017

Venue: Madrid, Spain

For more information please visit:

**www.argusmedia.com/solidfuels**

Rostering and Shiftwork for all Industries Training Course

Date : 10 - 11 May 2017

Venue: Manila, Philippines

**Tel: ++603- 2775 0067**

**Email: mikej@attendingyourevent.com**

NETZSCH Fine Powder Processing: "Energy Efficiency and Process Optimization"

Date : 31 May – 01 June 2017

Venue: Hanau, Germany

For more information please visit:

**www.netzsch-grinding.com**

2<sup>nd</sup> Central American Drymix Mortar Meeting

Date : 27 June 2017

Venue: Mexico City, Mexico

For more **information**, please visit:

**www.drymix.info**

IFAT Africa 2017 Trade Fair for Water, Sewage, Refuse and Recycling

Date : 12 - 14 September 2017

Venue: Johannesburg, South Africa

For more information please visit:

**www.ifat-africa.com**

Second Asia Mortar Summit

Date : 19 September 2017

Venue: Shanghai, China

For more information, please visit:

**www.drymix.info**

11<sup>th</sup> Global Insulation Conference & Exhibition

Date : 25 - 26 September 2017

Venue: Kraków, Poland

For more information, please visit:

**www.GlobalInsulation.com**

17<sup>th</sup> Global Gypsum Conference & Exhibition

Date : 25 - 26 October 2017

Venue: Kraków, Poland

For more information, please visit:

**www.GlobalGypsum.com**

Fifth Latin American Drymix Mortar Conference ladmmc five

Date : 26 October 2017

Venue: São Paulo, Brasil

For more information, please visit:

**www.drymix.info**

Cement. Concrete Dry Mixtures 2017

Date : 29 November - 01 December 2017

Venue: Moscow, Russia

**Email: a.sidorova@alitinform.ru**

Bauma 2019

Date : 08 - 14 April 2019

Venue: Munich, Germany

For more information, please visit:

**www.bauma.de**

# ЦЕМЕНТ

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# Cement and Building Materials Review

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Diary Dates

Editor-in-Chief

Eng. Ahmad AL-Rousan

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- *The Magazine editorial staff welcome the contribution of experts to enrich the contents of the magazine .*
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# Arab News

## Arab News

### Algeria

#### **Algeria to stop importing cement in 2017**

Minister of Industry and Mining has said that Algeria will stop importing cement in 2017. He made the comments at a visit to the China Triumph International Engineering (CTIEC) cement plant being built at Adrar. "The year 2017 will mark the end of cement imports in Algeria, with the commissioning of all cement plants across the country, whose total annual production capacity is expected to reach 6Mt," the Minister said. He added that industrial projects will allow the country to achieve self-sufficiency in cement and begin to export it.

#### **Global Cement News**

#### **GICA shows its ambitions for 2017**

GICA announced it will ramp up its production capacity to 13.2Mt of cement, with the second line of the Aïn El Kebira cement plant (Setif) entering production in 2017.

#### **Daily cement**

#### **GICA to start producing oil well cement**

Groupe Industriel des Ciments d'Algérie (GICA), the government-owned cement producer, has launched the certification process of its oil well cement ahead of plans to produce the product itself. A sample batch of 300t was produced in November 2016. Rabah Guessoum, the chief executive officer of GICA, said that the cement will be produced at the company's Setif plant and sold to Sonatrach group and foreign oil

companies. A national demand of around 300,000t/yr is anticipated.

#### **Global Cement News**

#### **New cement plants in Relizane and Djelfa**

Djelfa plant will have joint-venture with Chinese partner.

CILAS, a joint venture between Lafarge Algeria, holding a 49% stake, and Souakri Group with a 51% stake, will officially inaugurate its Biskra cement plant in January 2017.

#### **Daily Cement**

#### **Algerian investors to buy ASEC Algeria for US\$60m**

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

#### **Global Cement News**

#### **New Cement Production Unit Inaugurated in Constantine**

A new cement production plant located in the industrial area of Benbadis, about 20 Km southeast of Constantine, was inaugurated last December.

#### **Daily Cement**



## Egypt

### Egyptian government sells three cement licences

The Industrial Development Authority (IDA) has tendered three licences to build new cement plants to El Sewedy Cement, South Valley Cement and Cement Egypt. The licences were sold for a total of US\$28m. IDA chairman said that the three cement plants built using the new licences will have a total production capacity of 6Mt/yr. The new capacity is intended to support local infrastructure projects including the construction of a proposed new capital city.

### Global Cement News

### Greenfield cement plants to be setup in New Valley

The cement plants will produce white and gray cement

### Cemweek

### Government aims cement sector to increase alternative fuel use by 30%

Minister of Industry and Foreign announced that the Ministry has completed a study on “interest earned from using alternative fuel sources, an alternative to fossil fuel, for cement plants' production in Egypt”.

### Arabian Cement invests in new plant

The cement plant will begin operation in Q42017

### Cemweek

### Arabian Cement's Board ratifies EUR 7 million power saving plan

Arabian Cement Company's Board of Directors approved a power saving plan worth €7 million.

### Daily Cement

### Fives upgrades vertical ball mill and grinding plant for Suez Cement

Fives has delivered to Suez Cement Co. (Italcementi Group) a new FCB TSV™ Classifier in order to modernize a vertical ball mill and optimize the operation of the solid fuel grinding plant.

## Iraq

### China Machinery Engineering to build cement plant in Iraq

China Machinery Engineering Corporation has signed a US\$250m deal to build a cement plant at Qarachog. Once operational the unit will produce 6000t/day of clinker. The scope of the contract includes project design, supply, civil construction, installation, training and commissioning. Once construction starts the project will take 22 months to complete.

### Global Cement News

## Jordan

### Lafarge Jordan to start building 15MW solar power unit in 2017

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

### Global Cement News

## Kuwait

### Kuwait Cement invests in ecofriendly cement

The company burned used tires as fuel.

### Cemweek

## Morocco

### Domestic cement sales in 2016 down

The Ministry of Housing published its statistical data on the country's domestic cement sales during 2016, which declined by 0.7%.

### Daily Cement

### Global Oil Shale Group To Build Cement Plant In Tarfaya

Global Oil Shale (GOS), a company focused on development of oil shale projects, will shift to cement production amid the global decline in hydrocarbon prices.

### Daily Cement

### LafargeHolcim, ArcelorMittal, Evonik and Solvay form partnership to reduce carbon emissions across industries

LafargeHolcim, ArcelorMittal, Evonik and Solvay have formed a Low Carbon Technology Partnerships Initiative across the steel, cement and chemicals industries. This new partnership will look at the potential synergies that exist between the manufacturing processes of these three energy intensive sectors, and how these synergies could be harnessed to reduce CO<sub>2</sub> emissions.

As a first step, and following preliminary research, the innovative partnership will produce a study with the technical support of Arthur D Little to identify potential ways to valorize industrial off-gases and other by-products from their manufacturing processes to produce goods with a lower carbon footprint than through the fossil path. The preliminary research has already allowed identification of significant potential in

selected trans-sector pathways.

The study is aimed at bringing a fact-based overview of carbon and energy sources from industrial off-gases (first at a European level), and evaluating the technical, environmental and economic feasibility of different Carbon Capture and Usage (CCU) pathways and their potential.

Initial findings from the first step already underway suggest that deploying cross-sector carbon capture and reuse opportunities on an industrial scale could reduce up to 3 GT/yr or 7% of global anthropogenic CO<sub>2</sub> emissions. Existing conversion technologies that could be deployed across the three sectors could utilise by-products in the off-gases to create building materials, organic chemicals and fuel. Increased availability and greater access to renewable energy sources would significantly boost net carbon reduction efforts by those three sectors, within a supportive legislative framework. Cross sector carbon capture and reuse should also result in job creation, to be further investigated.

The study, carried out at European level, is building the ground for similar investigation extended at global level and paves the way for identifying and assessing industrial scale projects on CCU at the interface between the sectors.

“Concrete offers the highest level of life-cycle sustainability performance and we are continuously developing new products and solutions for a low carbon society. This new ambitious partnership will support our mission to cut our net emissions per ton of cement by 40% towards 2030 (versus 1990) and to develop and further deploy low carbon solutions for the construction sector. But to make this a reality, we will need an enabling regulatory framework and support for innovation,” said Bernard Mathieu, Head Group Sustainable Development of LafargeHolcim.

## Global Cement News

### LafargeHolcim Morocco increases capital

LafargeHolcim Morocco will increase its capital, in the light of its merger with Lafarge Cementos.

## Daily Cement

### Oman

### Government Transfers Majority Stake in Oman Cement To Oman Investment Fund

Oman Cement Company (OCOI), listed on the Muscat Stock Exchange, announced it has received a letter from the Ministry of Finance regarding the transfer of

the Government's stake in the company onto Oman Investment Fund.

## Daily Cement

### Qatar

### Qatar Primary Materials Company inaugurates Bulk Materials Handling System

On December 8, 2016, Qatar Primary Materials Company (QPMC) celebrated the inauguration of the Qatar-owned Bulk Materials Handling System (BMHS) which has been successfully developed under the supervision and management of QPMC.

### Saudi Arabia

### Export tariff expected to hit Saudi Arabian cement profits

New legislation requiring cement exporters to pay tariffs of up to US\$35/t is expected to reduce profits. The new import tax is also expected to compound problems for exporters created by restrictions linked to the gradual lifting of a ban on exports. Cement producers are expected to be encouraged to focus on domestic sales instead.

## Global Cement News

### Local companies' cement and clinker inventories rise in 2016

Local manufacturers' inventories of cement and clinker have increased since the beginning of 2016, amid low demand.

## Daily Cement

### City Cement Company upgrades production capacity

City Cement Company announced it has started trial operations, following the project.

## Daily Cement

### Eastern Province Cement to start trial run of new mill in 1H17

Eastern Province Cement Co. announced that the trial operations of its new cement mill are expected to start during the first half of 2017.

## Daily Cement

### GAS Arabian Services to supply gas for Yamama Cement plant

Yamama Cement Co. announced that it has a special agreement with GAS Arabian Services Company to supply fuel for the cement manufacturer's new plant.

## Daily Cement

**Saudi Industrial Development Fund  
Finances Yamama Cement Company**

Yamama Cement Company announced that it has signed a financing agreement with the Saudi Industrial Development Fund.

**Daily Cement**

**Sudan**

**Cement market faces struggles**

The productivity of the sector is declining steadily

**Cemweek**

**Syria**

**Hama Cement to enter maintenance works**

Hama will refurbish its kiln number 3.

**Tunisia**

**New cement plant in Tunisia to open in 2018**

A new 1Mt/yr cement plant in Sidi Bouzid is set to open in 2018. The project is budgeted at US\$220m.

**UAE**

**Union Cement waste heat recovery project recognised by Dubai Carbon Centre of Excellence**

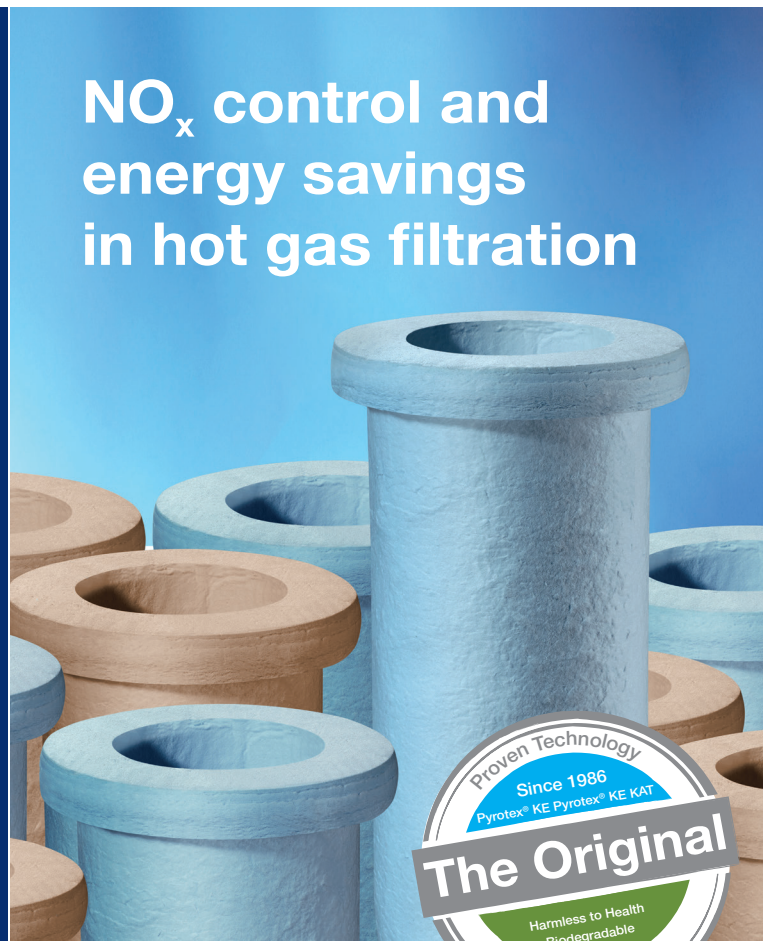
Union Cement's waste heat recovery project has been recognised by Dubai Carbon Centre of Excellence (DCCE) for reducing CO<sub>2</sub> emissions in the emirate in 2016.

**Yemen**

**Yemen: National Cement Company's plant resumes operations**

The plant was closed for repair works

**Cemweek**



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VDZ's premises, Duesseldorf, Germany

#### Topics:

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- Operation of the raw, cement and coal mills
- Optimising production
- Managing process disturbances and special situations



### Cement manufacturing course

Module 1: 08 May – 02 June 2017

Module 2: 25 September – 20 October 2017

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- All main production steps from quarry to dispatch
- Material technology, emissions abatement
- BAT, production optimisation, energy efficiency
- Operational case studies
- Simulator training
- Maintenance, refractories, safety at work
- Visit of cement plant and VDZ's laboratories



### Plant maintenance and refractories course

19 – 23 June 2017

Cement plant in Germany

#### Topics:

- Theoretical and practical maintenance inspection and measurement solutions
- Open gear lubrication and its application
- Online machinery diagnostic and vibration analysis
- Inalienability of non-distortion testing (NDT) and analysis
- Refractory material and installation



### Process operator training

4 – 22 September 2017

VDZ's premises, Duesseldorf, Germany

#### Topics:

- All main production steps from quarry to dispatch
- Material technology
- Emissions abatement
- Simulator training
- Cement plant visit



For further information and booking visit [www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)

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# 14.

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Frugal Innovation: A way that creating high-quality products with limited resources

#### Sub-themes

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#### Registration and Floor Plan

<https://www.tcma.org.tr/ENG/index.php>

tekniks@tcma.org.tr



## AUMUND and SWEIDAN open Spare Parts Stock in Riyadh with AUMUND Supervisor on site

**In continuation of the valued partnership, AUMUND Fördertechnik GmbH, Germany, and SWEIDAN Industrial Services, Riyadh, are keen to announce the opening of the new Spare Parts Stock at the Riyadh Warehouse to be at full disposal with parts instantly available, this is of particular importance in a case of emergency to get the machine running again. Additionally, a local AUMUND Supervisor is available to support the customers.**



The new SWEIDAN and AUMUND warehouse at Riyadh

AUMUND ensures a high level of After Sales Service along with top quality products. For onsite services local AUMUND supervisors are at any time ready to assist the customers for whatever reason: Troubleshooting, technical advice, installation supervision, preventive maintenance service PREMÁS® and equipment inspection.

### **About the AUMUND Group**

The AUMUND Group is active worldwide. The conveying and storage specialists have special expertise at their disposal when dealing with bulk materials. With their high degree of individuality, both its technically sophisticated as well as innovative products have contributed to the AUMUND Group today being a market leader in many areas of conveying and storage technology. The manufacturing companies AUMUND Förder-technik GmbH (Rheinberg, Germany), SCHADE Lagertechnik GmbH (Gelsenkirchen, Germany), SAMSON Materials Handling Ltd. (Ely, England), as well as AUMUND Logistic GmbH (Rheinberg, Germany) are consolidated under the umbrella of the AUMUND Group. In conjunction with the headquarters of the manufacturing companies, the global conveying and storage technology business is

spearheaded through a total of ten locations in Asia, Europe, North and South America and a total of five warehouses in Germany, USA, Brazil, Hong Kong and Riyadh.

### **About Sweidan**

Sweidan Industrial Services is a focused service company that provides innovative solutions to achieve customer satisfaction by meeting and exceeding their expectations; utilizing the latest available technologies with the best practices.

Sweidan forged strategic partnerships and business association with leading global companies and agents, to provide the best products and solutions to a significant number of industries, ranging from cement to petro-chemicals.

Sweidan diverse products and services; which are carefully selected and studied provide a range of options and intuitive support systems, along with the services that are delivered through Sweidan high-skilled technical team.

Sweidan has established its presence in the Middle East region, specifically Saudi Arabia and Jordan, and expanded to Oman, Iraq and UAE markets, in order to gain an insight on the real market needs.

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## Clinker conveying equipment for two new lines

# Yamama Saudi Cement Company counts on AUMUND machines

**Yamama Saudi Cement Company, one of the biggest cement producers in Saudi Arabia, will start up two turnkey clinker production lines in 2018 at a new site to the south west of the capital city, Riyadh. The two lines, with a combined capacity of 20,000 t/d, are being built by thyssenkrupp Industrial Solutions, a subsidiary of thyssenkrupp. In 2016, AUMUND Fördertechnik GmbH won the order to supply the clinker conveying equipment for both lines.**



AUMUND Double bucket elevator (Graphic AUMUND)

The large supply package for Yamama Saudi Cement Company includes 29 chain bucket elevators and 18 belt bucket elevators, in heavy-duty and lighter designs, for these two lines in the Gulf. For raw meal, AUMUND belt bucket elevators will be used. Filter dust will be conveyed by AUMUND chain bucket elevators optimal designed for low capacity.

Two AUMUND double chain bucket elevators with a capacity of 2,300 t/h were ordered per line as recirculating bucket elevators in the cement mill. Double chain bucket elevators are specially designed by AUMUND for capacities above 1,300 t/h, by combining two standard central chain bucket elevators. Both bucket strands run over the same drive shaft which is held by pillow block bearings and driven by double drive units. The symmetrical distribution of weight means that the chain and drive shaft will have long lifetimes. There is no mechanical connection between the two bucket strands. The chain wheels and tension shafts have separate bearings so that any lengthening of a chain that might occur after a long running time can be adjusted independently of the other.

The supply package for the two lines also includes six AUMUND pan conveyors as well as various flat gates, silo discharge gates, telescopic chutes and cleaning conveyors.

“We won the order among other things because of AUMUND’s expertise in advising on concept and design”, says AUMUND MD, Robert Gruss happily, when speaking of the trust of the customer. “Our strategy is to put our focus on a close relationship with our customers, accompanying them from the initial planning stages right through until after commissioning, and it is gratifying to reap the rewards.”

## 108 Machines for greenfield project in Egypt **AUMUND equipment for six new clinker production lines in Beni Suef**

June 2016, Sinoma International Engineering announced that its subsidiary, Chengdu Design & Research Institute of Building Materials Industry (CDI) had signed a contract with the Egyptian government to build six production lines for clinker of 6,000 tpd each, in Beni Suef. AUMUND Fördertechnik GmbH, in close cooperation with its Chinese subsidiary AUMUND Beijing, has now won the order to supply the clinker conveying equipment for the project.

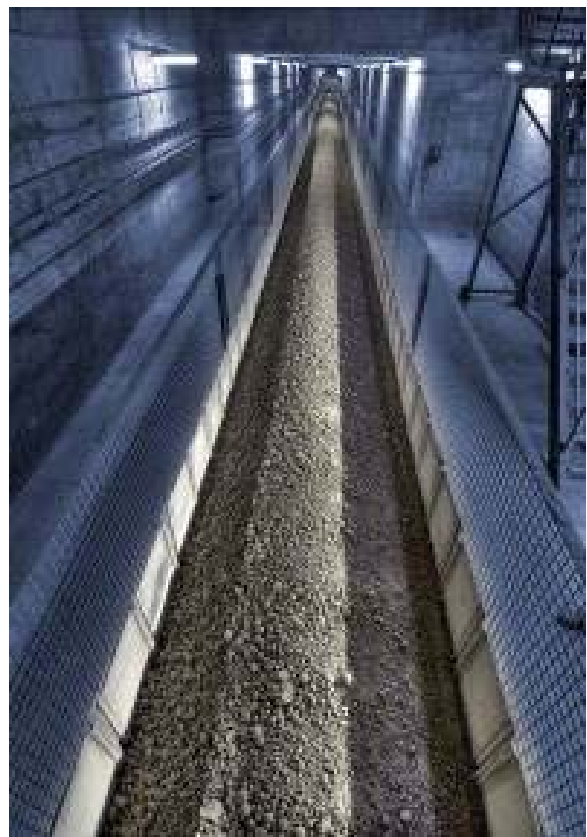
for each of the six lines.

The new greenfield project in Beni Suef is to be fully completed within the next three years. The pilot phase of the new production lines is due to start as early as December 2017.

AUMUND Fördertechnik will supply these 108 Machines to Egypt in three deliveries, between April and June 2017.



AUMUND Bucket Elevator type BWG  
(©AUMUND)



AUMUND Pan Conveyor type KZB  
(©AUMUND)

Egypt, with a capacity of 70 million tonnes, is one of the world's biggest producers of clinker. Around 52 - 54 million tonnes of cement are consumed annually in Egypt. The identical lines will each be equipped by AUMUND with four BWG belt bucket elevators, with capacities up to 650 t/h and three BWZ chain bucket elevators (up to 550 t/h).

The machinery package also includes four BWG-L belt bucket elevators (170 t/h) one BWZ-L chain bucket elevator (80 t/h) as well as six pan conveyors (375 t/h),

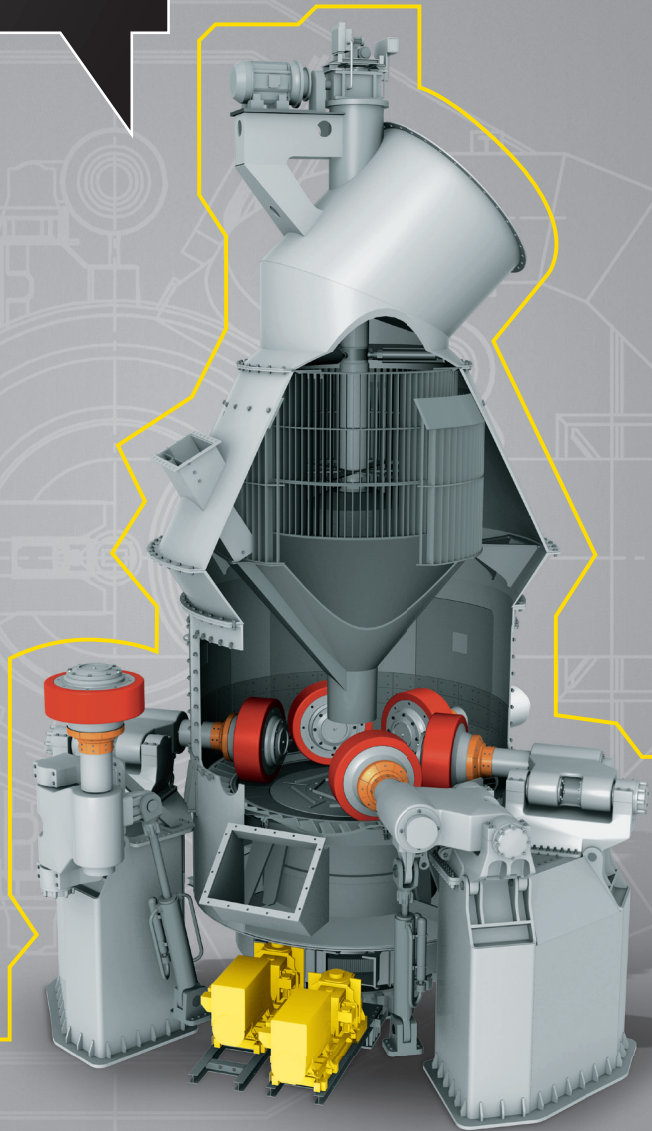
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## VORTEX APPOINTS IBC AS NEW UAE AGENT

Vortex Global Limited, a solids and bulk handling Components Company, announces the appointment of Integrated Business Corporation (IBC) as its new agent in United Arab Emirates, Oman, and Kuwait. IBC is a portal company who utilises local knowledge of developing projects to integrate global partners into the local Omani market.

"IBC's aim is to be one of the top companies for agreements to hold business licenses to expand in Oman and UAE," Rey Acurantes, IBC Business Development Manager says. "We are able to mobilise within these regions at short notice and provide service for our global clients who wish to invest in these countries. We like to develop tailored sustainable solutions that integrate quality systems into the culture and practices of an organisation."

The UAE is currently diversifying its sources of income as oil prices continue to lower across the globe. The Ministry of Economy hope to increase the manufacturing industry sectors to absorb the financial shock of the current oil prices. Projects in base metals, chemicals, food and beverages, machinery, rubber and plastics, cement, glass, and wood are planned to help the UAE economy

"IBC is able to easily identify the challenges of the market in Oman and the Emirates," says Laurence Millington, Vortex Director of International Business. "Being a dry bulk components company, this is an exceptionally good time to enter the Middle Eastern markets. IBC has the expertise to get us there."

About IBC:

IBC, the portal to business in the Middle East, specialises in introducing international brands to the local market in the Middle East giving them unparalleled business opportunities both with private and government sectors. IBC's vision is to improve the business infrastructure and introduce new fields of business to the local and regional market.

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Web: [www.ibcarabia.org](http://www.ibcarabia.org)  
For more information: [VortexGlobal.com](http://VortexGlobal.com)

## VPIstruments launches new website

VPIstruments is proud to announce the launch of its new website: [www.vpinstruments.com](http://www.vpinstruments.com). The producer of energy management solutions has worked hard on giving the site a new "look & feel", adding more features and more functionality.

This website is a dynamic forum that will change constantly. VPIstruments will add process related information, customer cases and educational videos to offer visitors a variety of information on how they can save money on their compressed air and how they can elevate their energy management to a higher level.

Customers are able to login and have access to information catered to their needs, prospects can enter inquiries and search on products or process related features.

VPIstruments provides real-time insight into the consumption of compressed air and technical gases. The equipment shows where, when and how much the usage is. The innovative and user-friendly meters and monitoring equipment guarantee substantial savings. The web-based software of the VPVision monitoring system is the cornerstone of any energy management system with ISO 50001 certification. Investments in products by VPIstruments very quickly pay for themselves.

