



# CEMENT & BUILDING MATERIALS REVIEW

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*Arab Union for Cement and Building Materials*

المؤتمر والمعرض العربي الدولي الثالث والعشرون  
لصناعة الإسمنت  
(AICCE23)

**23<sup>rd</sup> Arab International Cement  
Conference and Exhibition**

*Le Royal Hotel  
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Jordan  
20-22/11-2018*

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# Global Cement Events 2019

For details, please visit each event's web site.

## 4th global cempower

22-23 January 2019,  
London, UK  
[cempower.com](http://cempower.com)

The 4th Global CemPower Conference and Exhibition will take place in London once again, and will cover waste heat recovery, captive power generation (including solar and wind, and energy storage), grinding optimisation and electrical energy efficiency. *If you want to reduce your cement plant's electrical energy bills, or can help companies in the cement industry to save electrical energy, then you should attend!*



## 13th global cemfuels

20-21 February 2019,  
Amsterdam, Netherlands  
[cemfuels.com](http://cemfuels.com)

The popular Global CemFuels Conference and Exhibition will visit Amsterdam for the first time in 2019 and is expected to attract one of its largest-ever audiences from around the world. The event will showcase the state-of-the-art in handling, processing and firing all types of conventional and alternative fuels for cement (and lime) production. *If you produce or use fuels and alternative fuels in the cement and lime industry, then you should attend!*



## 2nd global cemtrans

14-15 March 2019,  
Brussels, Belgium  
[cem-trans.com](http://cem-trans.com)

The 2nd Global CemTrans Conference and Exhibition on trade, freight, markets, flyash and GBFS, cement and clinker transport and logistics will take place in Brussels in March 2019. The event - which follows on from the previous CemTrader and CemTrans conferences - will see producers, shippers, traders and buyers from around the world in attendance. *If you are involved in the trade and transport of raw materials, clinker or cement, then you should attend!*



## 14th global slag

3-4 April 2019,  
Aachen, Germany  
[globalslag.com](http://globalslag.com)

The 14th Global Slag Conference and Exhibition will take place in Aachen, in the heart of Europe's iron-, steel- and slag-producing areas. Slag producers and users are expected to attend from throughout Europe and from the rest of the world: Slag products have the potential to be profitable for both the iron and steel industry and also for the cement, concrete and construction products industries. *If your business is in slag, then you should attend!*



## 2nd global futurecem

22-23 May 2019,  
Brussels, Belgium  
[futurecem.com](http://futurecem.com)

The 2nd Global FutureCem Conference and Exhibition will take place in May 2019, looking at how the global cement and concrete industry can adapt to a high-carbon-price, low- or no-carbon future. In addition to equipping delegates with the latest information, news and developments, the networking opportunities will once again be excellent. *If you want to reduce your company's CO<sub>2</sub> footprint (and its future CO<sub>2</sub> bill), then you should attend!*







# Cement and Building Materials Review

*Arab Album*

*International News*

*New Products*

*Technical Articles*

*Diary Dates*

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Eng. Ahmad Al-Rousan  
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## CONTRIBUTIONS

- *The Magazine editorial staff welcome the contribution of experts to enrich the contents of the magazine .*
- *Articles are not to be returned to authors .*
- *Points of view expressed in the magazine do not necessarily express points of view of the AUCBM or the magazine itself . It is rather the opinion of the author. The AUCBM does not bear legal liability or responsibility from any article .*

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# Contents

**Arab News  
International News  
New Products and Media**

**Articles:**

- **The advanced uses of white cement (in Arabic)**  
*By: Dr. Hamdallah Al Khatib, Jordan*
- **Cement and water properties varying according to Nile River level**  
*By: Ahmed M. Shafeek, Hamdy Salah, Nabila Shehata, A.B. Saddek, Egypt*
- **Concrete Applications ..... No Borders**  
*By: Eng. Osama Aly Ahmed, Engineering Consultant, Egypt*
- **Adaptive control strategies for intelligent high-precision dosing and weighing systems**  
*By: Dr. Dominik Aufderheide, Dr.-Ing. Luigi Di Matteo, DI MATTEO Group, Germany*
- **The importance of sample preparation for a reliable quantification of clinker**  
*By: Thomas Witzke & Thomas Fuellmann, Malvern Panalytical B.V., The Netherlands*
- **Optimisation of Kiln Burning Operations**  
*By: Mr. Mark Mutter, JAMCEM Consulting, UK*

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AUCBM's *Quarterly Cement and Building Materials Review (CBMR)*

**EDITORIAL SCHEDULE FOR 2018**

ISSUE	THEMES	EVENTS
* September 2018	<ul style="list-style-type: none"> <li>- Sustainable Development</li> <li>- Environment Protection</li> <li>- Alternative Fuels</li> <li>- RDFs / SRFs</li> <li>- Cleaner Production in Cement Industry</li> <li>- Filters, Baghouses &amp; Dedusting Equipment</li> <li>- Emission Monitoring &amp; Gas Analysis</li> <li>- Energy Saving</li> <li>- Case Studies</li> </ul>	<p style="text-align: center;"><b>AUCBM's 23<sup>rd</sup> Arab International Cement Conference and Exhibition (AICCE23)</b></p> <p style="text-align: center;"><b>Amman, Jordan</b> <b>20-22<sup>nd</sup> November 2018</b></p>
December 2018	<ul style="list-style-type: none"> <li>- Bagging, Packaging &amp; Dispatch</li> <li>- Loaders &amp; Unloaders</li> <li>- Feeder Technology</li> <li>- Bulk Storage and Handling</li> <li>- Storage of fuel</li> <li>- Conveyors, Bucket Elevators</li> <li>- Rock Blasting</li> <li>- Quarrying &amp; Quarry Management</li> <li>- Occupational Health &amp; Safety</li> <li>- QC circles</li> </ul>	

\* September is a bonus issue that will be distributed to the Conference participants

Deadlines for receiving articles, press releases, or advert materials for 2018 issues are as follows:

September (bonus) issue: **30<sup>th</sup> August 2018**

December issue: **5<sup>th</sup> December 2018**



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## **ALGERIA**

### **GICA makes first cement export to Europe**

Groupe des Ciments d'Algérie's (GICA) has made its first export to Europe. The Ministry of Industry and Mines said that 45,000t of cement was exported to Europe via GICA's building materials distribution subsidiary. The consignment was the last part of a contract to export 0.2Mt of cement to Europe.

*Global Cement*

### **LafargeHolcim finalizes seventh export to West Africa**

LafargeHolcim de M'Sila carried out its seventh export operation of gray cement to West Africa from the Dejndjen port since December 2017.

*Daily Cement*

### **Aoulef cement plant starts exporting cement from Algeria to Niger**

The Aoulef cement plant in Afrar province has started exporting cement to Niger. The plant exported 950t of Ordinary Portland Cement by land. The 1.5Mt/yr Aoulef cement plant started production in December 2017. It aims to export around 1Mt/yr of cement.

*Global Cement*

### **CBMI deal resurrects Djelfa plant for ASEC Cement**

China's CBMI has signed a contract with ASEC Cement to build a 4500t/day clinker production line at ASEC Cement's Djelfa plant. The unit was originally partially built by ASEC Egypt in 2008 and had completed 90% of civil work before it was suspended due to the financial crash. Local company ETRHB Haddad and the Algerian subsidiary of China State Construction Engineering Corporation (CSCEC) took control of ASEC Cement in 2017 allowing the Djelfa

project to continue.

The engineering, procurement and construction contract covers limestone crushing to cement packaging and delivery. It includes engineering, equipment and steel structure procurement, civil construction, erection, training and commissioning. Construction is scheduled to take 19 months from the contract's activation date. As such the plant could be operational by the end of 2019.

*Global Cement*

### **Djen Djen Port plans to become export hub**

The port, located approximately 10 kilometers from the city of Jijel, plans to become "a cement export hub" in the region, having already signed two important export contracts.

*Daily Cement*

### **Cimprogetti making progress on lime plant project for Algerian Qatari Steel**

Italy's Cimprogetti says it is making progress on a lime plant it is building with Bedeschi for Algerian Qatari Steel. The project is to build a lime plant supporting a steel plant at Bellara in Jijel. It includes the design and supply of the entire lime plant, from the limestone receiving area to quicklime storage, which is directly connected to the Danieli steel mill. The design of power and control systems has been developed by Cimprogetti, including the supply of all electrical panels, medium and low voltage transformers, the diesel generator set and all cables. Cimprogetti is also working with Idom, a Spanish company, on the design and erection phases of the project.

The lime plant will use two Flex Reversy 9 kilns with a daily production of 420t/day each, and will be operated with natural gas.

*Global Cement*



**BAHRAIN**

**United Cement Company resumes importing Saudi cement to Bahrain**

The United Cement Company (UCC) has resumed importing cement from Saudi Arabia to Bahrain. Since the Saudi government lifted cement tariffs in February 2018, UCC had imported up to 60,000t of cement. The Company supplies around 70% of the construction market in Bahrain.

Imports from Saudi Arabia were disrupted when the Saudi government allowed cement to be exported to other countries in March 2017. However, new tariffs were introduced at the same time. Following the opening of exports, the price rose and Bahrain was forced to source cement from other countries including the UAE. Previously, Bahrain had exclusive access to imports of cement from Saudi Arabia.

*Global Cement*

**EGYPT**

**Egypt's state projects absorb most of cement production**

Cement manufacturers have become dependent on large infrastructure projects

*Cemweek*

**Cement and construction materials exports grew in Q1**

The General Organization for Export and Import Control announced that cement exports in the first quarter of 2018 increased by 16% to USD 28 million.

*Daily Cement*

**New production line at Arabian Cement Company plant**

The Minister of Environment has opened a new production line at Arabian Cement Company's Ain Sokhna plant in Suez. The line uses FLSmidth's Hotdisc combustion device to allow it to use high levels of alternative fuels.

In 2015 Arabian Cement Company commissioned another Hotdisc

**8<sup>th</sup> INTERNATIONAL VDZ CONGRESS**

**26 – 28 September 2018**

**Duesseldorf Germany**

**Programme published**

**The Vdz Congress** is an international scientific forum of the cement industry and its suppliers. **Delegates from all over the world** will come together to discuss the latest developments and challenges in state-of-the-art cement manufacturing with international scientists and experts from cement plants at the forefront of technology.

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**LEBANON**

**Environmental group protests against cement plants in Lebanon**

Residents in Koura district has demanded that nearby cement plants be closed and cement exports banned due to health fears. The group wants local cement plants in the area to move out of residential areas, close down unauthorised quarries and replace petcoke usage with natural gas. In the longer term the group wants the government to plant trees on cement company land and decrease the cost of local cement.

*Global Cement*

**LIBYA**

**German investors to build cement plant in Libya**

German investors have met with the mayor of Al-Bayda to discuss building a cement plant in Cyrenaica. The proposed plant will have a production capacity of 4000t/day. The plant will be located south of Al-Bayda.

*Global Cement*

**MOROCCO**

**CBMI signs deal with LafargeHolcim for grinding plant in Morocco**

China's CBMI has signed a contract with LafargeHolcim to build a cement grinding plant near Agadir. The deal for the SSS 13 & 14 Grinding Plant EPC Contract was signed on 21 March 2018 at the LafargeHolcim Technology Centre in Lyon, France. Once operational, the plant will be run by LafargeHolcim Maroc.

*Global Cement*

**Cement sector facing difficulties**

Cement manufacturers expect a difficult year as sales in April fell to their lowest since 2014.

*Daily Cement*

installation. At the time is said it had a designed fuel mix of 70% coal and 30% alternative fuels, using a mixture of agricultural wastes, municipal sludge, and refuse-derived fuel (RDF).

*Global Cement*

**Suez Governorate discusses environmental impact of new cement plant**

Members discussed the impact of a new production unit from El Sewedy Cement

*Cemweek*

**Titan Cement to build 8MW solar power station in Beni Suef**

Titan Cement Egypt is planning to spend US\$8m towards building a 8MW solar power plant next to its Beni Suef cement plant. Surplus energy from the unit will be sold to

the national grid.

*Global Cement*

**Saudi company to build bag plant in Egypt**

Saudi Arabian company plans to build a US\$28m paper bag plant at Borg El-Arab in Alexandria. The plant will have three production lines including one exclusively for manufacturing cement bags. The Company plans to start production a year-and-a half after land for the unit is allocated.

*Global Cement*

**IRAQ**

**Cement complex restarts production in Iraq**

Badush cement complex reopened with new cement factory

*Cemweek*



**OMAN****Georgia: Raysut Cement plans to build plant**

Oman's largest cement producer is planning to carry out a study on establishing a cement plant near Tbilisi, Georgia.

*Daily Cement*

**Raysut Cement inaugurates new packing unit at Salalah plant**

Raysut Cement has inaugurated a new packing unit at its Salalah cement plant. The upgrade doubles the plant's packing capacity. This will allow the cement producer to export an additional 1Mt/yr of bagged cement to markets in Yemen, Somalia and elsewhere in East Africa. The company spent just under US\$4m on the project.

*Global Cement*

**Cyclone Mekunu shuts down Raysut Cement**

Cyclone Mekunu has forced Raysut Cement to stop production for eight to 10 days. The cement producer said that the storm caused external damage to its plant at Salalah and flooded production buildings and the stockyard.

*Global Cement*

**QATAR****Fives FCB releases update on work on fifth line for Qatar National Cement**

France's Fives FCB has released more information about its project to build a fifth production line for Qatar National Cement at its Umm Bab plant. The new 5000t/day clinker line was ordered in April 2014 and Fives has been responsible for the supply of a complete production line from raw material preparation to cement despatch. The new line is expected to be commissioned in the first half of 2018.

The line uses natural gas for fuel. Raw material preparation includes a 1000t/hr double impact rotor crusher for limestone, clay or shale, a gamma ray analyser, two limestone storage silos of 30,000t and two shale and clay storage siloes of 10,000t. For raw meal grinding the line will use a 440t/hr FCB B-mill with a diameter of 5.6m, a length of 21.2m and a power of 6600kW. It also has a FCB TSV 7500 Classifier BF.

The 5000t/day kiln consists of a five-stage single string FCB Preheater with low pressure drop cyclones, a FCB Zero-NOx Precalciner with a diameter of 5.2m

fitted with a Pillard PRECAFLAM burner, a three piers FCB rotary Kiln with a diameter of 4.8m and length of 76m, a Pillard NOVAFLAM burner for rotary kiln, a clinker grate cooler with an active area of 112m<sup>2</sup>, an electrostatic precipitator for cooler dedusting, a Pillard ROTAFLAM burner as auxiliary burner and a Pillard HeatGen Systems for hot gas generation. The kiln line also includes Fives TGT UP Filters for the kiln and alkali bypass. The line has a 40,000t clinker storage silo.

Cement grinding comprises two FCB B mills with a capacity of 115t/hr. These have a diameter of 4.6m, a length of 14m and a power of 4200kW respectively. Cement grinding also includes Two Fives SONAIR Filters, two FCB TSV Classifiers and two Fives SONAIR Filters. Cement storage consists of two 20,000t silos.

Finally, cement packing and dispatch includes four truck loading systems with a capacity of 250 - 300t/yr each and one big bag loading station with a capacity of 30t/hr.

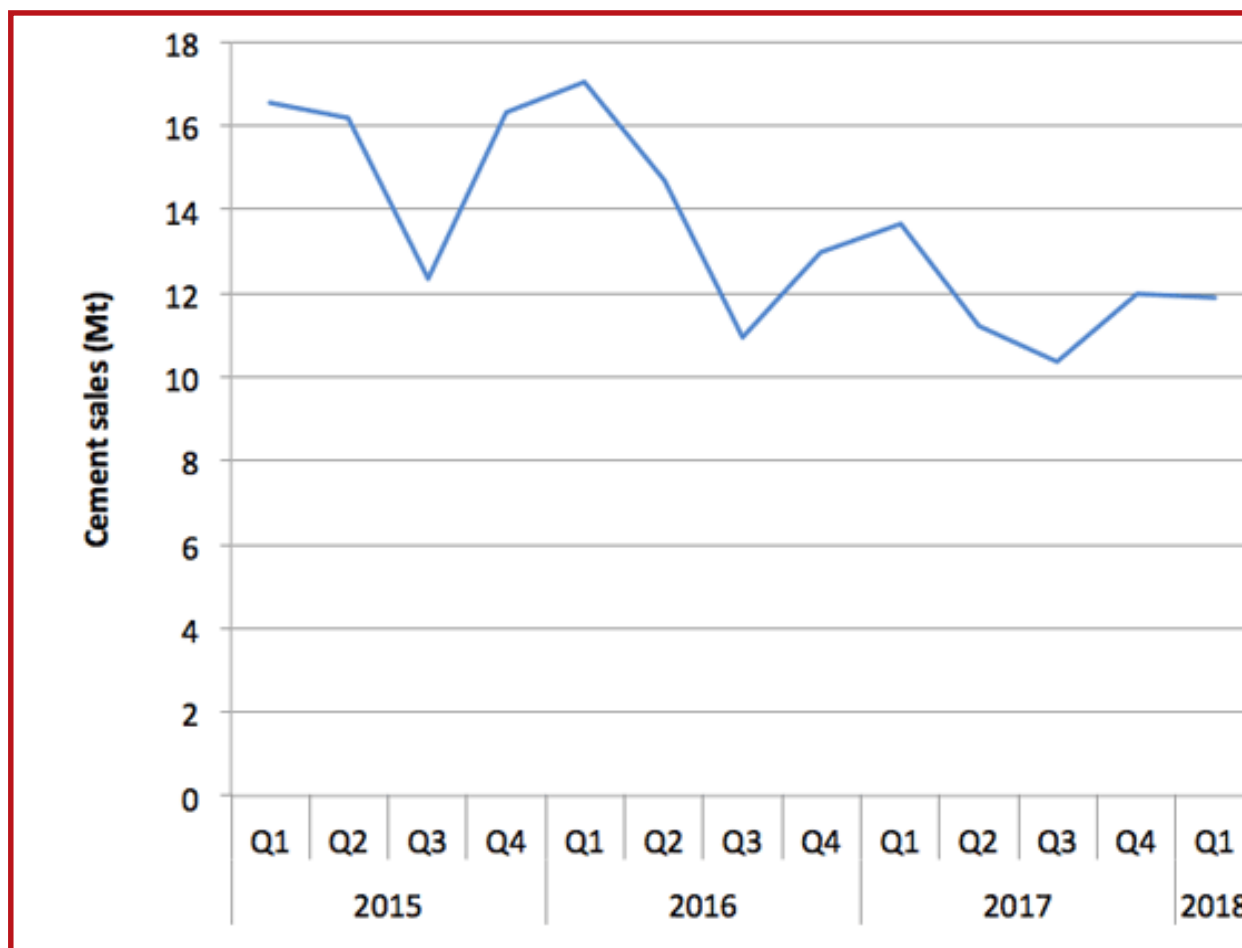
The project follows collaboration between Fives and Qatar National Cement on lines two, three and four at Umm Bab.

*Global Cement*

**SAUDI ARABIA****Update on Saudi Arabia**

No consolidation has happened yet in the Saudi Arabian cement industry but exports have started to be announced. Yanbu Cement signed an export deal in March 2018 to despatch 1Mt of clinker and 0.5Mt of cement from one year from 1 April 2018. Prior to that, Al Jouf Cement Company started a contract to export 72,000t/yr to Jordan from late February 2018. Earlier still, Bahrain was expected to benefit from a lifting of cement export tariffs at the end of January 2018.

Its early days yet but some of sort of action is starting to happen about the country's falling cement sales. If export deals are in the early stages of being set following the lifting of the ban, then local movements of cement have intensified. As Al Rajhi Capital reports in its latest market update, that producers have been forced by low sales and high inventory levels to take action. It says that cement companies have started to sell products in different parts of the country than they do normally leading to a 'price war'. The financial services and analytical company has pinpointed the central region as the key battleground as company



Graph 1: Cement sales (Mt) by quarter in Saudi Arabia, 2015 to March 2018. Source: Yamama Cement.

market shares have fallen over the last six months as northern producers have moved in.

Cement sales fell by 15% year-on-year to 11.8Mt in the first quarter of 2018 from 13.7Mt in the same period in 2017. This is the first time in recent years that sales did not rise from the fourth quarter to the following first quarter. Not a good sign. Despite the bad news, a few producers did manage to increase their deliveries in the first quarter, including Saudi Cement, Hail Cement, Umm Al Qura Cement and United Cement.

Bizarrely, into this sales environment, plans for the long delayed Al Baha Cement plant project have re-emerged. The project previously has received coverage at various stages over the years. This time it has reportedly gained a licence to set up the company and it hopes to start tendering for the build in the second half of 2018. The investors may want to leave it a little longer given the current state of the Saudi cement industry.

*Global Cement*

**Najran Cement receives clinker export licence**

Najran Cement has received a clinker export licence from the Ministry of Commerce and Investment. The licence is valid for one year from 30 April 2018.

*Global Cement*

**Yanbu Cement signs export deal**

Yanbu Cement has signed an agreement to export 1Mt of clinker and 0.5Mt of clinker for one year from 1 April 2018. The arrangement is expected to add around US\$27m to the company's revenue.

*Global Cement*

**GE to upgrade gas turbines at Saudi Cement's Hofuf plant**

GE has struck a deal with Saudi Cement to upgrade three GE 6B gas turbines at Saudi Cement's Hofuf plant with its Advanced Gas Path (AGP) product. The AGP upgrade is intended to increase the combined output of the three turbines by 16.9%. The upgrade should help Saudi Cement increase power output and



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efficiency while reducing the need to draw power from the local power grid.

*Global Cement*

### **TUNISIA**

#### **Anhui Conch to open office in Tunis**

China's Anhui Conch plans to open an office in Tunis to explore investment opportunities. A delegation from the cement producer met with the Minister of Industry and Small and Medium Enterprises.

*Global Cement*

#### **Ciments de Bizerte starts clinker exports to Cameroon**

Ciments de Bizerte has restarted exports of clinker and cement after a hiatus of ten years. A shipment of 25,000t of clinker disembarked from the cement producer's port to Cameroon in early April 2018. The local cement industry has an overcapacity of 1Mt/yr.

Moreover, the Company tested its new wharf facilities by loading 11,000 tonnes of clinker on a ship that will be sent to Italy.

*Global Cement*

#### **Carthage Cement says production resumed at plant**

Carthage Cement says that production has restarted at its Djebel Ressas plant. NLSupervision, a subsidiary of Denmark's FLSmidth that holds a contract to operate the plant, resumed activity on 14 April 2018. Carthage Cement has also started marketing the cement locally once again. Production at the unit stopped in early April 2018 following a dispute between NLSupervision and staff. The company's owners put the plant on sale in late 2017.

*Global Cement*



## Because of its exceptional advantages and international standards

### Social Fund for Development (SFD) in Yemen recommends the use of National Cement's Portland Pozzolana Cement



On 11<sup>th</sup> October 2017, the Technical Unit of Social Fund for Development in Yemen issued a circular to SFD branch directors and executive unit heads, recommending the use of Pozzolana Cement.

In his interview with "Cement and Building Materials Review", Mr. Ali Al-Ahdal, Marketing Director of National Cement Company, stressed that the Technical Unit at Social Fund for Development recommended in its circular to its branches that coastal and high-humidity areas, as well as Sewerage projects, should only use Portland Pozzolana Cement.

Al-Ahdal added that the circular emphasized the significance of characteristics and specifications of this type of cement. He also pointed to SFD praise for the National Company's keenness to develop its product, Portland Pozzolana Cement.

It is worth saying that the Portland Pozzolana Cement referred to in this circular is the Portland Pozzolana Cement manufactured according to the American and European standards EN197-1: 2011CEMII / A-P 42.5N, which comply with the specifications of National Cement's Portland Pozzolana Cement, printed on the product bag.

Sales Engineer at National Cement Company, Mr. Yasser Al-Deghish, explained the difference between Ordinary Portland Cement (OPC) and Portland Pozzolana Cement (PPC): "Portland Pozzolana Cement is composed of 80-94% of OPC plus 6%-20% of Pozzolana (100% natural silicon and aluminous

volcanic materials, taken directly from volcanic mountains, which are not subjected to any chemical reactions or additions.

He added that PPC is similar to OPC in all its properties, but is superior to the latter in some characteristics: Compressive strength of PPC is higher than the compressive strength of OPC, in addition to its low hydration, which qualifies the PPC for use in different concrete casting.

Al-Deghish has also mentioned several examples of the use PPC, such as manufacturing all types of concrete blocks, concrete pipes exposed to high-sulfur-content water, Sewerage treatment plants, bridges and tunnels, and flood water channels in areas with high-sulfur-content and free-silica soil, in addition to concrete castings in all buildings and various installations.

He also explained that the presence of silica oxide and aluminum oxide in natural Pozzolana and its reaction with calcium oxide in cement helps maintain the concrete Pozzolana reaction and increases concrete strength and durability. It also reduces the cracks caused by the expansion of alkali reactions with aggregate.

Portland Pozzolana Cement has many other advantages, as it gives plasticity and flexibility to cement mortar for interior and exterior finishing of buildings, and it also reduces the heat resulting from the first stage of water addition.

PPC can also prevent alkaline reaction on concrete blocks, reduce

porosity and permeability, reduce moisture and water leaks in concrete due to its high fineness, and it is a good heat insulator (thus reducing power consumption).

It also absorbs noise and helps in acoustic insulation, as well as increasing the effectiveness of fire resistance (explaining why chimneys and furnaces are made of this cement type). Moreover, it is sulphate and chloride resistant.

Mr. Al-Ahdal pointed out that cement industry started in Yemen 1970s, but it remained in need of cement that is compatible with the Yemeni environment. The cement used in dry places is not suitable for the wet or salty environment and vice versa. Then, National Cement Company started offering consumers several types of cement according to the American and European standards; one of these types was its Portland Pozzolana Cement in 2013, which is suitable for all Yemeni environments.

He added, Pozzolana is burning rocks caused by volcanic eruptions, and are composed of stones and small pebbles of different sizes, some of which are no more than 4 cm, and they can be extracted from many volcanic sites in Yemen.

He stressed that Yemen is rich in all types of minerals, including volcanic rocks. Yemenis have known Pozzolana substance for more than four thousand years. Because of Pozzolana, tanks, dams, and water storage basins lasted out and can still absorb water and reserve it without leakage, even without maintenance, for centuries.

## New order for Interchem in Ivory Coast by Sea Invest

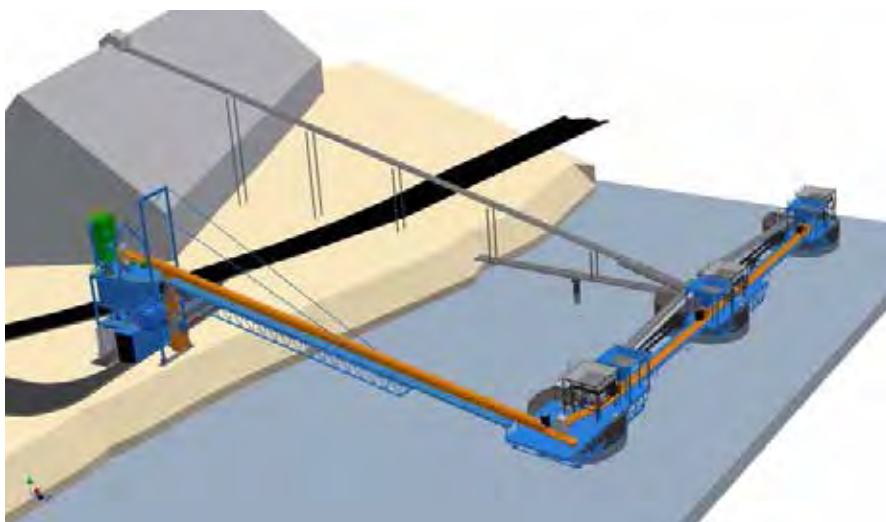
Expansion of the existing ship unloading system in San Pedro/Ivory Coast: provision of an independent ship unloading system for raw materials for the Cimaf Cement Grinding Plant.



Representatives from SeaInvest/Seatech, Cimaf and Interchem after contract agreement in Feb 2018

After having finished and successfully commissioned the ship unloading system on EPC basis for Sea Invest in Abidjan/Ivory Coast in Q4/2017, Interchem has again been contacted by Sea Invest for the expansion of the existing ship unloading system for the Cimaf Cement Grinding Plant in San Pedro/Ivory Coast on EPC basis. The contract was agreed by the Vice President of Cimaf in San Pedro, Melik Sefrioui, and Interchem's General Manager, Olaf Michelswirth. The order includes a 3D scan of the existing system to ensure planning security. Interchem will perform the engineering, the foundation works, the deliveries, the assembly and the commissioning. Completion of the order is previewed for Q4/2018.

