



CEMENT & BUILDING MATERIALS REVIEW

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Cement and Building Materials Review

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ALGERIA

Algeria to produce surplus of cement in 2017

Minister of Industry and Mines has said that Algeria will report a surplus in cement production later in 2017 as the country is expecting to produce 30Mt of cement due to newly commissioned plants. The Minister previously announced the commissioning of new plants at Adrar and in Biskra in April 2017.

On the other hand, GICA (Groupe Industriel des Ciments d'Algérie) announced it has produced 12.60 million tonnes of cement throughout 2016, up by 4% compared to 12.14 million tonnes in the previous year.

Global Cement News

Fives installs first cement grinding mill at ECDE's Chlef plant in Algeria

Fives installed the first FCB B cement grinding mill in early April 2017 at Entreprise des Ciments et Dérivés d'El Chellif's (ECDE) 6000t/day clinker production line at Chlef. Installation of the mill followed the erection of the FCB kiln (Ø 5.1 x L 82m) in February 2017. A heavy lifting jack crane system sliding on rails was required to install the 4.8 x 17.8m shell and 98.5t gearbox inside its specific finished building. Grinding mills no. 2 and no. 3 will be installed next to complete the cement grinding mills at the unit. Once complete it will include three 160t/hr FCB B-mills with 5320kW drives and associated FCB TSV4500 HF classifiers. ECDE is a member of the industrial group Ciments d'Algérie (GICA).

The plant will start production on 1st October this year.

Global Cement News

CBMI completes erection of rotary kiln and preheater at SARL Biskria cement plant

Chinese contractor CBMI Construction Co. Ltd. has completed the erection of the rotary kiln and of the preheating tower as part of the first production line at SARL Biskria cement plant.

Daily Cement

Saoura Cement Company chooses Gebr. Pfeiffer mill for new production line

The Saoura Cement Company has chosen a MVR 5000 R-4 mill from Gebr. Pfeiffer for the new production line at its plant in Zahana. The 425t/hr raw cement mill will grind material to a fineness of 12 % R90µm and the drive will have a power of 3500kW. The expected moisture level of the input material will be 13%. The order was placed by CBMI, a subsidiary of China's Sinoma, which is building a plant upgrade for Groupe des Ciments d'Algérie (GICA).

Global Cement News

MCC Baosteel Technology delivers non-standard steel for structure of GICA's cement plant in Sigus

The Heavy Machinery Branch of MCC Baosteel Technology Services Co. Ltd. commenced MCC Group's non-standard cement equipment project at GICA's cement plant in Sigus, in the Wilaya of Oum El Bouaghi, located south of Constantine, around 340 km east of Algiers.

Daily Cement

ASEC sells Algerian asset

ASEC Cement Company and ASEC Cement Djelfa Offshore have sold their 100% stake in ASEC Ciment Algerie to an Algerian investor for US\$60m. ASEC Cement is based in Egypt, while ASEC Cement Djelfa and ASEC Ciment Algerie are based in Algeria.

Global Cement News

EGYPT**Energy tariffs hike to affect Egypt cement firms**

Energy price hike in Egypt poses threat to the profitability of cement manufacturers. Electricity costs represents nine percent of direct expenses for cement producers, therefore a hike in power tariffs will very likely result in a more difficult situation for those companies.

Fuel-intense industries are actually expected to face an increase in electricity cost within the range of 35- 40 percent. However, companies like El Sewedy Cement have a large pricing power and may pass some of the raising costs to their final consumers.

On the other hand, Tourah Portland Cement will likely be more affected, since conversion to the use of coal is only expected to end-2018.

CemWeek

Sinoma-Chengdu to build Egyptian Cement's plant in Sohag

On April 13, 2017, Sinoma-Chengdu Design & Research Institute of Building Materials Industry Co. Ltd. announced it was awarded an EPC contract to build a clinker cement production line for Egyptian Cement (or Elmasreen Cement), part of Egyptian Steel Group.

Daily Cement

Massive mill order for Loesche in Egypt

Germany's Loesche GmbH has been contracted to supply 18 new vertical roller mills to China's Sinoma CDI, which is building a six line cement plant at Beni Suef on behalf of the Egyptian Ministry of Defence. Each line will have a capacity of 6000t/day (12.6Mt/yr), making the plant one of the largest in the world.

It is anticipated that the mills will be delivered within 2017, putting high demands on the delivery time of the mill components.

Global Cement News

Arabian Cement to spend US\$7m on upgrades

Arabian Cement has announced three upgrade projects with a budget of US\$7m. The projects include the construction of a mechanical crane to feed the kiln of the first production line, a new system to feed the cement mills and a new coal mill.

Global Cement News

Gebr. Pfeiffer supplies complete coal grinding plant to BMIC's Assiut cement plant

BMIC (Building Materials Industry Company) awarded Gebr. Pfeiffer a contract for a complete coal grinding plant on a turnkey basis for its cement plant located in Assiut.

Daily Cement

IRAQ**Man Diesel & Turbo supplies 6 engines to Samawah cement plant**

Man Diesel & Turbo has delivered six MAN 18V32/ 40 engines, including gen-sets and mechanical equipment, to Samawah cement factory's captive power plant.

Daily Cement

NORINCO International awarded EPC contract to build cement plant for Jabal Bazian Co.