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For more information, contact:

VPIstruments

Elaine Foster -

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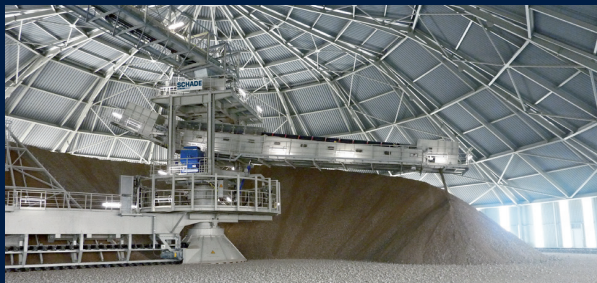
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## SCHADE Stockyard Equipment in the Cement Industry



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### **RAK Ceramics installs a new “industrial gem” with Sacmi in Bangladesh**

*Advanced technology and plant engineering for a new facility that will be producing a full complement of porcelain tiles. Sacmi reinforces its strong partnership with one of the world’s largest ceramics’ manufacturers.*

One of the largest ceramics’ brands in the world, RAK Ceramics produces 110 million square metres of tiles, 5 million pieces of sanitaryware, 24 million pieces of porcelain tableware and 600,000 pieces of faucets per year at its 17 state-of-the-art plants across the United Arab Emirates, India, Bangladesh and Iran. At its production facility in Bangladesh, **RAK Ceramics** recently started up an all-new plant, an industrial gem producing **12,500 square metres of tiles a day**, all fully controlled with **Sacmi technology**.

Successful testing and production at the new plant began in Q1 2016 and this latest plant is dedicated to the manufacture of technical porcelain floor tiles and wall tiles for the thriving local market. The added capacity brings the total output of RAK Ceramics’ Bangladesh operations to **25,000 square metres a day**, thus reinforcing its leadership position locally in the **quality ceramic products** sector.

The new production facility – located 60 km from the capital Dhaka – consists of an **MMC 092 modular mill**, designed to provide **energy savings of up to 40%** compared to traditional drum mills. Downstream is an **ATI 110 spray dryer**, also engineered and supplied by the Sacmi Impianti division, flanked by two MTD 340 mills.

The heart of the plant is the pressing department. This consists of no less than **three PH 5000L presses** (with an inter-column clearance of 1750 mm) that feed into two five-channel **EMS** driers with an effective load width of **2850 mm** and a length of 22.4 metres. RAK Ceramics has chosen this type of high tonnage press, together with very high-performing driers, in order to focus on manufacturing **all the variants of medium-large porcelain tiles** (technical and glazed) that are in high market demand.

Sacmi has also supplied **two inkjet digital decoration machines** developed and built by **Intesa**; these join numerous other decorating solutions already supplied to the RAK Group and there are now **a total of 14 Sacmi-Intesa decoration machines installed in their plants worldwide**.

To demonstrate its capacity to act not just as a machine supplier but also – and above all – an **all-round partner for the implementation of “turnkey” systems and services**, covering everything from development of the graphic image to production and storage of the decorated slab, Sacmi has also provided RAK Ceramics’ Bangladesh production facility with **2 sorting lines** designed by **Nuova Fima**, the group brand specialising in the design of automated end-of-line solutions. Completing the order there is, upstream, the necessary plant for the department where **glaze grinding** and concentrated colour preparation take place. For the firing department, Sacmi has supplied an all-new **153.3-metre single-channel FCC 2950 kiln** equipped with advanced **systems that recover cooling air** and then channel it towards the combustion zone to optimise and reduce gas consumption.

The completion of this installation in Bangladesh reinforces the **long-standing partnership between Sacmi Imola and RAK Ceramics**, which involves not only the Group’s many production facilities on several different continents but also their other core businesses of sanitaryware and tableware (**RAK Porcelain**).



**SIMAN NEWS**

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www.cementgroup.ir

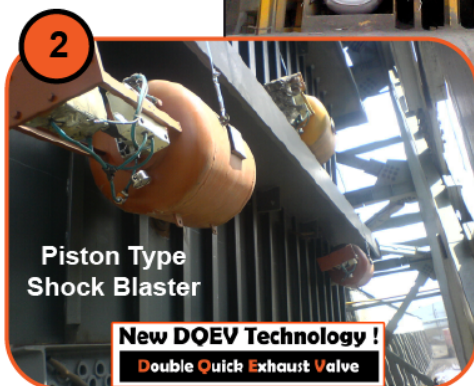
Complete Directory Of Iran Cement Factories & Engineering Companies

IRAN Cement Industry Capabilities and Equipments Production in SimanKhabar.ir

**SK Automatic Big Bag Filling Station With Lifting System**



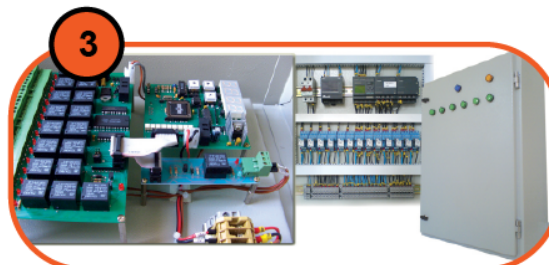
**SK Cement Packer**



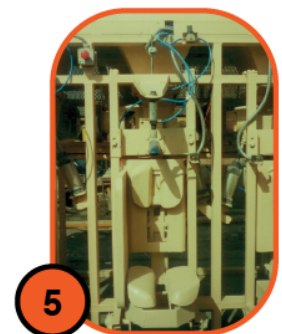
Piston Type Shock Blaster

**New DOEV Technology !**  
Double Quick Exhaust Valve

**SK Shock Blaster**



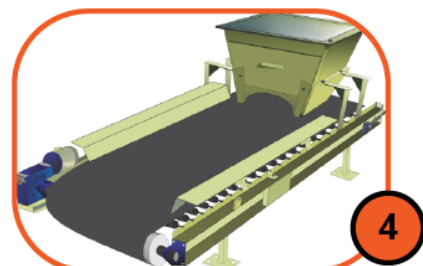
**SK Bag Filter Jet Pulse Controller**



**5**



**SK Weigh Feeder & Belt Scale**



**4**

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# THE “PARIS AGREEMENT” ON CLIMATE CHANGE: AN OPPORTUNITY FOR CEMENT SECTOR TO FURTHER REDUCE ITS CO<sub>2</sub> EMISSIONS

By: Philippe Fonta, Managing Director  
Cement Sustainability Initiative (CSI)  
World Business Council for Sustainable Development (WBCSD)

## **INTRODUCTION: A VOLUNTARY SECTORAL APPROACH**

Carbon emissions is an important sustainability issue for the cement industry as global cement manufacture accounts for about five percent of all man-made CO<sub>2</sub> emissions: about 60% of these emissions come from the raw materials used in the manufacturing process of cement, the basic chemical de-carbonation of limestone into lime releasing CO<sub>2</sub> whereas about 40% of these emissions come from the energy required to ensure the above chemical reaction and to heat the materials to a temperature of about 1450°C.

Aware of the challenges of the sector, some leading companies decided in 1999 to voluntarily cooperate in mitigating their CO<sub>2</sub> emissions and fighting against climate change, convinced that a collective approach would scale up the sector's improvements.

They then created the Cement Sustainability Initiative (CSI), a voluntary worldwide initiative under the auspices of the World Business Council for Sustainable Development (WBCSD) to collectively tackle the issue of climate change amongst other sustainability issues at stake for the sector. In order to be able to exchange information and best practices, while operating under the strict compliance of existing national and international anti-trust laws, the CSI established a robust governance structure with regular legal review of its operations.

In addition to this voluntary initiative, the CSI has been advocating for supporting policies and incentives to enable the sector implement the technical solutions at a scale and speed that is necessary to meet the challenges of climate change. For instance, the CSI has been advocating for on a long-term, universal climate agreement to enable the private sector to undertake appropriate long-term investments, and has been promoting the development of regulatory and financial incentives for innovative low-carbon cements.

## **THE PARIS AGREEMENT: A SIGNAL OF HOPE**

Over the past decades, most people agree that the process of UN negotiations was long and unsuccessful, moreover with regards to the challenge of climate change and the urgency to solve it. The limited success of the Kyoto Protocol, adopted in 1997 and only entering into force in 2005 was the perfect illustrative example of this lack of commitment. In the run-up of the Paris meeting, in 2015, the most sceptical people were pointing out that the meeting was the COP21<sup>1</sup>, i.e. the 21st meeting of that kind and that up until now, the results had always been disappointing.

However, in the various preparatory meetings of the COP21, every person involved could feel a different atmosphere, and although nobody would dare to say it openly, there was good hope to reach an agreement in Paris; one of the reasons why this relative optimism was present is because for the first time in the UNFCCC process, various stakeholders were sharing information, expertise and wishes. For the first time in history, the business was invited in the zone where the negotiations were happening and was not reduced to having side-events and meetings in another hotel at the over side of the city.

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<sup>1</sup> COP21 is the twenty-first session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris from 30 November to 13 December 2015

Then, only two weeks before the beginning of the COP21, terrorist attacks struck the city of Paris, challenging the possibility to maintain the COP21 in Paris as scheduled, and if so, suggesting that head of states and governments would be more focused on immediate safety and security issues rather than on climate change ones that appear for some of them as being of a more longer-term horizon.

Despite the difficult environment, an international multilateral, legally-binding agreement, known as the “Paris Agreement”, was officially adopted by 195 Parties on 12 December 2015 at COP21.



#### Adoption of the Paris Agreement on December 12, 2015

This agreement is a clear signal of hope and it also sets the framework for enhanced cooperation between the different stakeholders (States called Parties and non-party stakeholders being the private business companies as well as the civil society and non-governmental organisations).

Aiming at maintaining the global temperature increase well below the 2°C above the pre-industrial levels, pursuing efforts to limit the temperature increase to 1.5 °C above these levels, the Paris agreement targets a complete decarbonation of the economy by the end of the XXIst Century. It is an ambitious and balanced agreement, which defines commitments for all States based on their own impact on climate change through their own CO<sub>2</sub> emissions. Contrary to the preceding Kyoto Protocol, the Paris agreement does not have a fixed and limited period of implementation but it sets a permanent regime with regular updates for reporting and adjusting the ambitions defined by the different Parties. As such, it is a bottom-up approach, built on the Parties’ objectives of emissions reductions: it becomes obvious that the different Parties will ask the various sectors of the economy to report their emissions in order for them to consolidate their national stocktake (global volume of emissions) and be able to adjust their Nationally Determined Contributions (NDCs) with more ambitious targets. It will then be essential for the various sectors to be able to measure and report these emissions and, as requested for the Parties, to have these emissions reports verified and validated by an independent third party. Cooperation between states and non-state stakeholders will be more than ever essential, and some sectors like the cement sector, through CSI, have a long experience on reporting their emissions and having them verified by an independent third party.

Having these emission levels verified by an independent third party and the Parties committed to a regular update of their global stocktake and associated ambitions makes of the Paris agreement a legally binding text, which was a condition of success for this agreement.

Based on the Nationally Determined Contributions (NDC), the agreement is considered as successful as it sets the basis for implementing solutions, reinforcing the role and action of economic stakeholders and setting up a financial and technological package, essentially to help the developing countries.

**CSI MEMBERS ARE FULLY PREPARED TO THE NEW REGULATION**

Contrary to the Kyoto Protocol, the Paris Agreement entered into force on 4 November 2016<sup>2</sup>, only 10 months after its formal adoption. This accelerated ratification process, a “first” in United Nations history, demonstrates a clear change in the Parties’ commitment, reflecting the urgency for all stakeholders to fight against climate change and its impacts.

Members of the Cement Sustainability Initiative (CSI) welcome this historic moment and are ready for its implementation, having voluntarily established an independently verified database of CO<sub>2</sub> emissions. In 2001, CSI companies developed a common “Energy and CO<sub>2</sub> emissions” reporting protocol for the cement sector, based on the reference GHG protocol elaborated by the WBCSD and the World Resources Institute (WRI). This protocol (in its third version since 2011) ensures that all CSI members report their CO<sub>2</sub> emissions, using the same methodology, to a centralized database, called “Getting the Numbers Right” (GNR).

The GNR database, managed by an independent third party to comply with anti-trust regulations, is the most comprehensive database of independently verified CO<sub>2</sub> emissions that any industrial sector has ever established. This year is the 10th consecutive reporting year, bringing a robust performance tracking of the sector over a significant period of time. Showing a continuous reduction in CO<sub>2</sub> emissions, it also enables companies to define their future reduction targets and pilot their individual performance.

This process, a requirement for CSI membership, is fully consistent with the framework defined in the “Paris agreement” by which Parties must regularly report their CO<sub>2</sub> emissions, verified by independent third parties and adjust their Nationally Determined Contributions (NDC) with more ambitious objectives accordingly.

**GNR PROJECT  
Reporting CO2**



Select a region :

Glossary: definition of the main indicators of the project

Synthesis: number of plants, number of contributors, coverage

Download Excel report

**Production**

<b>8TG</b>	Total production volumes of clinker Grey clinker	t clinker
<b>8TGK</b>	Total production volumes of clinker Grey cement - by kiln type	t clinker
<b>8TGK%</b>	Total production volumes of clinker Grey cement - by kiln type (%)	% clinker
<b>21TGWcm</b>	Total production volumes of cement Grey and white cement	t cement
<b>21TGWct</b>	Total production volumes of cementitious products Grey and white cementitious products	t cementitious products
<b>21TGWce</b>	Total production volumes of cement equivalent Grey and white cement equivalent	t cement

**CO2 emissions**

<b>59cTGW</b>	Total gross CO2 emissions excluding CO2 from on-site power generation - Grey and white cement	t CO2
<b>59cTGK</b>	Total gross CO2 emissions excluding CO2 from on-site power generation - Grey cement - by kiln type	t CO2
<b>59cTGK%</b>	Total gross CO2 emissions excluding CO2 from on-site power generation - Grey cement - by kiln type	% CO2

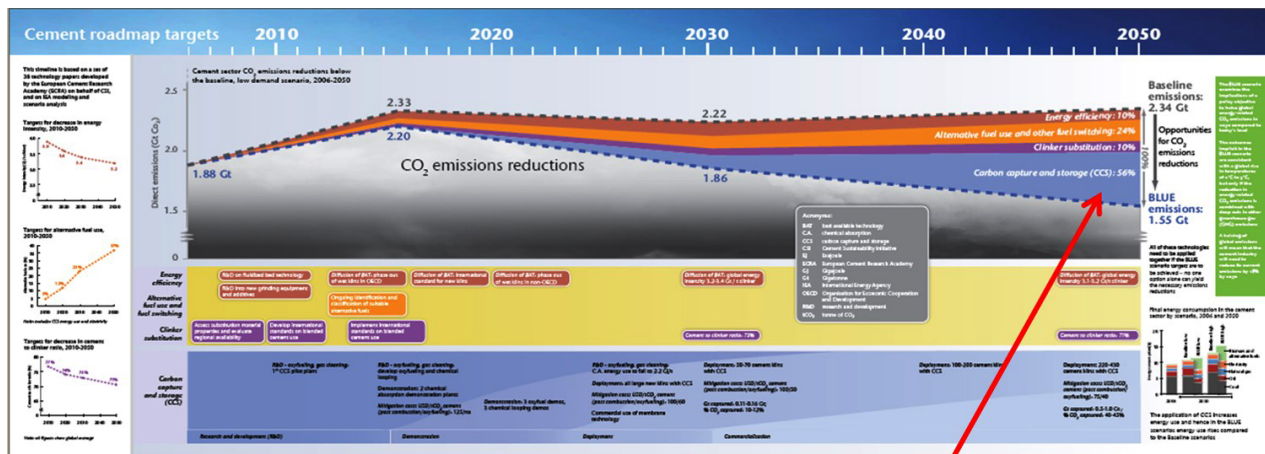
**GNR database, accessible at <http://www.wbcscement.org/GNR-2014/index.html>**

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



**THE NEED FOR ENHANCED COLLABORATION**

The Paris agreement emphasizes the need for enhancing cooperation between Parties and non-Party stakeholders. Once again, the CSI and its members had identified this trend and anticipated its implementation. As early as 2009, the WBCSD and the International Energy Agency (IEA) issued the very first sectoral Low Carbon Technology Roadmap, paving the way for other sectors to follow. Based on robust technology papers developed by the European Cement Research Academy (ECRA), this roadmap identifies the available and developing technologies, including breakthrough advancements and evaluates their potential and their needed implementation level to remain within the 2°C temperature increase above the pre-industrial levels, the key commitment of the Paris agreement.



Published by IEA/WBCSD 2009

**Emissions reduction levers:**

- Energy efficiency
- Alternative fuels
- Clinker substitution
- CCS

**2009 WBCSD/IEA Low Carbon Cement Technology Roadmap,**

Available at <http://www.wbcscement.org/index.php/key-issues/climate-protection/technology-roadmap>

Scaling-up the implementation of these technologies is essential to match the potential identified by the roadmap. Moreover, developing regional technology roadmaps (India, Brazil, Latin America...) to better fit to the local contexts will enable to better assess the potential of each technology by enhancing the granularity of the evaluation and also by involving local experts and stakeholders. Once some regional roadmaps have been developed, their results can be incorporated into a revision of the Global Roadmap. Based on revised and new Technology Papers, a complete update of the Low Carbon Cement Technology Roadmap is planned for 2017

Beyond the tremendous efforts already being undertaken by our cement companies worldwide, through the collaborative approach of CSI, we believe that further action is needed. In the preparation of the COP21 in Paris, we established a shared statement of ambition, by which CO<sub>2</sub> emissions should be reduced in the range of 20 to 25% by 2030 compared to business as usual, an average emission rate equivalent to the emissions of the best-in-class CSI company 2020 targets.

To move forward towards this aspirational goal, we, CEOs of the cement companies supporting this ambition, invite the whole sector to join and set-up the following action plan:

1. Enhance the coverage of the sector’s CO<sub>2</sub> emissions and energy consumption database, with a specific focus on China (about 60% of cement worldwide production).
2. Enhance overall energy efficiency of the cement manufacturing process.
3. Scale-up the collection, availability and usage of good quality alternative fuels and raw materials, including relevant waste from other sectors in a circular economy approach.
4. Further reduce the clinker content in cement to minimize the share of the energy-intensive

part of the process.






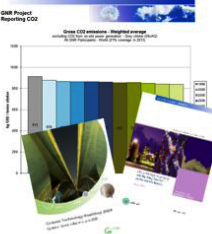

5. Develop new cements with reduced net CO<sub>2</sub> emissions over the full life cycle.
6. Engage the full building and infrastructure value chain in local markets to identify and maximize the avoided emissions by usage of cement and concrete products.
7. Evaluate cross-sectoral initiatives, particularly on the opportunity to capture, use and store carbon (CCS-U).

## Low Carbon Technology Partnership Initiative (LCTPi) – Cement

A **WBCSD**-led movement as the voice of business on sustainability issues

- Building up towards the **UNFCCC COP21 meeting in Paris** (Dec 2015)
- Elaborating sectoral statement of ambition and an action plan of technical solutions to reduce CO<sub>2</sub> emissions through partnerships
- The **CSI** is coordinating input from the **cement sector**

**Ambition: Scale up emission reduction in the range of 20 to 25% CO<sub>2</sub> in 2030 compared to business as usual**

<p>Enhancing energy efficiency of the cement manufacturing process</p> 	<p>Reducing clinker / cement ratio</p> 	<p>Engaging the full value chain to maximize avoided emissions by usage of concrete</p> 	<p>Evaluating cross-sectoral initiatives to up capture, use &amp; storage of carbon</p> 
 <p>Scaling up use of alternative fuels</p>	 <p>Scaling up coverage and implementation of the CSI tools (GMR, technology roadmaps) globally, with a focus on China</p>	 <p>Developing new cement clinkers with lower energy &amp; calcination requirements</p>	

**Key partners:** International Energy Agency (IEA), International Finance Corporation (IFC), national trade associations

### Cement Low Carbon Technology Partnership initiative (LCTPi)

#### TRADITIONAL SOLUTIONS

As identified in the 2009 WBCSD-CSI Low-carbon Cement Technology Roadmap and reinforced during the overall reflexion undertaken through the LCTPi process in the run-up of the Paris COP21 meeting, traditional technical solutions such as enhancing energy efficiency, reducing clinker/cement ratio and scaling up the use of alternative fuels have been identified again as levers to reduce the impact of the cement sector on climate change.

For instance, to increase electrical and thermal efficiency in cement plants, the following actions need to be implemented:

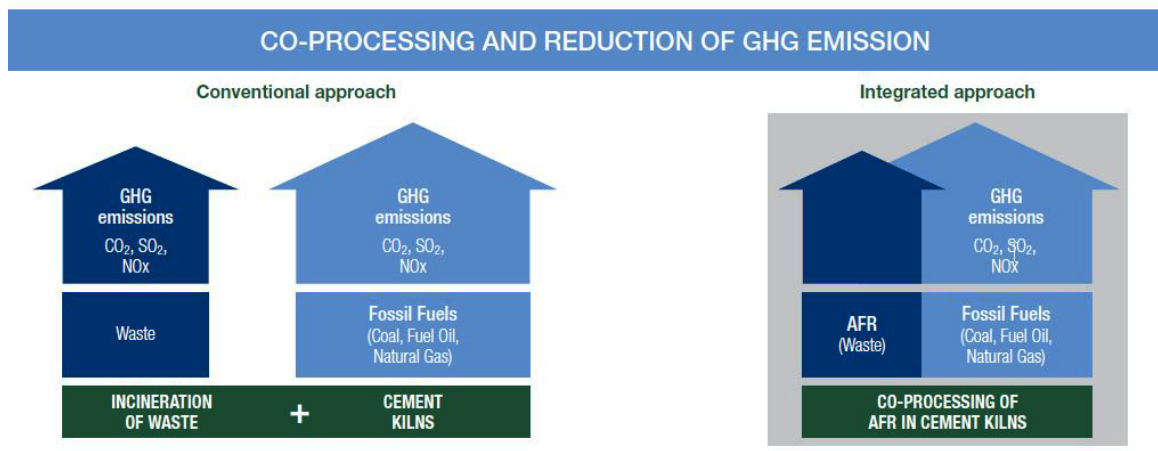
- Appropriate and regular training to ensure that plants are operated and maintained in order to ensure the optimum efficiency in operations;
- Increase use and production of renewable energy including waste heat recovery (WHR);
- A significant increase in Research and Development (R&D) over the long term is needed within the cement industry. Investment along the whole chain of innovation, from college level training to industrial-scale innovations, must come from academia, the industry, equipment suppliers and governments;
- Creation of public-private partnerships to help minimize technological risks and create options to increase energy efficiency or reduce CO<sub>2</sub> emissions;
- Phase-out inefficient long-dry kilns and wet production processes in both developed and developing countries;
- Develop and implement international standards for energy efficiency and CO<sub>2</sub> emissions in the cement industry;
- Share best practice policies for the promotion of energy efficiency and CO<sub>2</sub> emissions reductions in the cement industry; and
- Conduct regular energy audits;
- Have standard measurement and verification (M&V) procedure, cement companies and technology suppliers must work together to agree upon the standard mechanism of replacement (for instance, fan replacement) or retrofits.

In addition, to further reduce the clinker content in cement the following actions need to be implemented:

- R&D in processing techniques. Documented assessment of substitution material properties is needed to understand and communicate which substitute are best fitted for which intended applications.
- Cross-sectoral collaboration. Develop and cross-reference roadmaps for different industries which are linked to the cement industry by the production of clinker substitutes. This will enable forecasting of the effects of mitigation technologies in one industry impacting mitigation potential in other industries.
- Develop best practice guidelines and increase acceptance. Independent environmental impact studies (EIS) on the use of key substitution materials by the cement and other industries to show where to achieve the highest potential emissions reductions.
- R&D into processing techniques for potential clinker substitutes that cannot currently be used due to quality constraints.
- Promote international training events with national standardization bodies and accreditation institutes to exchange experiences on substitution, concrete standards, long-term concrete performance of new cements, and environmental and economic impacts.
- Consider standards that allow the use of blended cements and concrete with high recycled content.
- Establish hierarchy for recycled content in new building code - mandatory codes.

Finally, with regards to scaling-up the collection, availability, pre-treatment and usage of quality alternative fuels and raw materials (including waste from other sectors in a circular economy concept), the following actions need to be implemented:

- Promotion of co-processing in cement kilns in developing countries, for instance partnering with United Nations Industrial Development Organization (UNIDO), and enabling widespread expertise in using alternative fuels;
- Partner with other industrial sectors to raise the availability of suitable waste streams for the cement industry;
- Review and potentially update regional, national and local level legislation to ensure the use of alternative fuels and biomass is incentivized by policy;
- Develop resource use indicators, possibly partnering with World Resources Forum (WRF);
- Promotion of social acceptance, diffusion of the CSI coprocessing and stakeholder engagement guidelines and ensuring operators follow common sets of guidelines on alternative fuel use to guarantee adequate processes, e.g. providing induction and retraining, documenting and monitoring, for employees and contractors;
- Organize workshops aiming at sharing knowledge and showcasing best practices in the usage of alternative fuels (e.g. CSI Forum 2012 in China); and
- Develop inventories and categorize waste streams needed in some countries.



**source: The European Cement Association (CEMBUREAU)**

All these solutions will only be possible with a clear cooperation between the different stakeholders, whether they are from the private sector, the policy-makers and the financial community. For instance, in some countries, the authority applies the legislation for waste incinerators to cement kilns conducting co-processing activities. The temperature, residence time and level of final residues clearly demonstrate that a cement kiln has operating conditions and constraints far different than the ones of incinerators. Through proper discussion, mutual knowledge sharing and understanding, we can expect that a scaling up in usage of alternative fuels and raw materials could happen and deliver the potential that was highlighted in the low-carbon cement technology roadmap. A table of the different stakeholders and where their involvement is expected is given below.