Masterlayout of the expansion of the existing ship unloading system with truck loading in San Pedro/Ivory Coast



## Sea Invest – Ship unloading system commissioned

The order Intercem received from Sea Invest by the end of 2016 for the delivery of trough belt conveyors as well as all related components and the transfer tower on an EPC base – from the piling, the foundation works, the steel construction, the cladding of the building, the roofing of the belt bridges, the necessary filters and chutes to the electrical equipment, the installation and the commissioning has now been – as contractually agreed – handed over without delay.



Masterlayout of the ship unloading system of Sea Invest in Abidjan

The ship unloading system includes two belts with a length of 100 m and a capacity of 1200 t/h. The first belt can be charged with material from a hopper over its entire length. Two towers were built, one with a height of about 8 metres and one of about 34 metres of height. A generator situated in the lower part of the transfer tower 2 assures the emergency power supply.



Ship unloading system for Sea Invest in Abidjan successfully commissioned and handed over in Q4/2017

The ship unloading system was implemented to be connected with the 2 x 50.000 t clinker silos and the raw material shed for Cim Ivoire. Thus a truck-free unloading of clinker and raw material will be achieved to suit the new regulations of the port authorities in Abidjan/Côte d'Ivoire.

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## **Cargotec to establish a joint venture specialised in dry bulk handling with JCE Invest AB**

Cargotec has signed an agreement with JCE Invest AB to establish a joint venture, Bruks Siwertell Group, specialised in dry bulk handling. The new joint venture will own Siwertell AB (previously part of Kalmar Business Area within Cargotec) and BRUKS Holding AB (previously part of JCE Group). Both companies are world-leading suppliers of bulk materials handling solutions. Cargotec will own 48% of the shares in Bruks Siwertell Group, and JCE Invest AB will own the rest, 52%. The ownerships are included to venturers' consolidated financial statements in accordance with the applicable regulation. The transaction has been signed and closed on 9 May 2018.

"This joint venture supports Cargotec's strategy to focus on container ports, heavy industrial segment and logistics. Siwertell's business is outside these core focus areas, with different customers, customer locations and limited synergies with the rest of our businesses. By joining forces with JCE Group, we are able to create a company that will be a significant player in the bulk material handling with a globally competitive and specialised product portfolio," says Antti Kaunonen, President, Kalmar.

"This is a true partnership between two strong brands, Siwertell and BRUKS, as they complement each other very well both in terms of product portfolio and market coverage. Siwertell will benefit from BRUKS's strong position in the US market whereas BRUKS will gain access to Siwertell's Asian network, knowledge and exposure. Together we will be a full line supplier for almost all types of bulk materials", says Per Karlsson, Managing Director, Siwertell.

"Together BRUKS and Siwertell will have a strong position in the dry bulk handling industry and attractive growth opportunities in new markets and customer segments including biomass, bioenergy and biofuels industries. This cooperation will add customers, competence, additional knowledge, capabilities and products to support the future growth of the new company", says Peter Jonsson, Group CEO, BRUKS.

Siwertell is a world-leading supplier of ship unloaders, road-mobile unloaders, port-mobile unloaders, ship loaders, mechanical and pneumatic conveying systems, and bulk terminal solutions. Most equipment is customised according to individual bulk operating requirements, but the company also offers standardised products. In 2017, Siwertell generated total revenues of SEK 582 million and it employs 114 people in Bjuv, Sweden.

BRUKS is a global leader in mechanical-engineering and equipment supply for the bulk materials handling industries. The company provides specialised customer solutions, including the development of custom machines and systems. BRUKS product portfolio offers a wide variety of customised solutions for the bulk materials handling industry. In 2017, BRUKS generated total revenues of SEK 707 million and it employs 246 employees in Sweden, USA, Germany and Lithuania.

Cargotec (Nasdaq Helsinki: CGCBV) enables smarter cargo flow for a better everyday with its leading cargo handling solutions and services. Cargotec's business areas Kalmar, Hiab and MacGregor are pioneers in their fields. Through their unique position in ports, at sea and on roads, they optimise global cargo flows and create sustainable customer value. Cargotec's sales in 2017 totalled approximately EUR 3.2 billion and it employs over 11,000 people. [www.cargotec.com](http://www.cargotec.com).



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## **SCHADE Lagertechnik successful in accreditation to ISO 9001**

**In January 2018 SCHADE Lagertechnik GmbH, Germany, achieved re-accreditation under the international quality management system ISO 9001, as well as under the environmental standard ISO 14001 and the occupational health and safety standard OHSAS 18001. The audit was carried out by TÜV Hessen and completes SCHADE's transition to the newly-recognised 2015 standard for quality and environmental management.**

“Successful and comprehensive accreditation under the most recent national and international ISO standards is a significant achievement for SCHADE, because international customers expect and respect impeccable management systems for quality control, environmental protection, health and safety”, explains Guido Stratenhoff, Quality Management Officer at SCHADE.



From the left: Dr Christoph Seifert (Managing Director Sales), Guido Stratenhoff (Quality Management Officer) and Klaus Paul (Technical Managing Director) of SCHADE Lagertechnik, proud of their new TÜV certificate, received in several languages (photo SCHADE)

The ISO 9001 Quality Management Standard is the most prevalent and significant standard in quality management (QM) in Germany and abroad. Companies and



organisations of all sizes and in all sectors can be accredited under ISO 9001, and this is the basis for continuous improvement of internal quality management system processes (QMS). ISO 9001 stipulates the minimum requirements for a quality management system that a company must implement in order to fulfil the requirements of its customers and the quality of its products and services. By implementing a QMS, companies can increase transparency of internal processes, enhance customer satisfaction and reduce the frequency of errors, thus lowering costs.

ISO 14001 focuses on a continuous improvement process as a means of attaining a company's objectives with respect to its ecological performance, which means that the company must define its environmental protection strategy and prepare a management system to achieve these aims.

OHSAS 18001 (Occupational Health- and Safety Assessment Series) is currently standard only in Great Britain and Poland. However, in many other countries, including Germany, it is recognised and used as the basis for accreditation in management systems relating to occupational safety (OS). The structure of OHSAS 18001 is closely related to that of ISO 9001 and ISO 14001. With these standards, customers can rely on the integrity of their suppliers' social responsibility.

#### ***About the AUMUND Group***

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## Sacmi Innovation Lab, Industry 4.0 enabling technology

Work continues apace at the facility which, once at full capacity, will have a team of at least 30 people performing pure research into enabling technologies and new process control systems. Meanwhile, following the success in Italy, a similar project is now being set up in Spain-based Sacmi Iberica

Developing innovative know-how and **enabling technologies with an eye to Industry 4.0**. This, in short, is the mission of **Sacmi Innovation Lab**, the facility established in 2017 and already selected by the **Emilia-Romagna Region** as a candidate in the first phase of a **tender to attract investment** in advanced sectors of the region's industry.

But what are 'enabling technologies'? "Those ingredients which, if mixed and configured appropriately, create a competitive advantage for the customer", explains **Gildo Bosi**, Sacmi's **Automation R&D manager**. Following successfully completed projects on the Italian market in 2017, further examples now come from **Spain** where we're looking to replicate the positive Innovation Lab experience and provide the local market with a clear reference point.

"Our first project there concerns the development of **innovative process control systems**", explains Gildo Bosi, "the aim being to improve product quality control by measuring every parameter during the process cycle". From body preparation to firing, ceramic manufacturing involves several stages, each of which makes a crucial contribution to optimal finished product quality (and any potential defects). "On the basis of parameter readings and the long term defects database" explains Sacmi's Automation R&D manager, "it's possible to create **models that correlate defects with their upstream causes**. This constitutes a valuable tool for operators as it allows them to enhance their understanding of the ceramic process".

What's happened, and why. Two apparently simple questions which the models need to answer: a goal based on so-called "**data analytics**" (i.e. algorithms based on statistical correlations). "This is the first step", observes Gildo Bosi, "towards transforming a traditional ceramic plant into a more evolved **smart ceramic plant**. Of course, the next step consists of anticipating the causes of any defects by implementing **predictive diagnostics models**". The aim is to arrive at a point where it is no longer the operator who identifies and corrects the process inefficiency but the **plant itself that 'self-corrects' via the models**.

To this end, Sacmi Innovation Lab doesn't just focus on identifying enabling technologies: it also, and above all, has the task of **training the professionals** needed to manage such projects and translate them into winning manufacturing strategies. "That task involves distinctly **multi-disciplinary** skills that range from IT, mechanical engineering, physics,

and chemistry to mathematics (i.e. data scientists), automation and plant management expertise".

And it's this 'managerial' aspect that leads us to the second major project that Sacmi Innovation Lab is moving ahead with at Sacmi Iberica, one that concerns the **efficiency enhancement of machine lines**. "When we talk about 4.0", explains Gildo Bosi, "the focus isn't merely technological. For example, one of the systems used to transform a traditional ceramic factory into a smart factory involves **designing flows and plants innovatively** so they reflect the new market logic and provide greater efficiency and economy". That innovation aims to overhaul the way inventories and flows are managed and reorganise order management systems to cope with the increasing fragmentation of the orders themselves (a consequence of increasing **product personalisation, shorter life cycles and smaller volumes**). "The sum of these two logics", observes Sacmi's Automation R&D manager, "that is, the implementation of new enabling technology and managerial innovation, creates the 4.0 of the future".

Several pilot plants installed on the Italian market - with some of the Group's most important customers - follow these new logics. And **smart innovation**, points out Gildo Bosi, is all the more successful when the technological aptitudes of younger workers are merged with the experience of older ceramists: "New technology is a tool that streamlines people's work, allowing them to avoid repetitive tasks and dedicate more time to higher-added-value activities. Yet it should always be technology at the service of man, not vice versa. That's why it's essential to implement the **digital transition** so that it makes the most of the **ceramic-making experience** of those who've been with the company a long time".

Currently staffed by **15 people**, the Sacmi Innovation Lab is expected to grow significantly over the next two years, with employee numbers rising to **at least 30**. "This is a team dedicated exclusively to **research**, disengaged from production. It is, in fact, precisely when orders and in-company flows are at their height", concludes Sacmi's Automation R&D manager, "that we need to sharpen the focus on innovation so we're ready to meet the next challenge when it comes along".

Operating in close collaboration with **Academy 4.0** – the Sacmi facility that oversees 4.0 learning at every level, from internal training to relations with customers, suppliers, schools and universities – Sacmi Innovation Lab aims to become an **Emilia-Romagna High Tech Network** node by merging the numerous already-completed projects and existing partnerships with the regional research facility and university system. "In 2017 we hosted 5 dissertation students here in Imola. This year's goal is to have at least **6-8 dissertation students** assigned to the main facility research areas".





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MVR 6700 C-6 in operation at Lafarge Holcim's Biskra works in Algeria



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## Redefining fineness - Pfeiffer's MVR vertical mill with MultiDrive® grinds CEM I to a fineness of 4,800 cm<sup>2</sup>/g

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## GDA80, the Sacmi-Gaiotto gem leading the way in over 100 production plants worldwide

*Since its market launch in 2013, feedback from the field has painted a clear picture: the investment pays for itself after just one year thanks to maintenance and spare parts savings of over 90%*

To date, the **Gaiotto Diaphragm Automatic Gun (GDA80)** - the innovative **Sacmi-Gaiotto** glazing gun launched in 2013 - is in use in **over 100** sanitaryware plants all over the world. From Turkey to Algeria, Korea, Vietnam, Mexico, Indonesia, USA, Thailand and Peru, plus, of course, Italy: these are just some of the markets where this Sacmi-Gaiotto gem has won over manufacturers and yielded excellent results that range from outstanding **reliability** to **reduced maintenance requirements**.



In-the-field tests show that **components last at least a year**: far better than the performance observed on competing solutions. In practice, the **only part requiring replacement is the diaphragm** –which costs very little –making the **GDA 80** clearly **advantageous** with respect to other spray guns currently on the **robotized glazing** market.

The phrase “*Since we started using it we've almost forgotten it's there*” is typical of the feedback received from maintenance staff at companies using the Sacmi-Gaiotto gun. *Easy to install and maintain, investment in the GDA80 is amortized in less than a year. This is thanks to savings on maintenance work and spare parts which, on the basis of usage data provided by customers and constantly monitored by Gaiotto, exceed 90%.*



**Process consistency and repeatability** - essential in sanitaryware manufacturing - are 100% guaranteed by the GDA80 thanks to **elimination of the gun-closing needle**, a design feature that reduces wear enormously (and, simply, prevents the usual nozzle clogging problems). By removing

anything that might have a negative impact on glazing quality, Sacmi-Gaiotto has achieved nothing less than **excellence**, doing so also via features that ensure **more uniform glaze distribution** and **less overspray**.

Stable spraying parameters and **glaze economies** which –compared to competitors' solutions – **exceed 50%**, have been made possible thanks to a **cap with wider air through-holes** (a feature that may, in some cases, allow utilisation of one gun instead of two). Completing the picture is the **footprint**, now some 25% smaller thanks to a positionable arm that also enhances **flexibility and handling** of the device by the robot. Featuring an all-stainless steel body, the GDA 80 is supplied by Sacmi-Gaiotto with **0.5 - 2.7 mm nozzles** and is **CE** and **Atex** certified for use in explosive environments.

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## CEMENT AND WATER PROPERTIES VARYING ACCORDING TO NILE RIVER LEVEL

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### Abstract

This paper studied the influence of fluctuation of the Nile River level on water composition. And, its impact on cement properties for cement plants, which are using the Nile water for the industrial purpose. The plant under study is El-Minia white cement plant. The plant has a water treatment unit which is a sand filter. The Nile River was classified to four periods according to level; the periods are Flood, intermediate, drought and intermediate period. The paper discussed the analysis of Nile water before and after treating at all periods of the Nile River. It also discussed the analysis of the cement at the same periods. The results showed that the fluctuation of the Nile River had a significant impact on its biological nature rather than chemical nature. The analysis of the treated Nile water showed that the filter not separates the cations and anions and not completely prevent the passing of the phytoplankton at all periods. Still, there are inverse relationships between Nile level and algae count after treating. The water contains algae have a negative impact on the cement strength. The cement strength increased in

flood period and decreased in a drought period according to algae concentration.

**Keywords:** Cement, Nile river, Water pollution, Clinker, Compressive strength

### 1.1 Introduction

#### 1.1.1 Water

The Nile River is the principal artery of life in Egypt. The Nile River has shaped the life of Egyptian people over the centuries, their habits and culture, and through its periodic flood was like a renewed life cycle (Rasheedy 2007; Karyabwite 2000). The Nile River is the main source of fresh water resources in Egypt for domestic use and agricultural purposes (El-magd et al. 2014). Egypt's vulnerability is also explained by the amount of rainfall the country receives in the Nile River basin, the main basket area for the country's agriculture since Pharaoh's time (Rasheedy 2007). The catchment of the Nile in Egypt, has a population of over 75 million and the Nile receives industrial,

biological and domestic waste whilst water is abstracted for drinking water, irrigation and industry (Fishar and Williams 2006). Common inorganic salts that can be found in water include calcium, magnesium, potassium and sodium, which are all cations, and carbonates, nitrates, bicarbonates, chlorides and sulfates, which are all anions (Safe Drinking Water Foundation 2009). Heavy metals can be found in water include copper (Cu), cadmium (Cd), zinc (Zn), lead (Pb), mercury (Hg), arsenic (As), silver (Ag) chromium (Cr), iron (Fe), and the platinum group elements (Bourai et al. 2010)(Abdo, M. H and El-Nasharty 2010). Water quality is affected by changes in nutrients, sedimentation, temperature, pH, heavy metals, non-metallic toxins, persistent organics and pesticides, and biological factors, among many other factors (Carr 2008). The most important organic pollutant in the present study is algae. The physical and chemical factors are the most factors which may affect on algae growth. Temperature and light can be considered the most factors that affect on algae growth where the algae growth increases with temperature above 20°C (Singh and Singh 2015; Ren 2014). On the other hand light is an essential key to the growth of microalgae. Microalgae uses light to process the photosynthetic, but the light energy cannot be stored by microalgae, so the light should be supplied sustainable (Ren 2014; Singh and Singh 2015; Huang et al. 2015). Chemical as nutrients and essential elements, have a high effect on algae growth and the nutrients changed according to algae type.

### 1.1.2 Cement

Annually, 2.7 billion tonnes of cement are manufactured around the world, which in

turn makes 20 billion tonnes of structural concrete, foundations, blocks and paving slabs, mortar and rendering, roof tiles and other products (Black et al. 2010). Portland cement (OPC, Ordinary Portland Cement) is a mixture of clinker and ground gypsum (controller plug) (Benmohamed et al. 2016). Portland cement clinker mainly consists of CaO, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub> and Fe<sub>2</sub>O<sub>3</sub>; are accounting for more than 95%. The minor components in total are less than 3% are MgO, TiO<sub>2</sub>, P<sub>2</sub>O<sub>5</sub> in individual and alkalis. In clinker, oxide are not present, but exist as compounds formed by two or more oxides. The mineral phases are very fine, usually 30-60 µm and consist mainly of alite, belite, calcium aluminate and aluminoferrite. Alite (C<sub>3</sub>S) (Ca<sub>3</sub>SiO<sub>5</sub>) is the most important constituent, 50-70%. Belite (C<sub>2</sub>S) (Ca<sub>2</sub>SiO<sub>4</sub>) constitutes 15-30%, aluminate (C<sub>3</sub>A) (Ca<sub>3</sub>Al<sub>2</sub>O<sub>6</sub>) constitutes 5-10% and ferrite (C<sub>4</sub>AF) (Ca<sub>4</sub>AlFeO<sub>5</sub>) makes up 5-15% of normal Portland cement clinkers (Aldieb and Ibrahim 2010; Oss and Padovani 2003). The formation of clinker need very high kiln temperatures, the materials reach temperatures of about 1450 °C in order to form the key C<sub>3</sub>S mineral (Oss and Padovani 2003). White Portland cement (WPC) has similar bonding characteristics as gray Portland cement. WPC has also higher performance due to the use of high-quality materials and control process in its production (Temiz et al. 2013). White cement contains a very low amount of iron since it decreases the whiteness, which implies insignificant content of C<sub>4</sub>AF. Therefore, white clinker contains three major constituents: C<sub>3</sub>S, C<sub>2</sub>S, and C<sub>3</sub>A (Reina and DelaTorre 2009). The cement compressive strength is generally used as a measure of overall concrete quality (Ge, 2005). The water was added during cement industry in three stages, which are clinker cooling, cement grinding and during mixing water for

concrete. The high concentration of impurities even if chemical or biological impurities in the mixing water are affecting on concrete strength and setting time. Therefore, certain optional limits should be set on these impurities (Komastka et al. 2003; Whiting et al. 2002).

The aim of the present study is to assess the effect of fluctuation in Nile River level on the concentration of pollutants for Nile water before and after treating during the year. The treating will be done at El-Minia white cement plant by using a sand filter. The study also aimed to assessment the impact of the treated Nile water on the cement industry during all periods.

## 1.2 Material and methods

### 1.2.1 Sampling

#### 1.2.1.1 Water Sampling

The sampling area are two areas, one for raw water (Nile water) and the second after treatment unit of the cement plant. The Nile area was selected to be near from studying cement plant (El-Minia white cement plant), which is located at Bani Khaled, Samalout, El-Minia Governorate. The plant uses treated

Nile water at different processes for clinker cooling in the rotary cooler and at a cement mill. The periodic water samples were manually collected from the surface

water with deeps 30 cm. The samples were collected according to the level of the Nile river, which was in flood period in August, intermediate period in October, a drought period in January and intermediate period in April month for two years (2015 and 2016). The same periodic water samples were collected after the treatment unit of the cement plant.

#### 1.2.1.2 Clinker sampling

The samples for semi-final product (clinker) were collected manually by using two methods, which are.

- a. The traditional method

Periodic clinker samples were manually collected after rotary cooler (Fig. 1.1). The plant is using treated Nile water for cooling clinker by nozzle system. The amount of water was used for clinker cooling, around 600 ml/kg.

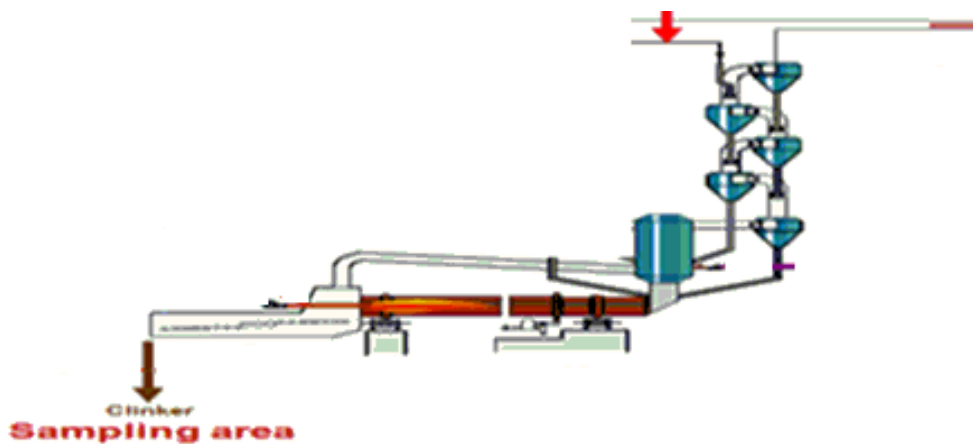


Figure 1.1: Traditional method for clinker sampling.



b. Statistically method

The method was done by collecting experimental results from the plant during one year. And compare the results during different periods of the Nile.

## 1.2.2 Analysis

### 1.2.2.1 Water analysis

The temperature (°C) was measured by using an ordinary dry mercury thermometer. The hydrogen ion concentration (pH) was measured by using PH meter, (Model Jenway 3510). Total solids (TS), volatile suspended solids (VSS), total dissolved solids (TDS), total suspended solids (TSS) and oil & grease were measured by gravimetric methods. Conductivity (EC) was measured by using Conductivity meter, (Model Jenway 3110). Turbidity was measured by using turbidity meter, (Model Turbo Direct). The color was measured by using U.V-VIS spectrophotometer, (Model Gary 100 U.V-Vis). The analysis of  $\text{CO}_3^{2-}$  and  $\text{HCO}_3^-$  was measured by titrimetric methods. Analysis of  $\text{Cl}^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{NO}_2^-$ ,  $\text{NO}_3^-$ , total phosphorus (TP) and  $\text{F}^-$  were measured by using Ion chromatography, (Model Dionex-ICS-5000). Analysis of tannic acid was measured by using Spectrophotometer, (Model Jasco, uv-vis-630). Analysis of Mn, Zn, Al, Fe, Cu, Pb, Cd, As, Co, Cr, Ni, Sn, Hg, Ti and B were measured by using inductively coupled plasma optical emission spectrometry (ICP), (Model Agilent ICP-

OES 5100). Analysis of  $\text{N-NH}_4$  was carried out by using Gerhardt Digestion and Distillation apparatus, (Model Vapodest 20S). Enumeration of phytoplankton concentration was measured by the Microscope, (Model Leica CM E). All the analysis unless otherwise specified, was carried out according to (APHA, 2005).

### 1.2.2.2 Cement analysis

The free lime in clinker was measured by titrimetric methods according to (ES 474 – 1994). The whiteness of clinker was measured by color measurement apparatus, (Model colorFlex EZ). Loss of ignition (L.O.I) was measured by muffle furnace, (Model Nabertherm more than heat 30 – 3000 c) according to (EN 196/2). The chemical analysis was measured by X-Ray fluorescence apparatus, (Model Axios mAX by PANalytical) according to (EN 196-2.2:2005 ) and (ASTM C114). Determination of expansion (soundness) was carried out by Le Chatelier method (Model LD-50) according to (ES 2421 – 3) and (UNI EN 196-3). Setting time was measured by VICAT apparatus according to (ES 2421 – 3) and (UNI EN 196-3). The compressive strength was measured by compression and bend test apparatus, (Model Toni/Technik) according to (UNI EN 196-1).

### 1.3 Result and discussion

All previous studies were concerned about the effecting of mixing water for concrete. The present study takes care with the effecting of water, which is used for clinker cooling and at cement mills.

#### 1.3.1 Water used for clinker cooling

##### 1.3.1.1 Traditional method

The physical, chemical and biological analysis of Nile water (raw water & treated water) was given in (Table 1.1 & 1.2).

The results of raw water showed that the fluctuation of the Nile River had a significant impact on its biological nature rather than chemical nature. The main reason for increasing the algae count at drought period attributed to Nile level (Shafeek et al. 2017). But the reason of stability of chemical elements in the Nile during the year attributed to the presence of algae. Chemical element considers the major source of nutrient for algae. The algae uptake the chemical elements, resulting no noticeable variation in

the chemical composition of the Nile during the year.

The results of the treated water showed that the filter doesn't separates the cations and anions and doesn't completely prevent the passing of the phytoplankton (Table 1.1 & 1.2). The results showed that still there are inverse relationships between Nile level and algae count.

The clinker samples were withdrawn throughout the year in the same periods of the previous withdrawal of the Nile water samples. The clinker samples cooled by treating Nile water and the sampling duplicated at each period for 3 times (Table 1.3). The analysis of clinker showed that only one physical property has a strong positive relationship with Nile level, the property is the clinker compressive strength. According to the results of treated Nile water and the results of compressive strength of the

Table 1.1: Chemical analysis for Nile

Parameters	Units	Flood period/2015		Intermediated Period/2015		Drought period/2016		Intermediate period/2016	
		Nile Water	Treated water	Nile Water	Treated water	Nile Water	Treated water	Nile Water	Treated water
Air temp	°C	39	39	28	28	8	8	29	29
Water temp	°C	36	39	25	29	5	10	25	32
E.C	µSem/cm	370	360	358	351	340	340	339	336
TS	mg/L	232	223	238	231	256	242	240	233
TDS	mg/L	225	221	233	230	244	239	231	231
TSS	mg/L	7	2	5	1	12	3	9	2
VSS	mg/L	N.D	N.D	N.D	N.D	10	2	7	1
Carbonate	mg/L	121.3	115.3	115	115.0	120	114.0	118	118.0
Bio-carbonate	mg/L	105.4	105.4	106	106	40	40	45	45
Chloride	mg/L	17.9	17.9	62.7	58.7	66	66	28.3	27.3
Fe	mg/L	0.19	0.19	0.14	0.13	0.05	0.05	0.06	0.06
F <sup>-</sup>	mg/L	0.96	0.92	0.13	0.13	0.48	0.43	N.D	N.D
T.P	mg/L	N.D	N.D	2.3	2.3	0.35	0.35	0.8	0.8
SO <sub>4</sub>	mg/L	49.5	48.1	65	64.0	32.9	33.0	47	47.0
Ca	mg/L	33.7	33.7	33	33	30	30	34	34
Na	mg/L	23.3	23.3	30	30	41.8	41.8	27	27
K	mg/L	4.9	4.9	5.3	5.3	5	5	6.8	6.8
Mg	mg/L	12.24	12.24	30	30	38.6	38.6	12.5	12.5
Ph	--	8.2	8.6	8.1	8.5	7.6	8.1	7.6	8.0
NO <sub>2</sub>	mg/L	N.D	N.D	0.05	N.D	N.D	N.D	N.D	N.D
NO <sub>3</sub>	mg/L	0.64	0.64	0.39	0.39	0.2	0.2	1.3	1.3
NH <sub>4</sub>	mg/L	0.27	0.27	0.23	0.23	N.D	N.D	N.D	N.D
Color	Pt/ Co	15.3	4.3	8	2.0	6	1.2	7	1.4
Odor	--	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
Turbidity	NTU	1.0	1.0	1.7	1.3	6	5	2	2
Oil& grease	mg/L	14	11	13	12	3.8	3.5	4	3
Heavy metals	mg/L	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
Tannic acid	mg/L	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D



Table 1.2: Biological analysis for Nile water after treatment unit at all periods

Algae parameters	Units	Flood period/2015		Intermediate period/2015		Drought period/2106		Intermediate period/2106	
		Nile Water	Treated water	Nile Water	Treated water	Nile water	Treated water	Nile Water	Treated water
Air temp	°C	39	39	28	28	8	8	29	29
Water temp	°C	36	39	25	29	5	10	25	32
Diatoms	org/ml	135	45	380	150	1850	650	610	170
Green Algae	org/ml	48	15	56	17	120	40	80	22
Blue green Algae	org/ml	38	7	44	10	99	20	66	10
<b>Total Algal Count</b>	org/ml	221	67	480	177	2069	710	756	202

clinker which is treated by the water. These results showed that the impurities of treated water at drought period reduced the cement strength. On the other hand, the cement compressive strength improved in flood period. The difference in values of the cement compressive strength during flood and drought periods strongly appeared at early strength (2 days) than others (Fig. 1.2). The difference reaches to 17.24% at early age (2 days) (Fig. 1.2-A). The difference decreased gradually at 7 days, which reaches to 11.26 % (Fig. 1.2-B). Finally, at late strength the difference reaches to 5.4% (Fig. 1.2 -C). The main impurities appeared with stronger

concentration at drought period than flood period is the biological impurities. The algae strongly appears in drought period with semi-stability of inorganic impurities at all periods. From this discussion, we can say that, the cement strength reduced as the algae present in treating Nile water increased. The algae prevented the complete crystallization of calcium silicate, and lead to the poor formation of mineralogical phases (Shafeek et al. 2017). From the other hand, the concentration of inorganic impurities or TDS in treated Nile water gave semi-stability at all periods and didn't effect on the cement strength.