Jabal Bazian Company for General Trading Ltd. and NORINCO International Cooperation Ltd, a subsidiary of China North Industries Corporation, have signed an agreement for building a cement plant on EPC basis.

Daily Cement

JORDAN

Cement demand down 40% from 2010 to 2017

Cement demand has plunged by nearly 40% over the past 7 years due to lower project activity and higher land prices, a latest report revealed.

Daily Cement

LIBYA

Libyan Cement Company to resume operations at Benghazi Cement Factories

Following a General Assembly Meeting held in Amman, Jordan, the Joint Libyan Cement Company Inc. announced plans to get its 2 cement factories in Benghazi back in operation as soon as possible.

The Libyan Cement Company (LCC) plans to rebuild and reopen two cement plants in Benghazi and Hawari. The chairman of parent company Joint Libyan Cement Company (JLCC) said that the priority was getting the plants near Benghazi operational again. Following a survey LCC says that extensive rebuilding will be required and this may take up at least one year.

LCC is 90% owned by the JLCC, a joint venture between Asamer Libya and the Economic and Social

Development Fund. Asamer Libya was purchased in 2015 from Asamer by Libya Holdings Group. LCC also operates a third cement plant at Derna that has remained operational throughout the conflict.

Global Cement News

MOROCCO

Cement sales in 1Q17 down 4.74% year-on-year

The Direction for Studies and Finance Forecasts (DEPF) in the country's Ministry of Economy and Finances released its report on Morocco's cement consumption during the month of March and the first quarter of 2017.

Daily Cement

SGTM to start building its new cement plant in El Jadida

SGTM (Société Générale des Travaux du Maroc), the country's leader in terms of public works, will finally set up its proposed plant in the rural municipality Ouled Ghanem, 45 km from El Jadida.

Daily Cement

LafargeHolcim to inaugurate Laâyoune cement grinding plant

LafargeHolcim is preparing to inaugurate its Laâyoune cement grinding plant. The unit is expected to join Ciments du Maroc, a subsidiary of HeidelbergCement, that also operates a grinding plant in the south of the country. In addition to these plants Anouar Invest also announced plans in late 2015 to build a 0.5Mt/yr cement plant in the region under the name of Ciment Sud (CIMSUD).

Global Cement News

LafargeHolcim has new research lab in Morocco

LafargeHolcim is expanding its commitment to innovation by opening a Construction Development Lab in Casablanca. Dedicated to the Moroccan and African construction markets, the CDL enables LafargeHolcim Maroc to leverage the Group's global experience and technical know-how to develop construction solutions adapted to the unique constraints and characteristics of its markets, while meeting the technical demands of customer projects.

This new Construction Development Lab aims to deliver innovative construction solutions that match the needs of the Moroccan and African markets, drawing on Lafarge's Research and Development expertise around the world.

Another of LafargeHolcim's major objectives with this new laboratory is to develop partnerships with startups, universities and other higher education institutions to promote R & D, test new ideas and reinforce relationships with building and infrastructure construction experts.

CemWeek

OMAN

Raysut, Oman Cement to build joint cement plant

A new joint-venture, Alwasta Cement, emerged from two Oman cement producers, Raysut cement Company and Oman Cement Company.

The new joint venture will set a new cement plant in the near future, a project currently undergoing detailed feasibility study.

Raysut Cement alone sold a total of 764,000 tons of cement during the first quarter of 2017, compared to 1.02 million tons in the same quarter last year, a decline of 24.88 percent. Oman producers face strong competition from UAE firms.

Recently, Al Anwar Holding and Iranian company HCC announced their own joint venture, to build a cement plant in Duqm. Demand in the Al Wusta region is expected to grow thanks to new infrastructure and industrial projects in the Duqm free zone and adjoining areas.

CemWeek

FLSmidth reports on the new grinding system built for Oman Cement

FLSmidth reports on the company's first EPC project in Oman, to add a 5th cement grinding unit at Oman Cement's plant in Rusayl Industrial Area.

Daily Cement

Raysut Cement receives proposal to sell Oman Portuguese Cement Products

In a filing to the Muscat Securities Market, Raysut Cement Company (RCCI), Oman's largest cement producer, announced it has received an offer from a local company to sell the 50% stake it holds in Oman Portuguese Cement Products LLC.

Daily Cement

SAUDI ARABIA

Saudi Arabia exports cement during 1Q2017

Saudi Arabia exported part of its cement production during the first quarter of 2017. During the March quarter, the country exported a total of 141,000 tons of cement.

Also in the last quarter, Saudi Arabia imported roughly 100,000 tons, mainly from Bahrain.

Recently, the Saudi government lifted its ban of cement exportation and the Ministry of Trade and Investment began issuing export licenses. However, companies are finding it difficult to penetrate regional markets like Qatar or the UAE, because those are already self-sufficient in terms of cement production.

CemWeek

Eastern Cement's limestone mining license renewed

Eastern Province Cement Company announced that its mining license for limestone and clay was renewed.

Daily Cement

Hail Cement Company secures export licence

Hail Cement Company has obtained an export licence from the Ministry of Commerce and Investment. The licence is valid for one year from the date of issue. No significant financial impact is expected upon the financial results of the company.