**Partner roles**

**Potential impacts**

item/partner	industry	industry suppliers	governments (including local municipalities)	universities	research institutes	
best practice	x	x				<p>Low High</p> <p>Energy savings</p> <p>CO<sub>2</sub> savings*</p> <p>Cement production</p> <p>Investment needs</p> <p>* Range given depends on the definition of alternative fuel used</p>
technology research	x \$	x \$	\$	x	x	
technology diffusion	x \$	x \$	\$			
institutional structure	x	x	x	x	x	
performance data	x					

x = leadership role and direct involvement required  
 \$ = funding source

**Partners roles and potential impacts on the scale-up of alternative fuels and raw materials usage**

**NEW SOLUTIONS**

Beyond the traditional technologies identified as soon as 2009 through the development of the first sectoral low-carbon technology roadmap for cement, some new technologies that were not evaluated through the above-mentioned roadmap need to be properly assessed to provide the complete picture of the sector’s potential. One of the avenues is to develop new cement clinkers with lower energy and calcination requirements and new cements that sequester CO<sub>2</sub> through a carbonization reaction while hardening; the following actions will be implemented:

- R&D in processing techniques. Documented assessment of potential to lower raw material costs for belite-calcium sulfoaluminate-ferrite clinkers. Further development of this class of materials to make them more competitive in cost to OPC;
- Sectors collaboration. Develop incentives for the concrete products industry which has little or no CO<sub>2</sub> emissions to enable adoption of new technologies that have the potential for mitigating CO<sub>2</sub> emissions from the cement industry;
- Develop best practice guidelines and increase acceptance. Independent EIS on the use of low clinker cements by the cement and other industries to show where to achieve the highest potential emissions reductions;
- Join new cements and cementitious materials research initiatives, e.g. École polytechnique fédérale de Lausanne (EPFL) 2 & UNEP SBCI initiative ;
- Wide promotion of alternative sources of funding for low carbon technologies in the cement industry, including export credit agencies and multilateral development banks (e.g., Climate

Investment Funds 3) administered by the World Bank Group, International Finance Corporation (IFC) 4), European Bank for Reconstruction and Development (EBRD) 5), European Investment Bank 6) and energy services companies.

- R&D into totally new classes of cement clinkers with the potential for lower energy and lower calcination emissions; and
- Promote international training events with national standardization bodies and accreditation institutes to exchange experiences on new types of cements, concrete standards, long-term concrete performance of new cements, and environmental and economic impacts.

Additionally, it will be essential to engage the full building and infrastructure value chain in local markets and maximize the avoided emissions by use of innovative cement and concrete products. On that purpose, it will be necessary to increasingly base the selection of building materials and solutions on an assessment of impacts over the full life-cycle of buildings and infrastructure projects, covering extraction of raw materials, processing, transportation, construction, use phase and end-of-life (demolition / reuse) (cradle-to-grave / cradle-to-cradle); the following actions need to be implemented:

- Enhance and expand the benefits that concrete brings in terms of mitigation and adaptation, increase the associated awareness and knowledge about it;
- Support customers in their striving to implement more sustainable projects by providing expertise and consultancy;
- Support actively the use of life cycle assessment (LCA) methodologies, including but not limited to:
  - o Constructive participation in the development of LCA-related standards, methodologies, tools, and best practices;
  - o Provision of Environmental Production Declarations (EPDs) for concrete and other building products as key quantitative input for a meaningful impact assessment over the full life cycle of buildings and structures;
  - o Increased use of LCA techniques for internal decision making (e.g. selection of technologies, processes, fuels, materials etc.);
- Develop a common methodology and a simplified life-cycle framework for buildings and materials;
- Identify breakthrough cooperation opportunities, at cross-sectoral level, to evaluate the complete life-cycle of the products from other sectors, including the possibilities that some outcomes of one sector could be inputs for other sector in a full circular economy approach; and
- Promote concrete pavements and demonstrate the avoided emissions over asphalt.

Finally, the industry believes that the different sectors having an interest in carbon capture technologies and their applications should consider working together and this potential will certainly materialise only if each and every sector mutualise their knowledge and potential for the benefit of the collectiveness.

To evaluate cross-sectoral initiatives, particularly on the opportunity to capture, use and store carbon at scale, the following actions will be implemented:

- Identify costs and benefits of Carbon Capture and Utilisation (CC&U) for the cement and steel sectors, transforming CO<sub>2</sub> and CO into fuels and other applications thanks to the chemical sector's solutions;
- Measure the CO<sub>2</sub> emissions from manufacturing processes and products;
- Cooperate with the proactive energy-intensive sectors to facilitate the implementation of existing and breakthrough technologies identified through this initiative, a cooperation with the LCTPi on CCS could be envisaged;
- Promote appropriate regulatory framework and financial incentives mechanisms;
- Expand efforts by government and industry to educate and inform the public and key stakeholders about CCS / U; and
- Investigate linkages into existing or integrated networks and opportunities for cluster activities in industrial zones. Enhance the collaboration by building local and global partnerships benefiting from the synergies between the various actors, scale up the implementation of business solutions to build a low-carbon society.

### **CONCLUSION**

Clearly there is a world “Before Paris” and a world “After Paris”.

The Paris agreement has now entered into force, faster than any similar UN treaty, agreement or protocol. But more importantly, it is supported by the most progressive stakeholders of the business economy who have understood that the interest for working on climate change mitigation and adaptation makes also good business sense.

CSI will continue scaling-up its activities through its collaborative platform, partnering with the sector's various trade and industry associations and expanding the coverage of its activities through additional members and the enhanced deployment of its tools.

On 13 & 14 December, 2016, the CSI convened cement companies and a broad range of stakeholders to Madrid, for its annual Forum, to share the achievements reached in the first year after Paris and the next milestones of its global action plan on climate change, including enhanced energy efficiency and use of alternative fuels, reducing the clinker to cement ratio, identify and measure the avoided emissions throughout the value chain by using innovative concrete, the development of new cements and concrete and the carbon capture and utilization or storage opportunities.

This type of Forum shall be multiplied in various regions and countries to solicit higher interest and contribute to scaling up the activities and positive impact of CSI, through increased membership and improved performance of all its members

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**WORLD  
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# Potentials to improve performance and optimise the cost of cement production

**By: Martin Schneider // VDZ, Germany**

## **Abstract**

In addition to the everyday challenges of plant operation, the production process has to be constantly checked with regard to its operating efficiency and competitiveness. A detailed analysis based on a technical review reveals measures to reduce the specific energy demand, improve capacity utilisation or identify corresponding bottlenecks. This outcome can lead to a significant reduction in production costs while also positively influencing energy and resource efficiency.

VDZ energy efficiency analysis services are designed to identify potential energy savings in the cement production process and to improve the energy efficiency of the whole production line. Plant energy data are benchmarked against the VDZ database and BAT, allowing a fair and neutral assessment of fuel and electric energy efficiency. This results in an optimisation strategy to reach specific targets (e.g. clinker production rate, cost reduction), taking into account the need to ensure the consistency and uniformity of the product chemistry throughout the process. If required, solutions for emission reductions are proposed and the maintenance strategy is also reviewed. Finally, the potentials for cost reduction are identified.

Since the implementation of the measures proposed relies on skilled workforces, a performance review can be accompanied by corresponding training with a dedicated focus on the various subprocesses in the cement plant.

## **Introduction**

In addition to the everyday challenges of running a plant, the production process has to be constantly checked with regard to economy of operation and competitiveness. If necessary, the equipment has to be upgraded to be future-compatible by incorporating the latest technological developments or spare parts. Technical reviews, bottleneck analysis and process optimisation can significantly contribute to good plant efficiency and a good cost structure. This also includes the development of adequate key performance indicators and subsequent benchmarking. In addition, the right fuel mix, based on the characteristics of the fuels and their regional availability are of high importance. This has all to be seen against the background of good cement quality, which requires not only good laboratory expertise but well trained employees at the plant. VDZ has been a good partner to cement producers worldwide for many years to evaluate their plant performance and if necessary improve it.

## **Thermal energy efficiency**

Most of the fuel energy used in cement production is required for burning the cement clinker. Only a small amount of thermal energy is employed for drying other cement main constituents such as blast furnace slag. The principal raw materials are limestone marl and clay. The raw materials are burnt at temperatures of between 1 400 and 1 450 °C for the production of cement clinker with its characteristic properties. Due to the fact that a high-temperature process is necessary to satisfy the product requirements, the cement industry is one of the most energy-intensive branches. It has always made efforts to reduce its energy requirement with a view to cutting the high fuel energy costs involved.



The energy demand of a plant can be assessed in various ways, depending on the starting condition and the improvement potential. Already some 20 years ago, VDZ developed its kiln test to create a reliable basis for the optimisation of individual system components, operation and cement quality, and the reduction of emission levels. The objective of balances of volatile, e. g. alkali, chlorine and sulphur, and nonvolatile compounds is the assessment of material cycles and coating formation. The utilisation of alternative fuels, for instance, usually entails higher chlorine input into the kiln system, which in some cases results in malfunctions due to increased coating formation in the kiln inlet section and the lower cyclone stages. A schematic description of the parameters to be measured is shown in figure 1.

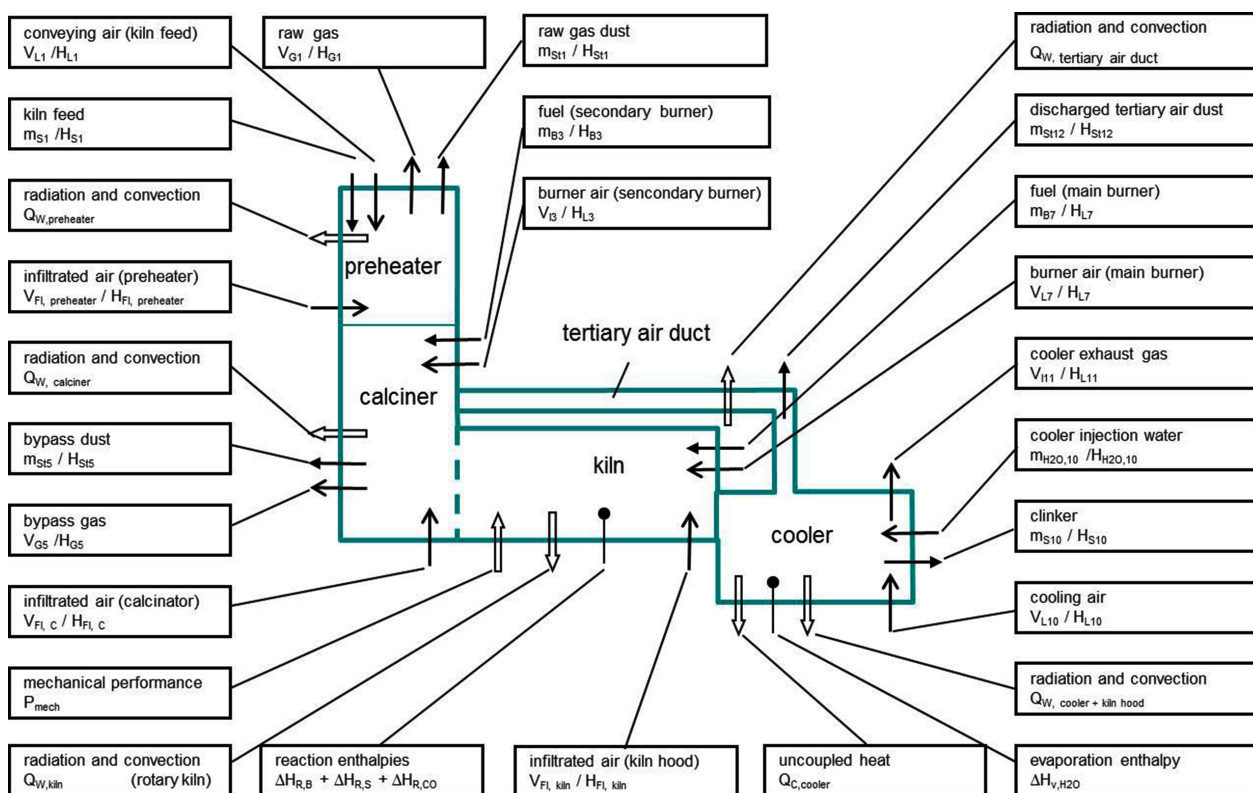
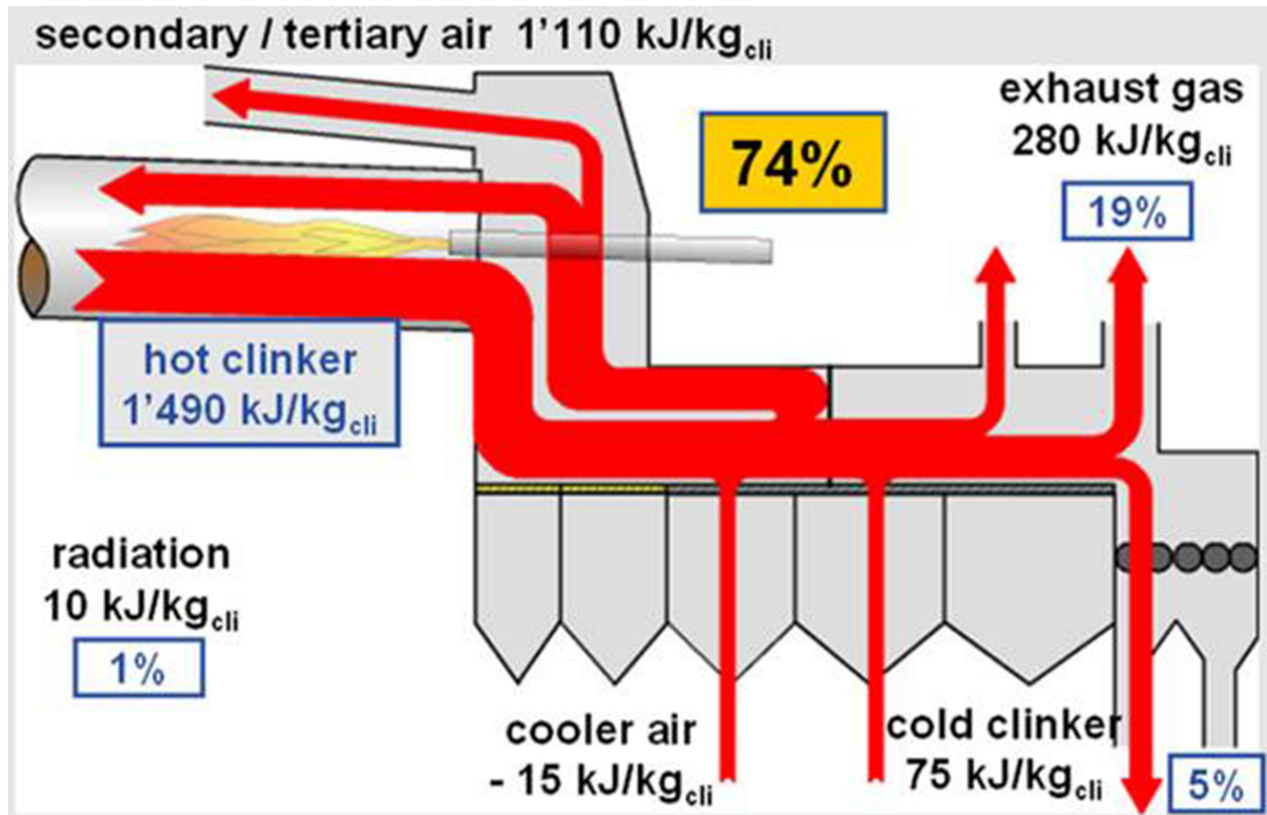


Figure 1: Energy balance of the full rotary kiln

A kiln trial, aiming at the investigation of material cycles, provides reliable data for the design or the upgrading of a bypass system. Balance investigations for trace elements can be carried out in order to obtain more knowledge about the behaviour of heavy metals in the kiln plant. The heat recuperation of clinker coolers is influenced by the cooler operation, cooler exit air and secondary air and at precalciner kilns by tertiary air. The degree of heat recuperation affects the fuel energy consumption and energy balance of the complete kiln line. Therefore, the determination of cooler efficiency may result in optimising the operational mode or in modifying the cooler technology. Figure 2 shows the result of such an assessment and enables a dedicated improvement plan. This can also help the decision to replace the cooler, since cooler technology has always been crucial to improving the energy efficiency of clinker burning. It is well known that fourth generation clinker coolers are widely available and new proposals have been made to further enhance the recuperation rate. This might ultimately result in waste

heat from the cooler with a sufficiently high temperature for even the on-site generation of electricity. To what degree this is possible and under what cost considerations recommendable depends on the specific situation in the plant but also on the local electricity market and energy policies.



**Figure 2: Assessment of the clinker cooler efficiency**

VDZ's assessment of the energy performance is based on key performance indicators derived from VDZ's data base. The approach is based on BAT (Best Available Technology) which takes into account the kiln design (capacity and type) and in addition the substitution rate of alternative fuels. Figure 3 gives an overview of a number of kilns which have been analysed by VDZ in recent years. While 3,000 kJ/kg can be seen as the energy consumption under performance conditions, the annual average for a BAT kiln of 3,000 t/d capacity is in the range of 3,160 to 3,320 kJ/kg of clinker. This refers to the use of coal as fuel – depending on the substitution rate of alternative fuels the consumption slightly increases.

It is well known in the cement industry that false air intrusion significantly increases the energy consumption of a kiln. As a result the reduction of the intrusion beyond today's levels by optimising the current sealings becomes even more important for overall energy efficiency. In order to reduce false air ingress the focus should be on non-permanent joints and on how these should be designed in order to fulfil the requirements of the respective sealing locations most comprehensively. Therefore, sealing locations such as the kiln inlet, kiln outlet, inspection doors, pokeholes, pendulum flap boxes, feed ports and rotary feeder and also control devices have to be examined. To determine the actual ingress of false air through the sealing locations of a clinker production the formula for the Poisseuille flow is used, taking into account the pressure difference between both sides of the sealing, the dimensions and geometrical properties of the sealing gap and also the temperature and viscosity of the involved gases. The calculation identifies the false air ingress of a conventional clinker production line, operated conventionally and equipped with state-of-the-art sealing technology.

An example of such an examination identified the kiln inlet sealing, the tertiary air (TA) slide damper, pendulum flap boxes, poke holes and specifically the inspection doors in the upper preheater tower as the major contributors to false air intrusion as shown in table 1. These doors by themselves provide approximately one third of the total false air because of the high differential pressure against which they have to seal. Accordingly, these identified sealing locations provide the biggest potential for false air reduction. According to the location and nature of the sealing, the prevalent specifics create requirements and side conditions of different importance for each of the

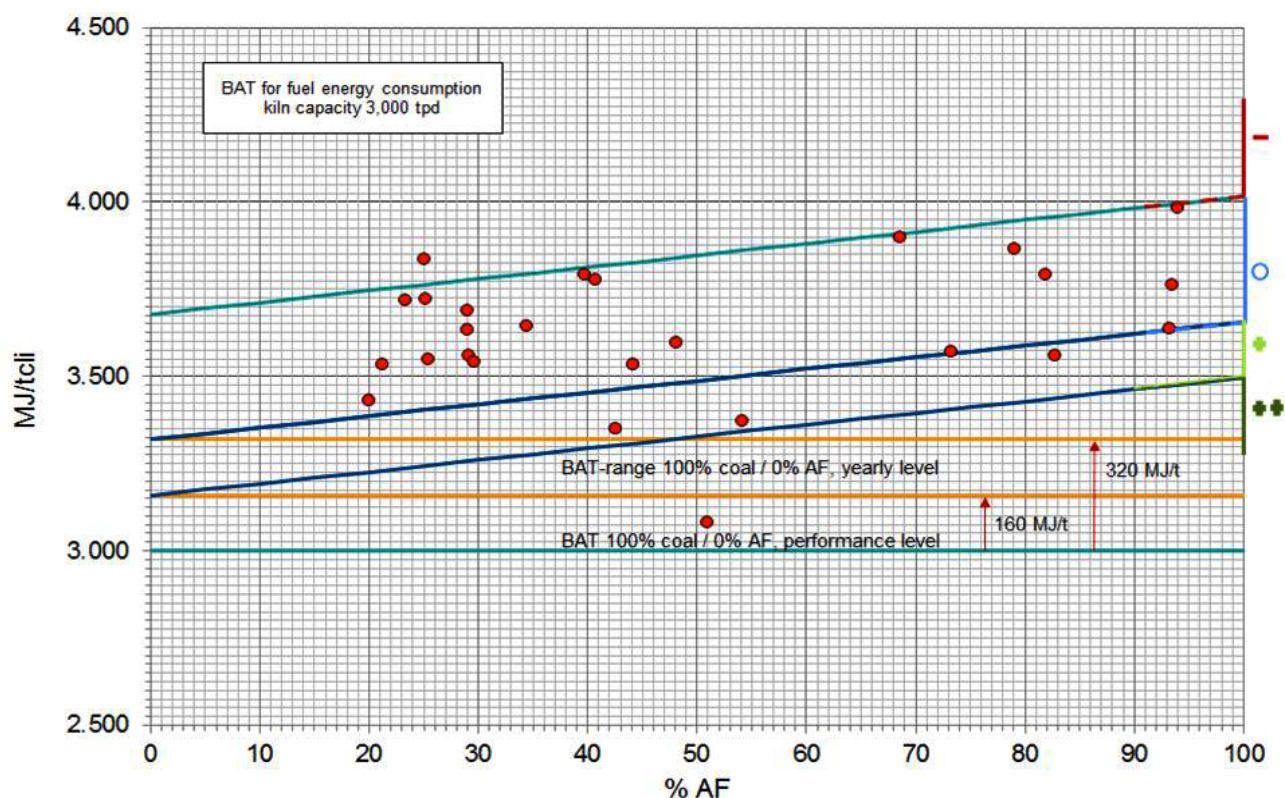


Figure 3: VDZ’s approach for assessment of fuel energy efficiency

sealing locations which should be taken into account for the development of concepts and designs for improved sealing solutions. The optimisation measures based on this analysis resulted in a false air reduction from 15 % as the reference level before optimisation to 8 % after optimisation. Subsequent cost savings were due to the reduction of the power supply to the main fan by 14 % and a reduction of fuel consumption by a minimum of 2 % in the long term average. Energy costs were reduced by 110,000 €/y correspondingly. Taking into account expenditures for improved maintenance of 35,000 €/y, the net annual savings were roughly 75,000 €/y.

Sealing location	Percentage of false air ingress
Kiln outlet	2 %
Kiln inlet	11 %
TA slide damper	10 %
Inspection doors, -20 mbar	7 %
Inspection doors, -40 mbar	35 %
Poke holes	9 %
Rotary feeder	7 %
Pendulum flap boxes	19 %

Table 1: False air ingress at different locations

**Alternative fuels**

The cement industry can make a valuable contribution towards the increased use of suitable resources. Moreover, the clinker burning process offers a unique opportunity for the simultaneous recovery of energy and the recycling of resources. Concerning the product quality, the ash content and the actual composition of the ashes play a very decisive role. In this context, once again sulphur and chlorine have to be taken into account. Moreover, the burning behaviour can at least indirectly influence the product quality. Material which is going to be fed via the main burner should be burned completely before falling down onto the clinker in the kiln. In such cases, the quality could be affected by local reducing conditions in the kiln.

For the production process the combustibility as well as the size and the shape of fuel particles are very important. Moreover, the moisture content and the calorific value have to be taken into consideration. Additionally, the chlorine and sulphur content play a decisive role in the production process. The feeding behaviour and questions related to the storage of the materials on site also have to be carefully considered. From an environmental point of view, the content of heavy metals such as mercury, thallium and cadmium is a particularly important aspect.

An example of the use of alternative fuels and its development is shown for the Germany cement industry in figure 4. Figure 5 shows the fraction of the various waste streams. The use of alternative fuels depends first of all on the local conditions, in particular the waste management in the country and region in question. In most cases however, a specific pretreatment of the waste intake material has to be carried out in order to provide a suitable alternative fuel for the clinker burning process. Over the past years, the cement industry has developed suitable pretreatment procedures, often in cooperation with waste management companies. These comprehensive and sophisticated processes allow even mixed waste streams to be converted into high quality alternative fuels. In this context, it is very advantageous if quality control and testing procedures are incorporated directly into the waste pretreatment procedures.