Table 1.3: Chemical and physical analysis of Kiln feed, clinker and cement samples at all periods

Chemical & Physical Analysis of the kiln feed																		
Parameters	Units	Flood period				Intermediate period				Drought period				Intermediate period				
		1	2	3	Average	1	2	3	Average	1	2	3	Average	1	2	3	Average	
XRF for Kiln Feed	SiO <sub>2</sub>	%	15.08	14.98	14.90	14.99	15.3	15.2	15	15.16	15.08	14.98	15.33	15.13	15.00	15.17	15.02	15.06
	Al <sub>2</sub> O <sub>3</sub>	%	2.44	2.33	2.51	2.43	2.48	2.41	2.44	2.44	2.44	2.41	2.42	2.42	2.5	2.48	2.43	2.47
	Fe <sub>2</sub> O <sub>3</sub>	%	0.11	0.09	0.11	0.10	0.1	0.12	0.12	0.11	0.09	0.09	0.09	0.09	0.1	0.1	0.1	0.10
	CaO	%	44.40	44.53	44.50	44.48	44.7	43.7	43.9	44.12	44.6	44.62	44.4	44.53	44.6	44.7	44.8	44.68
	MgO	%	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	SO <sub>3</sub>	%	0.17	0.21	0.18	0.19	0.16	0.16	0.15	0.16	0.18	0.18	0.17	0.18	0.16	0.14	0.15	0.15
	Cl	%	0.05	0.05	0.07	0.06	0.02	0.05	0.05	0.04	0.03	0.02	0.03	0.03	0.02	0.02	0.02	0.02
	LOI	%	35.5	35.7	35.9	35.70	35.8	35	35.1	35.30	35.7	35.7	35.5	35.63	35	35.7	35.8	35.50
	LSF		97.20	98.60	97.20	97.67	97.7	96	97.8	97.16	98.5	99	96.8	98.10	97.7	98.2	99.5	98.45
	SM		6.00	5.80	6.10	5.97	5.92	6.02	5.85	5.93	5.96	5.99	6.11	6.02	5.9	5.88	5.94	5.91
	C <sub>3</sub> A		9.74	10.20	9.90	9.95	9.97	9.51	9.65	9.71	9.82	9.7	9.71	9.74	9.95	9.96	9.77	9.89
	AM		24.30	25.20	25.30	24.93	24.8	20.1	20.3	21.74	27.1	26.78	26.9	26.93	24.8	24.8	24.3	24.63
	Na <sub>2</sub> O	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K <sub>2</sub> O	%	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Residue on 90 μ	%	2.1	2.2	2.0	2.10	1.8	2.3	2	2.03	1.9	2.0	1.8	1.90	1.8	1.9	2.0	1.90	
Residue on 63 μ	%	7.3	7.7	7.1	7.37	5.9	6.8	7.0	6.57	6.7	7.0	6.5	6.73	6.9	6.9	7.0	6.93	

Chemical & Physical Analysis of the clinker																		
Parameters	Units	Flood period				Intermediate period				Drought period				Intermediate period				
		1	2	3	Average	1	2	3	Average	1	2	3	Average	1	2	3	Average	
XRF for clinker	SiO <sub>2</sub>	%	24.04	24.06	23.84	23.98	24.22	24.21	23.7	24.05	24.42	24.54	24.1	24.35	24.04	24.54	24.2	24.26
	Al <sub>2</sub> O <sub>3</sub>	%	3.72	3.77	4.11	3.87	3.77	3.85	4.11	3.91	4.12	3.75	4.3	4.06	4	3.9	4	3.97
	Fe <sub>2</sub> O <sub>3</sub>	%	0.15	0.14	0.15	0.15	0.14	0.15	0.15	0.15	0.16	0.15	0.15	0.15	0.15	0.13	0.11	0.13
	CaO	%	68.55	68.21	67.7	68.15	69.33	68.18	67.2	68.24	68.95	68.78	68.33	68.69	68.77	68.78	68	68.52
	MgO	%	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.05	0.05	0.4	0.5	0.4	0.43
	SO <sub>3</sub>	%	0.2	0.41	0.11	0.24	0.23	0.22	0.21	0.22	0.11	0.18	0.31	0.20	0.23	0.15	0.17	0.18
	Cl	%	0.05	0.05	0.05	0.05	0.03	0.06	0.03	0.04	0.03	0.05	0.03	0.04	0.03	0.04	0.02	0.03
	L.S.F		95.46	94.9	94.4	94.92	95.8	94.1	94.2	94.70	94	95.29	96.8	95.36	94.2	96.1	95.2	95.17
	S.M		6.2	6.2	5.7	6.03	6.2	6.1	5.6	5.97	5.7	6.3	5.7	5.90	6.2	6.3	6.1	6.20
	C <sub>3</sub> A		9.6	9.8	10.6	10.00	9.8	10	10.6	10.13	10.7	9.69	10.6	10.33	9.6	9.69	9.7	9.66
	C <sub>3</sub> S		71.1	69.2	66.5	68.93	72.6	67.3	65.5	68.47	67.1	72.11	72.1	70.44	68.2	71.3	71	70.17
	C <sub>2</sub> S		23.1	26	26.6	25.23	24.4	27.5	27	26.30	26.5	26.7	24.3	25.83	25.3	24.1	24	24.47
	AM		24.5	26.4	29	26.63	26.5	26.1	30	27.53	29.3	25.7	24.3	26.43	24.5	25.7	27.2	25.80
Free lime	%	2.5	3.2	3.5	3.07	2.9	3.2	3.6	3.23	3.8	2.4	3.7	3.30	3.2	2.4	2.9	2.83	
Whiteness	%	87	86.2	87.1	86.77	87.2	86	86.9	86.70	87	86.7	87.2	86.97	87	86.7	87.3	87.00	
loss of ignition	%	1.3	1.0	0.9	1.0	0.9	0.8	0.5	0.73	0.6	0.9	0.8	0.76	1.0	0.7	0.5	7.3	
Soundness	%	2.0	3.0	4.0	3.0	2.0	2.0	4.0	2.6	4	2	3	3	3	2	2	2.33	
Setting time	Initial	Min	120	105	110	111.6	105	105	110	106.6	105	110	115	110	120	110	105	111.7
	Final	Min	155	135	140	143.3	135	135	140	136.6	140	140	150	143.3	155	140	135	143.3
Compressive strength	2 days	N/mm <sup>2</sup>	34.00	33.70	33.80	33.83	31.00	30.80	30.11	30.64	28.9	27.7	27.4	28.00	30.00	29.80	29.70	29.83
	7 days	N/mm <sup>2</sup>	46.00	46.70	45.90	46.20	43.00	42.50	42.70	42.73	42.5	40.70	40.00	41.07	40.30	39.00	40.10	39.80
	28 days	N/mm <sup>2</sup>	61.20	59.90	60.30	60.47	59.30	59.00	59.60	59.30	57.60	57.30	56.9	57.27	59.00	58.70	58.60	58.77

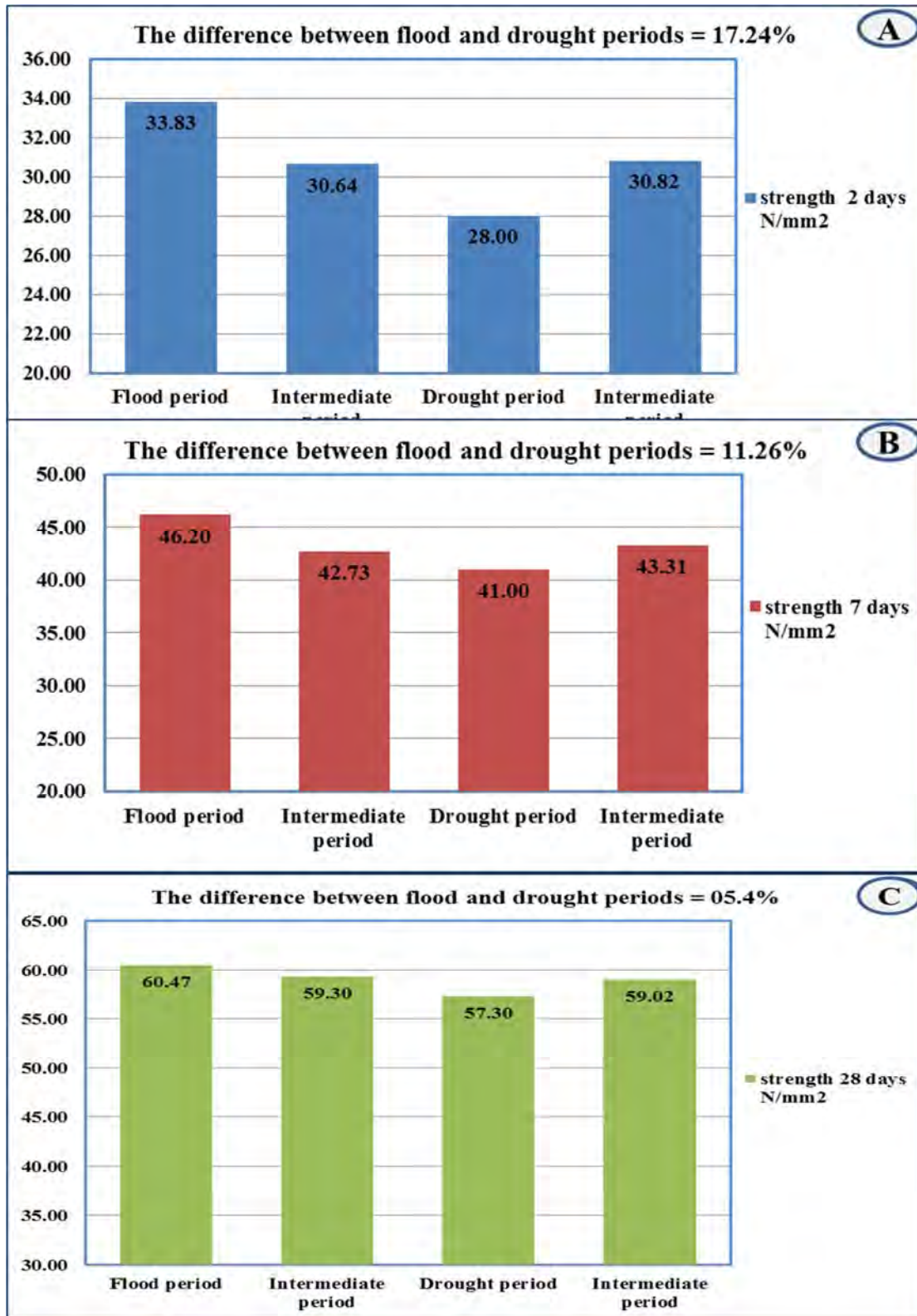


Figure 4.2: Cement strength 2(A), 7(B) and 28(c) days.



### 1.3.1.2 Statistically method

This method is a confirming procedure; it is drawing a complete picture of the relation between the fluctuation of Nile level and the change of cement strength during the year. The method was done by collecting the cement compressive strength results during the whole one year from the plant under study. The obtained results came to validate the positive relationship between cement strength and the Nile level (Fig. 4.3).

### 1.3.2 Water used for cement mills

It's not manually applicable; we couldn't add the same amount of water when grinding the previous clinker samples with gypsum as happens in the cement mill. So some samples were tested, by putting a very small amount of Nile water to 450 gram of cement during the preparation of the molds from clinker with gypsum. The results were compared with the previous samples, which was grinded without water. The cement strength was reduced with small values when added the water, especially at 2 days. The results proved that the water type can effect on strength when adding during grinding process.

The previous studies were concerned about the effecting of mixing water for concrete.

The permissible limit of inorganic salts is 2000 mg/L and Organic is 200 mg/L for concrete mixing water (Kucche et al. 2015; Komastka et al. 2003; Joshi 2014). The algae presence in water lead to lower strengths either by influencing cement hydration or by causing a large amount of air to be entrained in the concrete (Komastka et al. 2003).

## 1.4 Conclusion and Recommendation

The fluctuation of the Nile affected on the biological nature of water than chemical. The fluctuation increases the algae count at drought period. The plant sand filter didn't separate the cations and anions and not completely prevents the passing of the phytoplankton at all periods. The impurities of treated water at drought period reduced the clinker cement strength. On the other hand, the cement compressive strength improved in flood period. The fluctuation of the Nile, born negative impact on the cement industry, especially at clinker cooling process.

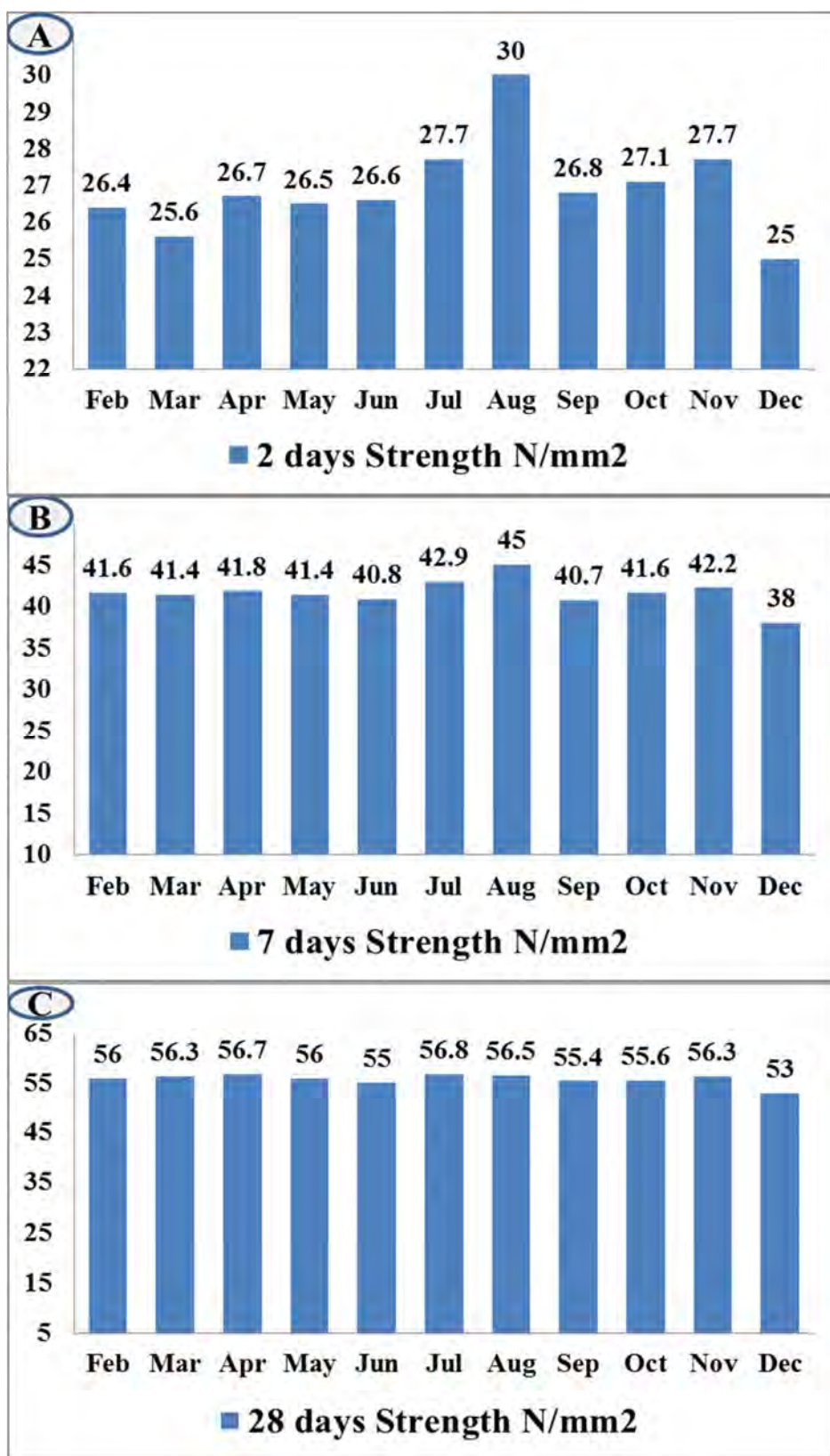


Figure 4.3: Average cement strength during the year for 2(A), 7(B) and 28(C) days.

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# Concrete Applications ..... No Borders

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Concrete is one of civilization's most durable building materials. People now use the material's modern version aggregates such as sand or gravel held together by a cement and water paste more than all other construction materials combined. The world produced 6.2 billion metric tons of cement in 2018, and this production will keep increasing as more sidewalks, buildings, and bridges get built in an increasingly urban world.

Now we try to discover more technologies & techniques related to concrete applications & technology

## 1- Concrete Printing Art

3D concrete printing is a technologically advanced and innovative method used for constructing pre-designed building components with the help of 3D concrete printers. The technology holds the promise of substantially optimizing the construction industry in terms of construction cost, time, error reduction, flexibility in design, and environmental impact.

The rate at which construction companies, researchers, and technologists are coming together in the development of 3D concrete printing techniques is commendable. A variety of concrete mixes, such as shotcrete, ready-mix concrete, limecrete, precast and stamped concrete, and high-density concrete, are already in the market and many more effective mixes are being introduced at a steady pace. Construction companies are increasingly utilizing the technique to formulate building elements such as panels, lintels, roofs, floors, walls, and pavement slabs.

Let us discover what is the meaning of 3D concrete printer Building a house is a process that is not only time-consuming, but also expensive. However, this could soon change. More and more manufacturers are exploring the world of construction 3D printing, also known as house 3D printing.

House 3D printers use paste extrusion to build houses. Paste-type material, such as concrete or mud, is pushed through the house 3D printer's nozzle in layers. 3D



printing in the construction industry helps save time, effort and material.

However, construction 3D printers are not yet capable of creating a fully functional house. Indeed, only the frame and walls of the house are built – other elements, such as electricity or indoor plumbing, need to be manually installed.

To provide a complete overview of the construction 3D printer market, we have listed 16 house 3D printing solutions. Some of them are 3D printers available for sale, but most are still at the start-up prototype stage or are external house 3D printing services as shown in Fig.1



Fig. 1

### Benefits of house 3D printing

House 3D printing offers significant advantages compared with traditional buildings:

- **Ecological:** 3D printed houses can be built with organic, eco-friendly materials. Moreover, some house 3D printers use solar energy and generate low CO<sub>2</sub> emissions.
- **Social:** house 3D printers can build affordable houses using earth materials, being of great aid for people in poverty-stricken regions.
- **Economical scaling:** house 3D printing reduces certain building costs. For example, the cost for 1 square meter of wall using traditional construction methods is approximately \$75, whereas with the Apis Cor house 3D printer it is only \$27.
- **Efficient:** since the materials needed to 3D print a house are 3D printed on demand, the machines produce less waste. In addition, it is possible to

recycle construction materials.

Differences between 3D printed houses and traditional houses

The main takeaway here is that 3D printed houses are built in less time and with less material than traditional houses. Even if they have a rougher exterior, post-processing is an option just as it is for regular 3D printed objects. 3D printed houses tend to be smaller due to 3D printer build volume limits, but this is not always the case.

### Limits of house 3D printing

Although house 3D printing offers many benefits, there

are certain limitations:

- **Expensive initial investment:** house 3D printers can sometimes cost up to one million dollars.
- **Partially-built houses:** house 3D printers only build house frames. The 3D printing process is usually paused to manually settle plumbing, wiring and rebars.
- **Rough exterior:** most 3D printed homes' exteriors are not as smooth as traditionally-built houses.

### 2- Concrete Penetration

Concrete has been used to make some of the most iconic, strong and long lasting structures in the world. However, nothing lasts forever – not even concrete. Exposure to the elements, the passage of time, and repeated use all have their effect. Built to last – the Pantheon in Rome (126 AD) is ample proof of its longevity, built with a form of concrete, so repairing and altering concrete





Fig. 2  
Rebar's left intact to maintain strength of the floor and surrounding walls

structures is no easy feat. Traditionally, this task was tackled using cutting and demolition hammers. However, an increasing number of people are now turning to hydro demolition thanks to its environmental and cost-effective properties. For jobs that require a safe and quick method of cutting through concrete, hydro demolition technology, first used in the 1970's utilizes high-pressure water to remove deteriorated and sound concrete. This process provides a sound bonding surface for repair material and new coating applications. First developed in Europe, this technology has become widely accepted for concrete removal and surface preparation throughout Europe and North America. Hydro demolition can be used to complete a myriad of jobs its central purpose is to remove, cut and scabble concrete. Yorkshire based hydro demolition company Hydro blast is frequently tasked with completing specialist projects using these methods. Hydro blast was contacted by a construction company after contractors found themselves needing to install a duct under the concrete floor of a shop as part of the work. When they began breaking the concrete floor themselves, they discovered that the floor was heavily reinforced with a large quantity of rebar. The rebar not only ran through the flooring but also had connections to the walls, and any damage could therefore spread to these areas and could possibly be detrimental to the building as shown

in Fig. 2

The project required a method that would leave the supports intact, and the project nagger therefore advised workers to use hydro demolition as a method to cut away the concrete. Before starting, Hydro blast identified with the construction team the areas that required cutting by using a concrete cutting saw a saw to lightly cut lines in the concrete to indicate the area for removal. All that Hydro blast required from the site was a regular water supply.

Using a hand lance and ultra-high-pressure water jet, Hydro blast cut the concrete with minimal noise, no vibrations, and no cracking. The task was completed in one day too, so that the construction team could continue working towards their deadlines. Using the Silt buster HD, Hydro blast were able to clean any wastewater – when the water leaves the hydro demolition machine it has a pH of 7, which is neutral. But when the water makes contact with the concrete surface, this pH level rises to 1011/, which is alkaline, and the water fills with dust and other pieces of debris. Before this wastewater is returned to the environment, the Silt buster HD is used to clean and restore the neutral pH of the water. This mechanism uses CO<sub>2</sub> to separate any solid particles from water.

right materials, while keeping to the fluid (true) nature



Fig. 3  
The key elements of architecture are design, details, computers and people

Our story from Henning Rasmuss, a practicing architect with Paragon Architects in Johannesburg, South Africa, opened the lively discussion in a room filled with an audience eager to learn what concrete had to do with beauty. He began by stating that the greatest limitation of an architect would be ‘drawing a building that could not be built’ and with that he emphasized the need to have the right tools throughout the design process.

Using some of the works the team has done in South Africa, the presentation aimed at showcasing the benefits of concrete in its fluidity, solid design and ability to be proportioned appropriately through proper control and moulding. In addition to putting effort in green building design through proper orientation and strategic planning, Henning urges architects on the importance of proper communication in order to achieve desired results. He says, “in the end, architecture is plan, section and elevation, ...”

Material variety brings forth an interesting solution in ‘The Creative Council’, a project that has brought mixed reactions from the general public and other practitioners as well. Concrete defines the silhouette of the building, while metal sheets were used for the conical forms. The challenge here was to specify the

of concrete. Based on the experience from the construction process of the Alexander Forbes building he recalls the triumph

in the concrete work that provided an excellent experience in achieving dynamic forms at reasonable cost using the shuttering available. It was not an easy task but it provided a much needed break from the norm.

Equating the architect to a chameleon that can easily adapt and with an exceptional set of skills in order to get work done, he stressed the importance of the knowledge of materials and building technology. “Architecture is unforgiving, you have to know your stuff, and you also have to be prepared to change either the design, the material” or the contractor’s point of view.

The BDO project, in Wellington, South Africa, as discussed by John Peska, a practicing architect with Paragon Architects, brings forth a creative form of concrete, glass and brickwork in the design of a corporate building. John Peska explained that corporate buildings are all about efficiency, and one should maximize on the built up area. The success of this design is not only in the integration of a variety of materials but in the proper understanding of the context





during the design and implementation process. Here, concrete is used extensively in the cantilevers, both in the interiors and exteriors.

Further discussions went on to expound on the benefits of precast concrete, which has been embraced by Paragon Architects as a powerful way of building with concrete. Precast concrete reduces failure and improves on quality.

What came out quite clearly from this presentation is that the architect must think through the entire design from its inception to its implementation. While he is faced with the challenge of giving value to the developer by designing buildings that are highly flexible, he must be creative, communicate effectively and design buildings that are buildable.

#### 4- Finally, does Concrete Heal Itself?

It is really wonderful to hear that Concrete heals itself! The concrete would heal cracks at various stages of formation using three different methods. In addition to bacterial healing, encapsulated chemical agents could patch small cracks up to 0.2mm-wide microcapsules of polyurethane or calcium alginate and fill them with minerals such as sodium silicate, colloidal silica, calcium oxide, or magnesium oxide that react with water and form cementations materials to seal cracks. The second technique uses shape-memory polymers made by Cardiff engineers. Shape-memory polymers can be triggered by heat or electricity to assume a

preprogrammed shape. The idea is that when a large, 1mm wide crack forms, a current that passes through the concrete would activate the shape-memory polymers to shrink and pull the concrete together for the healing agents to do their job.

The third component is a network of thin, hollow vessels throughout the concrete to replenish the healing materials once they run out

Nevertheless, the researchers are optimistic and believe that a market for self-healing concrete exists. The aim is to combine all three techniques into one product after getting results from the trial.

At last we found that no limitations or no borders to concrete applications

So we look forward to more market-leading designs and construction successes in the future in all Arab Region (not in GCC countries only), together with all the people who make us great. AUCBM remains a great place to innovate and to make a difference and to break new ground.

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# ADAPTIVE CONTROL STRATEGIES FOR INTELLIGENT HIGH-PRECISION DOSING AND WEIGHING SYSTEMS

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The accurate and efficient dosing of bulk materials is a crucial element of all feeding and blending plants in cement manufacturing processes. Di Matteo introduced in 2010 the innovative and award-winning ODM-WeighTUBE® as a novel concept for the accurate and efficient dosing of alternative fuels and other bulk materials. Parallel to the new tubular weighing system, a new modular and open control system architecture was introduced: ODM-GravitAS, which was implemented since then for all dosing systems from Di Matteo. This article provides an overview about the most prominent features of the ODM-GravitAS control philosophy based on its usage with the ODM-WeighTUBE® dosing device.

## 1. Introduction

During the last decades Di Matteo gained intense experience with the successful implementation of material handling solutions of alternative fuels, such as tire chips, animal meal or residue derived fuels (RDF), within the cement and power industry all over the world. One of the fundamental challenges faced during this period was and still is, the immense variety of the material properties (e.g. relative density, granularity, humidity, etc.) which needs to be covered by all machineries delivered within a complete alternative fuel dosing plant. Especially the integration of reliable and accurate gravimetric dosing systems into conveying lines for alternative fuels, needs to address the issue of time-varying material prosperities carefully. In this context, several different technologies for the metering of bulk material, such as belt weigh feeders or differential dosing units, have been applied in the past. The decision for a particular dosing technology depends mainly on the individual specifications of the bulk material and the corresponding process requirements. It is actually common sense that different types of dosing systems require the implementation of particular control platforms, which are often proprietary and closed in a sense, that they can only be considered as “black-boxes” for the automation and service personnel. From past experiences with installations for a great variety of applications, it is obvious that the staff of the service and automation departments in the plant require a full understanding of all components of a control system, both hard- and software, in order to guarantee a fast and competent reaction in case of possible malfunctions of the dosing device.