Global Cement News

Al Safwa Cement to recycle carbon ash from Saudi Electricity Company Saudi

Electricity Company (SEC) has signed a cooperation agreement with Al Safwa Cement Company for recycling carbon ash and use of oils and oil residues resulting from the burning of heavy fuel in the former's power generation plants.

CemWeek

Riyadh Cement Company issues acceptance certificate for Sinoma Nanjing

Riyadh Cement Company (RCC), a subsidiary of Saudi White Cement Co, issued the provisional acceptance certificate for the cement mill transformation project executed by Sinoma International Engineering (Nanjing) Co. Ltd.

Daily Cement

TUNISIA

Government withdraws license for Foussana cement plant

The Ministry of Industry and Trade has withdrawn a license to build a cement plant in Foussana, Kasserine governorate.

Daily Cement

Tunisian government starts bidding process for Carthage Cement

Al Karama Holding, a state-owned company, has initiated a bidding process to sell its stake in Carthage Cement. The company has started a consultation process with investment banks and consultation firms to help it sell its direct and indirect stakes in BINA Group, which includes Carthage Cement. The government owns an estimated 41% share of the cement producer.

Global Cement News

Ciments Artificiels Tunisiens receives ISO 9001:2015 certification

Les Ciments Artificiels Tunisiens (CAT), owned by Colacem, announced it has been granted the ISO 9001:2015 quality management system certification.

Daily Cement

UAE

United Arab Emirates University develops composite insulation from waste materials

Researchers at the United Arab Emirates University (UAEU) have developed a composite thermal insulation material made from a blend of unsaturated polyester liquid with date pits powder. The material is intended to improve upon the low mechanical properties that conventional insulation materials such as polyurethane, polystyrene and mineral wool have. As such it can be produced in different forms such as a sheets, boards and blocks.

Global Insulation News



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Outstanding order for LOESCHE in their 110th year. At a stroke Sinoma CDI orders 18 LOESCHE vertical roller mills for cement works Beni Suef.



The LOESCHE mill with the new COPE drive in operation in the cement plant Mfamosing

LOESCHE's sophisticated delivery schedule allows the general contractor Sinoma CDI to at once build 6 clinker production lines within only 18 months of construction and ensures the operator of the new cement plant Beni Suef a quick market access.

For the new cement plant Beni Suef LOESCHE will in total deliver the sum of 18 new vertical roller mills to the Egyptian Ministry of Defence. It is planned to build six new production lines with a total daily capacity of 36,000 tons of cement clinker until the end of 2017.

To realize this project, LOESCHE will deliver the vertical roller mills. The raw mill with a capacity of 500 t/h will be applied for the grinding of cement raw material to a fineness of 12% R 90 μm . The six powerful cement mills which will have a throughput of 350 t/h each are installed for the grinding of cement clinker to a fineness of 3,200 Blaine

in the step of the process. The six LOESCHE coal mills will be in operation for the grinding of coal to a fineness of 10 % R 90 μm .

Outstanding is the fact that at a stroke 6 lines with a daily total capacity of 6,000 t were ordered for only one cement plant with the challenge of taking up operation in the second half of 2017. These requirements place high demands on the delivery time of the mill components. Thanks to their long-standing experiences from a variety of fast-track-projects LOESCHE could carry conviction to the Ministry of Defence and assure the expected quick market entry with an elaborated plan of delivery.

This impressive order tops off the 110 years of LOESCHE and clearly underlines the strong clients' trust that LOESCHE has gained in their long history with more than 3,000 remarkable references.

Belonging to Sinoma International Engineering Co., Ltd., the renowned specialists for the planning of cement plants, Chengdu Design & Research is operating as the contract partner in this project. Both the general contractor as well as the end user were convinced that LOESCHE cement mills will produce cement of highest quality. This will help to cover the increasing cement demand of the public as well as the private sector and the mining industry. Moreover, the state-of-the art technology will improve the competitiveness of the operator as the plant can be operated with the lowest possible specific energy consumption.

On account of the new plant in Beni

Suef, what is more, a considerable number of prosperous jobs will be created and available for the people in the region

Long before, the Ministry of Defence had the opportunity to acquire positive experiences with LOESCHE mills in the cement plant El Arish where for some years two LOESCHE raw mills are operating successfully. This smooth operation led to another order for two more mills for the grinding of cement raw material two years ago.

At that point, the Ministry of Defence decided again in favor of LOESCHE vertical roller mills, ordering two big mills for the grinding of cement at the El Arish cement plant which meanwhile were installed and put into operation meeting all expectations. These energy efficient mills are like all other LOESCHE vertical roller mills designed for the grinding of cement in the position to produce a large variety of cement qualities.

For the Ministry of Defence one important aspect is the possibility to react flexible to the changing requirements of the market that does not only call for common OPC cements but also for a number of different cement types with a large range of additives and variety of product finenesses.

Another plus: by consequently implementing mills designed and delivered by LOESCHE, in the future the Ministry of Defence moreover will cash in on an efficient spare parts pooling, operating 24 LOESCHE mills throughout Egypt.

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For more info see:
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LOESCHE 

INNOVATIVE ENGINEERING

Complete Coal Grinding Plant, on a Turnkey (EPC) Basis

EPC Project: Gebr. Pfeiffer delivers Complete Coal Grinding Plant to Egypt

BMIC, headquartered in Cairo, awarded Gebr. Pfeiffer a contract for a complete coal grinding plant on a turnkey basis for its cement plant in Assiut, Egypt.