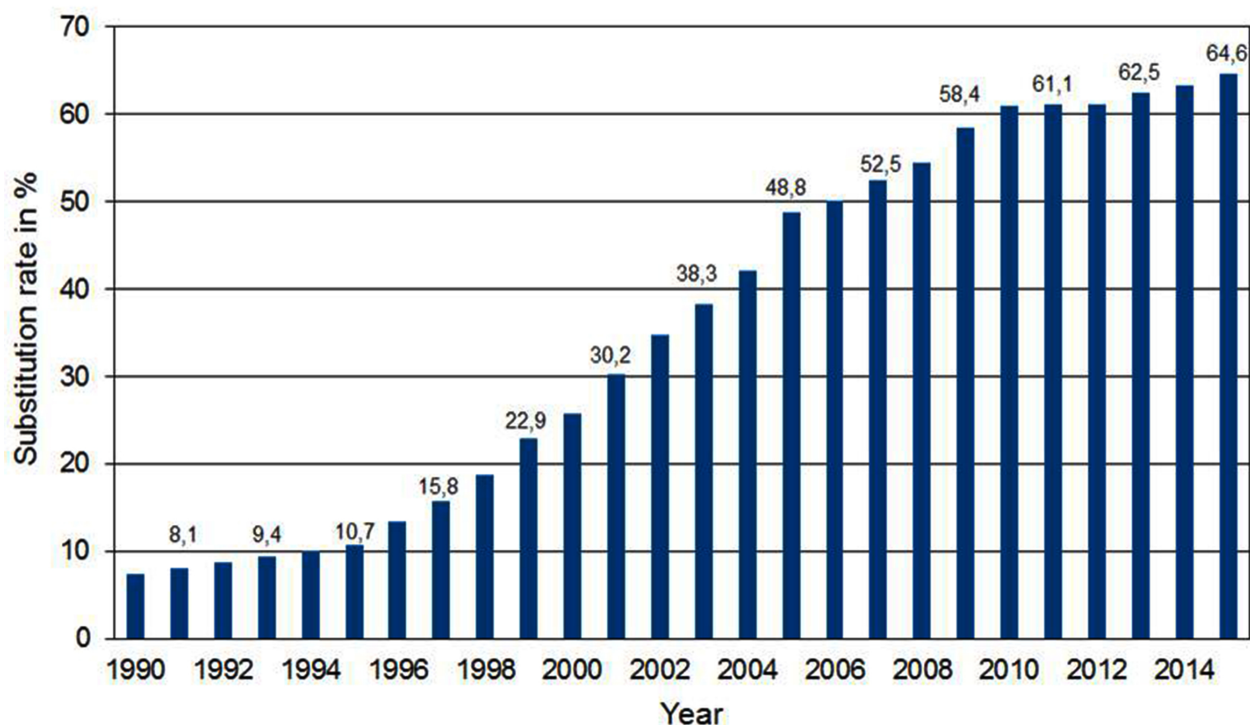


Figure 4: Development of alternative fuels in the German cement industry

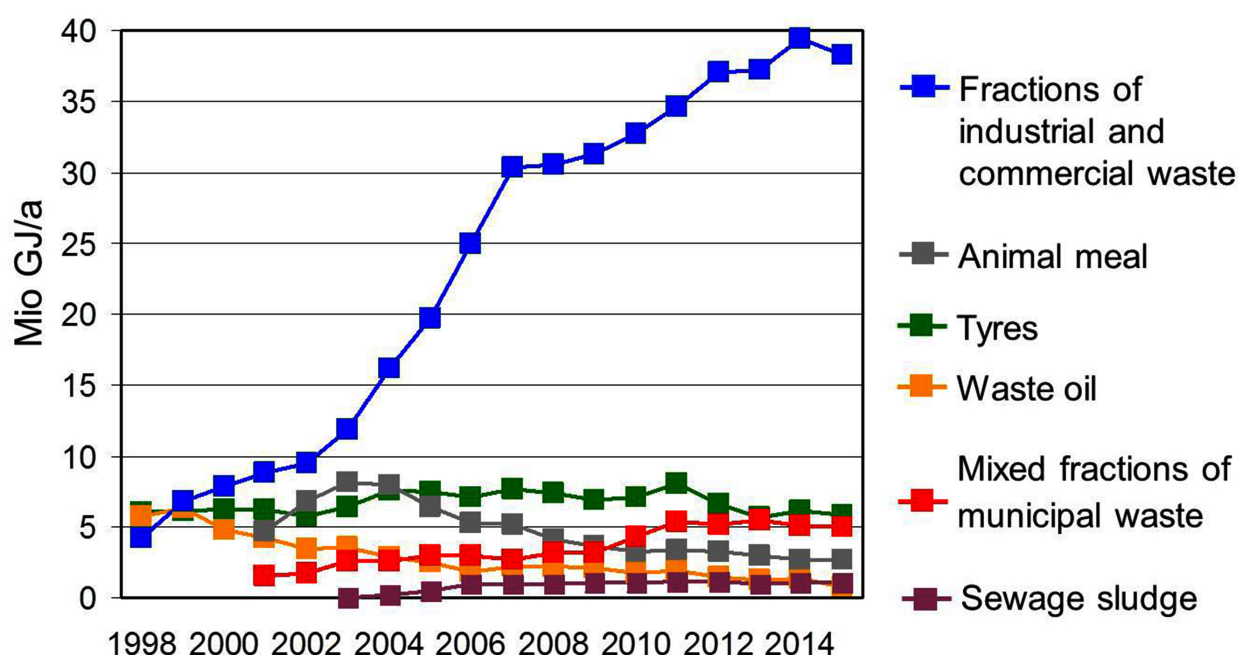


Figure 5: Substitution rate for selective alternative fuels in Germany

#### Quality control and laboratory reviews

Quality control of cement has a long tradition in the cement industry worldwide. Already in the 19th century the first standards for cement were published. Since those early days many further developments have taken place and techniques for quality control have also been improved. Traditional physical and chemical methods are still used, particularly as reference methods for quality control. Nevertheless, modern online and inline analysis has become more and more established. The cement industry realised very early that standardised rules are not only helpful for customers, but also for suppliers to ensure the quality of cement and thereby the safety and durability of construction works. Examples of modern automated analysis in cement plants are X-ray fluorescence analysis (XRF) and X-ray diffraction (XRD) combined with the Rietveld method. XRF is applied for the chemical analysis of, for example, cement and its constituents, in particular clinker. XRF and XRD can both be implemented as classical online methods in cement plants: Samples are automatically taken in the process and sent to a central laboratory, for example using a pneumatic tube, for further preparation and analysis. The whole procedure is much faster and needs less manpower than traditional wet chemistry or clinker microscopy. A direct process control is possible although there is still a minor loss of time between the sampling and the availability of the results.

It goes without saying that the analytical performance to determine the relevant parameters to operate the cement plant is crucial. VDZ's approach to ensure best laboratory operation is based on a review to evaluate the laboratory methods used for production and quality control purposes. The deliverables are a comparison of the test methods with best laboratory practice (incl. standards, reference materials and methods, Round Robin tests), the exposure of deficiencies in the currently used methods, and the elaboration of corrective and improvement measures. For this, the methods are reviewed with regard to standard requirements (as laid down in the respective standards) and state-of-the-art methodology. The audit includes an on-site visit by an experienced lab auditor, the organisation and evaluation of comparative tests and a comprehensive technical report with recommendations for the lab performance improvement (e. g. reproducibility and repeatability).

Figure 6 shows the impact of such a review. A reference raw material sample of known composition and LSF was analysed by the plant lab regularly once per week. The picture shows that the analytical bias led to an apparent variation of up to 1 % in the LSF of the raw meal. A lab review led to some new measures in sample preparation and calibration of the XRF and also in monitoring the XRF performance daily. After this, the weekly analyses of the reference sample only showed a very low bias, and results were very close to the reference data.

## Laboratory review to lower LSF standard deviation

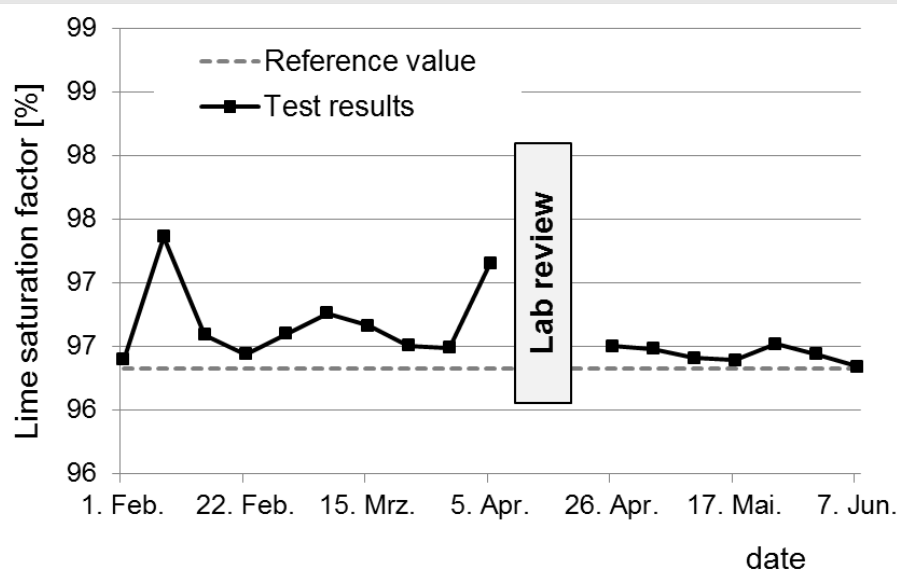


Figure 6: Laboratory review to lower LSF standard deviation

### Grinding

Comminution processes account for up to 70 per cent of the electric energy demand in cement manufacture. The majority of this requirement is needed for the finish grinding of the cement. Taking into account the ongoing diversification of the cement product range driven by the substitution of clinker by other main constituents, and also the strong increase in capacity in some markets, plus the continuously rising product fineness in other markets, this energy demand as well as the complexity of given grinding tasks is expected to rise further. Therefore, it is increasingly important to take care of the condition and the efficient operation of grinding equipment. While the replacement of an entire mill system may enable cement producers to save costs, such substitution also represents a sizeable capital investment. Therefore, the optimisation of existing mills is often a less expensive option with good potential to improve energy efficiency. A detailed analysis based on a technical audit can reveal measures to reduce the specific energy demand, improve capacity utilisation or identify corresponding bottlenecks. In this context, technical audits or process investigations for mills are valuable tools for mill optimisation. VDZ has gathered experience in numerous mill audits with a technical focus all over the world. The development of an ideal optimisation strategy is complex and different for every mill system. Not only the process technology has to be taken into account, but also the mechanical condition, product properties and investment cost.

Ball mills are used worldwide and have to be constantly checked with respect to their energy efficiency and product quality. Before complex and expensive measures are discussed, the mill's basic parameters have to be examined. The material filling degree is a good starting point. It is controlled by the diaphragm. Ball and material samples help understand ball classification and size reduction along the grinding path (photo 1). Figure 7 shows the outcome of a successful grinding audit with respect to the fineness of the cement along the grinding path, in this particular case showing insufficient stress intensity due to deformed balls and scrap metal.

In particular during a two-day process investigation, detailed evaluations cannot always be performed. In this case, the steps for further in-depth evaluation are also part of the final report. The first approaches normally include measures that can be applied without any or with only low investment costs, e.g. changes of operational parameters, slight modifications of the ball charge. Based on this, more sophisticated measures are suggested that can lead to higher investment costs e.g. the exchange of diaphragms and liners or the complete substitution of the ball charge. The general long-term strategy for optimisation should be developed in close cooperation with the plant personnel.



Photo 1: Ball mill review and sampling

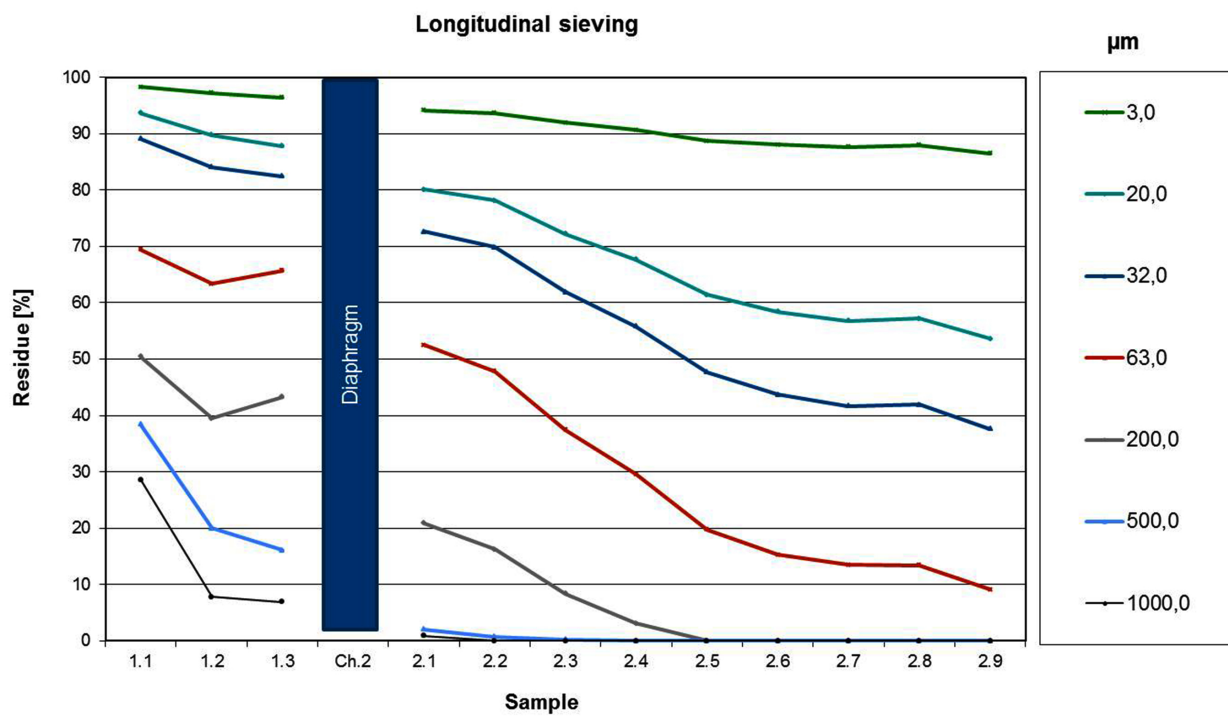


Figure 7: Longitudinal sieving results

**Training**

The processes involved in modern cement works are complex and highly automated. Technical innovation, the use of alternative fuels, cutting-edge environmental technologies and growing productivity have, in recent years, greatly increased requirements in terms of qualifications and flexibility for employees in the cement industry, whose work is being influenced more and more by technical progress. Without such advances it would be virtually impossible to run the high-tech plants found in this sector. The training and development of highly qualified staff and the continual improvement of employee skills are therefore key factors for success for many companies in industrialised countries and emerging economies. For growth markets the greatest challenges are undoubtedly the enormous increase in production, improvements in manufacturing processes and energy efficiency, and the switch to cutting-edge technology. Training programmes must be implemented to further educate workforces in order to operate production systems safely and efficiently. Engineers, control room operators and foremen need additional training at an advanced level to handle challenges like energy efficiency, alternative fuels, environmental technology and leadership. Typical examples of vocational training provided for the cement industry are VDZ training courses which can be adapted to the customer’s special needs, and VDZ online courses which comprise more than 30 modules on different topics from quarry to dispatch. Figure 8 shows a screenshot of a rotary kiln animation from one of the VDZ online courses which helps the participants learn and better understand the processes taking place inside the kiln.

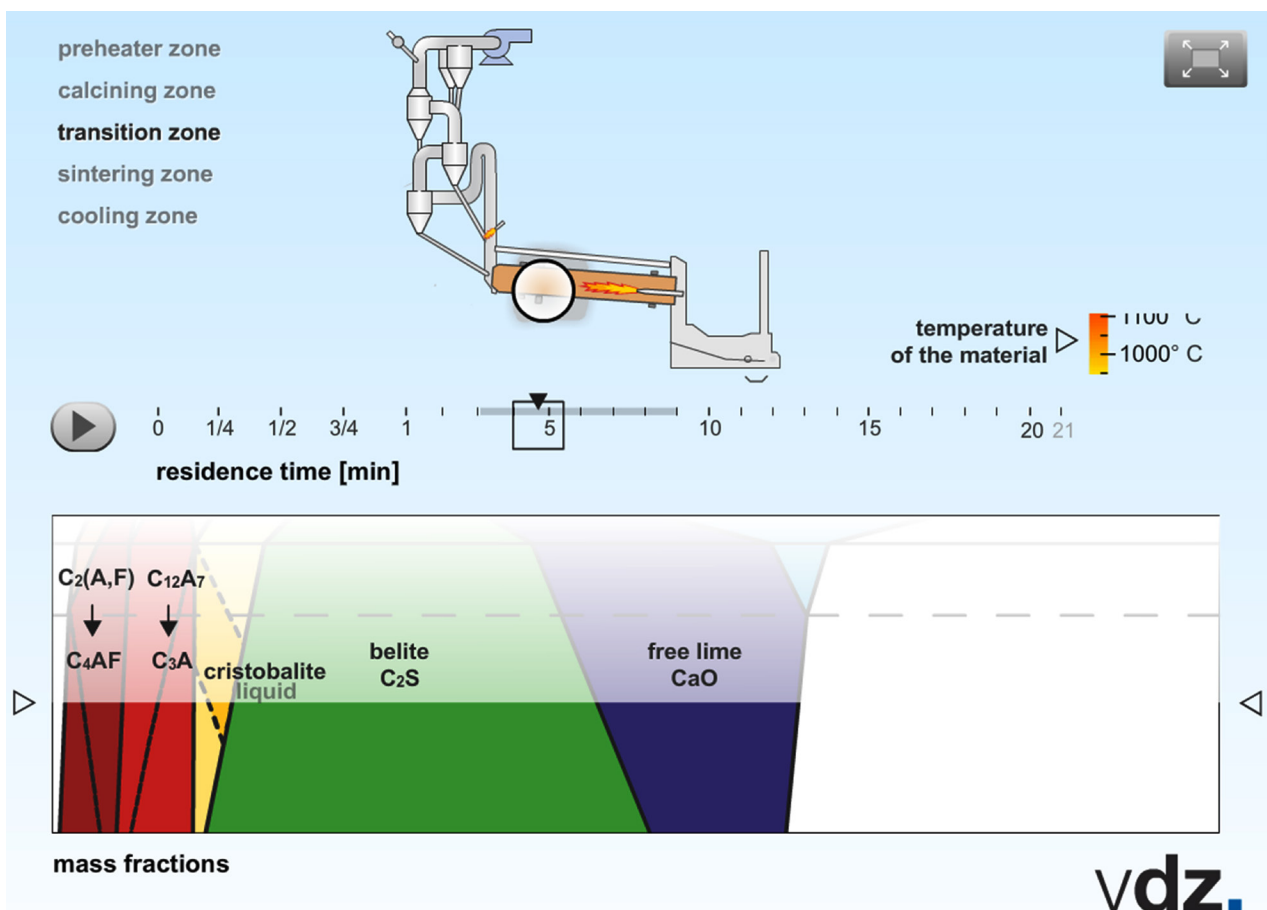


Figure 8: Animation of the burning process in the rotary kiln

**Conclusion**

The optimisation of cement plant operation with respect to energy consumption and energy efficiency can be achieved by technical reviews and subsequent performance assessments. Kiln trials are a good base to determine the gas and material flows and the corresponding enthalpies. Optimisation measures also include among many other aspects the examination of false air ingress. Training customised to suit the needs of the plant is crucial for well-trained employees, and laboratory audits can have a significant impact on correct analyses, which are important for the plant operation.



# The role of the cement industry in developing recycling projects

**By: Dirk Lechtenberg, Managing Director - MVW Lechtenberg Projektentwicklungs- und Beteiligungsgesellschaft mbH, Germany**

Many countries not only in the Arab world still lack the required infrastructure for collecting or treating municipal solid wastes. Therefore, particularly in developing countries, the cement industry establishes recycling projects. Dirk Lechtenberg, Managing Director of the well-known German based MVW Lechtenberg, describes recycling projects initiated by various cement plants in Egypt and gives some background about how cement groups can force the use of alternative fuels, especially refuse-derived-fuels.

Due to the political changes in recent years, Egypt is facing a major challenge in its energy policies. As one of the country's most important industries, the cement sector needs to adapt its overall energy use and consumption to suit these developments. With the rising cost of fossil fuels and their decreasing availability, the cement industry has looked into the use of alternative fuels and boosted energy efficiency in its overall processes. While the use of alternative fuels such as refuse-derived fuels or biomass derived fuels is a common practice in developed countries, where the infrastructure for the collection and processing of such wastes, raw materials and fuels is available, it first needs to be developed in Egypt.

Whereas in 1987 the average thermal substitution rate in the German cement industry was 4.1 per cent, the continuous use of various waste-derived alternative fuels then followed to achieve a level of 63.4 per cent or approximately 3.1 million tonnes by 2014.

In Egypt, where infrastructure of this type does not yet exist, the cement industry has the opportunity to support society by implementing an environmentally friendly waste management concept, in which the use of refuse-derived fuels (RDF) can be a significant driver of the waste management system. The first RDF production facility in a cement plant was inaugurated by the former Environment Minister, Laila Eskander, in February 2014 and by Suez Cement (Italcementi) with a five million euro investment. As waste processing

companies or cement plants in Egypt do not get paid for their services, these projects have to be financed purely by the separated recyclables and by the produced RDF, which replace fossil fuels such as coal or natural gas that would otherwise have to be purchased. Meanwhile, several cement plants in Egypt, such as LafargeHolcim, Titan, National Cement, Arabian Cement Company, Beni Suef and others are working hard on developing supply chains and the required technical equipment for the production of refuse-derived fuels, as well as systems for reception, storage, dosing, feeding and environmental control.

National Cement announced a tender for its project at the end of July, while Arabian Cement Company has formed a special entity focusing on the preparation of alternative fuels. Evolve Investments & Projects Management, with the support of MVW Lechtenberg, will concentrate on several projects for the production of alternative fuels as a subsidiary of Arabian Cement Company.

Lafarge Industrial Ecology (Ecocem) has signed two major contracts to manage and operate existing refuse-derived fuel (RDF) platforms in Suez and Qalyubeya in Egypt. Ecocem has already added a new production line to the Suez platform and plans an additional line within one year of signing its contract with the governorate. The plant will produce 42,000 tonnes of RDF per year and the investment will total 1.66 million US dollars.

Ecocem has also already added an extra line to the Qalyubeya plant, in addition to renovating one production line. The company's future investments in the governorate will increase the RDF production capacity by 32,000 tonnes to 280,000 tonnes per year. Both investments at the Qalyubeya plant were funded by GIZ and the Bill and Melinda Gates Foundation with a total investment of one million US dollars. Lafarge Egypt and Ecocem have implemented numerous projects over the past three years in order to increase the use of alternative fuels and aimed to achieve an

average fuel substitution rate of 25 per cent by the end of 2015. More than 260,000 tonnes of waste have been processed as fuels in Lafarge's Sokhna plant since 2013, an equivalent of 100,000 tonnes of fossil fuels.

ASEC (Quena Cement) has signed a contract with Grupo SPR from Spain to install a processing facility. Grupo SPR was also awarded a contract for a compact RDF plant in Qena, Egypt. This plant was delivered by Grupo SPR in 2015 and designed for the purpose of preparing and obtaining a material with a high calorific value from municipal solid waste (MSW) to substitute fossil fuels. The plant has a throughput capacity of 25 t/h of MSW. The main equipment includes a bag opener/SPR 2200 -55 pre-shredder, a magnetic separator and a disc screen, which facilitates in-feed and the correct separation of the various fractions.

MVW Lechtenberg also supported the well-known Reliance Group, a Cairo based service provider, which has already two modern RDF installations in operation: In Port Said and Ismailia with each a capacity of 30- 40 tons input per hour. With new equipment from Germany, Reliance is able to produce a high quality RDF.

In all of these plants, a simple basic concept has been implemented: In a first step, organic wastes are separated for further preparation as compost. The separation of recyclables such as glass, metals, some plastics (PET) and some cardboard is done manually. Finally, the high calorific value fraction, which consists mainly of non-recyclable small paper / cardboard / plastics, , etc., is treated via ballistic separation/air classifiers to separate foreign particles (such as stones) and shredded into a defined grain size for feeding into the precalciners or kilns of the cement plants.

#### **New technologies for processing wet and mixed municipal solid wastes**

By introducing proven technologies for the production of high grade compost and further separation of the organic fractions, it is even possible to process and use more than 80% of the incoming mixed municipal solid wastes.

In a pilot plant, which is installed in a German cement plant, MVW Lechtenberg is testing now a new technology which can dry, separate and shred mixed and pre-shredded municipal solid waste in one step, using cooler gases. A simple technology for reducing the contaminant content of any and all, delivered and received fractions now enables online preparation upstream of the kiln, including kiln-control stabilization. Arriving by walking-floor trailer, the pre shredded waste is fed continuously to a receiving and dosing station, where the alternative fuel is de-compacted. By

way of a conveying and weighing system, the RDF is pneumatically transferred to the so called "SI-TRO-ZER" unit. There, the continuous flow of RDF material is freed of contaminants and simultaneously dried and reduced to the desired particle size in an ascending stream of hot exhaust air from the clinker cooler. Then, the entrained air from pneumatic handling is expelled from the ready-processed RDF, which is then blown into the kiln's burners. The extracted contaminants are collected separately and can be returned to the recycling company, for example.



**Picture: The new "SI-TRO-ZER" Technology**

This new technology is even using less energy per processed / shredded ton of waste as any other known shredding technology in this field.

#### **Potential waste recycling quantities for the cement industry in Egypt**

At this point, it is helpful to assess the potential RDF demand of Egypt's cement industry. We calculated the potential amount of RDF from MSW and agricultural waste based on the following considerations:

- MSW generation: 21 million tonnes per year
- Percentage of materials useable for RDF according to MVW Lechtenberg's sorting tests on several landfill sites during 2014: 20.8 per cent, i.e. 4.16 million tonnes per year
- Net calorific value, depending on waste

- composition and quantity of RDF to be produced, between 3,500 kcal/kg and 4,500 kcal/kg
- Grey clinker production capacity: 58 million tonnes per year
- Assumed specific fuel energy consumption: 850 kcal/kg clinker

The Egyptian cement industry would achieve a thermal substitution rate of approximately 30 - 38% by co-firing 4.16 million tonnes of RDF, thus consuming approximately 1.8 to 2.3 billion m<sup>3</sup> less natural gas per year.

Kiln Production			Fuel Consumption						
Daily Production [ tpd ]	Production Rate [ tph ]	Clinker Production [ tpy ]	Calorific Cons. [ KCal/kg Clk ]	Total	[ % ]	[ tph ]	[ tpy ]	[ KCal/kg Coal ]	KCal/kg RDF
3.500	146	1.000.000	900	Precalciner	100	21	152.419	6.200	4.000
				Kiln	60	13	91.452		
					40	8	60.968		

Kiln Operation		
[ hrs ]	[ days ]	[ hpd ]
7.200	310	24
Revenue per ton cement [ \$ / t ]		
Coal Cost [ \$ / t ]	105	
RDF Cost [ \$ / t ]	35	

SUBSTITUTION of RDF								
Kiln is in operation with nominal capacity								
	Calorific Value		RDF Substitution				Equivalent to Coal	
	Burner [ % ]	Total line [ % ]	t/h	t/day	t/year	[ \$ / y ]	tpy	[ \$ ]
Substitutionrate Precalciner in %	<b>50%</b>	<b>30,0%</b>	9,8	236	73.238	2.563.313	47.250	4.961.250
Substitutionrate Main Burner in %	<b>20%</b>	<b>8,0%</b>	2,6	63	19.530	683.550	12.600	1.323.000
Substitutionrate all Burner in %		<b>38,0%</b>	12,5	299	92.768	3.246.863	59.850	6.284.250
							Savings from Substitution RDF	3.037.388

**Table: Savings of using RDF in a 1 million ton clinker production facility in Egypt**

### Summary and next steps

The cement industry has become a reliable partner to the waste management sector. The use of refuse-derived fuels for clinker burning is considered to be the Best Available Technique (BAT) and has contributed towards maintaining the competitiveness of the local cement industry as well as conserving natural resources. Especially for the cement industry in the Arab world with its modern and usually big rotary kilns, there is a huge potential to provide sustainable waste management solutions to the municipalities.

MVW Lechtenberg is currently providing assistance to cement plants and waste management companies in various member countries of the Arab Union for Cement and Building Materials (AUCBM). E.g. in Lebanon, MVW Lechtenberg provides assistance to the new operator of the waste management facilities in Beirut, processing approx. 3,000 tonnes of municipal solid waste per day. Such project can provide more than 50% of the thermal energy needs in the Lebanese cement industry.

Secured by long-term contracts for the waste recycling with municipalities, the cement industry can secure local alternative fuel sources, avoiding the use of fossil fuels with its negative climate and financial impacts. At the same time, new jobs can be created.