Nevertheless, in most cases different types of dosing systems require the implementation of particular control system architectures, which follow often a closed proprietary system design philosophy. As is common practice, there are numerous different metering and dosing controllers and their corresponding electrical equipment (load cell couplers, HMI, etc.) in operation within a single cement plant. Thus, it can



be concluded that such a scenario leads to a situation, where the plant has to deal with the unavoidable drawbacks of closed control system architectures, such as a high demand of specialized product trainings for the service technicians, the necessity of holding spare parts for different controller types and possible problems with system incompatibilities.

During the development process of Di Matteo's novel and award winning tubular weigh feeder, the ODM-WeighTUBE®, it was obvious, even during the design phase, that the corresponding control philosophy need to be more customer orientated than the usual proprietary "black-box" approaches of common dosing controllers. For this reason the automation specialists at Di Matteo developed a full modular hardware and software concept for the realisation of gravimetric dosing controllers, the ODM-GravitAS control system. This concept implements a modular hardware approach, which is only based on off-the-shelf products from widely accepted vendors of automation products. Furthermore the software implementation is based on common open standards for PLC languages, such as IEC 61131-3, or quasi-industrial PLC standard language sets (e.g. STEP7 from Siemens).

ODM-GravitAS was initially developed for its usage with the revolutionary ODM-WeighTUBE® (see also [1]) gravimetric tubular feeding system, but since then extended for the application with all other dosing and metering devices from Di Matteo (e.g. the ODM-GraviSCALE belt weigher). As shown in Figure 1, the GravitAS system is nowadays available for different kinds of dosing and feeding machines, such that one dosing control philosophy fits all possible applications and plant setups. By this, some of the typical drawbacks of the actual commonly used closed control architectures can be compensated, which provides an enormous potential regarding cost efficiency during maintenance cycles and general operation of the dosing devices.



Figure 1- GravitAS control system for different dosing and feeding machines

This article provides an overview of the modular hard- and software concept of ODM-GravitAS, where especially the usage with the ODM-WeighTUBE® is covered. In section 2 the typical requirements of modern bulk dosing systems are introduced. Section 3 provides an overview of the mechanical platform and introduces the main algorithmic entities of the GravitAS system. Since the WeighTUBE® dosing system was



initially developed for the accurate dosing of alternative fuels within the cement industry, the corresponding control algorithm contains certain routines which provide the possibility that the control system tunes itself to varying material properties. This adaptive controller, which is based on automatic online calibration, is described in section 4. The open and modular architecture of the controller is introduced in section 5. Finally section 6 concludes the whole article.

## 2. Typical Requirements of Bulk Material Dosing Devices

The base for a classification of different dosing and proportioning devices for bulk materials is a prior definition of the associated requirements and the expected performance measures. For this it is common sense to concentrate on the following three basic characteristics:

- i. Accuracy
  - ➔ The accuracy of a dosing or weighing system is the degree of closeness of measurements of a quantity (e.g. massflow) to that quantity's true value (see [2]).
- ii. Stability
  - ➔ The stability of a bulk material dosing unit is typically defined as a time interval in which the accuracy definitions associated to the system can be guaranteed without any manual intervention.
- iii. Availability
  - ➔ The availability of a dosing unit can be defined as the typical ratio between the time where the system is operatable and the total working time in a defined period of time (see [3]).

All three properties of a dosing system shall be defined within the following subsections in order to provide a clear understanding of the importance of each requirement.

### 3.1 Accuracy, Precision and Trueness

The one major aspect which seems to be completely obvious, if associated to a bulk material dosing system, is the definition of the term accuracy. In most cases the term is simply understood to be definable by consideration of the true value of the measured entity (e.g. massflow)  $x_r$  and the corresponding measured value  $x_m$ . Therefore in most cases a relative error according to the following definition is used for a performance measurement of a dosing system.

$$e_r = \frac{x_m - x_r}{x_r} \quad [\%] \quad (1)$$

However this simple relation neglects the more profound meaning of the accuracy term according to the DIN ISO 5725 guideline [4], where the accuracy of a measurement system is defined as a combination of its *precision* and *trueness*.

Both terms can be easily explained by imagining the typical normal Gaussian distribution curve for a series of measurements. If it is assumed that a specific physical value (e.g. the massflow of a bulk material [kg/h]) has a true value  $\dot{M}_r$ , and a weighing or dosing system acquires a set of measurements of this specific value



$\dot{M}_m$ , then the measured values will follow according to probability theory a normal Gaussian distribution with a specific mean value  $\mu$  and standard deviation  $\sigma$ . The distribution, as defined by Equation (II), leads to the definition of a bell shaped curve, as shown in Figure 2.

$$f(\dot{M}_m|\mu, \sigma) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(\dot{M}_m - \mu)^2}{2\sigma^2}} \quad (II)$$

Here the mean value  $\mu$  defines the position of the bell shaped curve on the x-axis, while the standard deviation  $\sigma$  defines its shape.

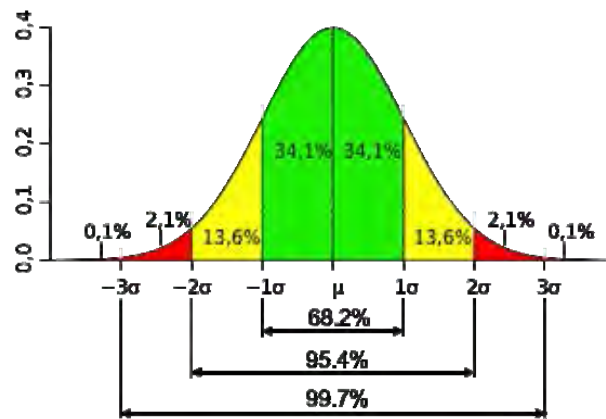


Figure 2- Normal Gaussian distribution of a measured value with a mean value  $\mu$  and a standard deviation  $\sigma$

From a statistical point of view, 68% of all the values are within the standard deviation of the mean, 95% are within two standard deviations from the mean and 99.7% are defined to be in an interval around three standard deviations from the mean.

By taking this into consideration, it is now possible to define the terms accuracy, precision and trueness in a quite straightforward way, by conducting a thought experiment. Here we consider a setup, where three people will throw darts on a typical target. Each thrower has three darts and shall aim to hit the middle of the target, the bulls eye, with all of his trials. Figure 3 - (a) shows the results for all three participants in different colours. Within this thought experiment each thrower represents a weighing or dosing system, the bulls eye would be the true value of the entity of interest (massflow)  $\dot{M}_r$ , and each dart would be one measured value as presented by the dosing system  $\dot{M}_m$ .

As it can be seen, the thrower with the red darts (bottom right target) was not able to hit the bulls eye even once. So, if somebody should provide an evaluation of this dosing system, it could be said that the trueness of the measured values are quite poor, since all values are in a considerable distance to the middle of the target. However, it needs to be also concluded, that all darts (measurements) are positioned in a quite distinct area on the target, so the precision of that system could be defined to be quite good, because it is able to deliver almost the same value for each time it measures. If these observations are transferred to the Gaussian distribution, from a statistical point of view the red dosing system would deliver measurements where the mean value is considerable different from the real value, but its standard deviation is small. This is visualised by the red bell curve in Figure 3 - (b).

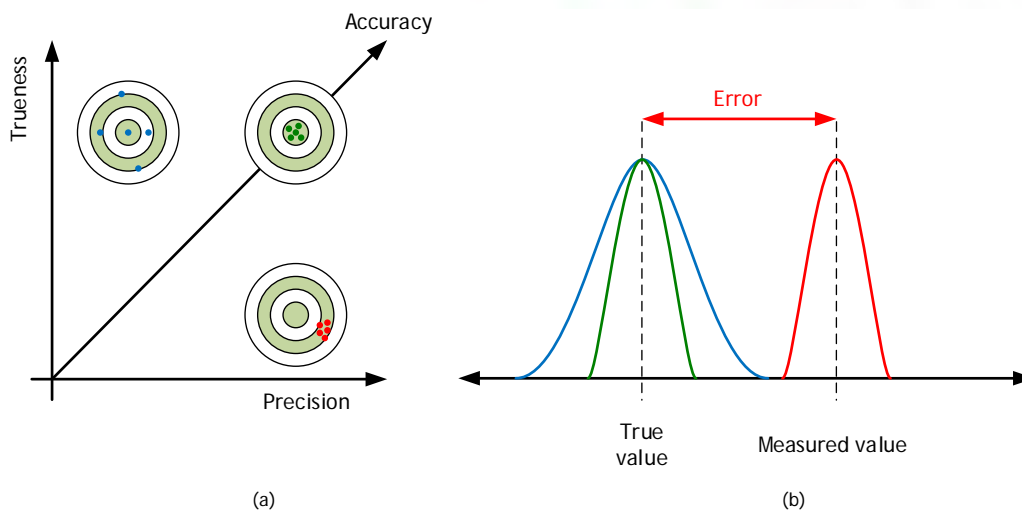


Figure 3- Definition of accuracy, precision and trueness of a dosing system

This contrasts the participant with the blue darts, who was able to place all its hits somehow around the centre of the target and even hits it once directly, however his precision lacks the one of the red thrower, since every single throw hits the target on a completely different spot. Such a dosing system would have a better trueness, but in total its overall performance is at least as unsatisfying as the former one, since his precision is really poor.

Thus, it is now obvious that if an accurate dosing system is needed, it would be necessary to guarantee both, trueness and precision, at the same time, as represented in the thought experiment by the participant with the green darts.

### 3.2 Stability and Time invariance

In practical application, even the most accurate dosing system would be worthless if its performance would not be stable over a long period of time. Since all system within the cement industry tend to be used on a 24/7 basis, one major aspect for the evaluation of a dosing system would be that the accuracy definitions of the system are actually stable over time. Technically this means, that the system shall have a time invariant behaviour according to the measurements provided. One of the typical problems of classical metering systems, such as belt weigh feeders, is their tendency to contain a non-negligible drifting behaviour, which leads automatically to the necessity of a weekly or monthly offline recalibration in order to guarantee that the error boundaries are not touched. However, such a manual calibration is time consuming and therefore costly, since it reduces the availability of the dosing device, as described in the next section.

### 3.3 Availability

Even the best technical system would be worthless if it cannot be operated in a reliable way. Therefore the term availability is extremely important to be considered for the selection of dosing equipment.



In order to provide a clear understanding of measuring the utilisation rate of a technical installation, it is useful to introduce some standard definitions of the most important terms:

The availability of a technical system is often measured by using the definitions of the VDI 3423 as released by the Association of German Engineers (VDI), where the availability of a technical system is defined as shown in the following relation:

$$\text{Availability} = \frac{\text{Total working hours of evaluation period} - \text{Down time in evaluation period}}{\text{Total working hours of evaluation period}} \quad (\text{III})$$

However, since this definition is a quite difficult measure for practical considerations, in most cases the definition presented e.g. in [5] is more useful, since it describes the availability as a function of the mean-time-between-failures (MTBF) and the mean-time-to-repair (MTTR). The exact definition of the inherent availability  $A_i$  can be defined as

$$A_i = \frac{MTBF}{MTBF + MTTR} \quad [\%] \quad (\text{IV})$$

In this context it should be mentioned, that the given definition is used for complex technical systems, where the availability cannot be defined based on a single component. For single components a definition based on the mean-time-to-failure (MTTF) is a more common representation.

This measure does not contain down times due to administrative, logistic or preventive maintenance reasons and is therefore a good measure to evaluate the overall systems reliability. So it can be concluded that the availability can be increased by either increasing the MTBF or decreasing the MTTR. While the MTBF depends mainly on adequate engineering decisions (e.g. usage of wear resistant materials or using of high quality technical entities) and reasonable pre-active service actions, the MTTR value is influenced by more complex factors, such as the training of the service personnel, the accessibility of the different system components or the usability of the software components. So at this point the main requirements for the implementation of an accurate, stable and available dosing systems are set. Subsequently the novel ODM-WeighTUBE® is instructed as a prominent example for a gravimetric dosing device.

## 2. ODM-WeighTUBE - An innovative tubular weigh feeder

The initial base for the development of the ODM-GravitAS control system was the introduction of the innovative ODM-WeighTUBE® platform in 2010. Even if the first installations of the novel dosing system were mainly focused on plants for problematic bulk material, such as residue derived fuels (RDF), shredded tires or polyethylene granulate material, actually about 50 units of the ODM-WeighTUBE® are successfully integrated around the world and have been also used for more conventional bulk materials, such as raw meal, fly ash, iron core or clinker. This can be interpreted as a great success, especially for a relatively conservative industrial branch, such as the cement industry.

Figure 4 provides an overview of the ODM-WeighTUBE® RWS series, in the German production facility of Di Matteo. Up to know, there are three different models of the WeighTUBE® available (RWS 500, RWS 400, RWS 250) depending on the type of bulk material and the intended dosing range.



Figure 4- ODM-WeighTUBE® RWS series

A key for success is the innovative mechanical concept based on a single shafted complex screw feeder which is used for both, the actual dosing from a feed buffer hopper and the metering of the actual mass flow. Figure 5 illustrates the closed mechanical design of the weigh feeder and its main elements.

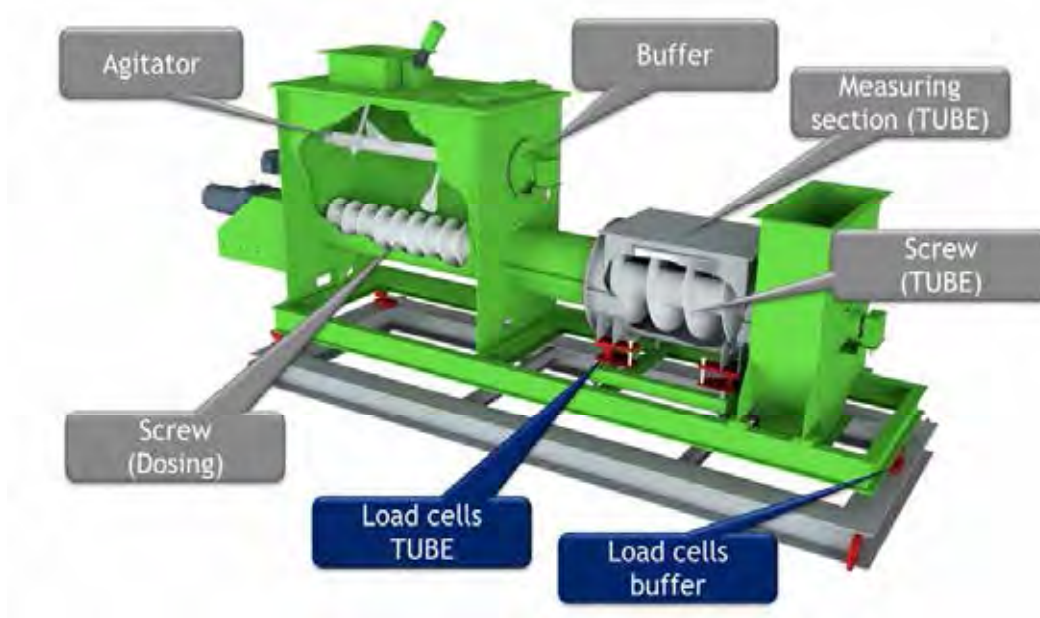


Figure 5- Design of the tubular ODM-WeighTUBE® RWS

The feed hopper acts as a material buffer during normal dosing operation. Due to the special requirements of problematic bulk materials (e.g. alternative fuels), the hopper can be equipped with an agitator and the buffer geometry is well suited in order to avoid impermissible compaction of compressible material, such as fluff. During the normal state of operation, the amount of material within the feed hopper is continuously acquired by a set of three strain gauge-based load cells (shown in blue in Figure 5). This weight is used within the GravitAS control system for two main functions: (i) the continuously control of the speed of all





pre-feeding units in order to achieve a constant buffer fill level and (ii) the adaptive online calibration routine. The continuous fill level controller for the feed hopper is an elementary component for a stable dosing behaviour, because it guarantees a homogeneous discharging behaviour and a uniform loading of the screw. For this reason the GravitAS control system calculates continuously speed setpoints for the pre-feeding units based on the acquired feed hopper weight.

During the dosing and metering process, the screw is continuously discharging material from the feed hopper and through the dosing section, which is located between the buffer and the actual metering section. The tubular metering section, from where the name WeighTUBE<sup>®</sup> is derived, is the actual weigh feeder, since it is mounted on a set of load cells (indicated as red boxes in Figure 5) which are used for the continuous high-precise acquisition of the total material weight within this section. Noteworthy, the metering section is designed in such a way, that its cross sectional area is bigger than that of the dosing section, in order to prevent tramp material from jamming between the metering section and the shaft of the screw conveyor. This is important for maximum precision and accuracy of the dosing operation, because it needs to be guaranteed that all material within the tube is acquired correctly. For this reason, the metering section is also completely decoupled from the outlet and dosing section by means of expansion joints.

The innovative mechanical design provides a maximum insensitivity against harmful impurities and allows easy maintenance within compact dimensions (see also [6]).

### 3. ODM-GravitAS - Adaptability as a key for precise dosing

Besides the innovative mechanical concept of the ODM-WeighTUBE<sup>®</sup> RWS series, ODM developed a novel concept which is able to compensate typical practical problems which are accompanied with RDF dosing, such as limited flowability or varying material properties (i. e. bulk density and humidity). Besides that, it was obvious that many existing weigh feeders on the market are distributed with a proprietary controller architecture and hardware, which typically limits the degrees of freedom for the integration of a weigh feeder within an existing automation system.

Thus the development of the ODM-GravitAS control system for ODM-WeighTUBE<sup>®</sup> was driven by the aim to provide a highly accurate and robust dosing controller which can be implemented in an open and highly modularized electrical automation platform. A scheme, which shows the relation between the mechanical platform of the ODM-WeighTUBE<sup>®</sup> and the ODM-GravitAS control system, is visualized in Figure 6.

The continuous dosing controller of the GravitAS control system is responsible for the screw speed adaption based on the actual tube weight. Here, an inverse relationship between measured weight and actual screw speed leads to a continuous, stable and constant massflow. The controller itself is based on a classical discrete PID-control structure, but contains certain interfaces to an additional online calibration routine, which is responsible for a continuous auto-tuning of the controller parameters.

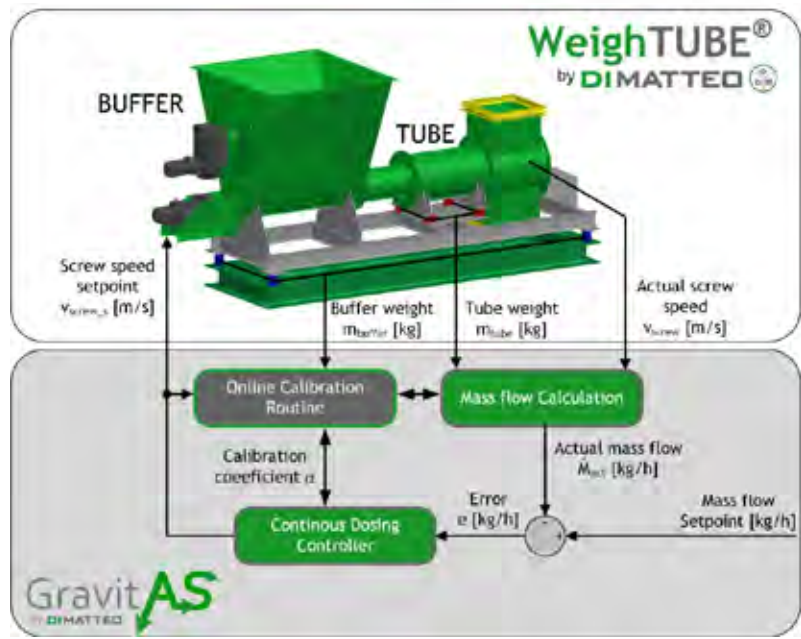


Figure 6- ODM-WeighTUBE and GravitAS control system

The controller parameters can be set during the commissioning of the system in order to meet the desired process behaviour defined by the specialists in the plant, where e.g. a highly dynamic variation of the throughput without any overshooting behaviour can be achieved, as shown in Figure 7.

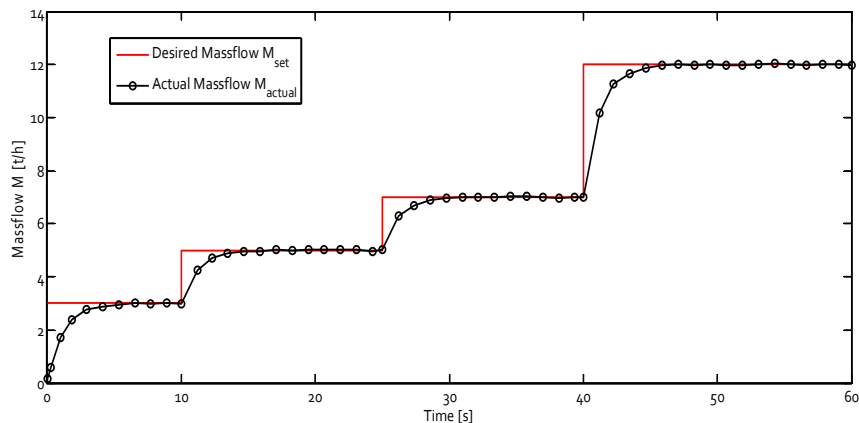


Figure 7- Controller behaviour for a variation of the desired throughput: highly dynamic variation without overshooting

An implemented process observer calculates from actual process entities the current massflow indication, which is then the base for a readjustment of screw speed.

As it was already stated above, all existing dosing methodologies are suffering immensely from the time-variant material properties of alternative fuels. This leads in practical applications to a non-negligible drift in the dosing accuracy over time. So, classical weigh feeders, such as belt weigh feeders, need to be



recalibrated on a regular basis (e.g. once a month) in order to guarantee a long-term stability of the feeding process. This re-calibration needs to be done manually by service technicians in a time-consuming process, during that the machine has to remain offline.

In comparison to that, the ODM-GravitAS control system implements an automatic calibration routine, which provides the possibility to estimate properties of the dosed bulk material and automatically adapt the controller parameters in such a way that the dosing accuracy remains stable over time. The actual process operation is not influenced by the execution of the automatic calibration routine, so that the available machine time can be increased.

During the automatic calibration routine, the intermediate buffer hopper of the ODM-WeightTUBE is filled to a certain maximum in a first stage of operation. Within the second phase, the buffer hopper is emptied by normal dosing operation (and parallel stopped feed of material to the buffer) up to a predefined minimum buffer weight. From the resulting difference in mass ( $\Delta m$ ) and the corresponding expired time ( $\Delta t$ ), the actual control parameters of the continuous dosing controller are automatically adapted. To avoid possible undesired influences, all controller parameters are checked for plausibility based on a probabilistic analysis of former calibration cycles, before they become active in the system. A typical calibration process, with its three phases, is shown in the following figure, where the actual buffer weight  $m_{\text{plant}}$  [kg] is visualised over time. The decreasing buffer weight in phase II of the calibration process follows an almost exact linear pattern, which can be interpreted as a manifestation of the highly constant material throughput of the device. A possible deviation between the actual and the desired massflow during this phase is evaluated for the probabilistic adaption of the controller parameter.

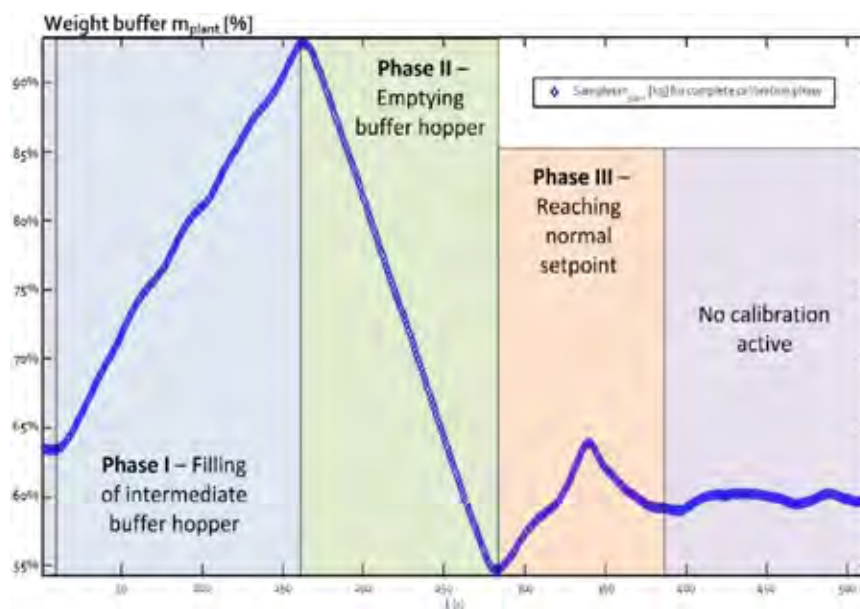


Figure 8- Three phases of a calibration routine

The possibility for a continuous on-the-fly auto-tuning of the controller depending on the given material properties is a very important element for long-time stability and accuracy of the gravimetric dosing. In particular, if the decreasing quality of alternative fuels derived from industrial waste (see [7]) is taken into account. By the combination of the ODM-WeighTUBE® platform with the GravitAS control system a high dosing precision of  $\pm 1\%$  related to the nominal throughput can be guaranteed.

#### 4. Tailor-made open controller

The GravitAS control system follows a highly modularized and open concept, which allows integrators and users of the ODM-WeighTUBE® to get exactly the system, they want to. Instead of using a closed and proprietary system setup, all electrical components can be chosen based on the standards and needs of each individual plant. Figure 9 gives an overview of the different modules of the GravitAS control system (four mandatory modules (green) and two optional elements (gray)).

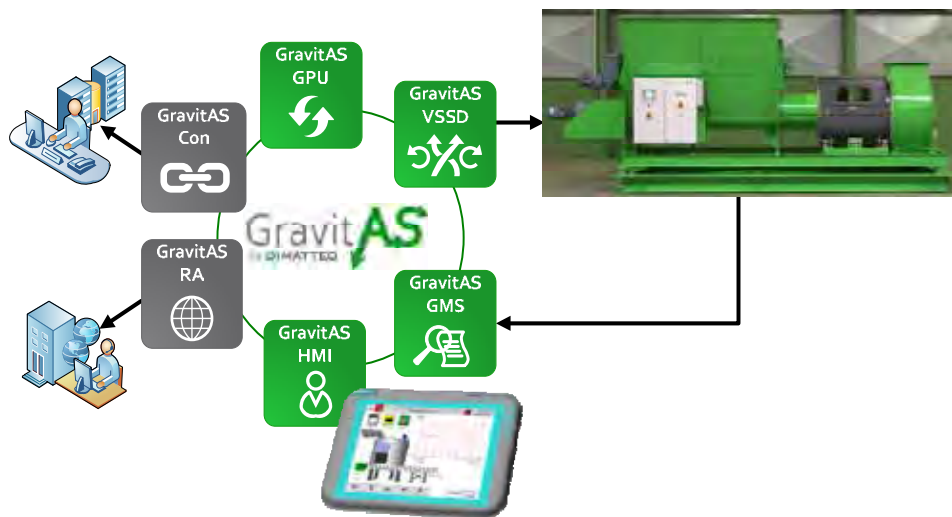


Figure 9- Modularized structure of ODM-GravitAS contains mandatory modules (green) and optional elements (gray)

The main element is the GravitAS GPU, which is the central processing unit and implements all program routines of the used control algorithm. ODM provides a great variety of standard PLC systems, which can be chosen as the main platform (Siemens S7®, Schneider Modicon®, Allen-Bradley Logix®, Beckhoff TwinCAT® etc.). By this, the integration within the plant's automation structure is very easy and cost effective and later maintenance and troubleshooting can be done by personnel of the plant without any additional expensive trainings and or the necessity of purchasing new software. In the same way, the manufacturer and the type of the screws frequency converter (as an element of GravitAS VSSD) can be chosen freely. The other mandatory elements contain the weighing units (GravitAS GMS) and a touch panel based human-machine interface (GravitAS HMI). Since standard components are also used for the HMI (e.g. touch panels from Siemens or Allen-Bradley) it is easily possible to integrate customised screens based on the operators needs.





As optional modules, the GravitAS CON contains all necessary elements for a field bus driven signal exchange (e.g. Profibus, EtherCAT, DeviceNet, etc.), while GravitAS RA allows a GSM or Ethernet based remote access and maintenance. All these elements are combined within an electrical cabinet, which is tailor-made for every new customer.

The complete system (ODM-WeighTUBE® and GravitAS control cabinet) is fully assembled, tested and undergone a quality control procedure, before the different components are delivered to the site of their later operation.