Gebr. Pfeiffer, together with its global and local partners, suppliers and subcontractors, is responsible for the complete scope, including engineering, supply of plant parts, imported or locally manufactured, construction and commissioning of the plant.

Detailed description of scope:

- Procurement and delivery of material and equipment
- Basic and detailed engineering
- Manufacture of equipment including supporting structures
- Civil construction, steel structure and mechanical erection works
- Installation of electrical equipment and process instrumentation
- Commissioning
- Management activities for the whole project, starting from the engineering phases through to the achievement of the provisional acceptance

From raw coal storage to injecting pulverized coal into the kiln burner (including upgrading the kiln and calciner burners) – everything comes from a single source: Gebr. Pfeiffer.

The core of the plant is the Pfeiffer MPS 2800 BK coal mill designed to grind 50 t/h coal to a fineness of 12% R 0.090 mm as well as 25 t/h pet coke to a fineness of 3% R 0.090 mm. The innovative mill design allows coal to be ground with a feed moisture of up to 15% and pet coke with a moisture of as much as 8%.

As the world's leading expert in coal mills Gebr. Pfeiffer offers all necessary safety concepts for the grinding of explosive feed material.

Safety concepts and standards:

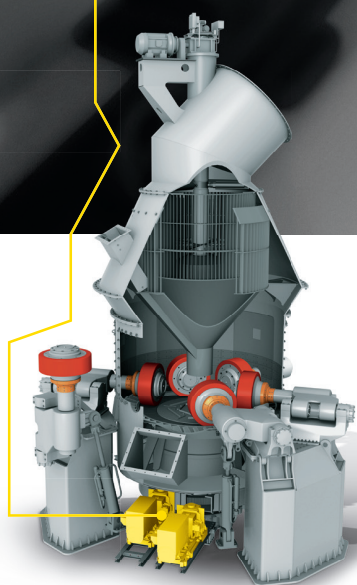
- Design of the grinding plant in accordance with the EC directive 94/9 (ATEX 95)
- Pressure-shock-resistant design of mill and classifier housings
- Explosion venting in ductwork
- Isolation of areas exposed to explosion hazards by installing rotary locks, flame arrestors and safety shut-off dampers
- Monitoring of CO and O₂ levels, dust emission values and process gas temperature
- Inerting and firefighting by CO₂ flooding
- Central vacuum cleaner to remove pulverized coal from mill building

The plant will start operation in the first quarter of 2018.



GEBR. PFEIFFER

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Once again Pfeiffer has set the new standard in grinding performance: MultiDrive®

Ultimate protection against total failure thanks to active mechanical and electrical redundancy - only provided by the MultiDrive®, especially developed for the Pfeiffer MVR mill. The grinding table of the mill is driven by a girth gear. The power of as much as 18,000 kW is delivered by up to six independent drive units, each consisting of gear unit and electric motor. Due to this innovative design, no gear unit is directly located under the mill and thus exposed to grinding forces. This makes the MultiDrive® so unique and most reliable. The active redundancy enables the mill to continue in operation, even in the unlikely event of failure of one of the drive units. The advantage: No unplanned downtime. Maximum production capacity. Always.

Pfeiffer. Passion for grinding.

MVR Vertical roller mill for cement raw material grinding

Société Saoura ciment switches to MVR mill from Gebr. Pfeiffer for its new production line

Société Saoura ciment relies on the Pfeiffer technology for its new cement production line, which will be set up in Zahana, Algeria. While, in 2015, the vertical roller mill for its first production line was supplied by a competitor, the customer has now decided in favour of Gebr. Pfeiffer's innovative vertical mill technology for its second production line.

The mill to be used in Zahana will be an MVR 5000 R-4, grinding 425 t/h of cement raw material to a fineness of 12 % residue 90 microns. The total drive power will be 3500 kW.

The feed material has a surface moisture of almost 13 % and is dried easily while being ground in the mill.

The order was placed by the Chinese contractor CBMI.



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VORTEX LOADING SPOUTS GAIN ATEX CERTIFICATION IN EUROPE

Vortex, a solids and bulk handling components company, announces its Loading Solutions product line has gained Zone 20 (internal) and Zone 21 (external) ATEX certification in the European Union. Because ATEX certification is required for equipment sold through the European Union (EU), this certification allows Vortex to broaden its international reach and enter an established European market for loading spouts. As Zone 20 and Zone 21 are the highest ATEX ratings that can be achieved, Vortex Loading Solutions are compliant for use in even the most hazardous applications, making Vortex products a viable option for all industries.

Established on March 29, 2014, ATEX Directive 2014/ 34/EU is a revised law requiring equipment manufacturers to design and construct equipment in a way that ensures a static dissipative path for material flow, thus reducing the source of ignition for use of equipment in explosive environments. Complemented by ATEX Directive 99/ 92/EC, which is law enforced in the workplace, the purpose of the ATEX Directive is to ensure employee safety and protection when manufacturing in hazardous environments.

The Notified Body sourced to assist Vortex in gaining certification was the UK-based firm, SGS Baseefa. A certification process which took nearly one year to complete, SGS Baseefa was responsible for reviewing drawings and product standards, and for performing material testing, to ensure the

Loading Solutions product line is mechanically and electrically compliant with ATEX Directive guidelines.