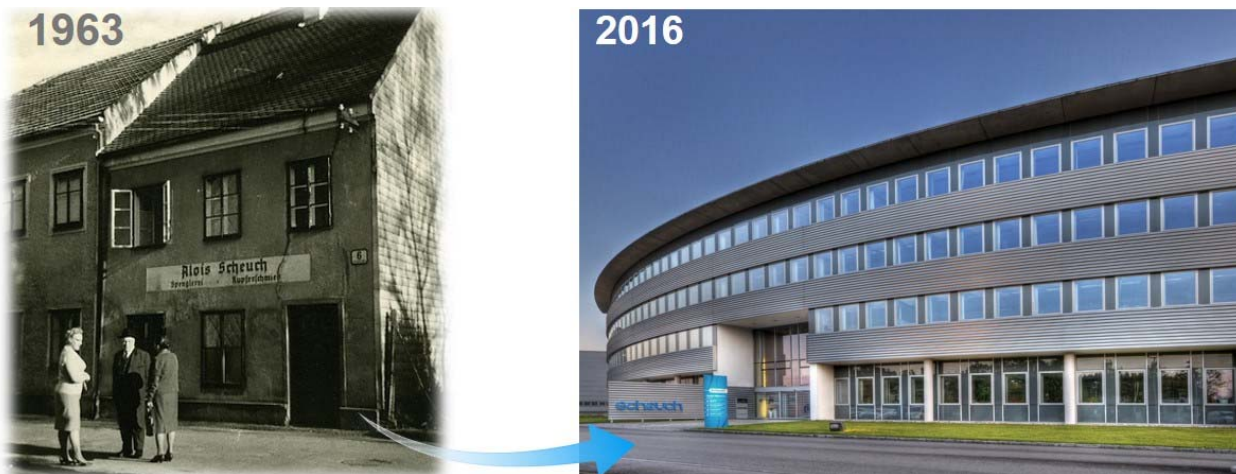


## INNOVATIVE TECHNOLOGIES FOR EMISSIONS CONTROL

By: Ruggero Baldi, Sales Manager

### SCHEUCH GMBH COMPANY PRESENTATION

As an international market leader in the ventilation and environmental technology sector, Scheuch GmbH always keeps up to date with the latest industry technology. Innovative air and environmental technology for industrial applications has been Scheuch's stock in trade for over 50 years now. Whether the solutions involve extraction, dedusting, conveying, flue gas purification or plant manufacturing, Scheuch is a leading expert with a pole position on the market in numerous sectors, and offers its customers application-specific, high-quality solutions to their air and environmental technology issues.



Nowadays Scheuch company have more than 1'000 employees, 600 located in Austria and more than 400 over different countries.

### Products/Technologies

Scheuch GmbH designs and manufactures filter equipment and gas cleaning systems for various industries, including Minerals Industry (lime, cement, gypsum), Wood Processing Industry and Wood Based Panel Industry (saw-mills, furniture industry, OSB/MDF/HDF board production), Utilities (waste incineration, biomass combustion, chip-driers) and the Metals Industries (ferrous- and non-ferrous metals, metal fabrication).

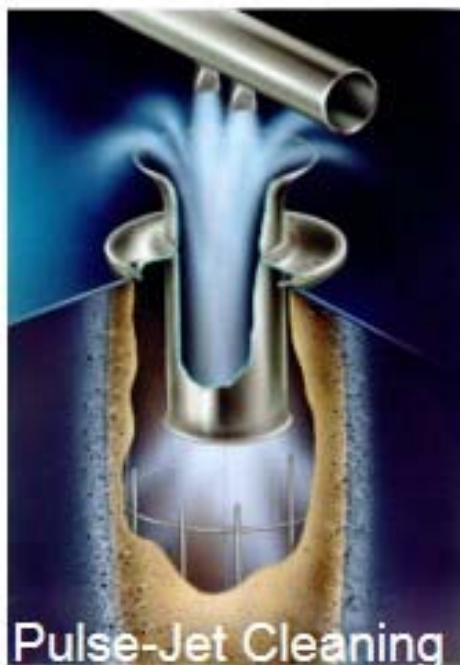
### Scheuch Production Sites

Scheuch is producing its equipment from own workshop that are located in Austria and Slovakia, total area = 15 football fields.



### IMPULS JET-FILTER SYSTEM

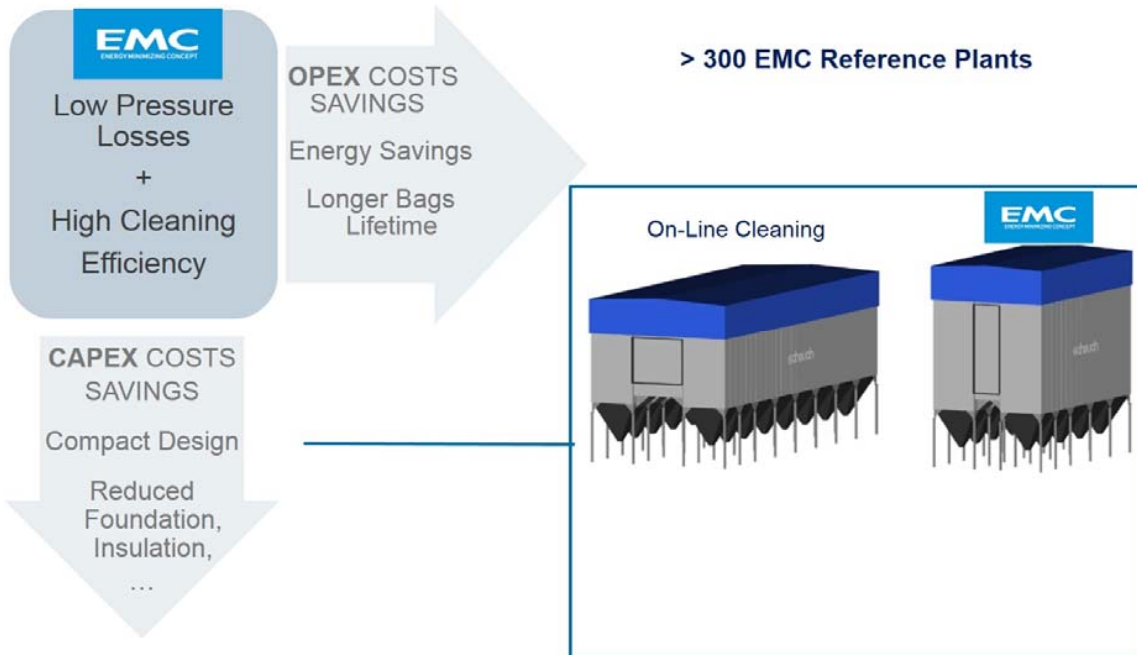
The application spectrum for IMPULS filters ranges from dedusting in the wood processing, wood based panel, metals and industrial mineral industries to the filtration of process and hot gases in, for example, the cement industry and the separation of contaminants (sorption process) when cleaning flue gases generated by combustion processes. In order to ensure the high degree of flexibility necessary to create pinpoint designs for the most diverse applications, the entire filter program is designed as a modular system consisting of five model lines. Large-scale filtration plants are generated using parametric variant modelling. The parameterization of design types increases flexibility with respect to dimensioning, design, metal thickness, etc. Consequently, customerspecific designs can be realized without additional expense, something that could be previously done only by creating a costly special design.



**IMPULS**  
PULSE JET-FILTER SYSTEM

**EMC ENERGY MINIMIZING CONCEPT**

In the last ten years, Scheuch’s EMC filter technology has revolutionized the dedusting process in the cement industry. The technology was able to set new standards with respect to bag length, pressure loss, cleaning pressure and the service life of filter bags. The result has manifested itself in a significant reduction of life cycle costs (LCC). The patented EMC concept is absolutely unique and is considered to be the Best Available Technology (BAT) for process filters – also when compared to electrostatic and reverse-air filters. The use of 8-meter long filter bags (EMC 8M) has since become the industry standard and 10-meter long filter bags (EMC 10M) are already in use with filtration systems with rated capacities of more than 1.000,000 m3/h.



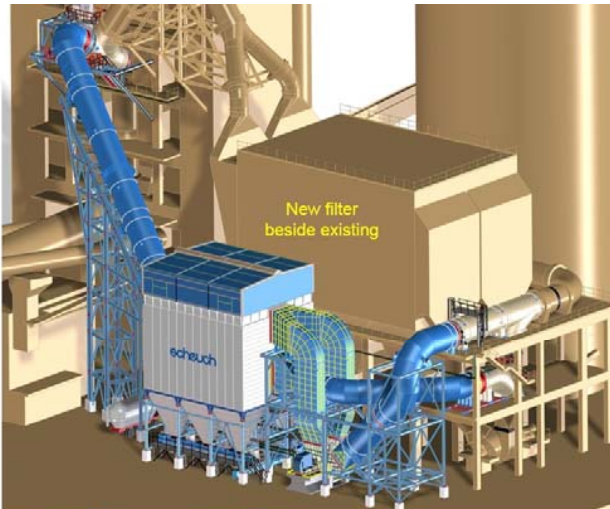
**EMC ENERGY MINIMIZING CONCEPT – CASE STUDY, ARABIAN CEMENT CO (KSA)**

ACC Arabian Cement Company awarded Scheuch for replacement of full set of process filters for their cement production plant in Rabigh (Saudi Arabia), Kiln-Raw Mill and Bypass filters for line #5 and #6.

Main performance values guaranteed to Arabian Cement Company:

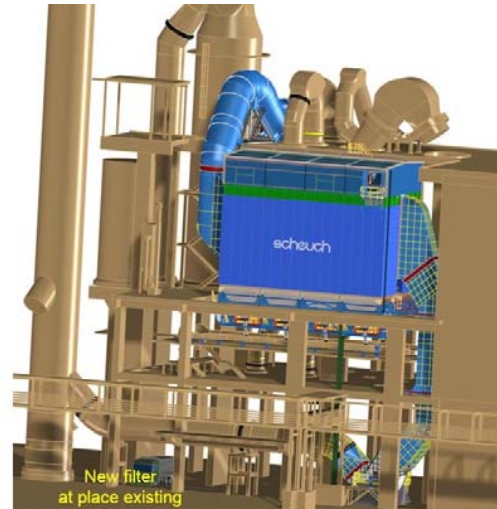
- Dust emissions at stack <math>< 5 \text{ mg/Nm}^3 \text{ @10\%O}\_2</math>
- Filtering bags lifetime > 5 years from start-up

Scheuch EMC filters have been installed successfully on December 2016 to replace old ESPs electrostatic-precipitators, the project was executed on turn-key basis by Scheuch.



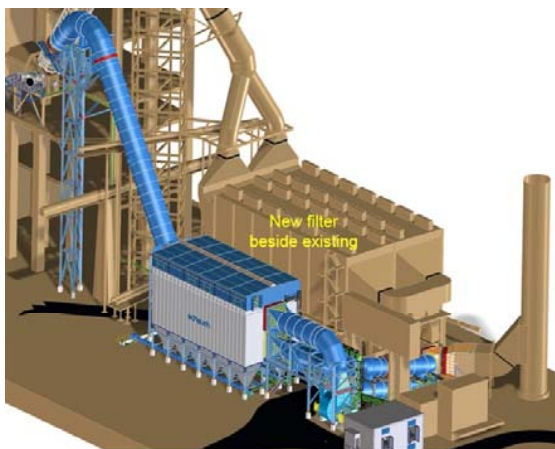
#### Line 5 / Bypass EMC Filter

Design Flow 596.660 Am<sup>3</sup>/h @ 230 °C  
 Filtering Surface 11.197 m<sup>2</sup>  
 2.160 Bags L=10m / Fibreglass+PTFE Membrane  
 Cleaning Press. 2-3 Bar



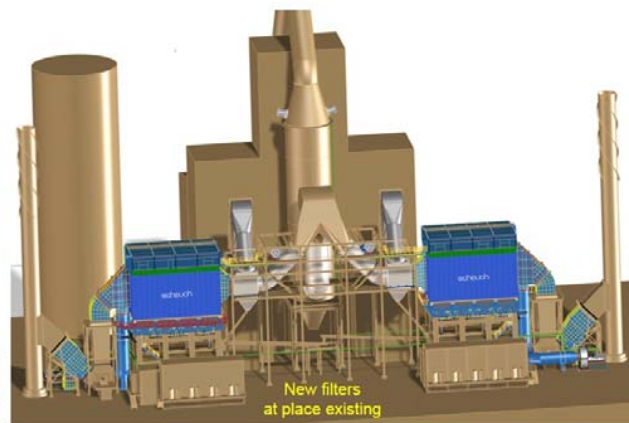
#### Line 5 / Kiln-RM EMC Filter

Design Flow 860.000 Am<sup>3</sup>/h @ 230 °C  
 Filtering Surface 14.929 m<sup>2</sup>  
 2.880 Bags L=10m / Fibreglass+PTFE Membrane  
 Cleaning Press. 2-3 Bar



#### Line 6 / Bypass EMC Filter

Design Flow 1.150.000 Am<sup>3</sup>/h @ 230 °C  
 Filtering Surface 22.3937 m<sup>2</sup>  
 4.320 Bags L=10m / Fibreglass+PTFE Membrane  
 Cleaning Press. 2-3 Bar



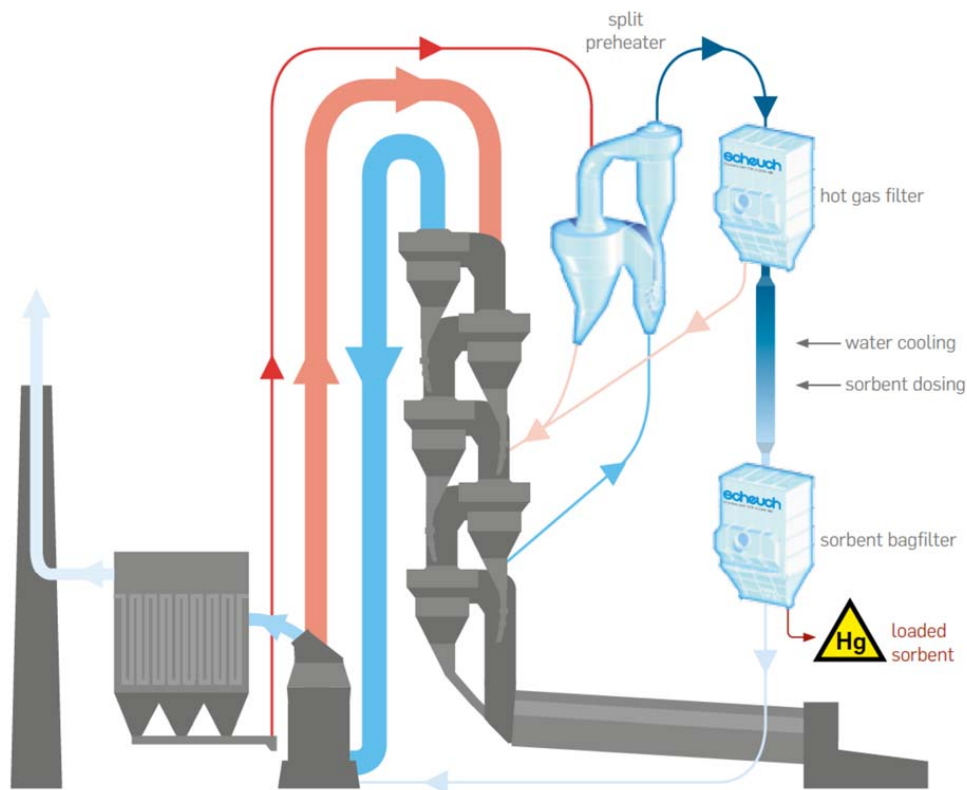
#### Line 6 / 2 x Kiln-RM EMC Filter

Design Flow 2 x 932.000 Am<sup>3</sup>/h @ 230 °C  
 Filtering Surface 2 x 14.929 m<sup>2</sup>  
 2 x 2.880 Bags L=10m / Fibreglass+PTFE Membrane  
 Cleaning Press. 2-3 Bar

### X-MERCURY SPLIT PREHEATER SYSTEM

The cement industry has been identified as second largest gaseous emission source of mercury just behind the conventional combustion of coal in thermal power and heating plants as well as in heating systems. Due to the health effects of mercury exposure, industrial and commercial uses are regulated in many countries worldwide. Mercury is treated as an occupational hazard: A challenge the cement industry is facing every single day – since mercury is present in raw materials and/or in the fuel used in the combustion process..

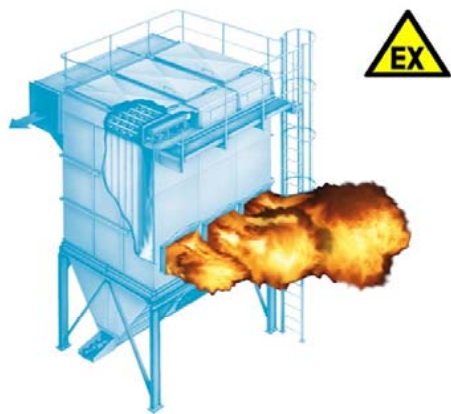
As the reduction of mercury emissions in the cement industry is either linked to high operating costs for fuel and raw material cleaning, flue gas sorbents, or investment costs for flue gas treatment systems, it has been decided to propose a new system combining low investment costs as well as lowest operating costs and minimized ecological footprint.



The Xmercury split preheater system implemented in the existing system.

**EXPLOSION-PROOF FILTERS FOR ALTERNATIVE FUELS APPLICATION**

Safety certification issued by an independent, recognized institute is required for equipment with an elevated hazard potential. Self-evaluation and a CE Declaration of Conformity by the manufacturer are no longer sufficient. The effectiveness of our explosion protection concepts with respect to pressure venting, decoupling and risks in external areas were verified and confirmed for the first time for an overall system under practical operating conditions by FSA, a recognized German testing authority. It includes the ATEX-compliant, certified Implementation by Scheuch as well as low flame ranges. More than 30 real-world tests provide the assurance of “real safety” in the case of an explosive event.

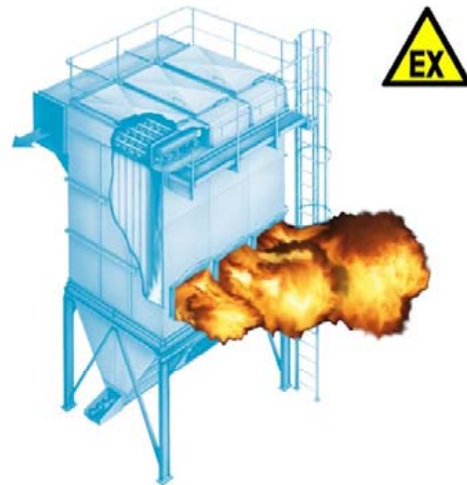


- Design of filters for explosive atmosphere**
- ATEX (ATmosphere EXplosive) Compliance
  - Specific design criteria
  - Isolating dampers at filter inlet / outlet
  - Fire extinguishing by water / CO<sub>2</sub> injection
  - Flame control flaps



Among several application in explosive environment, alternative fuels systems are more and more present in the daily life of industrial production plants providing an economical solution to fuel costs.

Scheuch developed special design and equipment to be applied for ventilation and dedusting of alternative fuels systems.



**Design of filters for explosive atmosphere**

- ATEX (ATmosphere EXplosive) Compliance
- Specific design criteria
- Isolating dampers at filter inlet / outlet
- Fire extinguishing by water / CO<sub>2</sub> injection
- Flame control flaps

Dedusting RDF transport system



**Scheuch GmbH**  
 Weierfing 68  
 4971 Aurolzmünster  
 AUSTRIA

# Key factors for the successful use of alternative fuels<sup>1)</sup>

By: Dr.-Ing. Luigi Di Matteo\*

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## Summary:

Although alternative fuels (AFs) have been used in the cement industry for more than 30 years there has so far been no systematic and analytical approach for the successful handling of these materials. Through ignorance and lack of experience the same mistakes are therefore made time and again in the design of new plants. DI MATTEO Förderanlagen GmbH & Co. KG from Beckum in Westphalia has carried out some pioneering work in the field of handling alternative fuels and, among other things, has also developed measuring procedures and investigative methods for evaluating the mechanical characteristics of these bulk materials that are often characterized by extreme properties. The SCC system described here is a systematic, modular and forward-looking tool that can be valuable for successful realization of plants for handling alternative fuels. The SCC (Seven Stage Concept) system differentiates between seven handling stages, beginning with the reception of the AF material in the cement plant and ending with its combustion in the rotary kiln. DI MATTEO contributes a great deal of mechanical equipment to the SCC system. The company has become particularly well known through its tubular weighing system – the WeighTUBE® – for which DI MATTEO received an award. The tubular weighing system consists of a tubular screw conveyor that is fed via an agitator and to which is attached a weigh tube. This rests on dynamic load cells and carries out the weighing so that the AF material can, for example, be transferred to a pneumatic conveyor for onward transport to the rotary kiln burner. DI MATTEO can point to numerous completed systems in the cement industry, both in Germany and abroad.

## 1 Introduction

For the majority of cement plants, both in Europe and around the world, the use of solid alternative fuels, referred to below as AFs, is of considerable importance for cost-effective and sustainable plant operation. In general, the efforts are now no longer looking just to achieve a low thermal substitution rate but are aimed at sustainable improvement in availability and raising the substitution rate to 100 % to achieve long-term cost and competitive advantages. In fact, there have already been many years of experience with the use of numerous alternative fuels, sometimes of widely differing types, such as the fuels known by the abbreviations SBS, RDF, SRF, MSW, containing industrial and municipal waste, biomass, fluff, etc. However, there are very often still substantial problems with the handling of these materials. Problems are often caused by lack of understanding of the relevant bulk material properties or through the use of unsuitable plant components for the particular application. Solid alternative fuels differ substantially from conventional classical bulk materials [4, 5]. A fundamental understanding of the bulk material properties is just as much an essential requirement for optimum and successful handling as the choice of the correct plant components.

## 2 Characterization of AFs

Accurate knowledge not only of the physical bulk material properties but also of the chemical and thermal properties is important for comprehensive characterization of AFs (Fig. 1). This article examines the physical properties as these are relevant for the thermal utilization of AFs in rotary cement kilns [6, 7].

<sup>1)</sup>Di Matteo, L.: *Systematic classification and modularization of handling systems for alternative fuels*, *Cement International* (2015) No. 2, pp. 54 - 61

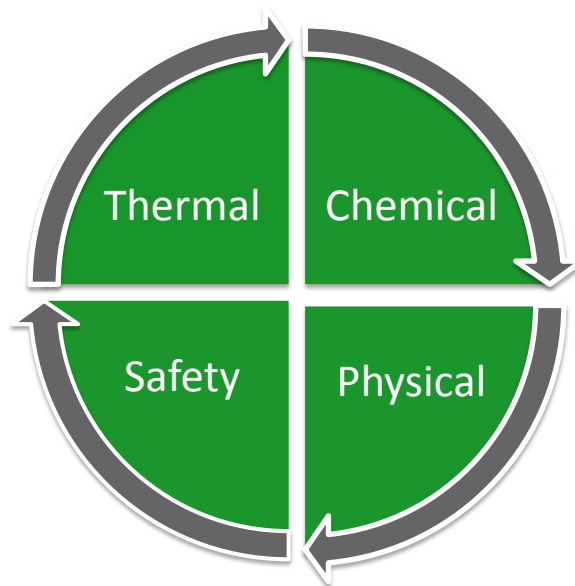


Fig. 1: Categories for comprehensive characterization of AFs

Analytical characterization of AFs should always be considered against the background of their thermal utilization in rotary cement kilns. For all alternative fuels the thermal utilization, i.e. the combustion of AF in the main burner or kiln inlet or in the calciner, takes place basically as shown in the diagram in Fig. 2.

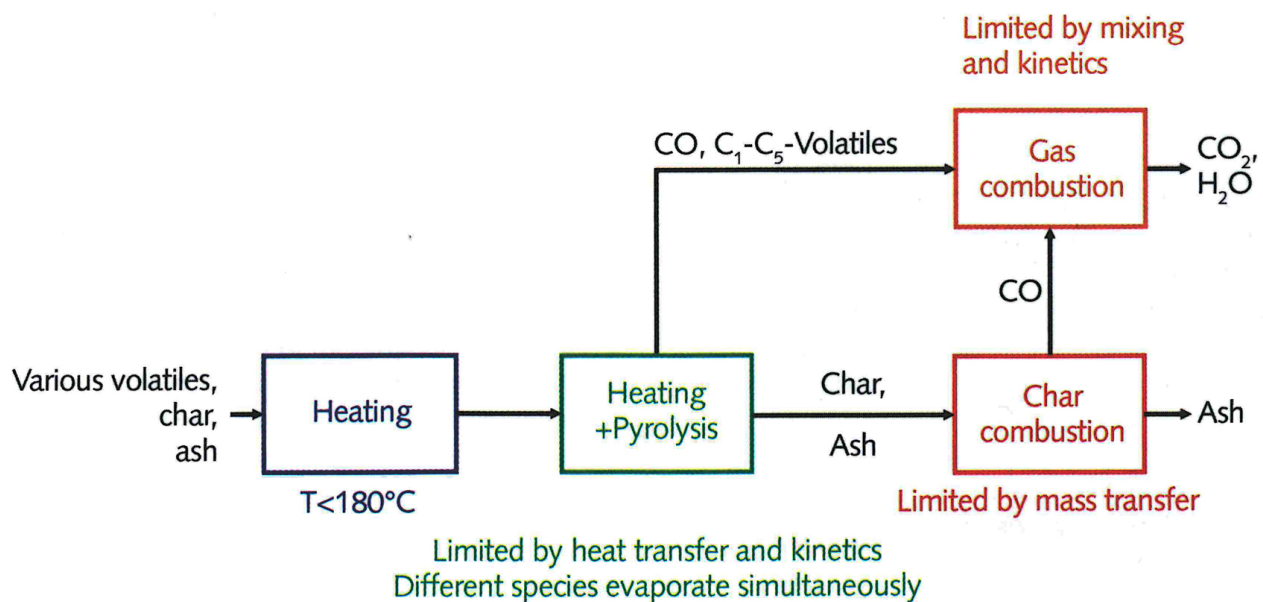


Fig. 2: Sequence of combustion during conversion of solid alternative fuels [8]

Against this background it is clear that optimum combustion can only be achieved if the fuel is introduced into the process with the largest possible specific surface area and with the parameters required by the combustion process. However, this means that the material to be burnt must not be compacted or compressed during the preceding handling as this causes substantial disruption to the kinetics of the burning process and can retard them. Some important physical properties of selected AFs are listed in Table 1. Because of different production processes and process engineering handling stages this can only provide indicative information that must be checked and verified in the specific instance as otherwise considerable discrepancies may occur. It must also always be borne in mind that the bulk material properties of AFs are not constant over time. For example, the bulk density can, depending on the type and duration of storage, change substantially due to the action of external forces during the storage of AF.