## 5. Conclusion

The ODM-GravitAS full modular and open control philosophy allows the implementation of tailor-made control systems which are able to cover all requirements of each individual plant. The hard- and software concept was designed in order to be implemented with different dosing and/or metering devices, such as the ODM-WeighTUBE® tubular dosing unit, the ODM-GraviSCALE belt weigh feeder or even differential dosing systems. Thus, there is the possibility to implement a single architecture for all gravimetric feeders, where the algorithms are implemented by using standardised PLC programming languages, such as Siemens STEP7 or IEC61131-3. It is also possible to combine the necessary algorithms for controlling more than one dosing unit into a single PLC, or even within an existing PLC system. This guarantees a cost-efficient daily operation of the equipment and minimised machine down-times, e.g. during maintenance phases. Furthermore it is also possible to use a common buffer for more than one dosing lines. This ODM-MultiTUBE arrangement is shown in the following figure (Fig. 10), where two dosing systems are installed below a shared buffer. The continuous discharge from the buffer is guaranteed by means of the ODM-RotoEX system.



Figure 10- ODM-MultiTUBE arrangement: (a) shared buffer and two dosing lines; (b) ODM-RotoEX silo extraction system

Furthermore, the implementation of the ODM-GravitAS system for the novel ODM-WeighTUBE® RWS series includes the innovative probabilistic on-the-fly online calibration algorithm, which provides the possibility for a long-time accurate and stable dosing of bulk material. The novel concept of the adaptive gravimetric controller has shown that it is able to outperform classical dosing methodologies, in particular for problematic bulk materials with time-variant material properties, such as all solid alternative fuels (e.g. RDF, SRF, municipal waste, biomass, animal meals or dried sludge). More recently the system design was also successfully implemented for the dosing of bulk material with more stable characteristics, such as iron core, slag, cement, etc. within the cement industry. DI MATTEO is also offering a specific service, where potential clients can test their own bulk material within the ODM's testing facility, as shown in Figure 11, in order to guarantee during an early project stage, that the chosen dosing technology (e.g. ODM-WeighTUBE® or ODM-GraviSCALE) delivers the optimum accuracy and robustness.



Figure 11- Testing facility for the experimental evaluation of bulk material dosing

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# The importance of sample preparation for a reliable quantification of clinker

By: Dr.Thomas Witzke & Dr.Thomas Fuellmann , Malvern Panalytical , The Netherlands

## 1. Introduction

A good and reproducible sample preparation is one of the most important requirements for a reliable quantification of clinker and cement samples, using X-ray diffraction data by the Rietveld method. It is well-known, that the sample preparation has a strong influence on quantification results, but studies on clinker and cement are poorly available. Especially weak minerals like gypsum or calcite can be easily destroyed during grinding and a quantification is impossible then. Hard materials like clinker also may undergo strong changes in phase content during sample preparation with widely used industrial mill and press machines. As clinker is regarded as a hard, resistant material, the changes in the material during preparation are often underestimated. This holds especially to the free lime content in the clinker.

Generally, any sample preparation changes the material. Milling change the particle size and crystallite size and can produce amorphous material. Pressing changes the orientation of particles/crystallites at the sample surface and lead to preferred orientation effects. The addition of a binder (wax or cellulose) dilute the material, change the behavior during milling, and can produce additional peaks in the powder diffraction pattern. Errors during sample preparation cannot be corrected by a perfect analysis.

## 2. Experimental program

For the study, an industrial clinker sample with 1.74 % free lime (determined by wet chemical analysis) was used. Sample preparation was done using a Herzog milling/pressing machine at different speeds (disk mill with 750, 900, 1100, and 1500 rpm) and different milling times (30, 60, and 90 sec). All samples were measured using a CubiX3 diffractometer, with Copper

radiation and X'Celerator line detector. Each sample was prepared three times. For the determination of the amorphous content an internal standard (rutile,  $\text{TiO}_2$ ) was used.

The quantification of the clinker samples as well as the determination of the peak intensities, peak areas and average crystallite size was done using the programs HighScore Plus and RoboRiet.

## 3. Milling conditions and scan quality

The milling conditions are directly related to the scan quality. With harder milling conditions, i.e. higher rpm and/or longer milling time, the scan quality decreases significantly. A loss of the intensity and a broadening of the peaks can be observed. In some areas in the scan the background is increased. Peaks from minor minerals cannot be discriminated from the background noise anymore. This is a result of a decrease in the average crystallite size and the formation of amorphous material during milling. It is obvious, that a reduced scan quality reduces also the accuracy of the quantification (Figure 1). Because of this it is necessary to optimize the sample preparation conditions to achieve a reliable quantification result. To find the right conditions it is especially important if the same sample should be used both for X-ray fluorescence and X-ray diffraction analyses. For XRD analysis the ideal average particle size is in the range of 10 – 50  $\mu\text{m}$ . For larger particles, usually too high or too low intensities for certain peaks are observed, resulting from particle statistics effects. Too small particles (crystallites) gave broad peaks or are even X-ray amorphous. For XRF the particle size should be very small (can be below 10  $\mu\text{m}$ ), and the formation of amorphous material has no negative influence on the analysis.

#### 4. Quantification results

The changes in peak intensity, area and shape are reflected by the Rietveld quantification results. In routine Rietveld analyses of clinker in cement plants, only the crystalline part of the material is analyzed. The formation of amorphous material during sample during sample preparation is not visible in the results. An analysis of the amorphous part would require more efforts. If the sample preparation is optimized, the formation of amorphous material is usually negligible.

If the milling conditions are too hard, significant changes in the quantity of the crystalline phases up to several wt.% (Table 1) can be observed, even if the amorphous part is not considered. In Table 1 for some phases a decrease and for other phases an increase can be observed. These are relative changes resulting from the fact that the amorphous part is not measured.

Especially affected by the sample preparation are alite and free lime (Fig. 2 and 4), and to a lesser extent also aluminat. A certain amount of these phases is destroyed, the crystallite size is now too small for diffraction (below ca. 5 nm) or the material is amorphous. For simplification, the term “amorphous” is used in this paper in a sense including material with crystallite size too small for diffraction. When only the crystalline compounds are determined, the more resistant phases like belite and ferrite show a relative increase of the amount in the clinker (Fig. 3).

Alite forms usually larger, more elongated crystals in the clinker, is relatively hard, but brittle and shows a good cleavage. Additionally, alite contains micro-cracks developed during cooling [1]. Because of these properties the alite is strongly affected if the milling conditions are too hard. Belite usually forms rounded crystals, is also relatively hard, but has a higher elasticity than alite, shows no cleavage and is more resistant to milling. Ferrite is also relatively resistant to the milling because it forms small isometric crystals, is as hard as alite and belite and shows no cleavage. Free lime is the weakest phase in the clinker and is strongly affected by the milling conditions.

From Figures 2 – 4 can be seen, that the most critical parameter is the milling speed. The formation of amorphous material is mainly caused by a too high milling speed. The milling time is the second important parameter, but not as critical as the milling speed. If possible, the milling speed (rpm) should be optimized at first, to achieve a good sample preparation. The milling time should be as short as possible, to reduce preferred orientation effects on one side and avoid amorphization on the other side. If a sample should be used both for XRD and XRF, a compromise in sample preparation had to be found to give good results for both methods.

#### 5. Formation of amorphous material

The quantification of amorphous material in clinker is not done in routine Rietveld analysis. The amorphous content in the study presented here was determined using the internal standard method. As standard was used rutile (TiO<sub>2</sub>) powder. To avoid changes in the standard material itself, the clinker samples were milled with the Herzog MP without the standard, but not pressed. After milling, 20 % standard were mixed, the material carefully homogenized and the samples pressed with a hand press.

The amorphous content of four samples is shown in Table 2. For 750 rpm and 30 seconds milling, the amorphous content was below the detection limit, which is around 5 %. According to this result, the material can be regarded as representing the original clinker composition as close as possible. At 1500 rpm and 90 – 18 seconds milling the material has undergone dramatic changes. One third and more of the clinker is now amorphous and doesn't give diffraction peaks anymore.

The real changes in composition, including the formation of the amorphous material, is shown in Table 3. According to the amount of amorphous material and the results of the Rietveld quantification, every phase contributes to the formation of amorphous material, but in different amount. Whereas the standard Rietveld quantification shows for alite just a loss of around 5 % with hard milling condition, in reality a loss of more than 20 % can be observed. The main contribution to the



amorphous material in absolute numbers is clearly from the alite. Belite, that shows in the standard quantification a relative increase, lost in reality also a small amount from the original content. Obvious is also the reduction of the quantity of crystalline free lime. By relative percentage, free lime is most affected by the milling. 75 % of the free lime is lost and cannot be detected by X-ray diffraction anymore. This shows again the importance of the sample preparation for a reliable quantification result.

In a study on particle statistics [2] during grinding (but only with two different grinding steps) the same tendencies were observed with stronger treatment: decreasing alite and aluminate content and increasing belite content in the Rietveld quantifications. The amorphous content was not determined.

There is a general agreement, that clinker with high alite and low belite and small crystal sizes are easy to grind, whereas clinkers with low alite and high belite and large crystals are the most difficult to grind [3]. Other factors with an influence on the grindability are the presence of belite clusters, irregular belite morphology, crystallinity of C3A, porosity of the non-grounded clinker, interstitial phase morphology, and the presence of minor and trace elements in clinker phases [3] [4].

## 6. Conclusions

The sample preparation has an enormous influence on the quantification results of clinkers. The amount of the crystalline compounds can change up to several percent

(absolute) with increasing milling time and/or increasing milling speed. Furthermore, X-ray amorphous material is produced.

The various clinker phases are affected in a different way by the milling, depending on their hardness, cleavage and crystallite shape. Alite and free lime are more affected than other phases like belite or ferrite.

A relative decrease in the amount can be observed for alite, aluminate, and free lime, and a relative increase for belite and ferrite with increasing milling time and speed. After intense milling, the Rietveld quantification underestimates alite, aluminate, and free lime, and overestimates belite and ferrite up to several percent (absolute), if only the crystalline phases are quantified as done in the standard Rietveld refinements for clinker.

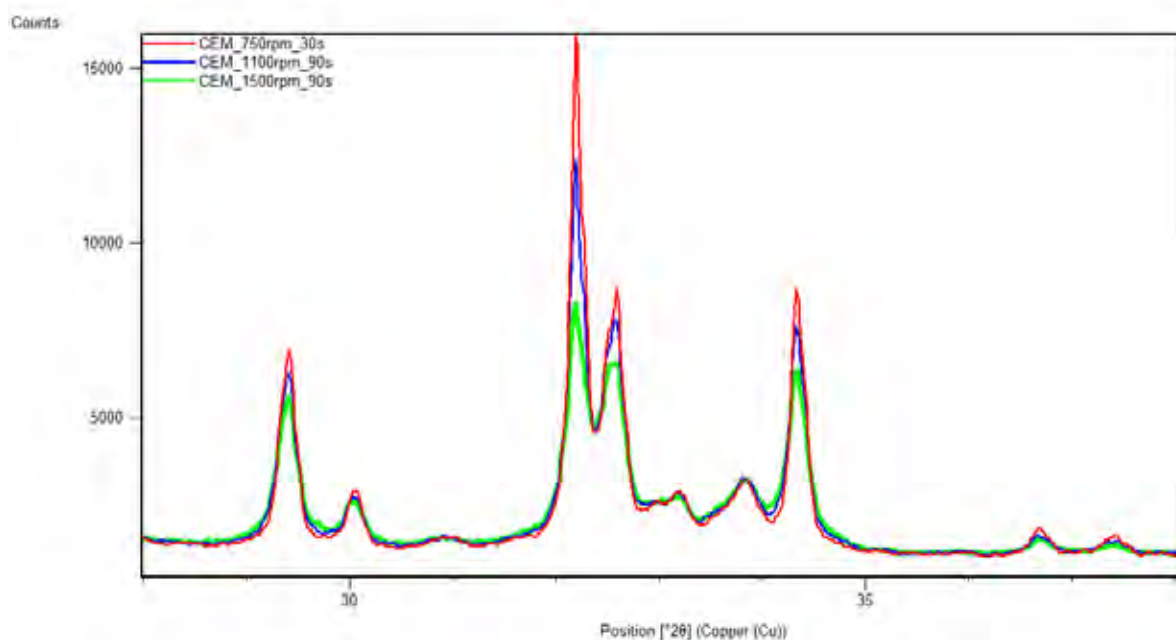
The main contribution to the formation amorphous material is the destruction of alite crystals, but also other minerals like aluminate, ferrite and free lime contribute to this. The amount of belite was only slightly reduced. After intense milling (1500 rpm, 90 sec.) more than 30 % of the sample is now X-ray amorphous.

For a reliable quantification, especially of minor phases in the clinker like the free lime, an optimization of the sample preparation is required. A correction of sample preparation effects in the Rietveld quantification is only possible to a certain degree.

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**Figure 1**

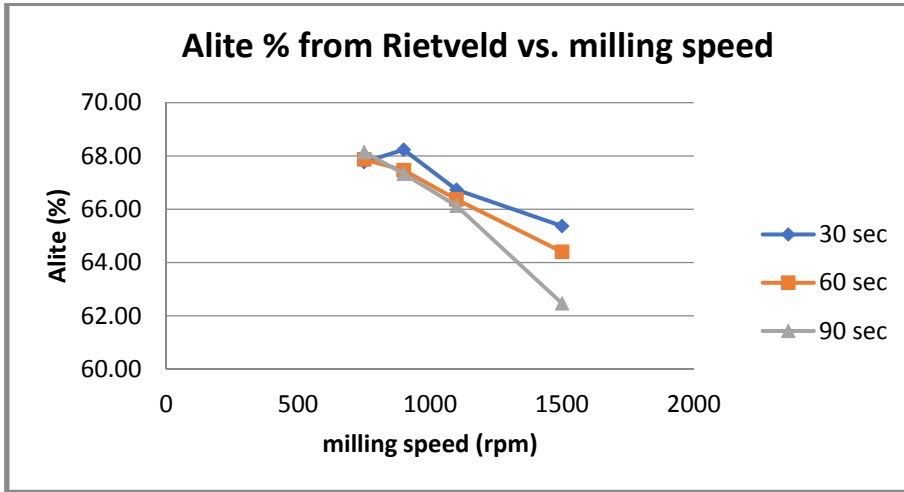


Fig. 2. Alite in wt.% in the clinker from Rietveld quantification, different milling speed and milling time

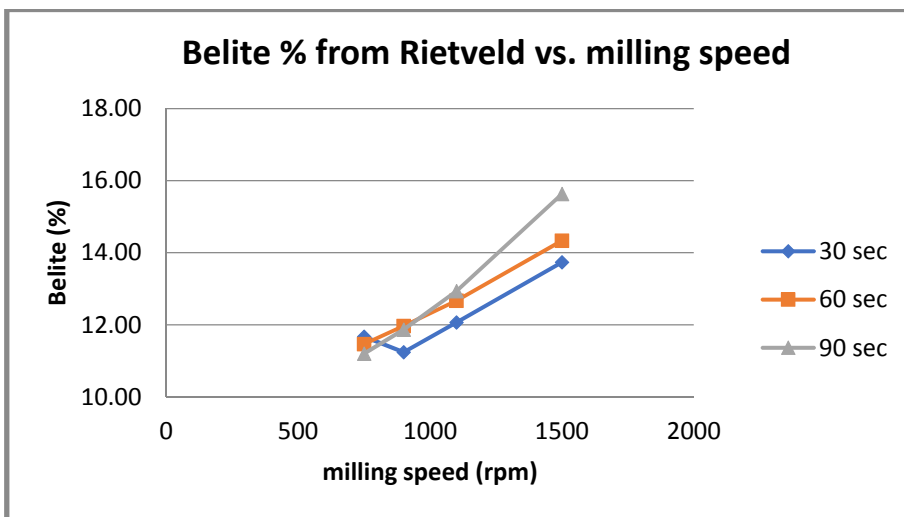


Fig. 3. Belite in wt.% in the clinker from Rietveld quantification, different milling speed and milling time

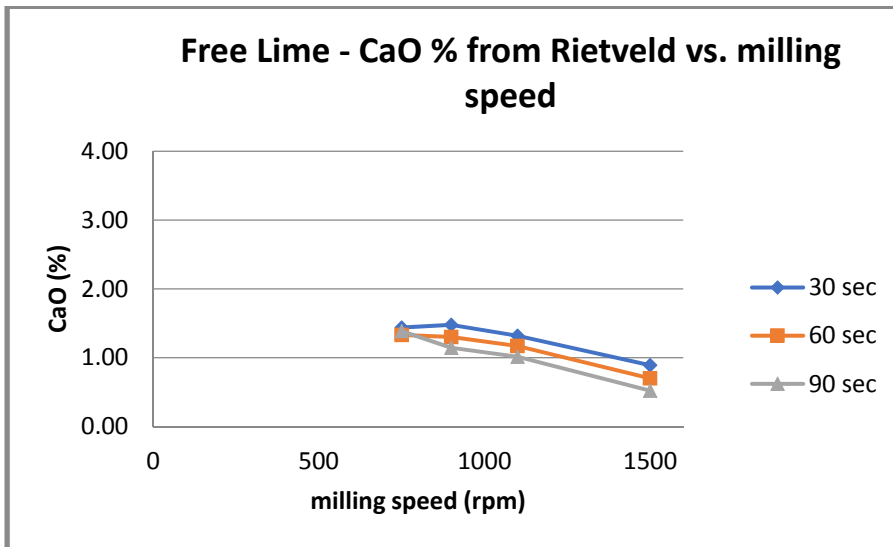


Fig. 4. Free Lime in wt.% in the clinker from Rietveld quantification, different milling speed and milling time

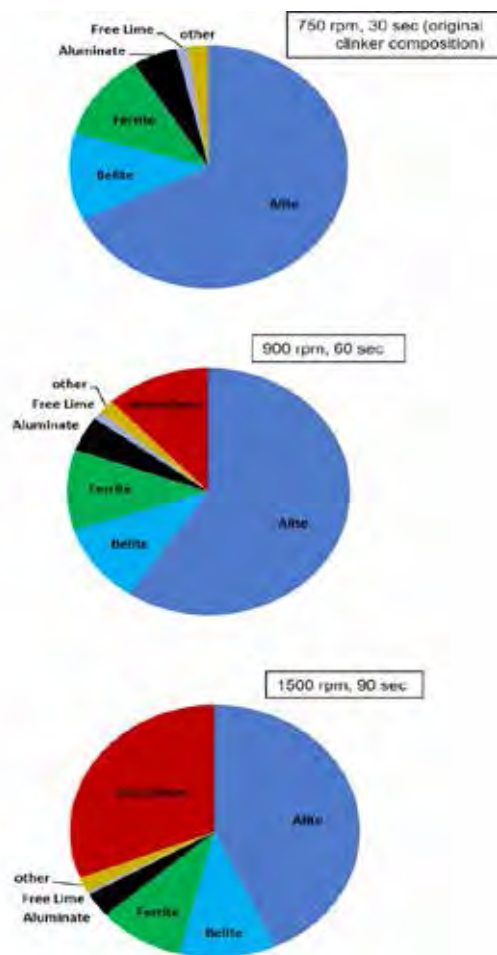


Fig. 5. Changes in the percentage of crystalline compounds and the formation of amorphous material during milling



Preparation	Alite (%)	Belite (%)	Aluminate (%)	Ferrite (%)	Free Lime (%)
750 rpm, 30 sec	67.77	11.67	5.23	11.63	1.44
750 rpm, 60 sec	67.87	11.47	5.17	11.80	1.33
50 rpm, 90 sec	68.18	11.20	5.30	11.65	1.39
900 rpm, 30 sec	68.23	11.24	5.26	11.41	1.48
900 rpm, 60 sec	67.47	11.97	5.17	11.97	1.30
900 rpm, 90 sec	67.33	11.87	5.13	12.10	1.14
1100 rpm, 30 sec	66.73	12.07	5.33	12.07	1.32
1100 rpm, 60 sec	66.37	12.67	5.20	12.57	1.17
1100 rpm, 90 sec	66.13	12.93	5.20	12.77	1.01
1500 rpm, 30 sec	65.37	13.73	4.83	12.87	0.89
1500 rpm, 60 sec	64.40	14.33	4.67	13.13	0.70
1500 rpm, 90 sec	62.47	15.63	4.60	14.00	0.52

Table 1. Results of the Rietveld quantification of the clinker samples after different sample preparation. Only crystalline compounds calculated, amorphous content not considered.

preparation	amorphous content (%)
750 rpm, 30 sec.	below detection limit (< ca. 5 %)
900 rpm, 60 sec.	12
1500 rpm, 90 sec.	31
1500 rpm, 180 sec.	39

Table 2. Amorphous content in the clinker after different sample preparations.

	Preparation 750 rpm, 30 sec	Preparation 1500 rpm, 90 sec (without amorphous)	Preparation 1500 rpm, 90 sec recalculated
Alite	67.77	62.47	43.10
Belite	11.67	15.63	10.78
aluminate	5.23	4.60	3.17
Ferrite	11.63	14.00	9.66
free lime	1.44	0.52	0.36
amorphous	below detection limit		31

Table 3. Amorphous content in the clinker after different sample preparations.

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# OPTIMISATION OF KILN BURNING OPERATIONS

Mark Mutter, JAMCEM Consulting

## Introduction

As a Consulting Company, JAMCEM visits many cement plants around the world and it has become clear that training and development of kiln operators is something that is very often informal, with little structure and thought as to the requirements of the kiln operator. In addition, many plants are run in manual as opposed to using the automated kiln control systems that are available in most modern cement plants.

It should be remembered that the role of the kiln operator is one of the most important on a cement plant due to the influence it has over the performance and profitability of a cement plant. They have the responsibility for the maximisation of clinker output, minimising the fuel consumption, producing the best quality of clinker possible, minimising the use of

the volatiles bypass if installed, extending the life of refractory and ensuring environmental compliance. And all of this in the busy atmosphere of the control room. Taking all this responsibility into consideration, cement plant operators should be investing in the development of the people that operate the most valuable assets on the plant.

## Challenges to the kiln operator role

We see that there are a number of issues in relation to kiln operations which can be split into three different categories – human resources, technical and operations as shown in the figure below:

### Human resources:

*Less people on plants including kiln burners*  
*Many experienced people have left*  
*No formalised training*  
*No “champion” for the control system for optimisation*

### Technical:

*Introduction of alternative fuels*  
*Lack of key instrumentation working*  
*No engineering drive to solve problems*  
*Lack of experience in solving process issues*  
*Incorrectly tuned process control systems*

### Operations:

*Too many “fingers in the pie”*  
*No clear kiln burning strategy*  
*Unclear messages to the operators*  
*Kiln burner position undervalued*



Whilst many of these issues are self-explanatory, there are several points which require further comment. In particular:

- Many plants that we visit do not use automated control since key instruments are not working – in particular gas analysers at the kiln back end or the calciner exit. Without these instruments, the control system will not work and therefore it is even more important that kiln operators receive training in kiln operations so that they can operate the plant themselves and understand the interactions of the different process control parameters.
- All of the Operations section of the diagram relate to the lack of an agreed kiln burning strategy. The kiln operator will be given different directions from different stakeholders in the plant – so for example the Plant Manager may be directing the operator to increase the use of alternative fuels, the Production Manager giving orders to maximise the throughput, the Quality Manager to reduce free lime and the Environment Manager to reduce emissions. How is the kiln operator supposed to deliver on all of these demands from different parties, when many of the demands cannot be achieved together?

Taking all these challenges into account, JAMCEM has joined together with CKS Simulator to provide a package of training and development for cement producers to both develop the operators and the plant operational strategy.

**The JAMCEM and CKS Package**

The package that has been developed aims to develop the kiln operators – but at the same time brings together the other departments that have a stake in the operation of the pyro-processing system. Therefore, the training starts with cement technology training sessions with the operators and representatives of the Production, Quality, Maintenance and Environmental Departments. This training is tailored to the plant and covers the process from quarry through to clinker production. Whilst the training has some elements classroom training, one of the main objectives is an open and interactive discussion between all the different stakeholders to develop the **Kiln Operational Strategy**.

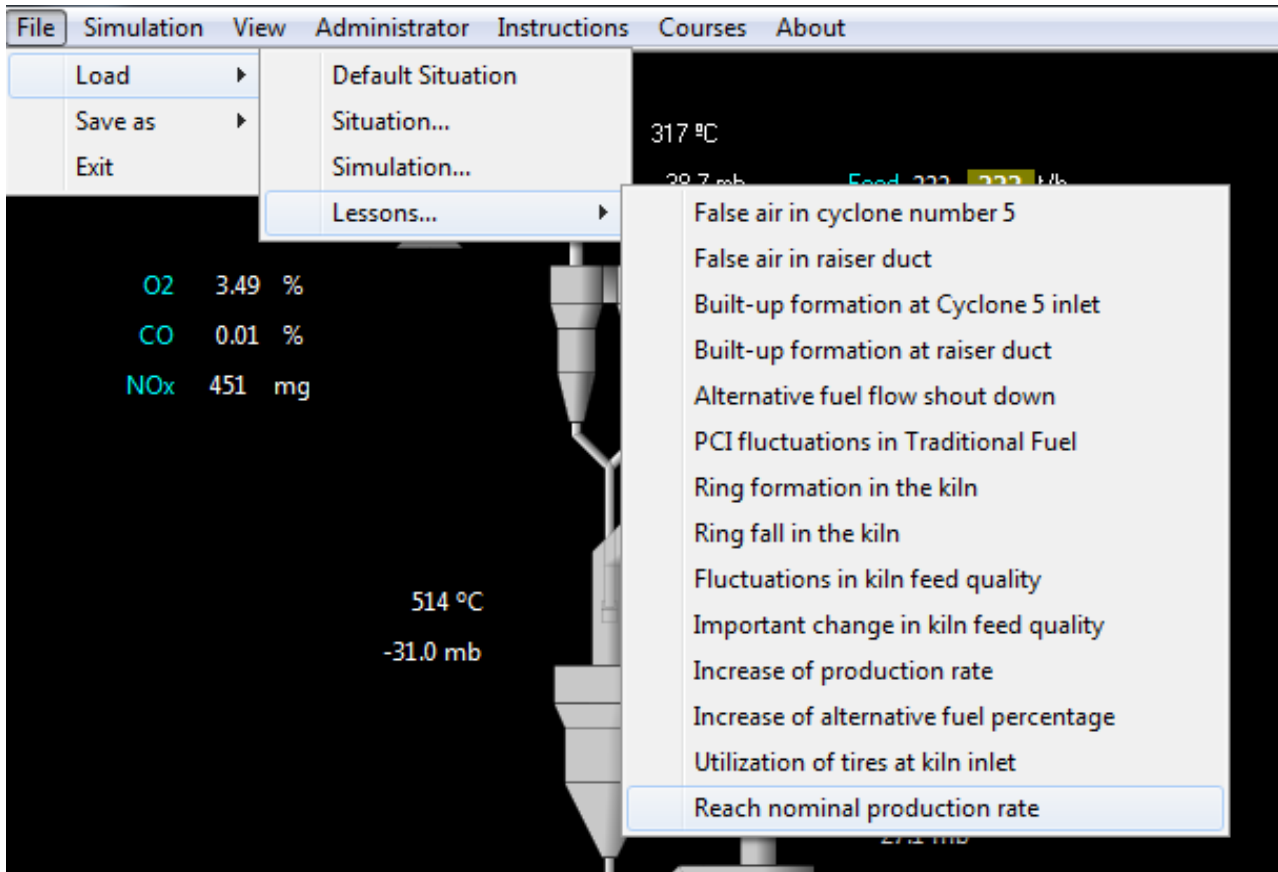
The Kiln Operational Strategy is an agreed manner of operating the pyro-processing system which is clear to the operators as well as meeting the needs of all the stakeholders; this should then be applied in the day to day operation of the plant and will allow the operators to get on with their job without interruption from different parties.

**The Simulator**

Prior to the training starting, the customer will provide CKS with the basic information relating to the plant so that the tailored simulator can be built and supplied to the plant. Any dry process system can be modelled and any configuration of calciner such as ILC, SLC, RSP can be incorporated. The simulator also takes into consideration the raw materials type, the fuel type used, the quality targets, the effect of volatiles in the system and the environmental emissions from the plant.



Example of a 5 stage, twin string calciner simulator



Predefined lessons in the simulator menu

JAMCEM and CKS will always train a person at the plant in how to use the simulator and at the same time will provide the kiln operators on the course with training in relation to the process control loops that are used in kiln operations. A key element of the training is the use of the predefined lessons that are included in the simulator, which are shown in the following screenshot.