Vortex Loading Solutions are designed to capture fugitive dust, prevent material waste, ensure plant and environmental safety, and minimize maintenance and service expenses. Vortex loading spouts can also be designed for standard, abrasive and food-grade material handling, making them an ideal solution for any bulk solids application. Spout sleeves can be constructed from four material options – two of which have been ATEX-certified. Coupled with the spout's four-cable pulley system and 10-year cable warranty, Vortex Loading Solutions are reliable for safety and functionality in any material handling application. Further, all Vortex products from the Quantum and Titan lines are also ATEX-certified, making Vortex one of the safest sourcing options for equipment used in hazardous manufacturing environments.

About Vortex:

For 40 years, Vortex has provided quality slide gates, diverters, iris valves and loading spouts designed specifically for handling dry bulk solids in gravity, vacuum, dilute, or dense phase applications. Vortex valves and spouts are engineered for dependability, durability, easy maintenance, and offer proven solutions to material handling and process efficiency problems. With an in-house team of engineers, Vortex products can be completely customized for individual applications or special installations.



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About the ATEX Directive:

The ATEX Directive 2014/ 34/EU covers equipment and protective systems intended for use in potentially explosive atmospheres. The Directive defines the essential health and safety requirements and conformity assessment procedures, to be applied before products are placed on the EU market. It is aligned with the New Legislative Framework policy, and it is applicable from 20 April 2016, replacing the previous Directive 94/ 9/EC.



For more information, visit:
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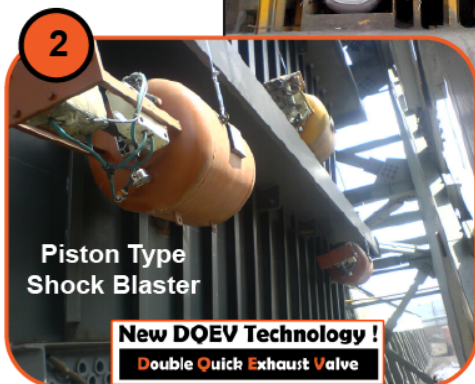
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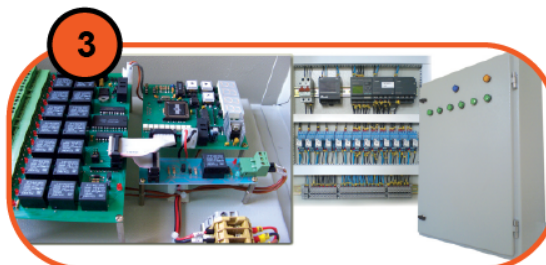
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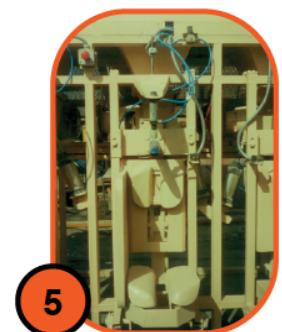
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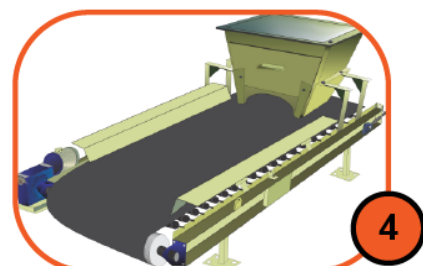
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A Taxonomy of Bulk Material Dosing Systems for Solid Recovered Fuels

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The proportioning of bulk materials is a key functional task within the overall process of cement manufacturing and all related transport and logistic systems. Solid recovered fuels are often characterised by their time variant bulk material properties, which often leads to a non-satisfying dosing accuracy, especially when the associated bulk handling installations are not adequately planned. Even if many different system architectures are proposed throughout the last decades, there is no systematic classification available, which allows a strategic decision for a specific methodology. This article proposes a general taxonomy for the classification of metering and dosing devices for bulk material. Based on the developed framework, an analysis of the typical range of products is carried out. Furthermore the novel ODM-WeighTUBE[®], a tubular gravimetric high-precision dosing system, is introduced as an example for the latest developments within the field of bulk material proportioning.

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 need 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 need 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 solid fuel and the corresponding process requirements.

As an example especially the physical properties shall be briefly introduced here, where the Table 1 provides an overview of typical bulk material properties of solid alternative fuels (here: biomass and refuse-derived fuels (RDF)), as defined in [1]. It shall be mentioned that many of the characteristic values vary immensely over time and for different fuel suppliers. In Europe especially the moisture content within the solid fuel is often causing problems, especially if the corresponding storage and transport systems are not adequately chosen. Here the influence of time-consolidation and compactibility of the material are often underestimated (see [2]).

Within this context, it is also important to consider the long-term stability of the aforementioned characteristics, which is often underestimated during the design phase of bulk material handling systems, especially if there is a lack of experience with the utilisation of novel materials, e.g. during the introduction phase of new alternative or secondary fuels. Therefore, it is essential to start the systematic selection of adequate dosing equipment with a holistic approach towards the exact characterisation of the bulk material by means of mechanical, chemical and other relevant evaluation methods. It is also noteworthy, that the actual process requirements of the proportioning process can also be completely different, depending on where the system shall be installed within the complete manufacturing and logistic process chain. Very important within this context are quite often also legal requirements which need to be fulfilled due to quite strict international standards and quality management procedures.