Typical data's		Comparison	Europe		Middle East	
		Coal	Biomass	RDF	Biomass	RDF
Bulk density	kg/m <sup>3</sup>	500 - 800	270 - 590	80 - 230	70 - 180	80 - 220
Moisture	%	< 15	< 35	2	< 10	< 20
Particle size (2D)	mm	< 1	< 200	< 50	< 100	< 50
Compressibility index	-	1,0 - 1,2	1,2 - 3,0	2,5 - 4,0	5,0 - 8,0	3,0 - 5,5
Flow properties	-	free flowing ...	bad flowing, fibrous, affinity for arching, time consolidating			
Explosion and fire requirements	-	yes	to be evaluated individually, in general to be considered			

**Tab 1: Examples of physical bulk material properties for selected AFs**

In general, the following physical bulk material parameters are of fundamental interest:

- Bulk density
- Particle size distribution
- Wall friction angle
- Internal material friction
- Horizontal stress behavior
- Consolidation with time
- Compressibility
- Explosion parameters

These bulk material parameters cannot be determined with the familiar available methods so DI MATTEO has developed suitable methods of measurement and measuring equipment with which the requisite physical bulk material properties can be determined. It is now possible, for example, to measure the compressibility behaviour as well as the time consolidation in the plant's own research centre with measuring equipment developed in-house.

**3 Frequent problems in the utilization of AF**

Problems that occur frequently during the handling of AF will be indicated below using the examples of storage and metering. Intermediate storage in operational plants is unavoidable when using large quantities of material. Various aspects have to be considered when choosing a suitable storage system. Defining a requirement profile for a fuel store basically gives rise to two categories (Table 2).

Operator's requirements	Requirements relating to the bulk material
<ul style="list-style-type: none"> <li>• Simple and reliable plant technology</li> <li>• High level of availability</li> <li>• Low maintenance and operating costs</li> <li>• Homogenization of the fuel, as usually from different suppliers</li> <li>• Scope of investment to be as efficient as possible</li> <li>• Largest possible storage volume (matched to size of investment), adequate for several days' self-sufficiency</li> <li>• Flexibility with respect to changing bulk material properties (security of investment)</li> </ul>	<ul style="list-style-type: none"> <li>• Avoidance of time consolidation</li> <li>• Avoidance of compression through own weight, therefore restricted store height</li> <li>• Avoidance of addition compaction by the discharge system</li> <li>• FIFO principle (first in – first out)</li> <li>• Homogenization to reverse changes to the bulk material cause by storage</li> <li>• Avoidance of spontaneous combustion</li> <li>• Consideration of the explosion and fire risks</li> </ul>

**Tab. 2: Requirements for a storage system for AFs**

The familiar types of storage used for other conventional bulk materials are also theoretically possible for storing AFs [4, 5]. However, experience shows that because of the specific bulk material properties of AFs, which can change greatly over the storage time, only a few types of storage can be used successfully. The different types of storage can be classified meaningfully using the outline in Fig. 3. When the types of storage listed in Fig. 3 are considered in the light of the specific bulk material requirements given in Table 2 it is advantageous for large silo volumes to aim for the FIFO principle to avoid time consolidation and compression of the AF. As an example, the use of a LUC loading and unloading reclaiming system will be compared with a MOV moving floor system. Both systems are produced and installed by DI MATTEO. However, the advantages and disadvantages of the respective systems should always be weighed against one another for the particular application.

When a LUC loading and unloading reclaiming system is used the material is deposited as shown in Fig. 4. Depending on the silo size/store height, storage time and the properties of the AF, such as particle texture, particle size and moisture, the material consolidates mainly in the lower region just through its own weight. In this system the AF is reclaimed from the top so that the material that is deposited first is reclaimed last. This storage and extraction system operates on the LIFO principle (last-in-first-out). Problems caused by the system that have negative effects on the combustion process can therefore be expected with an AF with a high moisture content and long storage times.

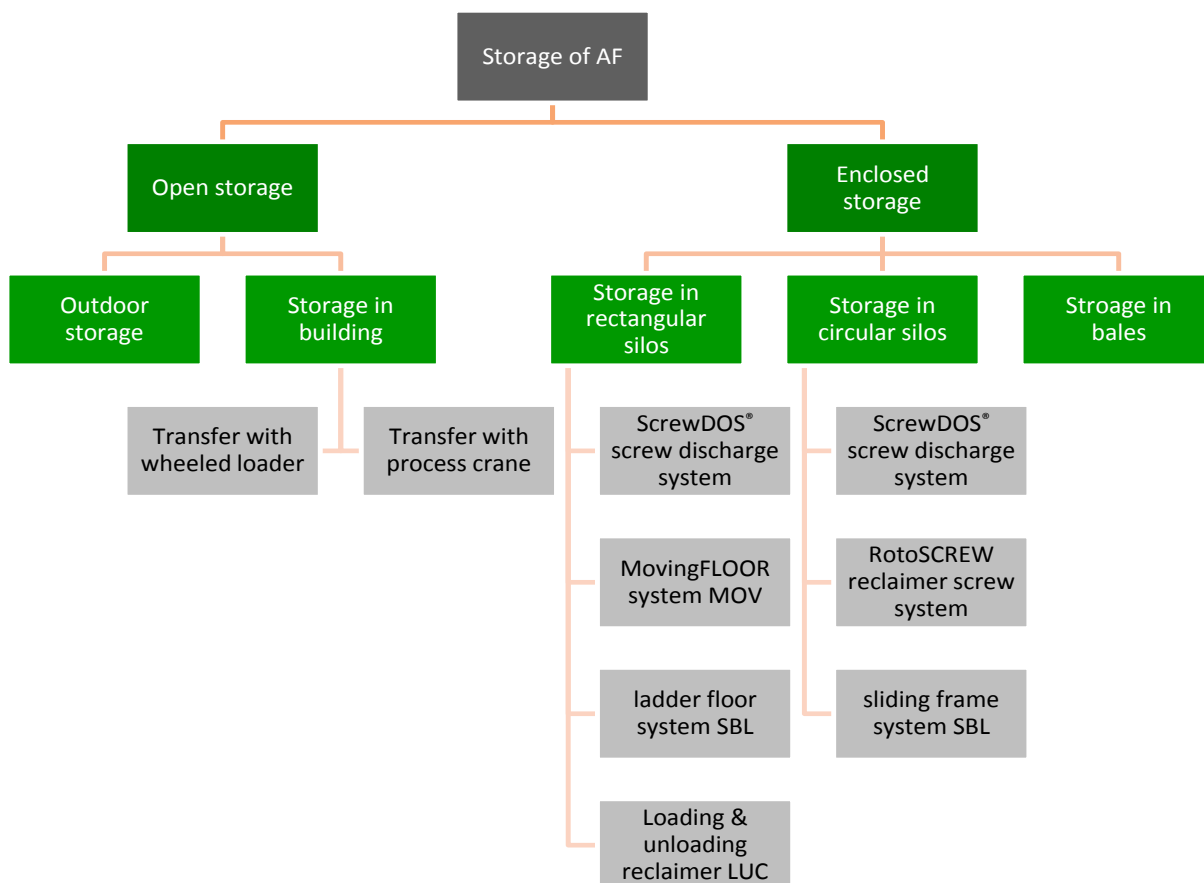


Fig 3: Classification of the principal types of storage for AFs

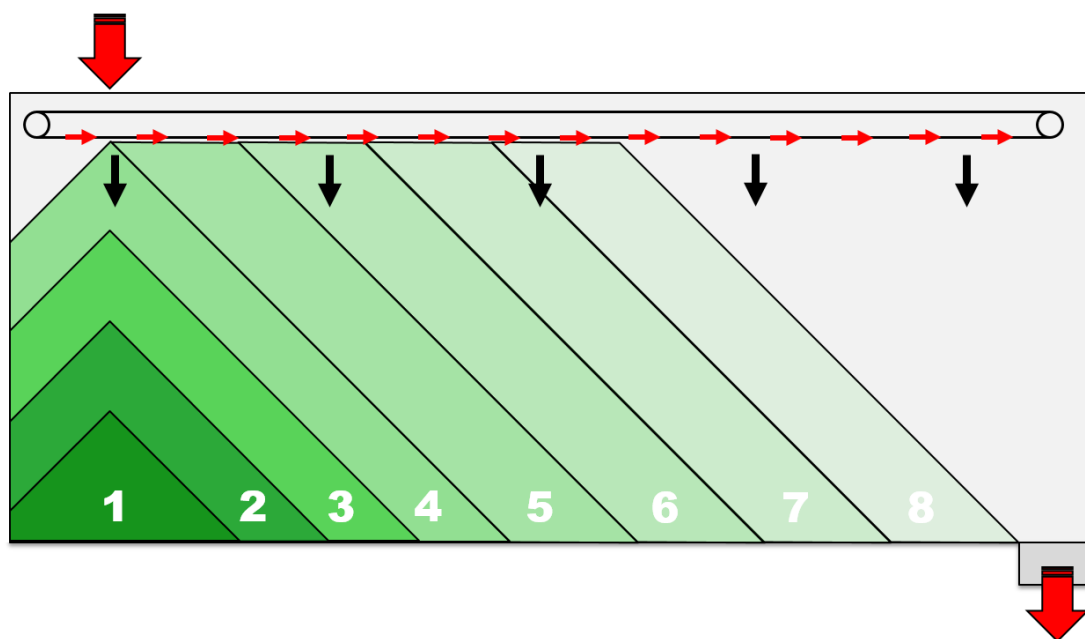
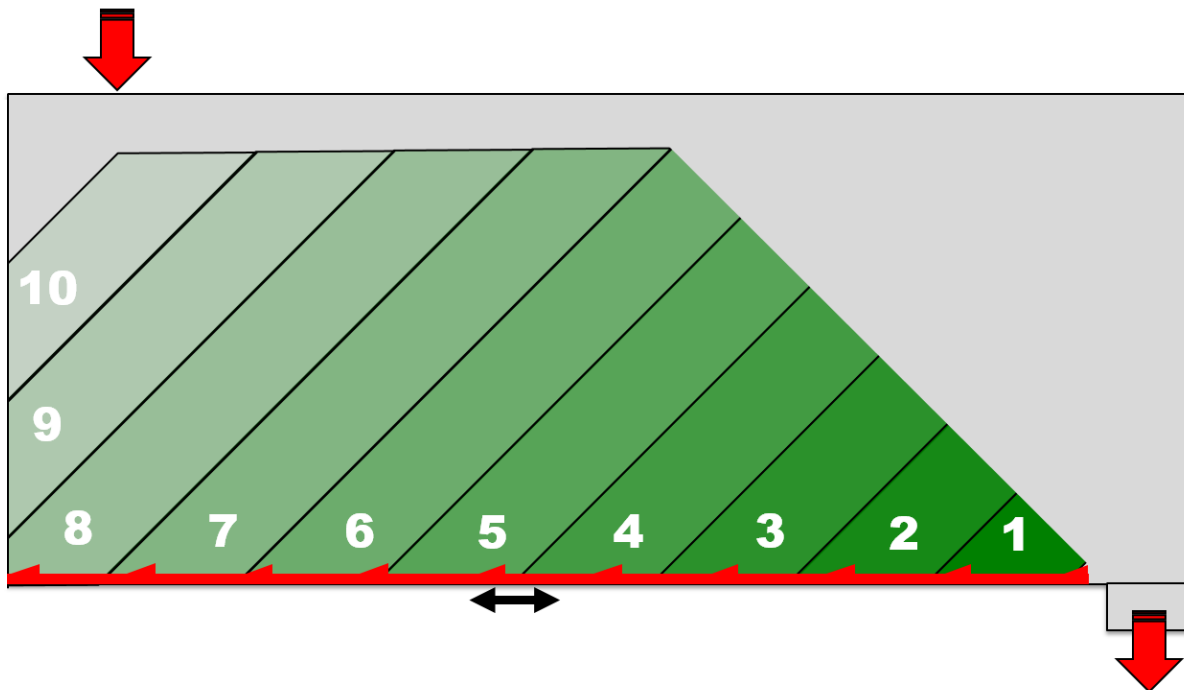


Fig 4: Material flow in a rectangular silo with LUC loading and unloading reclaimer



**Fig 5: Material flow in a rectangular silo with MOV flat moving floor discharge system**

Fig. 5 shows the material flow for the MOV moving floor system. Depending on the silo size/store height, the storage time and the properties of the AF material, consolidation can also occur here in the lower region. In contrast to the use of a LUC loading and unloading reclaimers, the extraction in the MOV moving floor system is produced by the horizontal movement of the entire volume of material in the direction of the outlet. This corresponds to the FIFO principle (first-in-first-out) and means that material flow problems caused by the system are not to be expected, even when using an AF material with high moisture content and long storage times. Furthermore, thorough mixing of different material layers occurs in the outlet area, which leads to better homogeneity of the AF material and assists the subsequent combustion process.

Operator' requirements	Requirements relating to the bulk material
<ul style="list-style-type: none"> <li>• Simple and reliable plant technology</li> <li>• Low maintenance and operating costs</li> <li>• High level of availability</li> <li>• High metering accuracy</li> <li>• Compact shape</li> <li>• Scope of investment to be as efficient as possible</li> <li>• Flexibility with respect to changing bulk material properties (security of investment)</li> </ul>	<ul style="list-style-type: none"> <li>• Avoidance of additional compaction by the metering system</li> <li>• Destruction of occasional agglomerates</li> <li>• Homogenization wherever possible</li> <li>• Consideration of the explosion and fire risks</li> <li>• Enclosed structure for Health and Safety</li> <li>• Suitability for widest possible range of AFs, e.g. very lightweight AF</li> </ul>

**Tab. 3: Requirements for metering systems for AFs**

Different aspects from those that occur during storage play a role during metering of AF (Table 3). For example, it is now expected that a metering system for AF should be enclosed to meet the current Health and Safety requirements. The metering system must also be suitable for the greatest possible range of AF materials with widely varied properties. The well-known belt weighfeeder and the weighing screw conveyor are compared below with the novel WeighTUBE® tubular weighing system. All three systems are produced and installed by DI MATTEO. The advantages and disadvantages of the respective systems should be known and taken into account when decisions are made about their use.

The metering systems shown in Fig. 6 – the belt weighfeeder (Fig. 6a) and the weighing screw (Fig. 6b) – are still used. The belt weighfeeder is the correct choice if it is a question of metering AF that is very coarse or has a large surface area, such as shredded tyres or SRF for firing the calciner. Regardless of the particular detailed design, the disadvantage is that the belt weighfeeder is, in principle, an open system. The weighing screw (Fig. 6b), in which the entire screw is supported on load cells, is now an outdated weighing system that is completely unsuitable for reliable metering of lightweight AF materials with bulk densities of less than 500 kg/m<sup>3</sup>. As a rule AFs always involve bulk materials that have some very corrosive and abrasive properties, so this requires the use of mechanically robust machines. The use of a weighing screw entails the problem that the very high tare weight of the machine is contrasted with the relatively low net weight of the AF material. In practice, this means that when a weighing screw is used it can only operate as a volumetric metering system.



**Fig 6: Well-known metering systems; a) Belt weighfeeder, b) Weighing screw**

Against the background of the two metering systems described above, DI MATTEO decided to develop a metering system that combines the advantages of the two metering systems shown in Figs. 6a and 6b. This resulted in the WeighTUBE® tubular weigher (Fig. 7). This involves a fully enclosed system that has solved the problem of the unfavourable tare/net weight ratio in that only a short section of the casing is weighed on load cells. The structural arrangement of the feed hopper, the agitator and the metering screw avoids any compaction of the material and also ensures that any agglomerates that may be present are destroyed, which is an advantage for the subsequent thermal utilization of the AF material. The novel WeighTUBE® tubular weighing system has already proved successful in many applications around the world for metering AFs as well as conventional bulk materials [10–13].

#### **4 The SCC system – systematic classification of plants for handling AFs**

As already indicated above, there are usually several alternative solutions for handling AFs. The problem is that the choice of the wrong plant component for the particular task at the design stage can mean the failure of the entire investment or, at the least, cause considerable worsening of the expected return on investment. DI MATTEO has therefore developed the SCC – a Seven Stage Concept (Fig. 8).





Fig 7: The novel patented ODM WeighTUBE® tubular weighing system

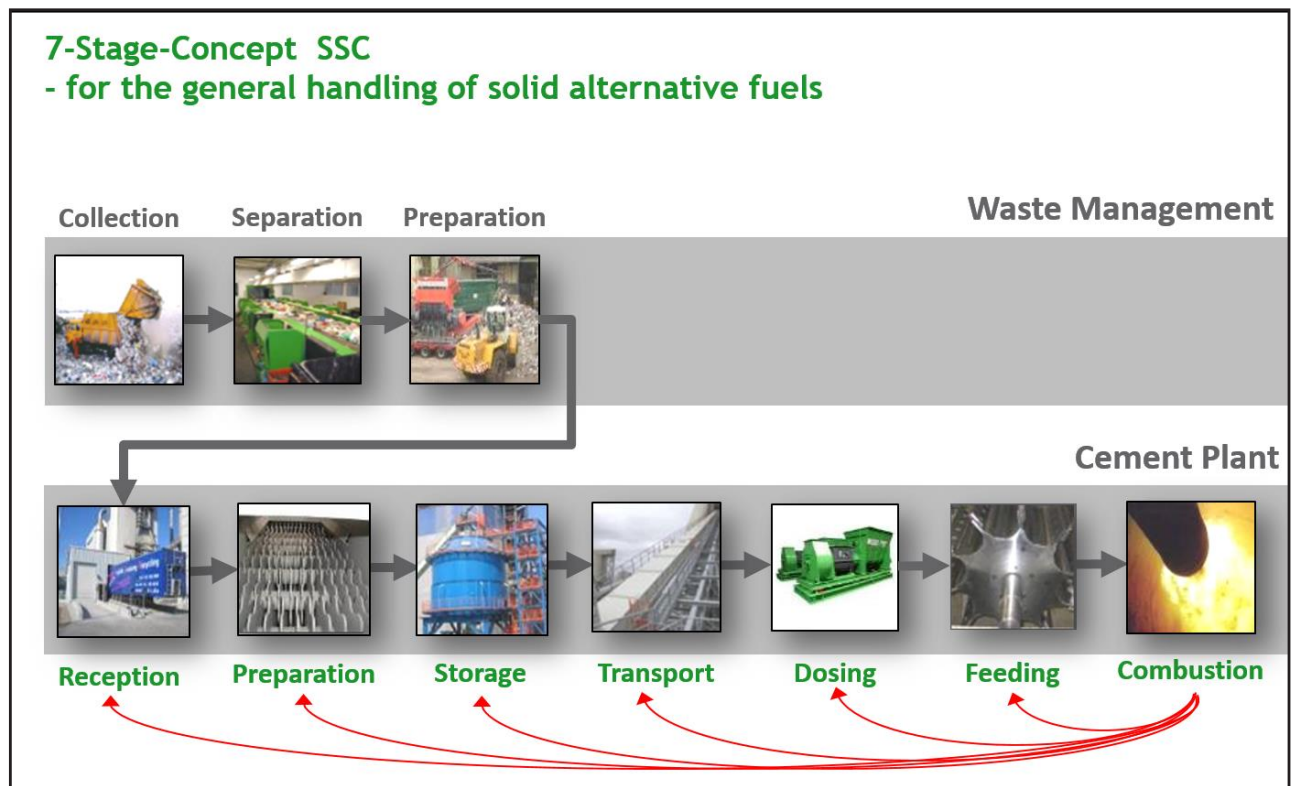


Fig 8: The SSC system – systematic classification of plants for handling AFs

Every plant for thermal utilization of AF can basically be subdivided into seven stages:

- 1) Reception
- 2) Preparation (e.g. protective screening)
- 3) Storage
- 4) Transport
- 5) Metering
- 6) Feeding to the kiln process
- 7) Combustion

Depending on the given or expected physical properties of the AF there are several alternatives available for technical implementation of each stage. During the systematic and purely analytical development of a complete plant for handling AF the optimum plant design for the individual client is worked out with the aid of appropriate choices. The most important aspect in the choice of plant components is the consideration of the ultimate thermal utilization of the AF from the point of view of avoiding compaction and formation of agglomerates that are detrimental to combustion.

This approach offers several advantages over haphazard and unsystematic plant design:

- Only tried and tested plant components are permitted in the SCC system.
- The advantages and disadvantages and the limits of use for the different AFs are laid down for each plant component so that the use of plant components for the wrong tasks is avoided.
- Because of a wide product portfolio all the current and proven alternative plant components for solving the particular problem can be offered without bias within the framework of the SCC system.
- As a modular system the SCC system offers the opportunity for ongoing systematic extension by the addition of new plant components. The individually optimized plant design can be given a modular configuration with maximum flexibility for the client.
- All plant modules are designed, manufactured and installed by DI MATTEO so that the client obtains everything from a single source

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# “Multi-fuel Systems are the Future”

Alternative fuel expert Thomas Jennewein from FLSmidth Pfister talks about trends in secondary fuels

By: FLSmidth Pfister GmbH / Germany

Interview with Thomas Jennewein, Expert for Alternative Fuels

One doesn't have to be a prophet to predict that oil and gas prices will rise again in a medium-term perspective. These primary energy sources release carbon dioxide when combusted. And carbon dioxide is known to be climate-damaging. In the cement production branch the application of alternative fuels (AF) is perceived as crucial – under the aspect of decreasing of CO<sub>2</sub> emissions as well as under the aspect of the return on investment. Thomas Jennewein, expert for alternative fuels at weighing and dosing specialist FLSmidth Pfister, is commenting on his current findings on this market.



1. From small to huge: Thomas Jennewein shows Pfister rotor weighfeeders for alternative fuels set up for different, individual demands

- **In comparison to heating with primary energy sources, the use of AF poses a challenge. In which way?**

When you remember that coal or lignite as well as oil and gas have been used since the beginning of the industrial age as an energy source, you'll understand that their processing is optimized and these fossil fuels are therefore available in homogenised forms. Also

they are momentarily very cheap. Furthermore their material properties like handling ability and calorific value are fairly steady all year round.

This is quite different with alternative fuels whose origin is considerably different. The predominant portion in AF before processing is rubbish. It's an undefined material mixture which would have been collected most likely on a landfill in former times. In most cases only several processing steps make an AF from this garbage. Considering that the cement industry usually obtains its AF from a number of different suppliers, it's no surprise that their flow behaviour changes from charge to charge. Humidity and bulk density also vary substantially. On account of the origin of the fuel unfortunately foreign bodies can also never be fully excluded.



2. A selection of alternativ fuels: chunky, powderous, fluffy, light, heavy. the variety is large

- **How can this challenge be met?**

Generally speaking dosing systems have to be able to handle different levels of humidity and density as well as a varying level of quality even of the same material. You have to keep in mind that recycling companies inevitably also produce different qualities today from

tomorrow. When shredding, the blades wear out which of course influences the cut results. All this adds up to an initial position which cannot be solved by customary weighfeeders which are used for dosing of uniform bulk goods. On account of the extreme inhomogeneity of the AF we have learned that we need really "multi-fuel capable" weighfeeders. With the rotor weighfeeder Pfister® TRW-S (the 'S' refers to secondary fuels) we developed such a device. Why is it "multi-fuel"? Its pre-hopper is mounted directly at the inlet to the rotor weighfeeder and is equipped with a stirrer to prevent adhesion of the secondary fuel, loosens and homogenizes it at the same time. Its rotor consists of an ideal number of big rotor chambers and is constructed very robust. It resembles a round drag chain conveyor but is especially configured for dosing of diverse AFs. With the prospective control, ProsCon®, which is implemented in all Pfister® rotor weighfeeders, the system reacts to variations in flow density or changes its flow behaviour even before material is discharged. So the material is fed into the firing process with extremely high constancy.



3. Thomas Jennewein shows two extremes of AF: On the left a very light AF (mixture of wood chips and rubber) which might be used in a calciner; on the right an AF (RDF mixture of plastic, paper and shredded carpet) which might be used for a main burner

• **What can the cement industry do to improve the quality of AFs?**

Though the fuel suppliers are taken on board with checks and audits with regard to particle sizes, chlorine content and calorific results as well as humidity and granularity this often times is not enough. In spite of these measures most cement makers additionally employ an oversize and a magnetic separator to guarantee the quality of the material. Foreign bodies can still not be fully excluded. Hence, receiving, feeding and weighfeeder systems should be employed which do not have narrow gaps and whose engines are equipped with an overload protection.



4. For perfect handling of AF the homogenisation bins of Pfister rotorweighfeeders are equipped with stirrers like this.

• **Are there any AFs which are suited better than others?**

In my opinion this question cannot be answered in general. First of all the goal of any cement manufacturer is to produce clinker with a satisfactory quality. So not only the calorific value/price ratio is of interest, but also the chemical properties of the fuels related to the respective raw material. To reach a high substitution rate, several different alternative fuels are in use within a cement plant. Meanwhile many cement plants are able to apply 10 or even more AFs. Which AF is used then depends on the respective availability or the cost/performance ratio, but also on the chemical composition of the fuel.

• **How does the market for dosing systems for alternative fuels present itself, momentarily?**

At the moment the market is difficult because of the low oil price. To start firing with AF now, means that a plant first has to invest in alterations, e.g. in the building of

storage, transport, dosing and in the modification of the combustion process. Previously, these investments had to be amortized over less than ten years, then less than five. In the meantime the pressure has clearly become greater.

On the other hand, the whole business branch has committed to a considerable reduction of the CO<sub>2</sub> output. An important step to achieve this is the use of AFs. In this connection I would like to point out that from the decision to use AFs and the final implementation several years can easily pass by: This is due to necessary approvals, investment planning and the organisation of the fuel supply.



5. In this installation rotor weighfeeder Pfister® TRW-S is utilized for feeding fluffy and dusty alternative fuels with a feed rate of 8 t/h. Above the red rotor weighfeeder an homogenization bin is installed.

#### Can you identify any trends in employing AFs in the cement industry?

At first sight there are two opposing trends: Some cement plants are using more and more grounded fluff. This fuel has a very short burning time and is thus suitable for application at the main burner. Here, the substitution rate could be increased further in a

number of plants. Because this dried fluff shows a high proportion of dust, ATEX conform and pressure-proof dosing systems should be employed. Because of the high calorific value and the low bulk density, I can only advise to use highly precise dosing systems to guarantee stable fuel processing.

At the calciner there is a contrary trend: Some cement plants try to apply extremely coarse fuels. Though this reduces the effort for preparation and thus makes the use of the fuel apparently more lucrative, but it clearly shows a bigger challenge for fuel storage, transport and the dosing process itself. Plus, without bigger rebuilding this trend is limited. The retention time – this is the period between inserting the material in a modern calciner to its complete burn out – is only between 8 to 10 seconds. If only one pre-shredding device is employed so called “burning chambers” are necessary. But these mostly necessitate extensive rebuildings at the calciner.