These lessons allow the operators to attempt to control the kiln under many different scenarios, without having to do this in a live situation where adverse outcomes could result. The simulations demonstrate the interaction of the different process parameters as well as allowing the operator to observe the effects of their reactions to different situations. Simulations can be saved for use later and the simulator has an on-line evaluation score – showing the operator how well

their reaction to the scenario has been in achieving the target for that lesson. The simulator also trends the key parameters that the operator would use in the control room, both allowing them to monitor the effects of their changes to key parameters and modify their actions to bring the system under control. Simulations can be run at different speeds dependent on the time available for the training.

### Automated kiln control

Whilst much of the training is done with the simulator in manual control mode, to allow the operators to test their understanding of the training and learn how to control the kiln, there is an option to turn on a number of different control loops that would normally be used in an automated system.



Automated control loop options

In this way, anything between one and all of the control loops can be put into action and a simulation run so that the operators can understand how a certain loop works, what actions the system takes and how the system performs with a certain loop in place. This is particularly useful in a plant where only certain loops can be put into action and it also assists in developing the skills of the operator if they can only run their plant in manual, as it shows the speed of reaction of different parameters to changes.

### Summary

The package that has been developed by JAMCEM and CKS Simulator delivers a structured approach to developing kiln operation and kiln operators. The first part of the training focuses on developing the Kiln Operational Strategy whilst the second part is focused on training the operators and developing their skills in dealing with many different process conditions in a safe environment. JAMCEM can also tailor the training package to any combination of the above – so for example if the plant only wanted the simulator, this could be purchased with a “Train the Trainer” module, so that there is a site champion for the use of the simulator.

The simulator itself is unique: It is the only simulator that is tailored to your exact plant configuration, your raw materials, your fuels and your quality targets – it behaves the same as your kiln system. This allows the operators to transfer what they have learnt on the simulator straight to the control room. The simulator

runs on your computers and is available 24/7 – not like some simulators where time must be booked in advance.

There is a one-off fee for the simulator, so you do not have to pay each time you use the simulator. The predefined lessons allow the operators to experience different scenarios without the danger of damaging the kiln system and the system measures the performance of the operators to check on their understanding of the training. Following this through, additional support can be provided to the operators where required. To demonstrate the view of the Simulator training, we have included a quote from a recent customer, which summarises their satisfaction with the system:

“I have had the opportunity of working with “CKS Simulator”, I believe it has important advantages compared to others that I have used: it is not standard, it is the first that I had been see that adapts fully to the conditions of operation of the plant.

It has an expert system that shows the operator how the system reacts. It also includes a full specific course on kiln operation.

Finally, it contains an evaluation system that allows a very good follow-up on the knowledge gained by the new operators and checks the level of the most experienced operators.”

Mark Mutter, JAMCEM Consulting

## **ABB introduces gearless conveyor drive for wider range of motors**



ABB introduces gearless conveyor drive for wider range of motors

Innovative solution fulfills eco design requirements, improves reliability, saves energy costs and reduces overall maintenance costs for mining and cement operators.

ABB announced today that its innovative gearless conveyor drive is available for use on a wider range of conveyor systems. Already proven on larger motors, the newest drive is designed for medium power range motors (1 to 3 MW per motor) to make this technology economically feasible for a broader range of conveyor systems, including the use on mobile equipment in

mining operations. The new solution can be applied for both greenfield and brownfield systems, and significantly decreases the cost threshold for gearless conveyor technology.

Fewer parts and new motor technology increase the reliability and efficiency of the overall conveyor system. A permanent magnet motor specifically designed for mining applications is a core element of this system that contributes to its reliability and ability to perform in the most challenging environments.

The gearless conveyor drive system eliminates the gearbox from the drive. This reduces the number of main wear parts, so less maintenance is needed, and

lengthens the lifespan of the equipment. The expected lifespan for the drive train increases by more than 10 years when compared to traditional geared systems, to a projected in service life of 25 years.

Other advantages include a considerable reduction in the drive system's footprint, so it can be installed in smaller spaces, less weight, and a reduction in the instrumentation required to operate the system. The gearless drive design is also more energy efficient, requiring less power, and operates more quietly, thus reducing noise emissions.

In July 2017, the pilot project of this solution was installed in collaboration with Lausitz Energie Bergbau AG (LEAG) in the open-pit lignite mine Jänschwalde, located close to Cottbus, Germany. The new gearless solution was installed on a high capacity (15.000 t/h) discharge conveyor of a bucket chain excavator in parallel with the existing geared drive. Both drives connect to the same pulley shaft to allow for exact benchmarking. The gearless solution has performed better in regard to dynamic accuracy and overall efficiency than the existing traditional solution.

The operational data demonstrate the advantages of the gearless solution with less components. A gearless solution is more reliable (with a 50% lower failure rate) and requires less maintenance. It is meeting eco design and energy performance requirements according to international standards to support mine site's environmental approvals or certification. The new drive also consumes 5% less energy than the other installed drive.

“The interest of LEAG in this pilot project mainly lies in the expectations related to higher efficiency, lower wear and hence less expenses for repairs and maintenance,” said Peter Scholze, Head of Service Open Pit Mines, LEAG. “These results were verified from measurements and analytics taken during operations in the past few weeks. At the same time, the project proves LEAG's interest in a future-oriented and innovative technical approach. Thanks to the close cooperation between LEAG and ABB, the project could be finalized within a short period of time. Since commissioning has taken place, the drive has been running smoothly.”

The onsite team was impressed with ABB's quick and flawless project commissioning. The operations and maintenance team also found the new system to be easy to learn, understand, and use, without any major difference in operation or handling when compared with the existing systems/ technology.

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## HELMKE Slipring Motors with brush lifting device



Most of all installed slipring motors in the world are operated with continuous contact of the brushes to the sliprings. The advantage of a slipring motor during the starting period due to high starting torque and low starting current turns into a disadvantage during normal motor operation. The motor performs like a squirrel cage motor but there is a constant wear of the brushes and sliprings. This results in reduced maintenance intervals to avoid critical failures and downtime of the plant. Furthermore the costs for new brushes can easily reach thousands of dollars during the lifetime of the motor.

An effective provision to keep the advantages of a slipring motor but to avoid the described disadvantages is a slipring motor with an automatic brush lifting device. This innovative system lifts the brushes from the sliprings after the motor has reached its nominal speed and executes the short circuit of the rotor phases in the slipring compartment.

HELMKE has successfully installed several slipring motors with a brush lifting device to customers world wide. The better performance and maintenance free operation of the motors convinced our customers to invest in this optional feature.

Advantages of an automatic brush lifting device:

- No wear of brushes and sliprings
- No risk of flash overs in the slipring compartment due to excessive carbon dust
- No regular cleaning of slipring compartment and brush change
- No follow-up costs for carbon brushes
- Extended maintenance intervals and motor life time

HELMKE slipring motors with a brush lifting device are ideal for all constant speed applications like e.g. ball mills, vertical mills, fans, crushers, compressors etc.

The brush lifting device is available for motor powers up to 10 MW (for higher powers on request), all voltages from 380 V to 13.8 kV and for all speeds.

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## Ignition protection type Ex n electrical drives

Menzel Elektromotoren supplies Ex n (non-sparking) frequency inverters and electric motors for use in zones 2 and 22 with hazardous gas and dust atmospheres. Low, medium, and high-voltage motors for power ratings up to 5,000 kW and voltages up to 13.8 kV are custom-tailored. They are shipped with an EU Declaration of Conformity according to ATEX Directive 2014/34/EU. For the long-established company with over 90 years of experience in electrical drive technology and industry-specific motor manufacturing, gas and dust explosion protection for hazardous area systems is a routine issue. Two current projects include orders for several drives with Ex n ignition protection. In one of these cases, Menzel recently delivered five 600 kW low-voltage motors for inverter operation to a site in Algeria. These units power multiphase gas and oil pumps at ambient temperatures up to 55 °C. In the other project, Menzel designed a slipring motor for a coal mill in Senegal as a superior alternative to squirrel-cage motor.

The slipring motor has a lower inrush current and supplies higher starting torques. The plant operator has now placed a follow-up order for four identical mill drives for zone 22. The IP65-rated motors prevent any ingress of coal dust and keep particles from settling on slip rings and brushes. In addition, these systems will be supplied in slightly oversized housings to ensure that the operating temperature will not exceed 125 °C.

### About Menzel Elektromotoren

Based in Berlin, Menzel Elektromotoren GmbH has been manufacturing and distributing electric motors for more than 90 years. The medium-sized company specializes in the delivery of large electric motors, including special models, within the shortest possible time. The product range comprises high and low voltage motors, DC motors, transformers, and frequency inverters. Services include motor production and short-

term adaptation of stocked motors to application-specific requirements. In order to ensure fast deliveries to the customer at all times, the company maintains a very extensive inventory including more than 20,000 motors with a maximum performance of up to 15,000 kW. Qualified engineering, experienced staff, and state-of-the-art production and testing facilities help Menzel provide excellent reliability. Menzel operates subsidiaries in the UK, France, Italy, Spain, and Sweden, and cooperates with numerous partners worldwide.

For more information, please contact:

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Fax: +49 . 30 . 349 922 - 999  
Email: [info@menzel-motors.com](mailto:info@menzel-motors.com)  
WWW: [www.menzel-motors.com](http://www.menzel-motors.com)



Illustration: Menzel supplies bespoke explosion-proof drives





## VORTEX RELEASES FASTTRACK PROGRAM

Vortex® announces the release of its new FastTrack™ program, an order fulfillment program designed to deliver small quantity orders on select product designs and sizes in two weeks. This program accelerates the delivery of common Quantum Series™ products, including the Vortex® Roller Gate™, Vortex® Orifice Gate™, Vortex® Maintenance Gate, and Vortex® Wye Line Diverter™.

“FastTrack was developed based on our customers’ feedback regarding lead times for key Vortex products,” said Brian Burmaster, vice president of sales at Vortex. “It was a market-driven decision, to ensure Vortex is meeting our customers’ needs.”

Previously, Vortex utilized a first-in-first-out (FIFO) manufacturing process. In this process, standard product orders often competed for manufacturing time with more time-intensive, specialized product orders. This made for delayed order fulfillment and inefficient lead times of 3–4 weeks. Now, by dedicating manufacturing resources toward a stand-alone FastTrack production process, Vortex is able to assemble select products in quicker cycle times without delaying the production of special-engineered product designs.

“Vortex understands lead time is often a significant factor in the purchasing decision,” said Burmaster. “FastTrack aligns Vortex lead times with market expectations. Now, customers will receive the same high-quality Vortex products in compressed lead times. We are excited to offer this program to our customers.”

Note: Only predetermined products, sizes, and quantities will be available through the FastTrack program. Any products, sizes, or quantities outside the scope of the FastTrack program will be subject to current lead times. For more FastTrack information or to inquire about what product orders qualify, contact us.

Vortex  
1725 Vortex Ave.  
Salina, Ks 67401  
USA  
Contact: Mrs. Lisa Johnson [ljohnson@vortexglobal.com](mailto:ljohnson@vortexglobal.com)

## The Rotary Cone Sample Divider LABORETTE 27 – guaranteed representative sample division!

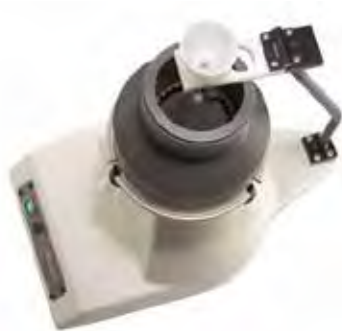
The most precise way of sample division – guaranteed of up to 99.9 %



Rotary Cone Sample Divider LABORETTE 27 – with dividing head 1:8

A perfect sample preparation is the indispensable foundation for every analysis – because any errors will be reflected in the results later on. Therefore, the reliable creation of guaranteed representative subsamples plays an absolutely central role.

The FRITSCH **Rotary Cone Sample Divider LABORETTE 27** offers the ideal conditions: it is the only sample divider on the market dividing your samples with up to 3,000 dividing steps per minute centred over a rotating dividing cone into up to 30 separate channels. Each individual sample with identical chemical and physical properties – and with 99.9 % accuracy for many more sample materials than any other similar method. The best sample division, possible today.



Rotary Cone Sample Divider LABORETTE 27 – with dividing head 1:30

### The FRITSCH ADVANTAGES

- ④ The sample delivery funnel guides the sample material exactly centred on the tip of the rotating cone – for even more accuracy during sample division.
- ④ Division of liquid samples – without modification – by simply repositioning the funnel since suspensions can only be divided eccentrically.
- ④ The LABORETTE 27 is also suitable for the production of specific mixing ratios of dietary supplements, mineral feed mixtures etc. or for mixtures according to the QuEChERS method.
- ④ Specially developed plastic inserts with 25 ml volume for insertion into the 250 ml and 500 ml sample bottles for smallest quantities.



- ⤷ Practical quick clamping for rapid and safe fixing of sample bottles with 250 ml and 500 ml useful capacity.
- ⤷ Glass collecting vessels in different sizes from 15 ml to 500 ml for up to 4 litres total volume – dishwasher-safe and therefore particularly easy to clean.
- ⤷ Depending on the used dividing head chemically and physically identical subsamples of 8, 10 or 3 can be created at ratios of 1:8, 1:10 or 1:30.
- ⤷ Easy cleaning due to removable dividing head
- ⤷ Feed particle sizes 2.5 mm – 10 mm

#### **Dividing heads for every material**

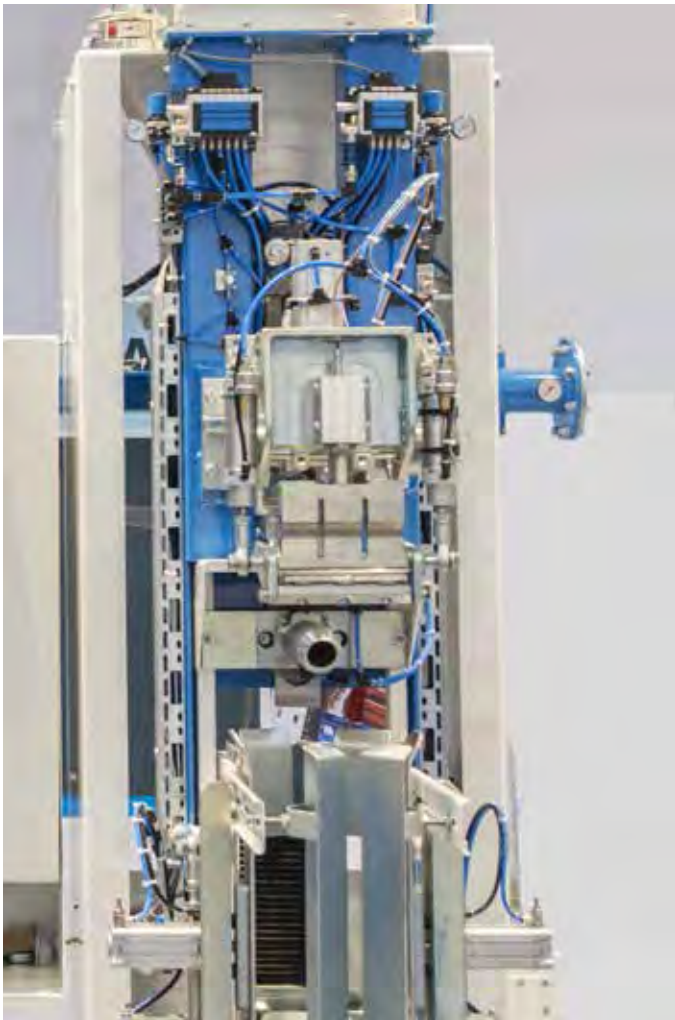
Select exactly the right dividing head for your LABORETTE 27 as an accessory according to your application in the division ratios of 1:8; 1:10 or 1:30 made of stable POM plastic. Anodised aluminium dividing heads – 1:8 and 1:10 – are available for materials and suspensions with abrasive properties. And for especially aggressive solids and suspensions, the resistant PTFE-coated aluminium dividing head 1:30 is also available.

**Up-dated information on the whole FRITSCH range for efficient sample preparation at [www.fritsch-international.com](http://www.fritsch-international.com).**

contact: FRITSCH GmbH • Milling and Sizing  
Selina Krieger  
Industriestrasse 8 • 55743 Idar-Oberstein • Germany  
Phone +49 67 84 70 155 • Fax 0 67 84 70 11  
E-Mail: [krieger@fritsch.de](mailto:krieger@fritsch.de) • Internet: [www.fritsch.de](http://www.fritsch.de)

## BEUMER Group equips BEUMER fillpac R with ultrasonic sealing unit For a perfect appearance

BEUMER Group, a solutions provider for complete packaging systems, is now offering the option to equip the BEUMER fillpac R filling system with an ultrasonic sealing unit. The filled bags have an even better appearance, giving users a significant image advantage over competitors.



The BEUMER fillpac R fills bags with bulk construction materials and industrial powders efficiently, gently and with the required throughput. It enables bags of different formats and types, such as valve bottom bags and flat valve bags, to be filled with different materials ranging in structure from very fine to very coarse. To optimise their appearance, BEUMER Group can equip the fillpac R with an ultrasonic sealing unit on request.

This is how it works: Before filling, the inflatable sleeve which is mounted to the special filling spout is inflated, preventing the escape of material. When the bag is full, it is automatically pulled from the filling spout and sealed with ultrasound. Afterwards it is very clean and compact. The ultrasonic sealing also ensures that material is not spilled or contaminated during transport by truck. Users can state the filling quantity exactly and do not have to add material later.

BEUMER Group can now equip the BEUMER fillpac R with an ultrasonic sealing unit.



**SIMAN NEWS**

Iran Cement News Site

**www.simankhabar.ir**

پایگاه خبری تحلیلی صنعت سیمان ایران



www.cementgroup.ir

Complete Directory Of Iran Cement Factories & Engineering Companies

IRAN Cement Industry Capabilities and Equipments Production in SimanKhabar.ir

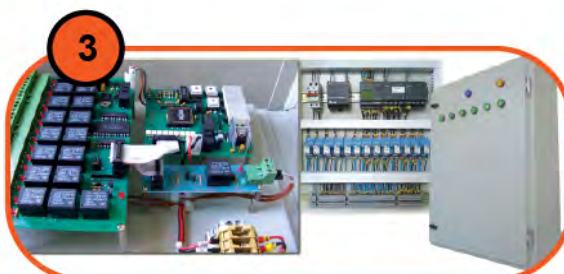
**SK Automatic Big Bag Filling Station With Lifting System**



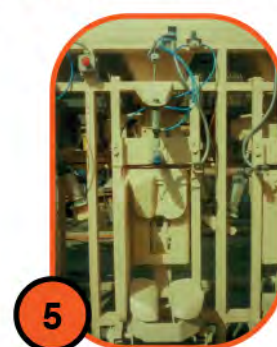
**SK Cement Packer**



**SK Shock Blaster**



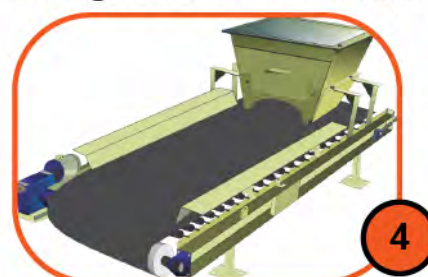
**SK Bag Filter Jet Pulse Controller**



**5**

**& ...**

**SK Weigh Feeder & Belt Scale**



**4**

For more information please contact us :

Tel : +98 21 6642 89 14

Fax: +98 21 6691 53 29

info@simankhabar.ir



## Starlinger: 300<sup>th</sup> conversion line for AD\*STAR block bottom valve sacks

**Worldwide production of AD\*STAR sacks now amounts to 10 billion every year**

The production of robust sacks is not only based on high-quality polypropylene fabric made from woven tapes, but also on precise sack conversion. In the case of AD\*STAR block bottom valve sacks, this important process step is performed on the conversion line ad\*starKON. In early 2018, the 300th line of this type was installed on the Philippines.

The Philippine packaging manufacturer Sakomoto International Packaging Corporation supplies the local cement industry with AD\*STAR sacks made of polypropylene fabric. In Caloocan City in the Philippine district Metro Manila, Sakomoto operates numerous tape extrusion lines, circular looms as well as lines for coating, printing, and sack conversion from Austrian world market leader Starlinger. “There is a long-standing customer relationship between Starlinger and Sakomoto,” explains Franz Steiner, who has known the customer since 2009. “Both sides value the excellent cooperation on the level of sales, service, and

management.” Sakomoto produces around 500 million sacks every year – a figure that will increase even more, as the installed capacity is constantly extended to supply the growing cement market with packaging. Philippine cement plants are increasingly recognizing the numerous advantages of AD\*STAR sacks over paper sacks, causing the market share of AD\*STAR sacks to rise continuously. In early 2018, two sack conversion lines were commissioned at Sakomoto; notably, one of these machines is the 300th ad\*starKON delivered by Starlinger. Furthermore, both machines belong to the first ones of the new generation ad\*starKON HX.

### **Intelligent sack conversion on the ad\*starKON HX**

The new series ad\*starKON HX features extremely precise sack conversion at an operating speed of up to 140 AD\*STAR sacks per minute. This increase in output of about 40 % compared to its preceding model is mainly achieved with the feature iMOVE, which dynamically adjusts bag transportation. For the customer, this means



The 300th Starlinger sack conversion line ad\*starKON. ©Starlinger





Work at the dual stacking unit of the ad\*starKON HX. ©Starlinger

not just higher efficiency, but also lower energy costs and reduced manpower, as a higher number of sacks is produced in the same amount of time with the same energy consumption. Apart from capacity, product quality plays an important role in sack production: This quality is perfected with the features iSHAPE and iPATCH, which ensure that each sack receives a precisely formed bottom and tailored cover and bottom patches. Other advantages of the line are the easily accessible dual stacking unit as well as the large format range for the production of sacks with a capacity of 4.5 – 100 liters. In addition, both lines at Sakomoto are equipped with the optionally available microperforation unit microSTAR+ for high air permeability and the quality management system qualiSTAR II.

#### **Advantages in handling, storage, and transport**

AD\*STAR sacks are ideally suited to packaging dry bulk goods such as building materials due to their high break resistance coupled with a low deadweight. The brick-shaped sacks are extremely tight and robust, which results in enormous advantages in handling, storage, and transport. In cement filling, the excellent suitability of the sacks for use on the most modern filling lines as well as automatic palletizing is essential considering that

a smooth packaging process saves time and costs. Sack quality also has a positive influence on the working conditions in cement filling plants, as the tightness of the sacks significantly reduces the creation of dust. And the environment likewise benefits from the use of AD\*STAR sacks: Low breakage rates save material

as well as CO<sub>2</sub> because there is no need to replace any damaged goods or packaging – a clear advantage over sacks made of paper or recycled polypropylene.

AD\*STAR® is a registered trademark. AD\*STAR® sacks are produced exclusively on Starlinger machinery. Images and captions:

#### **About Starlinger & Co. Ges.m.b.H.:**

Starlinger is a Vienna-based engineering company with production sites in Weissenbach and St. Martin, Austria, as well as Taicang, China. As the world's leading supplier of machinery and complete lines for woven plastic bag production, recycling and PET extrusion and refinement, Starlinger & Co. Ges.m.b.H. is a synonym for leadership in quality and technology in over 130 countries. Founded in 1835, the family-owned business has been exporting machines worldwide for more than 45 years with an export quota of over 99.5 %. Sales and service centres in Brazil, China, India, Indonesia, Mexico, Thailand, Russia, South Africa, USA and Uzbekistan ensure quick and professional technical support and service.

#### **Further information:**

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1060 Vienna, Austria  
T: +43 1 59955- 0  
F: +43 1 59955- 25  
E: sales@starlinger.com  
www.starlinger.com

## Transmitter offers high reliability in temperature measurement

- Dual sensor operation with 4 wire sensor connection
- Automatic redundancy switching for lossless recordings
- Wide range of hazardous approvals
- Versatile use in chemical, oil and gas, marine and power generation applications

With Sitrans TH320/420 and TR320/420, Siemens introduces a new generation of reliable WirelessHART (Highway Addressable Remote Transducer Protocol) temperature transmitters for a wide range of sensor types suitable for mounting in sensor head and rail mounting. They feature high availability of the measurement signal and ease of use. Due to the safety integrity level (SIL) 2/3 certification according to IEC 61508 the temperature transmitters are particularly suited for safety-critical applications. The devices also have a large number of country specific explosion protection certificates for all zones. They provide reliable results even under extreme conditions up to -50°C. Main application areas include industries such as chemical, oil and gas, marine and power generation.

With fast and accurate sensor and transmitter tuning, the use of the Callendar-van Dusen method or 60-point-curve ensures highest measuring accuracy. Deviations can be detected and monitored through the drift detection with dual-channel transmitters, e. g. for preventive maintenance. Electronic device descriptions (EDD, DTM and FDI) allow the new transmitters to be used in all current distributed control systems. A quick start wizard is just one example of their user-friendly features. Measurement values, device functions and visual alarm signals can be displayed Communications and operation planning and implementation is very convenient using special visualization components for

Simatic PCS 7 (Sitrans Library). When a sensor fails in operation, for example due to disconnection or short circuit, measurement failures may result in loss of control or production stops. To avoid this and ensure high measurement availability through reliability and long term stability, maintenance

the sensors using the Callendar-van Dusen method also meets the challenge of sensor inaccuracy caused by individual deviation from standardized Pt100 curves or by aging. Outstanding transmitter accuracy and sensor balancing enable simpler calibration of the sensors directly in the transmitter



planning is essential. The Sitrans TH420 and TR420 sensor backup function, drift detection and alarming make this possible. Using the 4 wire connection for both sensors increases data accuracy and reliability as it allows a seamless transition to the second sensor in case the first sensor fails. The continuous balancing of the two independent sensors measuring in parallel, while detecting and monitoring measuring value deviations, allows the scope of maintenance to be planned as required, following the description above, and production stops to be avoided. Balancing

and provide for highly precise individual values.

With Sitrans TH320/420 and TR320/420, Siemens introduces a new generation of reliable WirelessHART (Highway Addressable Remote Transducer Protocol) temperature transmitters for a wide range of sensor types suitable for mounting in sensor head and rail mounting.

This press information document and a press photo can be downloaded from More information is available at [www.siemens.com/sitranst](http://www.siemens.com/sitranst)

# VDZ Training courses for the cement industry 2018

## Process operator training

**3 – 21 September 2018**

VDZ's premises, Duesseldorf, Germany

### Topics

- Raw material preparation
- Raw meal uniformity and quality control
- Clinker production and burning technology
- Alternative fuels and effects on burning process
- Energy efficiency
- Raw material and cement grinding
- Environment and emissions abatement
- Refractories
- Simulator training
- Cement plant visit



## Plant maintenance and refractories course

**19 – 23 November 2018**

Cement plant in Germany

VDZ's premises, Duesseldorf, Germany

### Topics

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



## Crash course for young engineers

**10 – 14 December 2018**

VDZ's premises, Duesseldorf, Germany

### Topics

- Raw material handling
- Clinker and cement production
- Chemistry and mineralogy
- Concrete technology
- Product quality assurance
- Cement plant visit



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

We would be pleased to answer any questions about our training offers  
by email: [training@vdz-online.de](mailto:training@vdz-online.de)  
or by telephone: +49-211-45 78-402

**vdz.**



## Virtual tour through motor test field



The Menzel Elektromotoren homepage provides transparent insights into production facilities at the company's headquarters in Berlin, Germany. The latest new feature is a virtual-reality tour through the load test field, part of the storage area, the shipping hall, and the paint shop. The tour is animated by sound bites, video clips, and descriptive text about features and services. Information about historic milestones and the product range is also available. Menzel provides heavy-duty motors to customers throughout the world. Over 20,000 brand-new low, medium, and high-voltage motors as well as DC motors are always in stock, allowing for shortest delivery times. Knowledgeable staff are well equipped to quickly and flexibly implement customer wishes such as special windings and constructional adaptations. The family-owned company carries out all motor tests, a service that is not only available for in-house products – tests of

third-party motors can also be commissioned. The test field features state-of-the-art equipment for load tests, heating tests, and other quality and durability checks. Generators and entire drive systems including a motor, transformer, and frequency inverter are tested as well.