Table 1 – Typical physical properties of solid alternative fuels

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

If all above mentioned boundary conditions are well defined, it is still not guaranteed, that the actual task of choosing and integrating the optimal corresponding dosing equipment can be completed successfully, since it is observable that the decision for one or other solution is not following clear rational guidelines, but more fuzzy decision factors. A typical example for such a misconception during the planning and installation of dosing equipment is the transfer of positive or negative operational experiences with a particular piece of equipment from a quite specific field of application to a completely different scenario. Such an ill-posed transfer of experience is a typical trap during all conceptual phases of modern engineering, since it is contrary to a logical and rational selection of the optimal equipment.

DI MATTEO developed since its establishment in 1961 an immense experience with the implementation of all kinds of proportioning devices for a great variety of bulk materials in numerous different application fields. From the efficient feeding of alternative fuels (AFs) (e.g. RDF, shredded tyres, sewage sludge, etc.), over the classical dosing of raw materials (limestone, clay, sand, iron ore, etc.) to the implementation of all kinds of weighing hoppers and silos, all types of possible projects were already successfully engineered and realised in cement plants, steel factories and power plants all over the world. Furthermore, the company acted also as a driver of innovation within this field, with the successful introduction of the award-winning patented new tubular gravimetric dosing system ODM-WeighTUBE® (see [3]), and the development of the modular and comprehensive ODM-GravitAS control platform and software library, as introduced in [4] (see Figure 1).

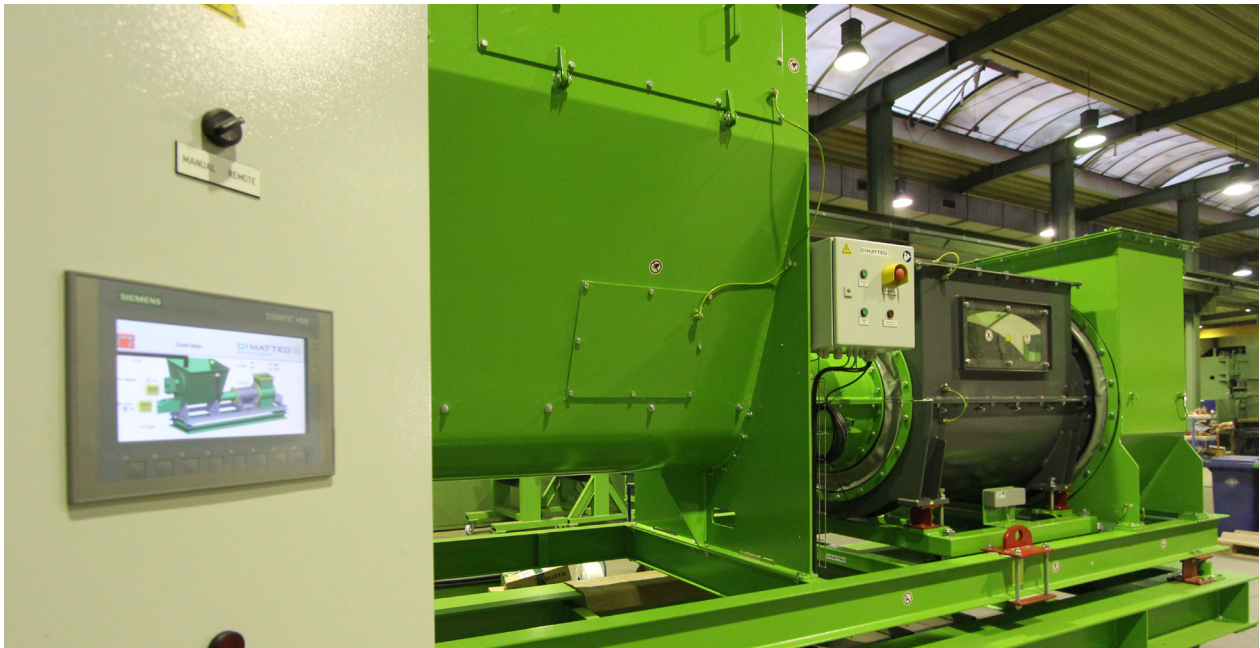
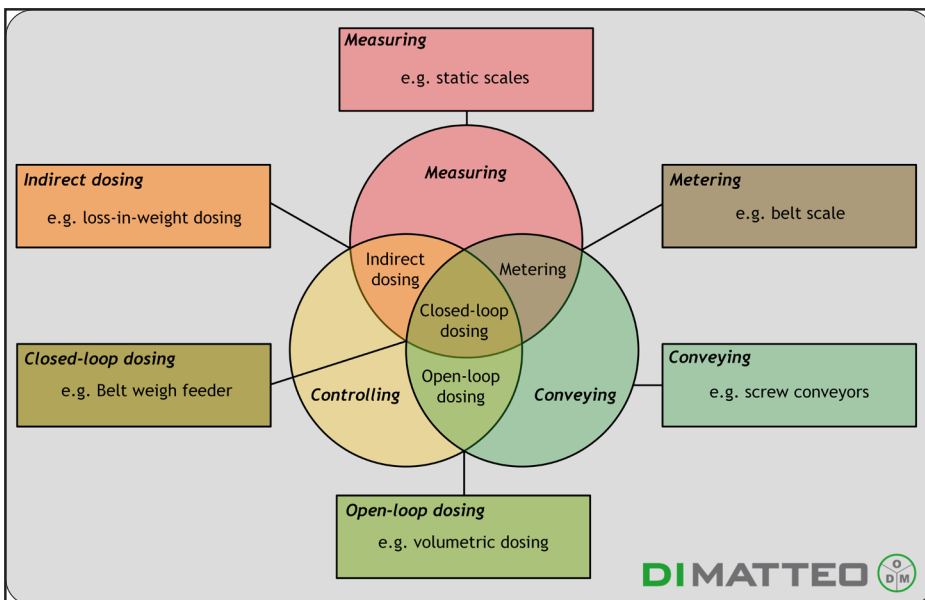