It's in the nature of things that when applying only one shredding-step, big particle sizes remain more often. To be able to nevertheless guarantee smooth and trouble-free operation, conveying and weighing systems are necessary, which allow these big chunks to pass without blocking.

#### • What's your recommendation to the cement plant operators with regard to the use of AF?

The installation of multi-fuel systems is clearly the trend. With small AF substitution rates a simple dosing system might be enough as compared to a more costly rotor weighfeeder. But, indeed, the question is why not investing in something absolutely decent, capable and future-oriented right from the beginning as the cement industry aims to higher AF substitution rates anyway. These can never be satisfyingly handled by volumetric

dosing devices. If an investment has to be made in a few years anyway, isn't it more clever to invest in the right system from the beginning as for example in the gravimetric Pfister® rotor weightfeeder TRW-S? These devices are multi-fuel per se and are able to handle a larger range of materials with different flow behaviour. Considering that the quality, availability and the prices of AF are constantly changing this is an important aspect for cement plant operators.

## A TEC Rocket Mill® RM 2.50 double starts operation in Austria



After seven month of engineering, construction works and installation on-site A TEC's Rocket Mill® was commissioned on 07.11.2016 in Wiener Neustadt.

### Highly caloric residue-derived fuels

To optimize the production of highly caloric residue-derived fuels for the cement industry the Austrian company .A.S.A. installed A TEC's Rocket Mill® RM 2.50 double in their treatment plant in Wiener Neustadt.

Pre-sorted and shredded household and commercial waste with a bulk density ranging from 100 - 300 kg/m<sup>3</sup> can be grinded down to a size of 15mm – 50% is smaller than 5mm – in only one step (depending on the size of the sieves). The material has excellent ignition properties due to a change of physical properties (higher specific surface). Subsequently it is used by cement manufacturers from the region. Mainly produced by A TEC Plant Construction in Eberstein the mill has a capacity of 7- 40 t/h and for different output size useable and is equipped with two grinding

chambers which can be independently loaded. Each one has a main drive with 315kW. Due to the grinding technology an additional drying effect of approx.10 % is given.

The mill convinces not only with its excellent output material it's also easy to maintain (no knives) and insusceptible against extraneous material and heavy items.

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## High-performance grinding down into the nano range!

Now available for sample quantities up to 450 ml and a max. feed size up to 10 mm – with premium performance, usability and safety!



Planetary Mill  
PULVERISETTE 6 *premium line*

With two grinding stations, we have developed the NEW FRITSCH **Planetary Mill PULVERISETTE 6 *premium line*** as the ‘big sister’ to the PULVERISETTE 7 *premium line*: Your ideal mill for fast wet and dry grinding of hard, medium-hard, soft, brittle and moist samples as well as for mechanical alloying, mixing and homogenising of larger sample quantities with reliable results down into the nano range – and an absolutely secure automatic clamping of the bowls by the mill.

**Your advantages with the **Planetary Mill PULVERISETTE 6 *premium line***:**

- ⊕ Extra strong 2.2 kW drive power and extremely high centrifugal acceleration up to 64 g and up to 800 rpm (rotational speed of the bowl 1600 rpm)
- ⊕ Motor-driven ServoLOCK clamping of the grinding bowls
- ⊕ Safe and user-independent reproducible clamping
- ⊕ 2 grinding stations for grinding bowls 160 ml, 250 ml and 500 ml volume
- ⊕ Intuitive touchscreen operation with colour display

### Grinding has never been safer

With the completely brand new ServoLOCK clamping of the grinding bowls and the automatic check of the fastening of the bowls inside the mill, man and machine are optimally protected. In the event of impermissible operating states, the machine blocks the start of a grinding – and if an imbalance occurs it automatically shuts off. It doesn’t get any safer than this. Just insert the grinding bowl – start – done!



Safely guided insertion of the grinding bowl

### FRITSCH *premium* advantage: Safely guided insertion

The grinding bowl is simply inserted in the PULVERISETTE 6 *premium line* from the front into the holder. Correct positioning is automatically ensured by a practical guide. The PULVERISETTE 6 *premium line* does not start until both bowls are correctly inserted and prevents due to bowl detection via RFID chip, the setting of too high speeds depending on the bowl material used.

**Your advantage:** guaranteed constant, reliable results – incorrect operation impossible.





Easy closing of the clamp,  
automatic locking via ServoLock

**FRITSCH *premium* advantage: Motor-driven grinding bowl clamping**

The revolutionary ServoLOCK is activated with a single hand motion by pressing down the clamp. It is automatically locked by the machine via ServoLOCK instead of manually. A LED light shows that the bowl is correctly inserted and clamped.

**Your advantage:** extremely safe and easy operation with reproducible, user-independent clamping at any time – without screwing or other manual fastening.

**FRITSCH *premium* advantage: Intuitive user navigation**

The PULVERISETTE 6 *premium line* is operated via the adjustable, ergonomically arranged touchscreen with high-resolution and logical menu structure in multiple languages and practical plain-text user navigation for fast and easy operation. Here you enter the variable rotational speed and define the grinding time. You can programme interval and pause times using the minutes and seconds timer and can save up to 10 programmes.

**Test the FRITSCH Planetary Mill PULVERISETTE 6 *premium line*!**

Send us your most difficult sample – we will carry out a complimentary **sample grinding** for you. Compare for yourself!

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## **BEUMER Customer Support ensures reliable intralogistic processes: Always supportive**

For BEUMER Group, Customer Support is much more than just a service. While it was once enough to "simply" prevent or quickly solve malfunctions and machine downtimes, the intralogistics provider has now significantly extended this service. Approximately 1,000 employees worldwide now work for this business segment. They take care of the customer, starting with the first project discussion, up until the system is in operation. Customer support comprises different types of agreements. With its Residential Service, the group assumes, for example, the responsibility to provide trouble-free operation on site, even for the long-term.

What makes for a good relationship between the user and the supplier? For Kornelius Thimm, the answer is simple. "We have customers that have been loyal to us for decades. This is certainly based on mutual trust," the Director of Customer Support at BEUMER Group is convinced. Because our systems and machines run reliably. His colleagues take care to ensure a high level of system availability for the entire running time. "Our customers know that we would never leave them out in the rain," adds Kornelius Thimm.

As an international manufacturing leader in intralogistics providing customised system solutions in the fields of conveying, loading, palletising, packaging, sortation and distribution technology, BEUMER Group knows the particular challenges posed by the customers. Its clients have ever increasing demands on machine availability and, therefore, on customer support. This is why BEUMER Group has developed and extended its customer support and established it as a business segment in its own right. Due to its global positioning, the group has consistently optimised and extended this segment

with specifically trained employees during the last few years. "We're not only providing service products, we really take care," emphasises Kornelius Thimm. This becomes more and more important to users from different industries. It is not always only about preventing malfunctions and machine breakdowns, which would lead to long downtimes. No matter what industry, companies have to meet the ever increasing market demands and improve the capacity of the equipment, for example. "And we take care of this," the service director promises.

### **Customised like a tailor-made suit**

Customer Support offers different types of agreements. They are matched individually to the respective needs of the customer, and the service intervals as well as the response times are agreed by contract. BEUMER employees develop the concepts individually with the customer, and adjust them so they meet exactly their requirements. In the event of a system standstill, qualified Customer Support technicians arrive quickly on site to prevent long downtimes. Customer Support offers around-the-clock telephone support every day of the year worldwide, helping further reduce downtime to a minimum. The technicians perform remote analyses, indicate corrective measures and offer quick and reliable solutions to correct any malfunction. The systems can be put quickly back in service. Additionally, we will also find the cause for the malfunction to prevent it from happening again.

### **The whole is greater than the sum of its parts**

One component of Customer Support is spare parts logistics. If customers decide to use this service, the service employees check the wear parts and spare parts at regular intervals and provide the supplies for the entire service life of the machine. "Already

when selling the new system, we advise the customer which spare parts to keep in stock," says Kornelius Thimm. "In case of parts for machine types that are to be discontinued, we inform the customer in time and consult them regarding replacement or exchange possibilities." Personal contacts offer technical support for all inquiries. During the maintenance of the machines, the customer support employees check whether or not there are parts to be replaced. If spare parts are required, BEUMER Group provides a quick delivery.

### Customised employee trainings

In order for the machines to run for the maximum operating time, users need to be trained at regular intervals. The performance of the machines also depends on maintenance and on how they are operated by the customer personnel. The employees who work with the machines are brought up to date, and new employees are introduced to the systems. Training is required for the initial installation, as well as a follow-up several months after the system has been running. At this time, the customer has the opportunity to ask questions related to their specific needs. "The training programmes are tailor-made for the customer and their systems", Kornelius Thimm points out. The users' expertise is maintained through the technical consultation by our Customer Support employees.

Customer Support offers basic trainings up to continuing education. They are tailor-made to meet the customers needs and are held for machines and systems of BEUMER Group as well as of other manufacturers. This is how the group ensures high health and safety standards. Experienced specialists impart detailed knowledge and structured procedures for successful maintenance and for the operation of the systems. This is particularly important for machine operators, because mechanics and control technology is becoming increasingly elaborate and sophisticated.

In order to meet future performance and technology requirements, BEUMER Customer Support employees ensure that the machines are always up-to-date. "We make sure that the machines are comprehensively modernised," says Kornelius Thimm. This means higher performance and availability, minimised energy consumption, more ergonomic working conditions, new functions and a better overall system

utilisation. For this, the employees can update or upgrade the systems.

### Sharing your accountability

A particularly important part of this business segment is the Residential Service. Customers can hand over the responsibility to BEUMER Group for availability, performance and economic efficiency of their filling, palletising and packaging technology, but also for sortation and distribution systems in logistic centres and airports. BEUMER Group employees carry out the maintenance with profound logistical and technical expertise, ensuring high levels of machine efficiency. If required, BEUMER Group appoints a team of specialists which will ensure proper operation and availability of the entire system on site.

BEUMER Group believes that the customer should have access to a Customer Support technician that originates from the same cultural background and speaks the same language. "For this reason we cannot just send colleagues from Beckum to Singapore", says Thimm. Successful customer support requires an understanding of the mentality of the customer: How is the customer positioned? What are his goals and how does he want to develop in the future? These questions require tactfulness and cultural know-how.

Logistics providers offer services for reliable filling, palletising and efficient packaging of products. This can sometimes involve overcoming considerable difficulties, because the products can have very different characteristics. Yet they have to be consistently handled safely and gently throughout the entire process chain. In addition, they need to be able to react to the continually increasing throughput rates of the installations and machines. Another demand to be met: the control, regulation and clear representation of the complete material flow. Kornelius Thimm knows that "if the service provider does not meet all these requirements, a competitor will do it". Customer Support employees make sure that the customer's systems are always perfectly adapted to their tasks, and that all processes run smoothly. They also carry out preventive maintenance, as well as other measures such as applying protective coatings or installing warning devices. Kornelius Thimm adds: "We also develop and implement concepts which enable a long-term and trouble-free operation of the buildings."



**Picture 1: The highly qualified personnel of the BEUMER Customer Support offers technical support and machine maintenance world-wide.**



**Picture 2: When necessary, the technicians arrive quickly on site to prevent long downtimes.**



Picture 3: Customers can hand over to BEUMER Group the complete responsibility for availability, performance and economic efficiency of their systems.



Picture 4: The whole is greater than the sum of its parts: Customer Support offers different agreements that are matched individually to the respective needs of the customer.

## Siemens extends high-voltage motor portfolio to include new series up to 70 MW

- **The new Simotics HV HP high-voltage motor series covers a power range of up to 70 megawatt**
- **Flexible, modular concept suitable for wide-ranging applications with exceptionally high power requirement**
- **Short delivery periods and reduced planning and engineering effort help speed up project completion**
- **Optimized design minimizes vibrations and noise**

With its new high-voltage motor series Simotics HV HP, Siemens is now able to cover an extended power range of up to 70 megawatt (MW). Its flexible modular concept makes this series ideal for precisely tailored solutions in all kinds of industrial applications in the high power range. The new series benefits from short delivery periods and helps minimize the work involved in planning and engineering, speeding up project completion and bringing forward overall plant commissioning. These high-voltage motors can be used for a wide range of applications in fields as diverse as ship building, power plant technology, and the oil, gas, metal and fiber industries.

The reduced planning and engineering input required is due to integration into the Siemens standard tools which now permit simple, rapid selection and configuration up to 70 MW. The design is implemented using Siemens PLM software, which allows data generated to also be used for plant planning. The use of standardized interfaces and the simple, compact concept make for easier plant integration. In terms of its structure, the system benefits from an optimized base frame which not only reduces noise and vibrations to a minimum but also makes the motor

exceptionally robust and able to cope with extreme ambient conditions, helping to maximize the availability of the overall plant. Overall availability also benefits from integration into condition monitoring systems, a service-friendly design and simplified spare

part procurement due to a high degree of component standardization. An added bonus is the extensive scope for system testing to ensure the optimum interaction of Simotics HV HP and Sinamics medium-voltage converters within an Integrated Drive System (IDS).

All the models of the Simotics HV HP series are available as synchronous or induction motors, in a high- or low-temperature version, with gas and dust explosion protection and with a wide variety of cooling methods. Simotics HV HP complies with a wide number of industry and country-specific certification requirements such as API, TR CU, CSA and NEMA.

With Simotics HV, Siemens covers a power range of up to 100 MW and beyond. All its high-voltage motors are available in a varied choice of configurations. By providing scope for selecting different cooling systems and protection ratings, as well as suitability for use in aggressive and potentially explosive atmospheres, the series affords an extreme degree of flexibility. The HV family is also characterized by its extreme reliability and long service life.

A flexible modular concept enables precisely tailored solutions in all kinds of industrial applications in the high power range: With the new Simotics HV HP high-voltage motor series, Siemens is now able to cover an extended power range of up to 70 MW.



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## Effective protection for electric motors and loads

- **High-performance Simatic ET 200SP motor starter with new versions and functions**
- **Now particularly powerful with four adjustment ranges up to 5.5 kilowatts**
- **New fail-safe versions for a wide range of switching and monitoring tasks**
- **New functions, such as motor blocking protection and Quick Stop, for greater throughput, productivity and availability**

The Simatic ET 200SP motor starter protects electric motors and loads. Siemens has designed it for higher performance, and added new versions and functions. Four adjustment ranges up to 5.5 kilowatts now make the motor starter particularly powerful. With the new fail-safe versions, there is now a wide range of standard and fail-safe motor starters for switching and monitoring tasks in logistics and production plants and on production machines and machine tools. New functions, such as motor blocking protection and Quick Stop, not only protect motors but also increase the throughput, productivity and availability of plants.

The powerful, compact Simatic ET 200SP motor starter saves space in the control cabinet and offers versatile control, switching, starting and monitoring functionalities. It reliably protects 1 and 3-phase motors against overload and short circuit when starting. The current values can also be used for energy management functions. Thanks to push-in technology, no tools are required for connecting the motor starters. Parameters are easily assigned with the TIA Portal engineering tool and the starters are connected to a controller without any programming effort. Any faults can be easily found and corrected

by a multitude of diagnostic options, such as residual current detection and LED displays.

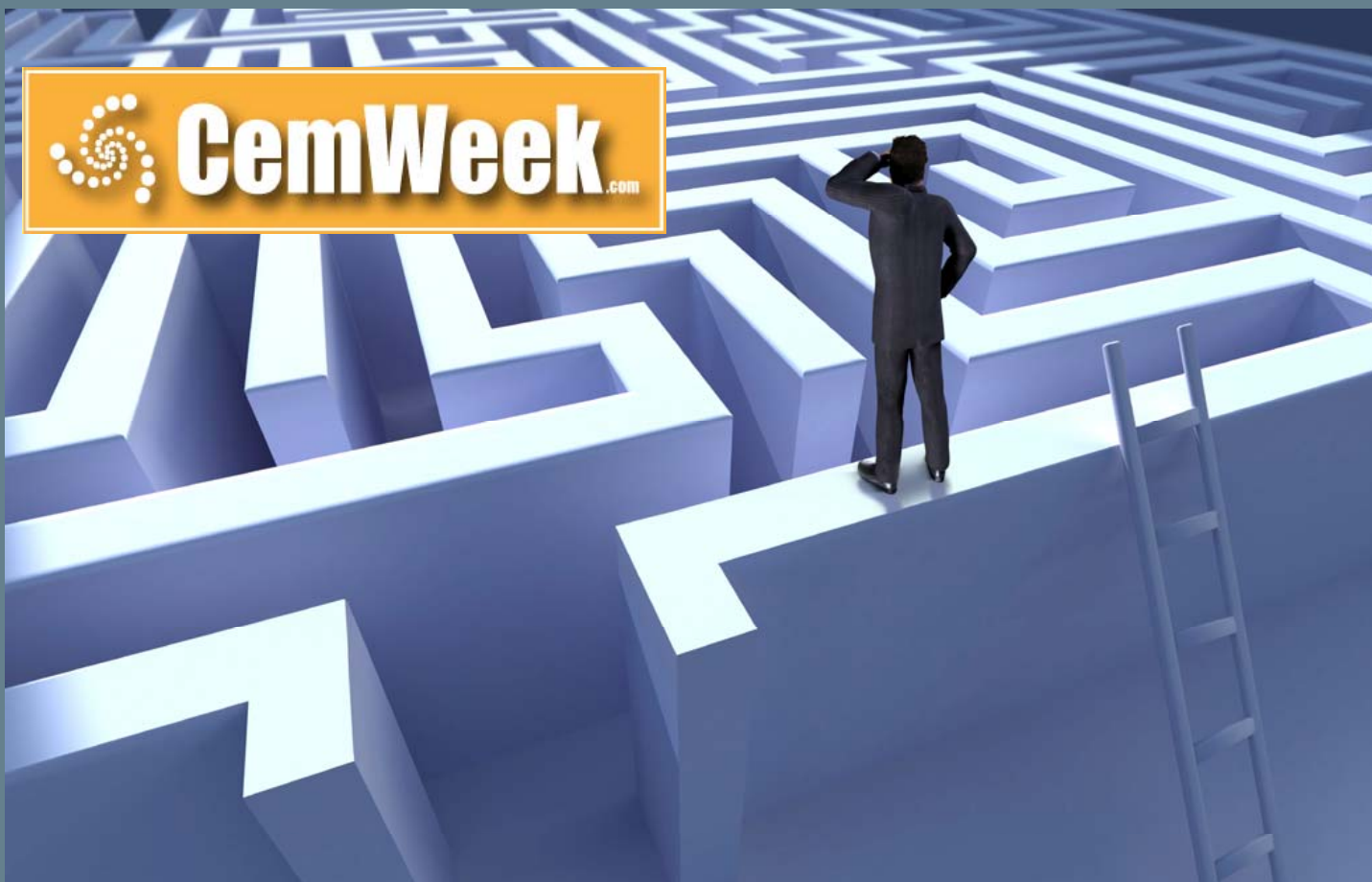
The Simatic ET 200SP motor starter safely switches off motors in two ways: The Sirius 3SK safety relay, which separates standard and safety engineering, is used for locally limited applications. For system-wide, integrated automation solutions, the safety-oriented F-CPU of Simatic controllers are used.

New functions include Quick Stop and motor blocking protection. The Quick Stop function stops conveyed goods precisely, which increases throughput and productivity. The motor blocking protection function switches off the plant quickly in the event of a mechanical blockage, such as when a tool gets wedged in the conveyor belt. This protects the motors and increases plant availability.

The Simatic ET 200SP motor starter protects electric motors and loads. Siemens has designed it for higher performance, and added new versions and functions. Four adjustment ranges up to 5.5 kilowatts now make the motor starter particularly powerful.







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## First tablet PC from Siemens: Rugged and geared for industrial applications

- First tablet PC from Siemens for mobile industrial applications
- The Simatic ITP1000 industrial tablet PC is currently the fastest tablet PC on the market
- High-performance chip set with practical industrial functions for demanding tasks and graphic applications in industry
- TPM 2.0 security to protect system and data

Siemens has brought a tablet PC onto the market for the first time. The Simatic ITP1000 industrial tablet PC is currently the fastest tablet PC on the market. It has a projective-capacitive 10.1-inch Multitouch display, the latest Intel Core i5 Skylake processor technology, and the Trusted Platform Module. Designed for industrial use, the Simatic ITP1000 is especially suitable for service, production, measuring and testing, as well as for operator control and monitoring. The new industrial tablet PC supports Windows 7 and Windows 10. With many different interfaces and well-thought-out product features, the Simatic ITP1000 is versatile, can be used everywhere, and can be integrated in both new and existing plant concepts. With long-term availability of components, as with all Simatic PCs, the new Simatic ITP1000 tablet PC can be used for many years.

To handle challenging tasks, a high-performance chip set with the latest Intel Skylake CPU technology is used in the Simatic ITP1000 industrial tablet PC. The DDR4 RAM can be upgraded up to 16 gigabytes, and a 256 or 512-gigabyte SSD (Solid State Drive) can also be added to the device. Even customized automation tasks can be handled flexibly with the practical industrial functions – such as RFID (Radio Frequency Identification), a bar code reader, camera, and six freely programmable function buttons. This is also supported by a wide range of interfaces – such as Bluetooth, WAN, 1-gigabit LAN, serial RS 232 DC-in, miniDP, SD card slot, 1 USB type C and 2 USB 3.0 ports. The PC has an integrated TPM 2.0 module to protect the system and data, and a Kensington lock to prevent theft. An optional docking station with a port replicator that has been designed for practical one-hand docking enables the new tablet PC from Siemens to be used as a complete workstation with an external monitor.

Typical service applications for the Simatic ITP1000 industrial tablet PC are instructional films for simple maintenance tasks, location-related service information, and remote access to plants. In the fields of measuring and testing, the uses of the new tablet PC include mechatronic simulations, such as those for minimizing the noise emitted by automobiles

and aircraft, as well as measuring energy consumption, flow and temperature. Applications for production include films for training new employees, mobile assembly stations, quality management, order-picking scales, and driverless transport systems. With operator control and monitoring, the Simatic ITP1000 is suitable for location-related tasks, such as indoor navigation, SmartAccess to panels, and web-based visualization. Office applications, such as Excel for evaluating production data, complete the wide range of possible applications for the new industrial tablet PCs from Siemens.

**Background information:**

The new Simatic ITP1000 industrial tablet PC is part of the Siemens portfolio of Simatic industrial PCs. This includes the scalable product lines of box, panel and rack PCs, supplemented by additional versions for special applications. The Simatic IPC range – from the compact fanless embedded device to the powerful, expandable high-end IPC – is specifically designed for industrial applications. For mobile automation engineering, users also employ the ready-to-run, rugged Simatic Field PG industrial programming device.

Siemens has brought a tablet PC onto the market for the first time. The Simatic ITP1000 industrial tablet PC is currently the fastest tablet PC on the market. It has a projective-capacitive 10.1-inch Multitouch display, the latest Intel Core i5 Skylake processor technology, and the Trusted Platform Module.



### The “perfect wave”: Intesa wins over ceramic industry with the new DHD Dimatix

Ten machines sold since the start of the year in the Italian ceramic district: new technology confirms all the quality and reliability-related plus-points in the ceramic product digital decoration field

On the market since January 2016, the new DHD 3.0 Dimatix wet digital decorator, produced by Sacmi-Intesa, has proved to be a hit with the Italian ceramic industry. In just a few months some ten machines have been sold and installed. Some of them were first-time orders while others were repeat purchases by customers who, after putting the first machine into production, immediately decided to order others - a clear sign of their immense satisfaction with the machines' performance in terms of print quality and manufacturing efficiency.

GoldArt, Fondovalle, Gardenia Orchidea, Marazzi and ABK have all acknowledged and greatly appreciated the advantages of this new printer, which draws on Sacmi-Intesa's unparalleled experience and know-how in designing and producing machines and plants for the digital decoration of ceramics.

Ultra-high print quality and resolution is ensured by the new control software developed by Sacmi-Intesa's engineers. This optimises the Dimatix technology and results in the simple, clean, efficient mechanical design of all machine components, ensuring the DHD 3.0 operates under perfectly clean conditions at all times.

No lines or droplets, cleaning times broadly within the market standard plus a software architecture specifically designed to control latest-generation inks and glazes. These, then, are the defining traits of the

Sacmi system: “open” by definition, it grants the customer huge freedom of choice with regard to the raw materials fed to the decorator.

Moreover, the DHD 3.0 Dimatix stands out on account of an innovative mechanical concept and specially designed software that ensures perfect piloting of the head as a function of customer-proposed inks and glazes.

Development work done in the company's labs to create perfect “wave forms” lets the head perform controlled, extremely efficient material application, providing solutions specifically designed to make the most of ceramic product aesthetic potential and the latest design trends.

What makes the difference is – from a production efficiency standpoint – an autonomy that is decidedly better than anything attainable with analogous solutions, as the machine can operate well beyond 4 hours before any automatic head and nozzle cleaning tasks are required.

Thanks to work carried out by the Sacmi-Intesa lab, the customer can also enjoy a total guarantee on compatibility between inks and internal machine components. Sacmi-Intesa also proposes the DHD 3.0 solution (in the DHD 1806 version) integrated on the new Sacmi CONTINUA+ line for the production of large ceramic slabs. Visitors to the Tecnargilla fair in Rimini will have a great opportunity to see it in action from 26 to 30 September. Just the first step, then, for a recently developed technology that is set to win over more and more customers within both the Italian and international ceramic industry.



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# CEMENTTECH

## Smart, robotized, 3D: Sanitaryware 4.0, the Sacmi way

“What drives us?” What guides us, then, on the way towards the future of ceramic sanitaryware? This was the theme of a very special day. On 26 September 2016 - simultaneously with the start of the international Tecnargilla fair in Rimini - over 140 client company managers and representatives from 40 countries visited both the factory and the research facility at Imola to find out more about the latest Group-developed sanitaryware industry solutions.

"Events such as these are essential", stated Daniele Coralli, the Division's General Manager, "as they let customers see the machines in action and fully appreciate the importance of new features and technical characteristics. They also promote networking between top-flight international companies, allowing for comparison and a heightened understanding of the latest developments in technology, plant engineering and market trends".