Link to the virtual tour: <https://bit.ly/2Hdqk7>

About Menzel Elektromotoren  
Based in Berlin, Menzel Elektromotoren GmbH has been manufacturing and distributing electric motors for more than 90 years. The medium-sized company specializes in the delivery of large electric motors, including special models, within the shortest possible time. The product range comprises high and low voltage motors, DC motors, transformers, and frequency inverters. Services include motor production and short-term adaptation of stocked motors to application-specific requirements. In order to

ensure fast deliveries to the customer at all times, the company maintains a very extensive inventory including more than 20,000 motors with a maximum performance of up to 15,000 kW. Qualified engineering, experienced staff, and state-of-the-art production and testing facilities help Menzel provide excellent reliability. Menzel operates subsidiaries in the UK, France, Italy, Spain, and Sweden, and cooperates with numerous partners worldwide.

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Germany

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**Email: [info@menzel-motors.com](mailto:info@menzel-motors.com)**

**WWW: [www.menzel-motors.com](http://www.menzel-motors.com)**



The VR tour showcases the motor builder's facilities that enable quick and reliable implementation of customer requirements





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[www.app.zkg.de](http://www.app.zkg.de)  
the desktop version



## Automation controller for distributed and PC-based applications

- **Distributed Simatic automation controllers for standard and fail-safe applications up to Performance Level e**
- **Compact devices with functions of a PC-based software controller, visualization, Windows applications and central I/Os**
- **World's only software controller with fail-safe, PC-based control which is operated independently of the operating system**

Siemens is extending its Simatic automation controller series for PC-based applications. The distributed automation controllers now include the new, more powerful Simatic ET 200SP Open Controller CPU 1515SP PC 2 – for standard and fail-safe applications up to Performance Level e. The new Open Controller, which is particularly suitable for series machine building, combines the functions of a PC-based software controller with visualization, Windows applications and central I/Os (inputs/outputs) in a single compact device. The new, fail-safe CPU1516pro-2 PN for the Simatic ET 200pro Distributed Controller also performs standard and fail-safe automation tasks up to Performance Level e in a single device.

Safety functionalities have now been integrated in the Simatic S7-1500 Software Controllers for the first time. This makes the CPU 1507S F the world's only software controller with fail-safe PC-based control which is operated independently of the operating system. This guarantees high system availability and facilitates the controller's rapid start-up. What is more, installation of Windows updates and rebooting is now possible while the controller is running. This also eliminates the need for the hardware controller that would otherwise also be necessary, thereby saving space and money and reducing engineering costs. The combination of PC-

based control and high-level language programs makes the Simatic S7-1500 Software Controller particularly suitable for special-purpose machine manufacturing.

### Background information:

Siemens offers the right controller for an extremely wide range of automation requirements. The scalable Simatic range of controllers, comprising Basic, Advanced, Distributed and Software Controllers, all have the same range of functions. The S7-1200 Basic Controllers are used for compact automation solutions, and the S7-1500 Advanced Controllers for complex tasks, while the ET 200SP Distributed Controllers are suitable for distributed applications, and the Software Controllers for PC-based applications.

Siemens is extending its Simatic automation controller series for PC-based applications. The new CPU 1515SP PC 2 for the Simatic ET 200SP Open Controllers combines the functions of a PC-based software controller with visualization, Windows applications and central I/Os (inputs/outputs) in a single compact device. The new CPU 1507S F for the Simatic S7-1500 Software Controllers is the world's only software controller with fail-safe PC-based control which is operated independently of the operating system.

### Further information at

[www.siemens.com/distributed-controller](http://www.siemens.com/distributed-controller) and [www.siemens.com/software-controller](http://www.siemens.com/software-controller)





# INTERMAINT Group

## Heavy Industrial Plants Services



www.intermaint.net



THINKING FOR  
TOMORROW



ISO 9001:2008 OHSAS 18001:2007 ISO 14001:2004



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Telephone : (203) 4492192 - (203) 4491913 - (203) 5931441 - (203) 5931442

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# INTERMAINT Group

www.intermaint.net



## 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** history of success in the total refractory systems all over the world to our different services inside Egypt.

## Fabrication

- Our Fabrication Experience Covers all The needs of Your Plant's Production Equipment.
- All Of Our Process Quality Controlled and quality assured

- We ensure the best quality in the shortest duration possible.
- Our Yearly Capacity Is About 7000 Tons Mixed, As Technological Steel Structure Plate Works And Built Up Sections , Spare Parts ..... Etc.



## Erection

- Our way to success is short time and high quality performance. for new or existing project we can do : -
- Installation of Electromechanical Equipments and Piping as a total services.
- Installation of insulation works. - Refractory services.



## Maintenance

- Quick intervention.
- Good preparation.
- Planning of shutdowns.
- Very short time execution period.





## DIARY DATES



## DIARY DATES

### CEMENT

#### **INTERCEM: Cairo to Cape Town – the Challenge of Change**

Date : 17 - 19 September 2018

Venue: Dusit Thani LakeView Cairo, Egypt

Email: [info@intercem.com](mailto:info@intercem.com)

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

#### **Christian Pfeiffer Seminar**

Date : 17 - 20 September 2018

Venue: Beckum, Egypt

For more information, please visit:

[www.christianpfeiffer.com/training-courses/](http://www.christianpfeiffer.com/training-courses/)

#### **8<sup>th</sup> International VDZ Congress**

Date : 26 - 28 September 2018

Venue: Maritim Hotel, Duesseldorf, Germany

For more information, please contact:

Tel.: +49 211 4578 342

Email: [info@vdz-congress.org](mailto:info@vdz-congress.org)

[www.vdz-congress.org](http://www.vdz-congress.org)

#### **Cemtech Europe 2018**

Date : 14 - 17 October 2018

Venue: Istanbul, Turkey

For more information, please visit:

[www.Cemtech.com/Europe2018](http://www.Cemtech.com/Europe2018)

#### **Cement Business and Industry AFRICA 2018**

Date : 18 - 19 October 2018

Venue: Johannesburg, South Africa

Email: [sales@gmiforum.com](mailto:sales@gmiforum.com)

For more information, please visit:

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

## DIARY DATES



### 18<sup>th</sup> Global Gypsum

Date : 22 - 23 October 2018

Venue: Vancouver, Canada

For more information, please visit:

[www.globalgypsum.com](http://www.globalgypsum.com)

### The 16<sup>th</sup> International Central Asia Conference & Exhibition

"The Cement Industry & the Market"

Date : 22 - 24 October 2018

Venue: InterContinental Hotel, Almaty, Kazakhstan

For more information, please visit:

<http://businesscem.ru/eng/events/2018/almaty/>

### 25<sup>th</sup> International Conference CONCRETE DAYS 2018

Date : 21 - 22 November 2018

Venue: Hotel Olympik Artemis, Prague, the Czech Republic

Email: [cbsbepton@cbsbeton.eu](mailto:cbsbepton@cbsbeton.eu)  
(Czech Concrete Society)

<http://www.cbsbeton.eu/en>

### MixBuild 2018

### 20<sup>th</sup> International Conference

"Modern Technologies of Drymix Mortars in Construction – MixBuild"

Date : 28 - 30 November 2018

Venue: Moscow, Russia

Email: [events@alitinform.ru](mailto:events@alitinform.ru)

For more information, please visit:

[www.dry-mix.ru/eng](http://www.dry-mix.ru/eng)

### Loesche Technical Seminar

Date : 04 December 2018

Venue: Duesseldorf, Germany

Email: [trainingcenter@loesche.de](mailto:trainingcenter@loesche.de)

For more information, please visit:

[www.loesche.com](http://www.loesche.com)

### 4<sup>th</sup> Global Cempower

Date : 22 - 23 January 2019

Venue: London, UK

For more information, please visit:

[www.cempower.com](http://www.cempower.com)

### 13<sup>th</sup> Global CemFuels

Date : 20 - 21 February 2019

Venue: Amsterdam, Netherlands

For more information, please visit:

[www.cemfuels.com](http://www.cemfuels.com)

### 2<sup>nd</sup> Global Cemtrans

Date : 14 - 15 March 2019

Venue: Brussels, Belgium

For more information, please visit:

[www.cem-trans.com](http://www.cem-trans.com)

### 14<sup>th</sup> Global Slag

Date : 3 - 4 April 2019

Venue: Aachen, Germany

For more information, please visit:

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

### 2<sup>nd</sup> Global FutureCem

Date : 22 - 23 May 2018

Venue: Brussels, Belgium

For more information, please visit:

[www.futurecem.com](http://www.futurecem.com)

### White Nights: V International Cement Business Conference

Date : 29 - 31 May 2019

Venue: Grand Hotel Europe, St. Petersburg, Russia

For more information please visit:

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

### 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 visit:

<http://www.iccc2019.org>

## TRAINING

### Cement Kiln Pyroprocessing (six-week online training)

Starting Date: 09 July 2018

Email: [Training@CemNet.com](mailto:Training@CemNet.com)

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[www.training.cemnet.com](http://www.training.cemnet.com)

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### **Cement Kiln Process Chemistry (six-week online training)**

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### **Cement Factory Maintenance (six-week online training)**

Starting Date: 16 July 2018

Email: [Training@CemNet.com](mailto:Training@CemNet.com)

For more information, please visit:

[www.training.cemnet.com](http://www.training.cemnet.com)

### **Cement Kiln Refractories Course (six-week online training)**

Starting Date: 16 July 2018

Email: [Training@CemNet.com](mailto:Training@CemNet.com)

For more information, please visit:

[www.training.cemnet.com](http://www.training.cemnet.com)

### **Cement Factory Quality Control (six-week online training)**

Starting Date: 06 August 2018

**Email:** [Training@CemNet.com](mailto:Training@CemNet.com)

For more information, please visit:

[www.training.cemnet.com](http://www.training.cemnet.com)

### **VDZ Process operator training**

Date : 03 - 21 September 2018

Venue: Training centre near

Duesseldorf, Germany

For more information, please visit:

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

### **White Cement Manufacturing Technology (six-week online training)**

Date: 10 September 2018

**Email:** [Training@CemNet.com](mailto:Training@CemNet.com)

For more information, please visit:

[www.training.cemnet.com](http://www.training.cemnet.com)

### **Cement Kiln Pyroprocessing (six-week online training)**

Starting Date: 08 October 2018

Email: [Training@CemNet.com](mailto:Training@CemNet.com)

For more information, please visit:

[www.training.cemnet.com](http://www.training.cemnet.com)

### **Cement Kiln Process Chemistry (six-week online training)**

Starting Date: 08 October 2018

Email: [Training@CemNet.com](mailto:Training@CemNet.com)

For more information, please visit:

[www.training.cemnet.com](http://www.training.cemnet.com)

### **Cement Factory Maintenance (six-week online training)**

Starting Date: 15 October 2018

**Email:** [Training@CemNet.com](mailto:Training@CemNet.com)

For more information, please visit:

[www.training.cemnet.com](http://www.training.cemnet.com)

### **Cement Factory Quality Control (six-week online training)**

Starting Date : 05 November 2018

**Email:** [Training@CemNet.com](mailto:Training@CemNet.com)

For more information please visit:

[www.training.cemnet.com](http://www.training.cemnet.com)

### **VDZ Plant maintenance and refractories course**

Date : 19 - 23 November 2018

Venue: Cement plant in Germany

For more information please visit:

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

### **VDZ Crash course for young engineers**

Date : 10 - 14 December 2018

Venue: VDZ's premises in Duesseldorf, Germany

For more information please visit:

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

## **CERAMIC**

### **Tecnargilla 2018**

Date: 24 - 28 September 2018

Venue: Rimini, Italy

For more information, please contact: ITALIAN EXHIBITION GROUP SpA

Via Emilia, 155 - 47921 - Rimini - (RN) Italy





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## GENERAL

### **Green Finance Conference**

Date : 18 - 19 July 2018

Venue: Goodwood Park Hotel,  
Singapore

For more information please  
contact:

Trueventus

Mr. John Karras

**Tel: +603 2775 0001**

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

### **BLOCKCHAIN - Data decentralization for higher transparency**

Date : 18 - 19 July 2018

Venue: Bangkok, Thailand

For more information please  
contact:

Trueventus

Casey Lee

**Tel: +603 2775 0067**

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

### **Modern Method of Construction 2018**

### **7<sup>th</sup> Annual Modular and Precast Summit**

Date : 24 - 26 July 2018

Venue: Kuala Lumpur, Malaysia

**Tel: +603-2775 0067**

**Email: [markw@willbeattending.com](mailto:markw@willbeattending.com)**

### **12<sup>th</sup> fib International PhD Symposium in Civil Engineering**

Date : 29 - 31 August 2018

Venue: Technical University,  
Prague, the Czech Republic

**Email: [cbsbebtton@cbsbeton.eu](mailto:cbsbebtton@cbsbeton.eu)**  
**(Czech Concrete Society)**

**<http://www.phdsymp2018.eu>**

### **3<sup>rd</sup> Clean Energy Finance Europe 2018**

Date : 05 – 06 September 2018

Venue: Frankfurt, Germany

**Tel: +48 61 646 7022**

**Email: [rbaryah@acieu.net](mailto:rbaryah@acieu.net)**

### **BUILDAFRO 2018**

Date : 07 – 09 September 2018

Venue: Dar-es-Salaam, Tanzania

**Email: [info@mxmfairs.info](mailto:info@mxmfairs.info)**

### **20. ibausil**

Date : 12 - 14 September 2018

Venue: Weimar, Germany

For more information, please visit:

**[www.uni-weimar.de](http://www.uni-weimar.de)**

### **3<sup>rd</sup> Future of Surfactants Summit North America**

Date : 19 - 20 September 2018

Venue: Chicago, IL, USA

For more information please  
contact:

Mado Lampropoulou

**Tel: +440 20 3141 0607**

**Email: [dpavlyk@acieu.co.uk](mailto:dpavlyk@acieu.co.uk)**

### **7<sup>th</sup> Edition of International Conference on Green Energy, Green Engineering and Technology**

Date : 20 - 21 September 2018

Venue: Berlin, Germany

Tel: +1 800 841 6480

**+44 2033182512**

**Email: [greentechnologies@eurosciconconferences.com](mailto:greentechnologies@eurosciconconferences.com)**

**[greentechnologies@eurosciconmeetings.com](mailto:greentechnologies@eurosciconmeetings.com)**

### **11<sup>th</sup> Carbon Dioxide Utilisation Summit**

Date : 26 - 27 September 2018

Venue: Manchester, UK



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Cemtech Europe will place innovative production technologies at the heart of its agenda in a two-day conference programme designed for cement producers seeking to ensure their long-term sustainability and respond proactively to the evolving environmental context. From alternative fuels to the latest low-CO<sub>2</sub> product solutions, as well as new digital technologies, this conference will provide the know-how to advance your operations and activities in the cement sector. Over 25 leading industry speakers will present the latest information on cement market developments and production technology. In addition, delegates will be able to participate in the following activities:

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**SMARTECH for Marketing**

Date : 26 - 27 September 2018

Venue: Bangkok, Thailand

**Tel: +603 2775 0067**

**Email: stevej@**

**strategictruconferences.com**

**6<sup>th</sup> UIA Associations Round Table Asia-Pacific**

Date : 26 - 27 September 2018

Venue: Kuala Lumpur, Malaysia

**Email: nancy@uia.org**

For more information, please visit:

**www.uia.org**

**Ukrainian Energy Week '18**

Date : 02 - 04 October 2018

Venue: Kyiv, Ukraine

For more information please visit:

**www.a7conf.com**

**9<sup>th</sup> Addisbuild International Construction, Steel, Construction Materials & Infrastructure Exhibition**

Date: 10 - 13 October 2018

Venue: Addis Ababa, Ethiopia

For more information, please contact:

**info@addisbuild.com**

**sales@addisbuild.com**

**The 2<sup>nd</sup> International Symposium ISYGE 2018**

“Mineral Resources and Environment”

Date : 12 - 14 October 2018

Language: English and French

Venue: Hammamet, Tunisia

For more information please contact:

Dr. Wissem Gallala

**Email: wissem.gallala@fsg.rnu.tn**

Website: **www.sciencesconf.org**

**2<sup>nd</sup> International Conference (EMENA-ISTL)**

Date : 25 - 27 October 2018

Venue: Fez, Morocco

For more information please visit:

**www.emena.org**

**2018 IRU World Congress**

Date : 06 - 08 November 2018

Venue: Muscat, Oman

**Email: IRUevents@mci-group.com**

**8<sup>th</sup> European Biomass to Power**

Date : 07 - 08 November 2018

Venue: Stockholm, Sweden

Email: **dpavlyk@acieu.net**

**Solids Dortmund 2018**

Date : 07 - 08 November 2018

Venue: Dortmund, Germany

For more information, please visit:

**www.solids-dortmund.com**

**4<sup>th</sup> International Conference**

**“WELDING AND FAILURE ANALYSIS OF ENGINEERING MATERIALS” (WAFA-2018)**

Date : 19 - 22 November 2018

Venue: Aswan, Egypt

**Email: info@wafa-egypt2018.org**

For more information, please visit:

**www.wafa-egypt2018.org**

**2018 European Thermoplastic Compounding Summit**

Date : 21 - 22 November 2018

Venue: Dusseldorf, Germany

For more information, please contact:

Mr. Adam Kowalewski

**Tel: +48 0 616 46 7047**

**Email: adam@acieu.co.uk**



# ЦЕМЕНТ

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### **15<sup>th</sup> Arab International Mineral Resources Conference**

Date : 26 - 28 November 2018

Venue: Cairo, Egypt

For more information please contact:

Mineral Resources Direction - Arab Industrial Development and Mining Organization

**Tel: +212 537274500**

**Fax: +212 537772188**

**Email: oadim.mining@gmail.com**

**www.aidmo.org**

### **Bauma China 2018**

Date : 27 - 30 November 2018

Venue: Shanghai, China

For more information, please visit:

**www.bauma-china.com**

### **5<sup>th</sup> International Conference**

“Precast Housing: Production. Design. Construction”

Date : 28 - 30 November 2018

Venue: Moscow, Russia

**Email: events@alitinform.ru**

For more information, please visit:

**www.con-tech.ru**

### **15<sup>th</sup> Edition SteelFab 2019**

Date : 14 - 17 January 2019

Venue: Expo Center Sharjah, UAE

**E-mail: info@expo-centre.ae**

For more information please visit:

**www.steelfabme.com**

### **III Ukrainian Defense & Security Forum '19**

Date : 21 February 2019

Venue: Kyiv, Ukraine

**Email: contact@a7-group.com**

For more information please visit:

**www.a7conf.com**

### **Invest & Trade in Ukraine '19**

Date : 07 - 13 March 2019

Venue: Transatlantic Tour, Ukraine

**Email: contact@a7-group.com**

For more information, please visit:

**www.a7conf.com**

### **Bauma 2019**

Date : 08 - 14 April 2019

Venue: Munich, Germany

For more information, please visit:

**www.bauma.de**

### **Ukrainian Infrastructure Forum '19**

Date : 18 April 2019

Venue: Kyiv, Ukraine

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ICR / <b>Cemtech</b> Europe 2018	93	<a href="http://www.Cemtech.com/Europe2018">www.Cemtech.com/Europe2018</a>
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National Cement Company Yemen	13 AR	<a href="http://www.nccyemen.com">www.nccyemen.com</a>
UAE Cement Portal Website	9 AR	<a href="http://www.uaecement.com">www.uaecement.com</a>
VDZ 2018 Congress	7	<a href="http://www.vdz-congress.org">www.vdz-congress.org</a>
VDZ 2018 Training Courses	81	<a href="http://www.vdz-online.de/en/training">www.vdz-online.de/en/training</a>
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# المكتويات

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الموضوعات:

- الاستعمالات المتطورة للإسمنت الأبيض (باللغة العربية)  
إعداد: د. حمدالله الخطيب – المملكة الأردنية الهاشمية
- اختلاف خصائص الإسمنت والماء حسب مستوى نهر النيل  
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- تطبيقات الخرسانة .... بلا حدود  
إعداد: م. أسامة علي أحمد – جمهورية مصر العربية
- استراتيجيات التحكم القابلة للتكيف من أجل الأنظمة الذكية للتغذية والوزن بالغة الدقة  
إعداد: د. Dominik Aufderheide و د.م. Luigi Di Matteo / DI MATTEO Group – ألمانيا
- أهمية تحضير العينات لتقدير كمية الكلنكر  
إعداد: Thomas و Thomas Witzk Fuellmann/ Malvern Panalytical .B.V – هولندا
- تحسين عمليات حرق الفرن  
إعداد: Mark Mutter ، JAMCEM Consulting – المملكة المتحدة

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## مجلة عالم الإسمنت ومواد البناء

### جدول موضوعات المجلة لعام 2018

المناسبات	الموضوعات	العدد
المؤتمر والمعرض العربي الدولي الثالث والعشرون لصناعة الإسمنت: عمان / المملكة الأردنية الهاشمية 22-20 نوفمبر / تشرين الثاني 2018	* التنمية المستدامة * حماية البيئة * الوقود البديلة * الوقود المستمد من النفايات الصلبة / الوقود المستمد من النفايات * الإنتاج الأنظف في صناعة الإسمنت * المرشحات ، أنظمة الترشيح القماشية ومعدات إزالة الغبار * مراقبة الانبعاثات وأنظمة تحليل الغاز * توفير الطاقة * دراسات حالة	* سبتمبر/أيلول 2018
	* التعبئة والتغليف والتسليم * معدات التحميل والتفريغ من السفن * تكنولوجيا التغذية * تخزين ومناولة المواد السائبة * تخزين الوقود * أنظمة النقل والرافعات الدلوية * تفجير الصخور * الاستخراج من المقالع وإدارة المقالع * الصحة والسلامة المهنية * حلقات ضبط الجودة	ديسمبر/كانون الأول 2018

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آخر موعد لاستلام المقالات أو النصوص الصحفية أو الإعلانات لأعداد عام 2018 هو على النحو التالي :

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2. عدد ديسمبر / كانون الأول : 5 ديسمبر / كانون أول

## الإعلانات

(بالدولار الأمريكي)

الإعلان في عدد واحد	الإعلان في عديدين	الإعلان في ثلاثة أعداد	الإعلان في أربعة أعداد	
1,200	*	*	*	غلاف خارجي ملون (يمين أو يسار) A4
900	*	*	*	غلاف داخلي ملون (يمين أو يسار) A4
700	900	1,200	1,300	صفحة داخلية ملونة A4
400	500	600	700	نصف صفحة داخلية ملونة A4
250	300	350	400	ربع صفحة داخلية ملونة A4
250	300	350	400	صفحة أسود وأبيض

أبعاد الإعلان : A4 مع مسافة على الأطراف الأربعة  
أبعاد الإعلان على الغلاف الخارجي : ارتفاع 20 سم وعرض 14 سم  
الدقة : 300dpi  
نوع الملف : PDF أو EPS أو PSD

### إعلان على موقع الاتحاد [aucbm.org](http://aucbm.org)

- عرض 200 بيكسل وارتفاع 75 بيكسل ، بقيمة 150 دولاراً أمريكياً في الشهر الواحد
- يرجى إرسال الصور مع اللينك المطلوب ربطه بها بدقة 300 dpi (dot per inch)



## أخبار صناعة الاسمنت في الدول العربية

### البحرين

تأهيل معدات الرصيف للترفيغ في طاقة الشحن والتفريغ لتصل الى مستوى 500 طن/ساعة .

كما قامت الشركة بصيانة وتطوير مينائها التجاري البحري ، مما سيساعدها على توريد مادة «فحم البترول» المستعمل كوقود لها وليقية الشركات الناشطة في القطاع وكذلك لتصدير مادتي الكنكر والإسمنت . كما بادرت الشركة إلى إنجاز استثمارات للتقليص من التلوث والاستجابة للمواصفات البيئية المتعلقة بضبط الحدود القصوى لملوّثات الهواء من المصادر الثابتة ، مما أتاح لها التخفيض في نسبة الغبار الإجمالي والغازات طبقاً للمواصفات الدولية .

المصدر: [www.ifm.tn](http://www.ifm.tn)

### الجزائر

#### مجمع جيكا للإسمنت يصدر 200 ألف طن إلى أوروبا

توصل المجمع الصناعي لإسمنت الجزائر - جيكا - إلى توقيع عقد تصدير 200 ألف طن من الإسمنت إلى أسواق أوروبية وذلك لأول مرة . وقد تم تصدير 45 ألف طن في نهاية شهر أبريل / نيسان الماضي . كما بدأ مجمع الإسمنت جيكا بمفاوضات لتصدير كميات إضافية من الإسمنت نحو أسواق افريقية وأوروبية ، وهذا بعد أن بلغ إنتاج المجمع أرقاماً قياسية في 2017 قدرت بـ 14 مليون طن ، مقابل 12.6 مليون طن في سنة 2016 .

وأكدت وزارة الصناعة أن إنتاج الجزائر حالياً من الإسمنت قد بلغ 25 مليون طن في السنة ، وتوقعت أن تصل الكميات المنتجة إلى 40 مليون طن بحلول عام 2020 ، مشيرة إلى أنه بعمليات التصدير هذه فإن البلاد قد انتقلت رسمياً من بلد مستورد إلى مصدر لمادة الإسمنت .

المصدر: [www.echoroukonline.com](http://www.echoroukonline.com)

#### «لافارج هولسيم» تصدر 17 ألف طن من الإسمنت نحو دول أفريقية

ستقوم شركة «لافارج هولسيم الجزائر» بتصدير كمية من الإسمنت الرمادي نحو غرب أفريقيا . وستصدر الشركة كمية تقدر بـ 17 ألف طن من الإسمنت الرمادي من ميناء جن جن بجيجل ، وهي

#### البحرين تستأنف استيراد الإسمنت السعودي

استأنفت شركات بحرينية استيراد الإسمنت من السعودية بعد تراجع الأخيرة عن فرض رسوم على التصدير . وتوقع مسؤولون لدى شركات إسمنت بحرينية أن تحافظ أسعار الإسمنت على استقرارها رغم بدء استيراد المادة من العربية السعودية .

المصدر: [www.bahrainmirror.com](http://www.bahrainmirror.com)

### تونس

#### شركة صينية ضخمة تقرر فتح مكتب في تونس

أعلن مسؤولو المجمع الصيني Anhui Conch عزمهم فتح مكتب في تونس العاصمة لدراسة فرص الاستثمار المتاحة خاصة في الولايات ذات الأولوية . وترى المجموعة المختصة في الصناعات الثقيلة تونس وجهة استثمارية ممتازة وبوابة للسوق الأفريقية يتوفر فيها مناخ الأعمال الملائم والاستقرار الأمني .

المصدر: [www.tunisianow.net.tn](http://www.tunisianow.net.tn)

#### إسمنت بنزرت تستأنف تصدير «الكنكر» إلى الكاميرون

غادرت باخرة محملة بـ 25 ألف طن من الكنكر رصيف شركة إسمنت بنزرت بميناء هذه المدينة باتجاه الكاميرون معلنة بذلك عن استئناف الشركة لبرنامجها التصديري لمادتي الإسمنت السائب والكنكر ، لأول مرة منذ عشر سنوات .

ويتطلع البرنامج التصديري للشركة إلى تصدير كميات كبيرة من مادة الكنكر والإسمنت السائب في اتجاه أسواق أفريقية وأخرى بحوض البحر الأبيض المتوسط .

وتسجل السوق الوطنية فائضاً على مستوى الإنتاج يفوق 3 ملايين طن من الكنكر وهو ما يوفر فرصاً تصديرية . وتعد هذه العملية التصديرية تنويجاً لمجهودات شركة إسمنت بنزرت التي دخلت ، منذ سنة 2011 ، في إنجاز المرحلة الثانية من برنامج تأهيل وتطوير ورشات خط إنتاج الكنكر والبرنامج المرافق له (تهيئة ورشة الكسار والمكاشط) وتحديث تجهيزات التعبئة وكذلك برنامج

الحالي ، حيث ستساعد التقنيات الجديدة في رفع الكفاءة بنسبة 3.3 % لكل توربين .  
المصدر : مباشر

## سوريا

**أعلنت الشركة السورية لصناعة الإسمنت ومواد البناء في حماة**  
عن نجاح التجارب الفنية لإنتاج إسمنت أبار النفط بالطريقة الجافة  
بأقل الكلف الاقتصادية لزوم سد احتياجات وزارة النفط والثروة  
المعدنية .

ويتمتع هذا المنتج الجديد بمواصفات فنية عالية ، وكان سابقاً ينتج  
بالطريقة الرطبة وبكلف اقتصادية كبيرة تصل إلى الضعف في  
استهلاك الفيول ، علماً بأن الشركة نجحت العام الماضي في إنتاج  
صنف الإسمنت المقاوم للكبريتات بالطريقة الجافة وذلك ضمن  
خطتها لاستثمار الطاقات وتخفيف كلف الإنتاج .