Figure 1- ODM-WeighTUBE® (back) and ODM-GravitAS control system (front)

In order to give a clear guideline which proportioning system or method is a preferable solution within different application scenarios, this article provides an introduction to a framework for the systematic classification and description of different approaches to dosing and metering of bulk materials, which was developed by DI MATTEO. With the integration of the classification system a corresponding taxonomy is proposed. For this reason, section 2 introduces a general classification framework for metering and dosing units. This classification is then used in section 3 to differentiate the typical range of products within the field of bulk material proportioning. One of the latest developments within the field of bulk material proportioning is the introduction of the award-winning ODM-WeighTUBE®, which is presented in section 4. Finally section 5 summarises the article and provides a conclusion to the topic.

2.General Classification of Bulk-Material Dosing Devices

The base for a classification of different dosing and proportioning devices for bulk materials is the former definition of the functional entities of those machines. For this it is reasonable to distinguish three main functional elements of typical dosing devices: (i). measuring, (ii). conveying and (iii). controlling as proposed in [5].



The combination of either any two or all three of these basic elements defines the specific character of the equipment, as shown in Figure 2.

Here, it is possible to name six different classes of machines as a general taxonomy for the proportioning of bulk materials. The exact definition and corresponding aspects are summarised within Table 2.

Figure 2- Classification of different dosing/metering/weighing devices based on three basic functional elements

Table 2 - Overview of different dosing/metering/weighing devices

Class of Machine	Measuring	Metering	Indirect dosing	Open-loop dosing	Closed-loop dosing
Description	The actual volume V or weight m of the material is measured and used to define the actual amount at a given time	The material is conveyed with a certain conveying speed v and at the same time the actual massflow is \dot{M} determined based on a measured weight m	The actual volume V or weight m of the material is measured and used to define the actual amount at a given time and at the same time a separate conveying system is controlled in order to achieve a certain volume flow \dot{V} or mass flow \dot{M} .	The actual conveying speed v is controlled based on a pre-defined calibrated relation in order to achieve a certain volume flow \dot{V} or mass flow \dot{M}	The actual weight m or volume V and the actual conveying speed v is measured to calculate the actual mass flow or \dot{M} volume flow \dot{V} . The actual conveying speed is continuously controlled in order to achieve a desired mass or volume flow.
Measured values	m [kg], V [m ³]	v [m/s], m[kg]	v [m/s], m[kg]	-	v [m/s], m[kg], \dot{V} [[m ³ /h], \dot{M} [kg/h]
Control variables	--		\dot{V} [m ³ /h], \dot{M} [kg/h]	v [m/s]	v [m/s] → \dot{V} [m ³ /h], \dot{M} [kg/h]
Type of operation	-	Continuous	Discontinuous	Continuous	
Type of dosing	--		Gravimetric	Gravimetric	
Example	Silo scale	Belt scale	Differential dosing setups (e.g. loss-in-weight systems)	Screw conveyor with pre-defined calibrated relation between volume and screw speed	ODM-WeighTUBE®

All of these machines are justified within their specific field of application and there is no suitable piece of equipment which can meet all technological and economic requirements of every possible field of application. If for example a continuous flow of material is required by the process (e.g. supply of alternative fuels), there is no possibility to utilize an indirect dosing setup, such as a loss-in-weight system, even if other aspects indicate it.

Therefore DI MATTEO developed and offers products from all the mentioned categories and within the next section, some of the available products will be classified by using the aforementioned framework, in order to get a clear understanding of the physical realisation of the introduced categories.

3. Typical Proportioning Equipment

There is a great variety of available products in the field of bulk material dosing and proportioning and within this section some prominent examples are used to clarify the taxonomy as introduced in section 2. For this the six categories, as introduced in Table 2, are used to provide a classification of the product range from DI MATTEO.

3.1 Pure Measuring Devices – Silo Scales and Weighing Hoppers

Typical examples for pure measuring devices are weighing hoppers and silo scales, which are mainly used in

order to determine the actual filling in terms of weight m [kg] and/or, for bulk material with constant density and humidity, also the volume V [m³]. The mass of the material is measured by means of a set of load cells, corresponding mechanical mounting modules for effective force transmission (see Figure 3) and a corresponding evaluation unit.



Figure 3- Typical load cell module for silo scales or weighing hoppers

A proper proportioning of the material within the silo or hopper is only possible, if the setup is complemented with a controllable discharge system (e.g. a screw discharge bottom – ODM-ScrewDOS). Such a setup would be an indirect dosing system, where the following section provides an example.