### **Robotics, the final frontier**

A leading protagonist at Tecnargilla in Rimini with cutting-edge solutions that explore the new frontier of collaborative robotics, Sacmi decided to show international customers the significant improvements made to the AVI high pressure casting cell; this was previewed at the last edition of the Rimini fair and this time was showcased with a major process automation upgrade. The latest version of the casting module - designed to handle WCs with stick-on rims using moulds with between 4 and 7 parts - requires, in fact, no worker intervention. All casting, mould handling and mould replacement tasks are performed by anthropomorphic robots, with changeover times now cut to under 15 minutes, with the user able to manage two distinct casting modules in parallel with just one robot. In essence, this solution is the best response to the sanitaryware market's natural need for flexibility: in every instance, the changeover time is shorter than the cycle time, thus eliminating downtimes, boosting process repeatability and quality and making work easier (the operator never has to physically enter the casting cell as all casting and mould changeover tasks can be conveniently managed via the user-friendly interface).

“Automation in sanitaryware”, explains Daniele Coralli, “is a dual frontier. On the one hand, Sacmi has developed ever-more advanced integrated production centres in which the robot plays a pivotal role, handling every aspect of production, eliminating any need for manual intervention, raising product quality and, last but not least, improving workplace safety. On the other, Sacmi is exploring the new frontier of collaborative robotics in which robots work should-to-shoulder with personnel, 'borrowing' solutions already used extensively in other sectors such as the automotive industry”. One of these - which participants at the special day in Imola later had the opportunity to see in action during the Rimini-held Tecnargilla fair - was recently included in the Sacmi Sanitaryware Division's plant engineering range. Equipped with cutting-edge safety systems, the robot that Sacmi uses for sanitaryware applications is built by the industry-leading multinational Fanuc and is designed to help workers handle the fired pieces to be inspected. Thanks to its outstanding ability to work alongside people, the robot can dynamically control all product handling, eliminating repetitive, tiring or awkward tasks and thus bringing the industry into line with the latest European directives on ergonomics in the workplace.



### **Large sinks and console washbasins. Sacmi presents the new ADI**

Something entirely new for 2016 that visitors to Sacmi Imola had the opportunity to see first-hand during their morning factory visit was the new ADI casting cell, designed to cast sinks and large console washbasins. With this unit the robot controls all the casting and mould opening/clamping tasks while mould replacement is handled by two workers in under 15 minutes (in complete safety and with the aid of a simple forklift), an approach dictated by the high weight of the moulds, sometimes heavier than 1,000 kg each. This solution offers outstanding flexibility as it is compatible with existing moulds already produced by Sacmi for the established ALS, ADS and ADM units. As with the AVI cell, mould replacement tasks – while requiring some manual intervention - can be completed in a time less than or equal to that of the production cycle, with a single robot able to handle up to three different casting modules; alternatively the integrated casting centre can, on request, be equipped with a latest-generation

Sacmi pre-dryer (FPV or FPL depending on whether mono or multi-mould cells are used) capable of reducing residual moisture by up to 35% and thus providing pieces already mature enough to be transported and placed on carts before they're sent on for final drying and firing.

Elegant designer washbasins - manufactured 'live' for visitors inside the same robotized casting centre - are, then, the result of the innovative ALV, a solution specially designed to produce such items, which need to be cast horizontally. In this case the ALV module - which also has changeover times lower than actual casting times - was coupled with the ADI but can, in principle, be configured in the robotized casting centre any way producers see fit.

### **Modelling and 3D scanning for total process digitalization**

At Sacmi (which, in over 30 years of doing business in the industry has developed and marketed some 30 complete plants, 280 WC casting systems, 170 washbasin and shower tray casting systems, 51 driers, 1,040 robotized glazing solutions plus 375 kilns and 6,228 moulds, all over the globe), 2016 marks the beginning, via advanced product and mould design solutions, of 3D digital modelling. This, then, was the common thread running through the various solutions shown to visitors during the special visit to the sanitaryware R&D lab: from digitization of the designer's preliminary drawing (followed by perfect digital reproduction of the piece, then



physical prototyping using a 3D printer) to advanced mould design software. The mould - usually finished on site - can be refined further via a real-time, error-free scanning solution that records, to an accuracy of one thousandth of a millimetre, all the modifications that will then be replicated on the die.

All-new GAS (glaze application scanning) technology is taking us in a similar direction: this advanced software makes the glaze spraying cone both visible and measurable, simulating all process parameters and allowing further reduction of overspray. It also provides feedback control of line operation (via real-time interception of any changes in glaze rheology, glaze nozzle clogging etc.).

### **Robotized glazing, the present speaks smart**

GAS is only the latest new product in a sector - Sacmi-brand robotized sanitaryware glazing - that saw, in 2016, the extraordinary success of the new GDA 80 (Gaiotto Diaphragm Automatic Gun) needleless glazing gun. The



latter has become extremely popular on the market (a good 110 solutions have recently been supplied) as it eliminates the need for maintenance while simultaneously boosting quality and process repeatability. Alongside this, Sacmi has gone a stage further with robotized glazing solutions (implemented on the latest Gaiotto GA-OL robot series) by introducing, as early as 2014, a new 'smart' software release for off-line robot programming: this feature revolutionises the way the production process is conceived as it allows the operator to program glazing recipes in advance on the PC - thus modelling gun trajectories and setting all the spraying parameters - and eliminate the downtimes that stem from the need to reprogramme the robot during size changeovers. Once executed, the programme can, in fact, be simulated and optimised without having to intervene directly on the line; programs executed in self-learning mode can also be imported to modify and optimise them.

**“Zero downtimes”, quality and energy for the industry: this is Sanitaryware 4.0**

This, then, is how Sacmi (which during the second part of that special day on 26 September took clients on a guided tour of another example of regional excellence, the Lamborghini factory in Sant'Agata Bolognese) is developing and, indeed, putting into practice Industry 4.0 principles within the sanitaryware industry. Automation, improved worker skill sets, digitization and quality control capable of acting retroactively on the process are all being used alongside new consumption optimisation systems. And that means all consumption: in terms of energy



(30% lower overall), of course, but also in terms of wasted time (slashed by over 65% thanks to elimination of the downtimes associated with synchronization of casting and mould changeover and reduced storage and handling requirements thanks to utilisation of advanced pre-dryers etc.); lastly, compared to traditional solutions, processing residues are 25% lower, offering direct advantages in terms of process efficiency and lower disposal costs.

Sacmi also sees Sanitaryware 4.0 - and has done for several years - as the development and provision of advanced after-sales services, supplied via its worldwide sales and spare parts network. That same goal is also, and above all, achieved via the cutting-edge remote support software installed on the machines; this allows customers, wherever they may be in the world, to count on the real-time support of specialised Sacmi technicians to fix all the most common problems. Sacmi, in fact, provides customers with customised solutions right from the design stage and carries on providing close support throughout the working life of machine and plant.

# DIARY DATES

## DIARY DATES

### CEMENT

Cement Business & Industry Conference and Exhibition  
Date : 15 - 16 February 2017  
Venue: Sao Paulo, Brazil  
For more information please contact:  
Ms. Beatrice Ene, Client Development & Marketing Director (International)  
**Tel: +1 203 987 5212**  
**Email: [be@gmiforum.com](mailto:be@gmiforum.com)**  
**[www.gmiforum.com](http://www.gmiforum.com)**

Cemtech Middle East & Africa 2017  
Date: 19 - 22 February 2017  
Venue: Dubai, UAE  
**Tel.: +44 1306 740 363**  
**Fax: +44 1306 740 660**  
**Email: [info@cemtech.com](mailto:info@cemtech.com)**  
**[www.Cemtech.com/MEA2017](http://www.Cemtech.com/MEA2017)**

VDZ Training course: Simulator training  
Date: 20 - 24 February 2017  
Venue: VDZ's premises, Düsseldorf, Germany  
For more information please visit:  
**[www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)**

INTERCEM Dubai  
Date : 06 - 08 March 2017  
Venue: Dubai, UAE  
For more information please visit:  
**[www.intercem.com](http://www.intercem.com)**

2<sup>nd</sup> Global SynGyp Conference & Exhibition on wet scrubbers and synthetic gypsum  
Date : 30 - 31 March 2017  
Venue: Lindner Congress Hotel, Düsseldorf, Germany  
For more information please visit: <http://www.globalgypsum.com/conferences/global-syngyp/introduction>

1<sup>st</sup> Global CemProcess Conference and Exhibition  
Process optimization, de-bottlenecking, production maximization and troubleshooting  
Date : 24 - 25 April 2017  
Venue: London, UK  
For more information please contact:  
Pro Global Media Ltd  
**Tel: +44 1372 743837**  
**Fax: +44 1372 743838**  
**[www.Global-CemProcess.com](http://www.Global-CemProcess.com)**

BusinessCem Moscow 2017  
Date : 24 - 26 April 2017  
Venue: Moscow, Russia  
For more information please contact:  
BusinessCem Media  
**Tel.: +7 499 977 4968**  
**Fax: +7 499 977 4495**  
**Email: [valev@businesscem.msk.ru](mailto:valev@businesscem.msk.ru)**  
**[http:// www.businesscem.ru](http://www.businesscem.ru)**

Cement & Concrete Exhibition 2017  
Date : 30 April - 03 May 2017  
Venue: Riyadh International Convention and Exhibition Center, Riyadh, Kingdom of Saudi Arabia  
For more information, please contact:  
Ms. Lama Nabil Project Manager of Cement & Concrete Exhibition 2017  
**Tel: +20 2 2270 35 84 /5**  
**Mobile: +20 10 96662964**  
**Fax: +20 2 2270 35 86**  
**E-mail: [lama@arabiangerman.com](mailto:lama@arabiangerman.com)**  
**<http://www.arabiangerman.com>**

CW SUMMIT DUBAI 2017  
Date : 17 - 18 May 2017  
Venue: Dubai, UAE  
For more information, please visit:  
**<http://www.gmiforum.com/cw-summit?view=event&id=56&catid=11>**



## THE TECHNICAL JOURNAL FOR THE CEMENT INDUSTRY

60217

**CEMENT  
INTERNATIONAL**

PROCESSING • PERFORMANCE • APPLICATION No. 2/2012

国际水泥 الأسمنت العالمية ЦЕМЕНТ ИНТЕРНЭШНЛ

3,600 tpd cement clinker production plant in Tunisia on stream

ThyssenKrupp Polysius

www.verlagbt.de

VERLAG BAU+TECHNIK

### PRACTICE-RELATED EXPERIENCE

Both reports on practical experience and up-to-date information from the areas of research and development are presented. Concomitant reports and short news items and announcement indicate to readers forthcoming trends in scientific-, product- and market developments.

### INTERNATIONAL

CEMENT INTERNATIONAL with international orientation is bilingual (German/English). As the official organ of the German Cement Works Association (VDZ) and the Hungarian Cement Association, the journal can lay claim to the highest standards und superlative quality.

### TARGET GROUP ORIENTED

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... WITH ALL THE OTHER CEMENT-JOURNALS

VERLAG  BAU+TECHNIK

12<sup>th</sup> Global Slag Conference, Exhibition & Awards

Date : 18 - 19 May 2017

Venue: Düsseldorf, Germany

For more information please contact:

Pro Global Media Ltd

**Tel: +44 1372 743837**

**Fax: +44 1372 743838**

For more information please visit:

**[www.globalslag.com](http://www.globalslag.com)**

VDZ Training: Cement manufacturing course -  
Module 1

Date : 08 May - 02 June 2017

Venue: VDZ's premises, Düsseldorf, Germany

For more information please visit: **[www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)**

2017 China International Cement Industry Exhibition

Date : 10 - 12 May 2017

Venue: Nanjing, China

**Email: [jinx@ccpitbm.org](mailto:jinx@ccpitbm.org)**

For more information please visit:

**[www.cementtech.org](http://www.cementtech.org)**

IV International Business Meeting

White Nights: Cement. Concrete. Dry Mixtures

Date : 17 - 19 May 2017

Venue: Grand Hotel Europe, St. Petersburg, Russia

For more information please visit:

**[www.white-nights.info](http://www.white-nights.info)**

VDZ Training: Plant maintenance and refractories  
course

Date : 19 - 23 June 2017

Venue: VDZ's premises, Düsseldorf, Germany

For more information please visit:

**[www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)**

VDZ Training: Process operator training

Date : 04 - 22 September 2017

Venue: VDZ's premises, Düsseldorf, Germany

For more information please visit:

**[www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)**

VDZ Training: Cement manufacturing course -  
Module 2

Date : 25 September - 20 October 2017

Venue: VDZ's premises, Düsseldorf, Germany

For more information please visit:

**[www.vdz-online.de/en/training](http://www.vdz-online.de/en/training)**

14<sup>th</sup> TCMB International Technical Seminar &  
Exhibition

Main theme: "Sustainable Environment & Energy"

Date : 10 - 13 October 2017

Venue: Kaya Palazzo Golf Resort, Belek, Antalya,  
Turkey

For more information please click:

**<http://www.tcma.org.tr/ENG>**

Cement.Concrete.Dry mixtures 2017

Date : 29 September - 01 December 2017

Venue: Moscow, Russia

**Email: [a.sidorova@alitinform.ru](mailto:a.sidorova@alitinform.ru)**

**For more information please visit:**

**[www.infocem.info/eng](http://www.infocem.info/eng)**

15<sup>th</sup> International Congress on the Chemistry of  
Cement (ICCC 2019)

Date : 16 - 20 September 2019

Venue: Prague, Czech Republic

For more information please click:

**<http://www.iccc2019.org>**

## CERAMIC

Glasspex India

Date: 23 - 25 February 2017

Venue: New Delhi, India

For more information, please visit:

**[www.glasspex.com](http://www.glasspex.com)**

Indian Ceramics & Ceramics Asia

Date: 01 - 03 March 2017

Venue: Ahmedabad, India

For more information, please visit:

**[www.indian-ceramics.com](http://www.indian-ceramics.com)**

Glassman South America

Date: 29 - 30 March 2017

Venue: Buenos Aires, Argentina

For more information, please visit:

**[www.glassmanevents.com/south-america](http://www.glassmanevents.com/south-america)**

## 11th **global** **cemfuels** CONFERENCE & EXHIBITION 2017

[CemFuels.com](http://CemFuels.com)



BARCELONA, SPAIN • 2-3 FEBRUARY 2017

The *Global CemFuels Conference* has established itself as the largest specialised annual alternative fuels conference in the world. The 11th *Global CemFuels* event in Barcelona will showcase the best alternative fuels projects and equipment from the cement industry in Europe and from around the world. 200-plus delegates from over 40 countries are expected to attend, including a strong South American contingent.

## 1st **global** **cemprocess** CONFERENCE & EXHIBITION 2017

[Global-CemProcess.com](http://Global-CemProcess.com)

LONDON, UK • 24-25 APRIL 2017

*Global CemProcess* is the new cement industry conference that looks at process optimisation, de-bottlenecking, maximising production and troubleshooting. The event will take place in London, the easy-to-access world city with direct transport links to over 300 global cities, and will include a field trip to Hanson Cement's Ketton plant in Rutland.



## 12th **global** **slag** CONFERENCE & EXHIBITION 2017

[globalslag.com](http://globalslag.com)



DÜSSELDORF, GERMANY • 18-19 MAY 2017

The 12th *Global Slag Conference* will take place in Düsseldorf, Germany in May 2017. The conference will allow all attendees to maximise their profits from slag, both ferrous and non-ferrous, will keep them up-to-date with state-of-the-art processes and will provide extensive networking and business opportunities.

## GENERAL

### BUILDEXPO West Africa 2017

Date : 22 - 25 February 2017

Venue: Dakar, Senegal

For more information please contact:

Sophia David, Marketing coordinator

International Trade Promotion

**Tel: + 91 8551918436**

**Email: intltradepromoters@gmail.com**

### Iran BuildEx - Iran International Exhibition of Building & Construction Industry

Date : 25 - 28 February 2017

Venue: Tehran, Iran

For more information please contact:

Serhan PUL, International Sales Director

**Email: serhan.pul@pyramidsfair.com**

**Tel: +90 216 575 28 28 Ext: 233**

### Buildafro Kenya 2017

Date : 03 - 05 March 2017

Venue: Nairobi – Kenya

**Email: inquiry@mxmexpos.info**

### Effectively Managing Risk Service Contracts

Date : 15 - 16 March 2017

Venue: Kuala Lumpur, Malaysia

For more information please contact:

Trueventus

Mr. John Karras

**Tel: +603 2775 0001**

**Fax: +603 2775 0005**

**Email: johnk@trueventus.com**

### Urban Distribution Hub Development Conference

Date : 15 - 16 March 2017

Venue: Singapore

For more information please contact:

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**Fax: +603 2775 0005**

**Email: johnk@trueventus.com**

### Uganda Trade Expo 2017

Date : 18 - 20 March 2017

Venue: Kampala, Uganda

For more information please contact:

Bright Exhibitions

**Tel: +971 6 5378331 Ext 127**

**Mob: +971 52 6474522**

**Email: info@brightfairs.net**

**www.bright-fairs.com**

### 7<sup>th</sup> Antalya City Planning & Technologies Fair and Local Government Symposium

Date : 23 - 26 March 2017

Venue: Antalya, Turkey

**Tel: +90 216 575 28 28**

**Email: info@pyramidsfair.com**

### 7<sup>th</sup> Annual Shopping Malls Summit

Date : 29 - 30 March 2017

Venue: Bangkok, Thailand

For more information please contact:

Trueventus

Mr. John Karras

**Tel: +603 2775 0001**

**Fax: +603 2775 0005**

**Email: johnk@trueventus.com**

### The 2<sup>nd</sup> Global SynGyp Conference & Exhibition

Date : 30 - 31 March 2017

Venue: Düsseldorf, Germany

For more information, please visit:

**www.globalgypsum.com**

### 6<sup>th</sup> International Drymix Mortar Conference IDMMC Six

Date : 03 - 04 April 2017

Venue: Nuremberg, Germany

For more information, please visit:

**www.drymix.info**

### 2<sup>nd</sup> Annual Mixed-Use Development Australia

Date : 03 - 04 April 2017

Venue: Brisbane, Australia

For more information please contact:

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Casey Lee

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**Fax: +603 2775 0055**

**Email: caseyl@trueventus.com**

# Cemtech MEA 2017

**DUBAI, UAE**

19-22 FEBRUARY 2017

Market insights &  
production expertise

INTERNATIONAL CEMENT CONFERENCE

# Cemtech

PRODUCTION EXPERTISE - MANAGEMENT SKILLS



**Cemtech invites you to its 12th Middle East & Africa conference and exhibition, taking place at the Grand Hyatt Dubai (UAE) on 19-22 February 2017, offering:**

- The chance to network with senior industry experts from over 35 nations
- Insights into the latest market trends, drivers for change, trade reports, regional forecasts and country profiles
- Stimulating technical programme, including case studies tackling key issues such as plant optimisation, alternative fuel systems and their implementation, and new plant construction
- The Cemtech exhibition, running parallel to the conference, providing a space for delegates to network and interact with a range of technology suppliers
- Extended technical programme: tour of local cement plant
- Exceptional hospitality, a hallmark of the Cemtech experience, including lunches, evening receptions and the renowned Gala Dinner.

**Early bird offer: register by 17 January 2017 and save US\$375**

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International  
**Cementreview**

Supported by  
the AUCBM



For more details, programme updates and registration, see:

**[www.Cemtech.com/MEA2017](http://www.Cemtech.com/MEA2017)**

European Coatings Congress, Construction Chemical Session

Date : 04 April 2017

Venue: Nürnberg, Germany

For more information, please visit:

**[www.european-coatings.com/Events/European-Coatings-Show-Conference-2017](http://www.european-coatings.com/Events/European-Coatings-Show-Conference-2017)**

25<sup>th</sup> International Mining Congress and Exhibition of Turkey

Date : 11 - 14 April 2017

Venue: Antalya, Turkey

**Email: [imcet.maden@maden.org.tr](mailto:imcet.maden@maden.org.tr)**

**For more information, please visit:**

**[www.imcet.org.tr](http://www.imcet.org.tr)**

Calculating the Durability and Fatigue of Mechanical Equipment

Date : 19 - 20 April 2017

Venue: Kuala Lumpur, Malaysia

For more information please contact:

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**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

Responding to Disruptive Innovation

Date : 26 - 27 April 2017

Venue: Goodwood Park Hotel, Singapore

For more information please contact:

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**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

5<sup>th</sup> Annual Township Development Conference

Date : 26 - 27 April 2017

Venue: Manila, Philippines

For more information please contact:

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**Tel: +603 2775 0001**

**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

Calculating the Durability and Fatigue of Mechanical Equipment Training Course

Date : 26 - 27 April 2017

Venue: Bangkok, Thailand

For more information please contact:

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Mr. John Karras

**Tel: +603 2775 0001**

**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

Design-Build, Epc, P3 - Construction Project Delivery Solutions for the 21<sup>st</sup> Century

Date : 26 - 27 April 2017

Venue: Bangkok, Thailand

For more information please contact:

Trueventus

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**Tel: +603 2775 0001**

**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

Irexpo

Date : May 2017

Venue: Tabriz, Iran

**Tel: +90 212 273 18 18**

**Email: [info@irexpo.net](mailto:info@irexpo.net)**

**[www.irexpo.net](http://www.irexpo.net)**

6<sup>th</sup> Annual Modular & Precast Conference

Date : 03 - 05 May 2017

Venue: Bangkok, Thailand

For more information please contact:

Trueventus

Mr. John Karras

**Tel: +603 2775 0001**

**Fax: +603 2775 0005**

**Email: [johnk@trueventus.com](mailto:johnk@trueventus.com)**

IE expo 2017

Date : 04 - 06 May 2017

Venue: Shanghai New International Expo Centre, China

For more information please visit:

**[www.ie-expo.com](http://www.ie-expo.com)**



# INTERMAINT

The International Company for Constructions & Special Maintenance (INTERMAINT) S.A.E.

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### Brief

International Company for Construction and Special Maintenance (INTERMAINT) was established in 2003 by the best referenced expertise of 18 years Working with Japanese ideology which proved a great success in the Egyptian market. That's why we manage through different valuable clients and meet their needs. Intermaint/Alfran partnership was formed to add **alfran** Total Refractory Solution's history of success in the total refractory systems all over the world to our different services inside Egypt.

INTERMAINT Group

01

INTERMAINT Libya Ltd.

INTERMAINT Saudi Ltd.

02

03

INTERMAINT Services

INTERMAINT FABRICATION

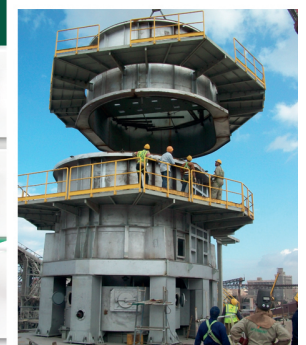
04

05

INTERMAINT GmbH

INTERMAINT ENERGY

06



### Fabrication :

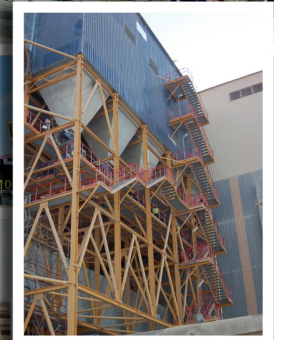
- Our Fabrication Experience Covers All The needs of Your Plant's Production Equipment.
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  - Installation of insulation works.
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- Very short time execution period



### Contact Information

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 Telephone : +(203)425-7843, +(203)425-7223  
 Fax. : +(203)425-7151 Mobile: +(012)781-6404  
 Email : imc@intermaint.com.eg Web site : www.intermaint.net

#### INTERMAINT FABRICATION LTD.

Address : Kilo 35 Alex- Cairo Desert Road, Al-Nassereyah, - Alex. Egypt  
 Telephone : (203) 4492192 - (203) 4491913 - (203) 5931441 - (203) 5931442  
 Fax. : (203) 4492199  
 Email: ifc@intermaint.net

#### Saudi Intermaint Co. Ltd.

P.O. Box : 325591 Riyadh 11371 Saudi Arabia  
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 Fax. : +966 11 2916798  
 Mobile : +966 505194064  
 E-mail : hesham@intermaint.net



THINKING FOR TOMORROW

Asphalt Mix Design

Date : 10 - 11 May 2017

Venue: Makati, Philippines

For more information please contact:

Trueventus

Casey Lee

**Tel: +603 2775 0067**

**Fax: +603 2775 0055**

**Email: caseyl@trueventus.com**

Argus Mediterranean Solid Fuels 2017

Date : 06 - 08 June 2017

Venue: Madrid, Spain

For more information please visit:

**www.argusmedia.com/solidfuels**

Rostering and Shiftwork for all Industries Training Course

Date : 10 - 11 May 2017

Venue: Manila, Philippines

**Tel: ++603- 2775 0067**

**Email: mikej@attendingyourevent.com**

NETZSCH Fine Powder Processing: "Energy Efficiency and Process Optimization"

Date : 31 May – 01 June 2017

Venue: Hanau, Germany

For more information please visit:

**www.netzsch-grinding.com**

2<sup>nd</sup> Central American Drymix Mortar Meeting

Date : 27 June 2017

Venue: Mexico City, Mexico

For more **information**, please visit:

**www.drymix.info**

IFAT Africa 2017 Trade Fair for Water, Sewage, Refuse and Recycling

Date : 12 - 14 September 2017

Venue: Johannesburg, South Africa

For more information please visit:

**www.ifat-africa.com**

Second Asia Mortar Summit

Date : 19 September 2017

Venue: Shanghai, China

For more information, please visit:

**www.drymix.info**

11<sup>th</sup> Global Insulation Conference & Exhibition

Date : 25 - 26 September 2017

Venue: Kraków, Poland

For more information, please visit:

**www.GlobalInsulation.com**

17<sup>th</sup> Global Gypsum Conference & Exhibition

Date : 25 - 26 October 2017

Venue: Kraków, Poland

For more information, please visit:

**www.GlobalGypsum.com**

Fifth Latin American Drymix Mortar Conference ladmmc five

Date : 26 October 2017

Venue: São Paulo, Brasil

For more information, please visit:

**www.drymix.info**

Cement. Concrete Dry Mixtures 2017

Date : 29 November - 01 December 2017

Venue: Moscow, Russia

**Email: a.sidorova@alitinform.ru**

Bauma 2019

Date : 08 - 14 April 2019

Venue: Munich, Germany

For more information, please visit:

**www.bauma.de**

# ЦЕМЕНТ

## и его применение

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The Russian-language periodical professional publication devoted to the production of cement and other binders, concretes, dry mixes and their applications, as well as to research and design.

A conspicuous place in the journal materials is given to the problems of plant development, capital movement, economic problems facing the cement industries of Russia and other countries.

The journal comes out once in two months and includes news, analytical materials and detailed abstracts of all the articles in English.

Cement and its Applications, Journal  
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