## العراق

### قطاع صناعة الإسمنت في نينوى يستأنف نشاطه

عاود قطاع صناعة الإسمنت في محافظة نينوى نشاطه تدريجياً  
بعد توقفه عن الإنتاج بسبب الظروف الأمنية . وكانت المحافظة  
تضم وحدها ستة معامل حكومية لصناعة هذه المادة من أصل 18  
معماً في عموم محافظات العراق قبل اجتياح داعش للمنطقة في  
2014 . وكانت هذه المعامل تنتج نحو مليون ونصف المليون  
طن سنوياً من جميع أصناف الإسمنت المقاوم والعاودي والأبيض.  
وتضرر قطاع الإسمنت في المحافظة إلى حد كبير جراء أفعال  
عناصر داعش الذين قاموا بتخريب أبنية المعامل وخطوط الإنتاج  
فيها وسرقوا الآلات والمعدات الخفيفة لاستخدامها أو بيعها ، ولكن  
اليوم تمت إعادة إعمار معملين لصناعة الإسمنت في نينوى ، هما  
الحدباء وحمام العليل ، بعد إصلاح الأضرار اللاحقة بهما وتأهيل  
الخطوط الإنتاجية .

كما أن أعمال التأهيل متواصلة في المعامل المتبقية، وذلك وفق  
خطط مدروسة ومعدة حسب الجدوى الاقتصادية لإعادة الإعمار  
وحجم الأضرار في كل معمل . وتجري الاستعدادات لتشغيل  
معملين آخرين في مجمع بادوش الصناعي حيث وصلت أعمال  
الصيانة والتأهيل هناك إلى مراحلها النهائية .

ومن الجدير بالذكر أنه مع انطلاق إعادة الإعمار ، قفزت الحاجة  
السنوية إلى الإسمنت إلى 24 مليون طن ، علماً بأن الإنتاج الوطني  
يسد حالياً 70 % من الحاجة المحلية . كما أن الحكومة تساعد في  
تسويق الإسمنت محلياً ، حيث أصدرت قراراً في 2015 بحظر  
استيراد هذه المادة في محاولة لحماية الإنتاج الوطني من المنافسة  
الأجنبية والتشجيع على تطوير تلك الصناعة الاستراتيجية .

المصدر: [www.diyaruna.com](http://www.diyaruna.com)

## عمان

### ريسوت للإسمنت» تعلن إجراء دراسات أولية لاستكشاف إنشاء

#### مصنع للإسمنت في جورجيا

صدق مجلس إدارة شركة ريسوت للإسمنت على القيام بإجراء  
دراسات أولية لاستكشاف إنشاء مصنع متكامل للإسمنت تقدر  
طاقته الإنتاجية بمليون طن في العام بجورجيا . وتجدر الإشارة  
إلى أن شركة ريسوت للإسمنت ممثلة في شركة بايونير - جورجيا  
المحدودة التابعة لها تمتلك محجراً بطاقة احتياطية للحجر الجيري  
بأكثر من 30 مليون طن على بعد 60 كم من العاصمة تيبليسي .

العملية السابعة منذ ديسمبر / كانون الأول 2017 من ميناء جن  
جن .

وتهدف الشركة إلى تصدير مليوني طن من الإسمنت في عام  
2020 كجزء من طموح البلد البالغ 5 ملايين طن سنوياً .

المصدر: [www.djazairess.com](http://www.djazairess.com)

### الجزائر تصدر الإسمنت نحو النيجر

شرعت الجزائر في تصدير أولى كميات الإسمنت إلى الخارج ،  
حيث قام مصنع الإسمنت أوليف بأدرار بتصدير نحو 950 طناً  
من الإسمنت الرمادي باتجاه النيجر . كما أعلن مصنع الإسمنت  
بأدرار والتابع لمجمع الهامل الخاص ، والذي دخل حيز الخدمة  
شهر ديسمبر / كانون الأول الماضي أنه يعتزم مواصلة صادراته  
بشكل منتظم في المستقبل وبكميات أكبر .

وبطاقة إنتاجية تقدر بـ 1.5 مليون طن في السنة ، يخطط مصنع  
الإسمنت أوليف لتخصيص جزء كبير من إنتاجه إلى التصدير،  
ليصل إلى نحو مليون طن سنوياً في المستقبل القريب .

المصدر: [www.tsa-algerie.com](http://www.tsa-algerie.com)

## العربية السعودية

### إسمنت نجران تستلم رخصة تصدير الكلنكر

أعلنت شركة إسمنت نجران استلامها رخصة تصدير الكلنكر  
بتاريخ 30 أبريل / نيسان 2018 والصادرة من وزارة التجارة  
والاستثمار . وقالت الشركة في بيان لها إن مدة الرخصة سنة من  
تاريخ صدورها .

المصدر: [www.argaam.com](http://www.argaam.com)

### إسمنت ينبع توقع اتفاقية لتصدير مليون طن كلنكر و500 ألف

#### طن إسمنت

أعلنت شركة إسمنت ينبع عن توقيعها اتفاقية لتصدير مليون طن  
من الكلنكر ونصف مليون طن من الإسمنت وذلك لمدة عام ابتداءً  
من شهر أبريل / نيسان .

وأوضحت الشركة في بيان لها أنه من المتوقع أن يبلغ الأثر المالي  
لهذه الاتفاقية على إيرادات الشركة حوالي 100 مليون ريال خلال  
العام المالي الحالي .

المصدر: [www.argaam.com](http://www.argaam.com)

### إسمنت السعودية توقع اتفاقية مع «جنرال إلكتريك» لزيادة

#### إنتاجية الطاقة

وقعت «شركة إسمنت السعودية» اتفاقية مع «جنرال إلكتريك  
للطاقة» لتحديث ثلاثة توربينات غازية من طراز GE 6B في  
منشأتها بالهفوف ، بهدف رفع حجم الطاقة المنتجة وتعزيز كفاءتها .

وقالت الشركة إن هذه الاتفاقية تمثل المرة الأولى التي يجري  
فيها استخدام حلول «مسار الغاز المحسن AGP» التي طورتها  
«جنرال إلكتريك» لتعزيز إنتاجية الطاقة ضمن قطاع الإسمنت  
على مستوى العالم . وأشارت إلى أن المشروع سيساهم في الحد  
من حاجة «الإسمنت السعودية» إلى سحب الكهرباء من الشبكة  
الوطنية .  
ومن المتوقع استكمال التحديثات خلال الربع الثالث من العام



لبدائل الوقود التي يتم تغذيتها بنظام الهوت ديسك، وسيتم تعميم هذه التكنولوجيا في مصر في المصانع التي يمكن استخدامها بدائل الوقود والاستفادة من مشروع تدوير المخلفات الصلبة .

ولهذه التجربة العديد من الفوائد البيئية والاقتصادية مثل الحد من انبعاثات غازات الاحتباس الحراري (غاز ثاني أكسيد الكربون) بما يزيد عن 30 ألف طن في السنة ، ما يجعل الشركة تحقق التوافق مع قانون البيئة رقم 9 لسنة 2009 ولائحته التنفيذية من خلال استخدام الوقود البديل دون أي تغيير يذكر في طبيعة الانبعاثات الغازية .

وذكر المدير الفني للشركة العربية للإسمنت أن المشروع يجري تنفيذه في خط الإنتاج الأول في الشركة التي تنتج 4.2 مليون طن سنوياً بمحافظة السويس .

المصدر: [www.almasryalyoum.com](http://www.almasryalyoum.com)

**لجنة البيئة بالسويس تبحث الأثر البيئي لتوسعات مصنع الإسمنت**  
عقدت اللجنة العليا للبيئة بمحافظة السويس اجتماعاً لدراسة تقييم الأثر البيئي لمشروع توسعات مصنع إسمنت السويدي، لإنشاء خط إنتاج إسمنت جديد بالمنطقة الصناعية للصناعات الثقيلة على طريق القطامية السخنة القديم باستثمارات تصل إلى 1.7 مليار جنيه ، وإنتاج 2 مليون طن إسمنت .

المصدر: [www.elwatannews.com](http://www.elwatannews.com)

**تبتان مصر تعزز تدشين محطة طاقة شمسية بقدرة 8 ميغاوات**  
تعزز مجموعة تبتان مصر للإسمنت تدشين محطة طاقة شمسية بقدرة 8 ميغاوات وبتكلفة تصل إلى 8 ملايين دولار ، بجوار مصنع إسمنت بني سويف ، وتربط القدرات المنتجة من المحطة على الشبكة القومية للكهرباء ، وتبيع الفائض للمصانع الأخرى .

وتنتج مجموعة تبتان مصر للإسمنت (TCE) الإسمنت والخرسانة الجاهزة، وتدير مصنعين للإسمنت في محافظتي بني سويف والإسكندرية .

المصدر: [www.alborsanews.com](http://www.alborsanews.com)

## المغرب

**قطاع الإسمنت يواجه صعوبات**  
تتوقع شركات تصنيع الإسمنت سنة صعبة حيث انخفضت المبيعات في أبريل / نيسان إلى أدنى مستوى لها منذ عام 2014 .

المصدر: [www.cementegypt.com](http://www.cementegypt.com)

وقد تم بدء المفاوضات مع شركاء محتملين للمشاركة في رأس المال والتعاقد الخاص بالإنشاء وتوفير المواد والتصميم الهندسي .

المصدر: مباشر

**تدشين وحدة التعبئة الأوتوماتيكية الجديدة لشركة إسمنت ريسوت**  
قامت شركة ريسوت للإسمنت وهي إحدى أكبر منتجي الإسمنت في سلطنة عمان بتدشين وحدة تعبئة الإسمنت الأوتوماتيكية الجديدة ، مما سيمكن الشركة من مضاعفة طاقة التعبئة والتوزيع ، وسوف يؤدي ذلك إلى تعزيز وجود الشركة في الأسواق المحلية وأسواق التصدير .

المصدر: مباشر

**«مكونو» يُوقف إنتاج «ريسوت للإسمنت» 10 أيام**  
توقعت شركة ريسوت للإسمنت أن يستمر توقف إنتاجها لما بين 8 أو 10 أيام، جراء تضرر الشركة من إعصار «مكونو».

وأوضحت الشركة أن ما شهدته من أنواء مناخية وإعصار تسبب في خسائر خارجية وفي دخول المياه إلى مباني الإنتاج وساحات التخزين مما أدى لتوقف الإنتاج .

المصدر: مباشر

## ليبيا

**بلدية البيضاء تبحث إنشاء مصنع إسمنت بالمدينة**  
عقد عميد بلدية البيضاء اجتماعاً مع عدد من رجال الأعمال بالبلدية وعدد من المستثمرين الألمان لدراسة وبحث إمكانية إنشاء مصنع لتصنيع وإنتاج الإسمنت داخل البلدية .

وتم خلال الاجتماع الاتفاق على توريد مصنع للإسمنت بقدرة إنتاجية تصل لـ 4 آلاف طن يومياً حيث سيتم توظيفه جنوب البلدية طبقاً للمعايير المتعارف عليها وللحفاظ على البيئة القريبة منه .

المصدر: [www.libyaakhbar.com](http://www.libyaakhbar.com)

## مصر

**ارتفاع صادرات الإسمنت بنسبة 16 % خلال الربع الأول من 2018**

كشف تقرير لهيئة الرقابة على الصادرات والواردات ارتفاع صادرات مصر من الإسمنت بنسبة 16 % خلال الربع الأول من 2018 لتسجل 28 مليون دولار مقابل 24 مليون دولار خلال نفس الفترة من العام الماضي .

المصدر: [www.youm7.com](http://www.youm7.com)

**خط إنتاج جديد في مصنع الشركة العربية للإسمنت**

تم افتتاح خط إنتاج جديد يتم تشغيله باستخدام الوقود البديل "تكنولوجيا الهوت ديسك" بالشركة العربية للإسمنت ، بمنطقة العين السخنة بمحافظة السويس وتبلغ طاقته الإنتاجية 6 آلاف طن كلنكر يومياً .

ويتكامل هذا المشروع مع مشروع جمع المخلفات الصلبة الصناعية والمحلية والزراعية حيث تقوم مصانع الإسمنت باستغلال 35 % من هذه المخلفات كبديل حراري باستخدام 75,000 طن سنوياً



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The www.uaacement.com portal website is a place for getting latest cement news, events and worldwide conferences.

We hope the above matters help the improvement of Cement industry in the U.A.E which needs more cement based projects in the future.

We kindly appreciate your comments and suggestions to improve the web site contents and information.

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### Cement types and engineering tables :

- UAE Cement production list
- All Cement types
- Cement burning methods
- Mesh sizes



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أسمنت الوطنية

شريك البناء والتنمية



يتم انتاجه طبقا للمواصفات  
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## لأنه يتمتع بمزايا استثنائية ومواصفات عالمية الصندوق الاجتماعي للتنمية في اليمن يوصي باستخدام إسمنت الوطنية البورتلاندي البوزولاني

أصدر الصندوق الاجتماعي للتنمية في اليمن - ممثلاً بالوحدة الفنية في 2017/10/11 م - تعميماً إلى مديري فروع الصندوق ورؤساء الوحدات التنفيذية فيه ، يوصيهم باستخدام الإسمنت البورتلاندي البوزولاني .

وفي حديثه «مجلة عالم الإسمنت ومواد البناء» أكد الأستاذ علي الأهدل مدير التسويق بالشركة الوطنية للإسمنت بأن الوحدة الفنية في الصندوق الاجتماعي للتنمية أوصت في التعميم الصادر إلى فروعها ، بأن يقتصر في تنفيذ المشاريع في المناطق الساحلية والمناطق ذات الرطوبة العالية ومشاريع الصرف الصحي على الإسمنت البورتلاندي البوزولاني .

وقال الأهدل إن التعميم يؤكد أهمية الخصائص والمميزات والمواصفات العالية التي يتمتع بها هذا النوع من الإسمنت . وأشار إلى إشادة الصندوق الاجتماعي بحرص الشركة الوطنية على تطوير منتجاتها من الإسمنت البورتلاندي البوزولاني . علماً بأن الإسمنت البورتلاندي البوزولاني الذي أقر استخدامه بموجب هذا التعميم هو الإسمنت البورتلاندي البوزولاني المنتج وفقاً للمواصفات القياسية الأمريكية والأوروبية بالكود





م. ياسر الدغيش مدير المبيعات



أ. علي الأهدل مدير التسويق

عديدة أهمها أنه يمنح اللدونة والمرونة لعجينة المونة الإسمنتية لأعمال التشطيبات الداخلية والخارجية للمباني ، ويقلل من الحرارة الناتجة من المرحلة الأولى لإضافة الماء .

كما أن من خصائص ومزايا الإسمنت البورتلاندي البوزولاني أنه يستطيع منع التفاعل القلوي على الكتل الخرسانية ، ويقلل المسامية والنفاذية ويقلل من تسرب الرطوبة والمياه في الخرسانة لنعومته العالية ، ويعد عازلاً جيداً للحرارة ، وبالتالي يعمل على تخفيف استهلاك الطاقة الكهربائية. كما يعمل على امتصاص الضجيج ويساعد في العزل الصوتي ، كما يزيد من فاعلية مقاومة الحرائق ، مفسراً بذلك سبب صناعة المداخن والأفران من هذا الإسمنت . كما أن من خصائصه ومزاياه مقاومته لأملح الكبريتات والكلوريدات .

وكان الأهدل قد أشار إلى أن صناعة الإسمنت بدأت في اليمن في السبعينيات من القرن الماضي لكنها بقيت بحاجة ماسة لإسمنت يتوافق مع البيئة اليمنية المتنوعة ، فالإسمنت الذي يستخدم في الأماكن الجافة لا يصلح في البيئة الرطبة أو ذات الملوحة والعكس ، حتى جاءت الشركة الوطنية للإسمنت لتقدم للمستهلك أصنافاً متعددة من الإسمنت وفق المواصفات الأمريكية والأوروبية ومن تلك الأصناف كان إسمنت الوطنية البورتلاندي البوزولاني في العام 2013 ، والذي يتناسب مع كل البيئات اليمنية .

وقال : إن البوزولانا هي صخور محترقة نتجت عن انفجارات بركانية ، وتتشكل من أحجار وحصى صغيرة بأحجام مختلفة بعضها لا يزيد حجمه عن 4 سم ، ويمكن استخراجها من مواقع بركانية كثيرة في اليمن ، مؤكداً بأن اليمن غنية بكل أنواع المعادن ومنها الصخور البركانية واليمنيون عرفوا مادة البوزولانا - أو ما يعرف بالقضاض - قبل أكثر من أربعة آلاف سنة، وبسبب قضاض - البوزولانا - صمدت الصهاريج في عدن ، وصمدت سدود وأحواض لحجز المياه في اليمن ولا زالت تستوعب الماء إلى اليوم وتحفظه دون تسرب ، بل ودون صيانة تذكر منذ قرون طوال .

(EN197 -1:2011CEMII/A-P 42.5 N) ، وهو ما يتطابق مع مواصفات إسمنت الوطنية البورتلاندي البوزولاني والظاهرة على عبوة المنتج (الكيس) .

من جانبه أوضح مهندس المبيعات في الشركة الوطنية للإسمنت م. ياسر الدغيش الفرق بين الإسمنت البورتلاندي العادي والإسمنت البورتلاندي البوزولاني قائلاً : «يتكون الإسمنت البورتلاندي البوزولاني من (80 - 94%) من مكونات الإسمنت البورتلاندي العادي مضافاً إليه (6 - 20%) بوزولانا (وهي مواد بركانية سليكونية وألومينية طبيعية مائة بالمائة ، تؤخذ من الجبال البركانية مباشرة ولا تتعرض لأية تفاعلات أو إضافات كيميائية» .

وأضاف إن الإسمنت البورتلاندي البوزولاني يشابه الإسمنت البورتلاندي العادي في جميع خواصه ويتفوق عليه في بعض الخواص منها : استمرار تطور مدى قوة المقاومة لإسمنت البورتلاندي البوزولاني أكبر من مقدار تطور قوة المقاومة للإسمنت البورتلاندي العادي ، وكذلك انخفاض درجة التمهيه مما يؤهل الإسمنت البورتلاندي البوزولاني للاستعمال في مختلف الصبات الخرسانية .

كما ذكر الدغيش أمثلة عديدة لاستخدام الإسمنت البورتلاندي البوزولاني ، منها تصنيع البلوك بكافة أنواعه والأنابيب الخرسانية المعرضة للمياه ذات النسبة العالية من الكبريت ومحطات الصرف الصحي ، والكباري والجسور والأنفاق ، وقنوات تصريف مياه السيول في المناطق التي تحتوي تربتها على نسبة عالية من الكبريتات والسليكا الحرة ، والصبات الخرسانية في كل المباني والمنشآت المختلفة .

كما أوضح بأن وجود مادة أكسيد السليكا وأكسيد الألومنيوم في البوزولانا الطبيعية وتفاعلها مع أكسيد الكالسيوم في الإسمنت يساعد على استمرار التفاعل الإسمنتي البوزولاني ويزيد من قوة وديمومة الخرسانة ويعمل على الحد من التشققات الناتجة عن تمدد تفاعلات القلوي مع الركام .

كما يتمتع الإسمنت البورتلاندي البوزولاني بعدة خصائص ومزايا



التاريخ: 2017/10/11م

الوحدة الفنية

مذكرة داخلية

المحترمون  
المحترمونالإخوة/ مديرو الفروع  
الإخوة/ رؤساء الوحدات التنفيذية

تحية طيبة وبعد،،،

الموضوع/ استخدام الأسمنت البورتلاندي البوزلاني (EN 197-1:2011 CEM II/A-P 42.5 N)

لا يغيب عنكم أن الصندوق الاجتماعي بموجب تعميمه الصادر في 2013/11/12م كان متحفظاً على استخدام الإسمنت البوزلاني في الخرسانات المسلحة بمشاريع الصندوق، وذلك بسبب انخفاض مقاومة مكعباته الاختبارية بعد 28 يوماً مقارنةً بنظيره الإسمنت البورتلاندي العادي، وهذا رغم تفوق الإسمنت البوزلاني الذي أشرنا إليه في نفس التعميم من حيث خصائصه البيئية ومقاومته للأملاح والكبريتات.

وبما أن الشركة المنتجة للإسمنت البوزلاني حرصت على تطوير منتجها من الإسمنت المذكور لتتوافق ملاحظة الصندوق التي حالت دون استخدام تلك النوعية من الإسمنت منذ وقت مبكر في خرسانات مشاريع الصندوق، فإنه لا مانع الآن من استخدام الإسمنت البوزلاني في كافة مشاريع الصندوق، سواءً كان ذلك في الخرسانات أو في أعمال التشطيبات.

وتوصي الوحدة الفنية كذلك بأن يقتصر تنفيذ مشاريع المناطق الساحلية، والمناطق ذات الرطوبة الهوائية أو الأرضية العالية، ومشاريع الصرف الصحي على الإسمنت البورتلاندي البوزلاني وحده، وإلغاء استخدام الأنواع الأخرى من الإسمنت الموسومة بصفة (الإسمنت المقاوم للأملاح أو الكبريتات) في المشاريع المشار إليها.

علماً بأن الإسمنت البوزلاني الذي أقر استخدامه بموجب هذا التعميم هو الإسمنت البورتلاندي البوزلاني المنتج وفقاً للمواصفات القياسية الأوروبية بالكود (EN 197-1:2011 CEM II/A-P 42.5 N)، مع ضرورة التأكد من وجود شارة ذلك الكود على غلاف العبوة الإسمنتية، ومع مراعاة إخضاع الخرسانات المسلحة المنتجة من ذلك الإسمنت لاختبارات المقاومة المعتادة التي يتم إجراؤها بعد 7 أيام أو 28 يوماً، وموافاة الوحدة الفنية بأي ملاحظات ترونها على النتائج.

مع خالص التحية والتقدير،،،

جميل القرشي

رئيس الوحدة الفنية

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الشركة الوطنية للأسمنت  
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## الاستعمالات المتطورة للإسمنت الأبيض

إعداد: د. حمد الله الخطيب

### مقدمة عن الإسمنت الأبيض

#### صناعة الإسمنت الأبيض

#### الاستعمالات :

أعمال البناء المختلفة

صناعة البلاط

تثبيت أعمال الرخام والأدوات الصحية

تثبيت البلاط السيراميك

أعمال الديكور

ترميم الآثار

صناعة النوافير

أعمال أحواض السباحة

عمل الخطوط الأرضية في المطارات

الطوب الرملي الأبيض

صناعة القوالب

مقاعد الحدائق والأكسسوارات

صناعة بلاط الموزايك

### استعمالات متطورة للإسمنت الأبيض

#### أولاً : القسارة الملونة

وذلك بإضافة الأصباغ المطحونة للإسمنت الأبيض

باللون المطلوب واستخدامه في أعمال القسارة في

البناء ومن ميزات ذلك :

- توفير في الدهان وثباته لسنوات .
- عدم تقشر الدهان او تغيره مع الوقت بتأثير العوامل الجوية
- يمكن تطبيقها في القسارة الداخلية أو الخارجية للمباني

- والأعمال الإنشائية .
- تنتج ألوان نظيفة وزاهية كما يمكن تشكيل اللون المطلوب بإضافة أكثر من صبغة وبالدرجة المطلوبة .
- استخدام ذلك أيضاً في أعمال الديكور المختلفة .
- تستخدم كذلك في الخرسانة الملونة .

#### ثانياً : صناعة ألواح الإسمنت (Fiber Cement Board) باستخدام الإسمنت الأبيض والألياف

لقد اعتمدت صناعة ألواح الإسمنت بالألياف ولسنوات عديدة على الإسمنت البورتلندي العادي ومن سلبيات ذلك التكلفة العالية في إضفاء اللمسات الفنية المطلوبة على الألواح كاللون وغيرها على السطح الخارجي وخصوصاً ألواح الجدران والفواصل والأسقف .

والآن تطور الموضوع بصورة أفضل وتكلفة أقل باستخدام الإسمنت الأبيض بصناعة ألواح جذابة وكما تم استخدام هذا التطبيق في صناعة الفواصل الداخلية Indoor Partitions بدلاً من تلك المصنعة بالجبس وقد انتشر هذا في كثير من دول الشرق الأقصى ودول أخرى كثيرة .

ويمكن توفير الألواح بالعديد من الألوان الجذابة والتي تحقق مجالاً واسعاً للاختيار في عمليات بناء المباني والمجمعات التجارية والفلل وأعمال الديكور المختلفة .

#### ثالثاً : حجر البناء الصناعي Artificial Building Stone

حجر مصنع من الخرسانة البيضاء المعالجة بحيث يأخذ ملامح وخواص حجر البناء الطبيعي من حيث اللون والشكل والخواص ويمتاز بجودة عالية ومنظر جميل وخصائص ممتازة من حيث ما يلي أيضاً :-

رابعاً : الإسمنت المضيء Light Cement

الإسمنت المضيء قد يغني عن كثير من إضاءة الشوارع وبعض أجزاء المنازل مما يوفر في الكهرباء .

تركيبة الإسمنت المضيء :

يصنع الإسمنت المضيء من الإسمنت الأبيض غالباً حيث تضاف له مواد راتنجية مطحونة لها القدرة على تخزين الطاقة الضوئية من الشمس نهاراً وإطلاقها كضوء ليلاً والإسمنت الأبيض لإتمام عملية الانعكاس للضوء .

ومن نتائج استخدام الإسمنت المضيء أنه يضفي زينة ومظهراً جمالياً للمدن في المستقبل بالإضافة إلى التوفير المتحقق من ذلك .

ويتوقع أن يلغي هذا الإسمنت الحاجة إلى كثير من الأنوار الخارجية في الطرقات وكذلك الداخلية في المنازل إلى حد كبير .

استخدامات الإسمنت المضيء :

- في طلاء المنازل والأسوار
- ممرات الدرجات الهوائية
- الطرق السريعة
- طلاء الجدران الداخلية لبرك السباحة
- الجسور
- من الممكن استخدامه في المناطق التي لا يوجد بها تيار كهربائي أو إنارة .

يقول مخترع هذا النوع من الإسمنت ( العالم المكسيكي خوسيه كارلوس ) بأنه يحافظ على خواصه المشعة لمائة عام على الأقل ويمكن أن يعمل أيضاً في الأيام الغائمة والأماكن الداخلية طالما أنه يتعرض للموجات فوق البنفسجية خلال النهار .

ومن الألوان المتاحة إلى الآن الأزرق والأخضر وهناك محاولات للتوصل إلى إسمنت يطلق اللون الأبيض والأحمر والبنفسجي .

- قلة امتصاصه للماء : ( 0.5 - 2 % )

- قوة مقاومة الضغط : ( 5 - 7 ) نيوتن / ملم مربع

- مقاوم للعوامل الطبيعية

- عازل للحرارة

- مانع للرطوبة والتعفن

ويمتاز بإمكانية التشكيل الجميل بتلبية مختلف الأذواق وبألوان مختلفة بالإضافة إلى دقة في القياس والشكل المطلوب ويمتاز بسرعة بنائه وخفة وزنه مقارنة بالحجر الطبيعي .

مكونات حجر البناء الصناعي :

تتكون الخلطة الخاصة بتصنيع حجر البناء الصناعي من المكونات التالية :

- الإسمنت الأبيض

- الرمل الزجاجي

- حجر جيرى مكسر ( عدسية )

- مواد مضافة ( صبغة باللون المطلوب )

حيث يتم تجهيز الخلطة ويتم صبها في قوالب بالمقاس والنقش والشكل المطلوب .

استخدامات حجر البناء الصناعي :

يستخدم حجر البناء الصناعي في الكساءات الداخلية والخارجية للمباني والفنادق والمجمعات التجارية ونشير إلى انتشار واتساع استخدامه وخصوصاً في دول الخليج العربي .

إيجابيات إنتاج واستعمال حجر البناء الصناعي :

- العمل على زيادة استخدامات الإسمنت الأبيض وما لذلك من إيجابيات .

- سهولة تشكيله بالمقاسات والألوان والأشكال المطلوبة .

- تدني سعره مقارنة مع أسعار الحجر الطبيعي حيث نصف تكلفة وتركيب الحجر الطبيعي .

- سهولة وسرعة في أعمال التركيب وإنجاز أعمال البناء والتشطيبات .

- من الممكن تصميمه أيضاً بما يسمح لإتمام عمليات توصيل الأنابيب وخطوط الكهرباء وغيرها .