3.2 Indirect Dosing – Differential Dosing Setups

The indirect dosing setup consists typically of a silo scale or weighing hopper, which is equipped with a controllable discharge system, as shown in the general principle illustrated in Figure 4. Here a screw is used to discharge a hopper, which is placed on a set of load cells, which acquire the actual material weight m [kg], within the hopper. By using the loss-in-weight principle the actual mass flow \dot{M} [kg/h] can be continuously calculated by taking into consideration the mass difference Δm [kg] within a defined time interval Δt [s] (time derivative of the material weight), according to the following relation:

By an adaption of the screw speed it is therefore possible to achieve a desired mass- or volume flow. However, the main drawback of this setup is the missing possibility to dose the material continuously, since the relation shown

$$\dot{M} = 3600 \cdot \frac{dm}{dt} \approx \frac{3600 \cdot \Delta m}{\Delta t} \quad [\text{kg/h}] \quad (I)$$

above is of course only true, if there is no simultaneous material infeed to the hopper. This means, that the setup

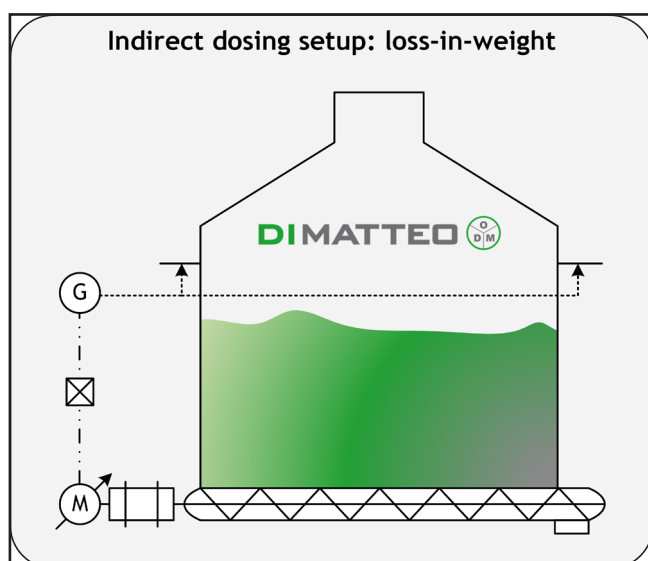


Figure 4- Setup of the indirect dosing architecture (here: loss-in-weight differential dosing)

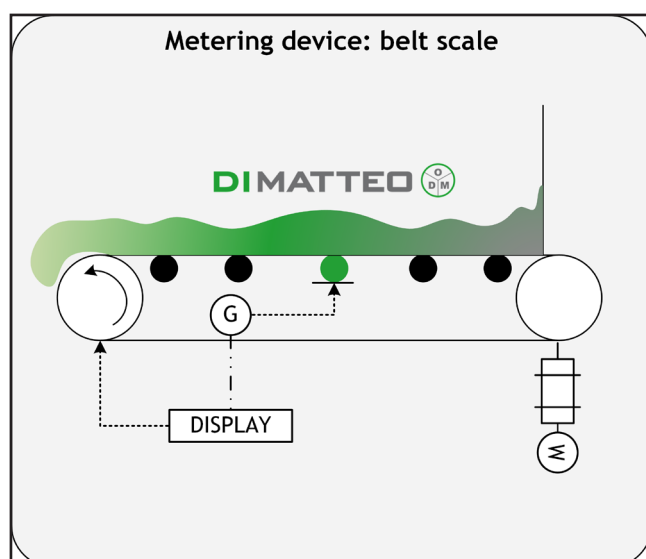


Figure 5- Example for a metering device (here: belt scale)



Figure 6 – ODM-ScrewMASTER Screw scale

is only suitable for batch-type dosing tasks, such as batch mixing or filling.

3.3 Metering – Belt scales and ODM-ScrewMASTER

The process of metering of mass flows consists of a standard conveying system (e.g. a belt or screw conveyor) and the determination of the actual flow by means of an integrated weighing system. As an example the typical belt scale is shown in Figure 5, where a belt conveyor transports material with a certain speed v [m/s] to a single weighing roller (marked in green), which determines the actual belt load m_{belt} [kg].

From the measured belt load m_{belt} it is possible to compute the actual mass per length unit ($\Delta m/\Delta l$ [kg/m]), which can be used to determine the actual mass flow \dot{M} [kg/h] as follows:

The standard metering device contains no control circuit at all, since it is only computing the actual mass flow but there is no feedback between this information and the actual speed of the conveyor. DI MATTEO offers such metering devices either as belts

$$\dot{M} = 3600 \cdot \frac{\Delta m}{\Delta l} \cdot v \quad [\text{kg/h}] \quad (\text{II})$$

or as screw conveyors. An ODM-ScrewMASTER screw scale (as shown in Figure 6) has the advantage that the system is completely closed and dust-proof and represents therefore in many cases the preferable solution.

3.3 Open-loop dosing

Open-loop dosing is also often called volumetric dosing, since the main principle behind it is the operation of a certain conveyor with a certain pre-defined speed for each possible mass flow setpoint. Thus, the actual weighing of the real material weight is neglected and instead it is assumed, that for the generation of a constant mass flow \dot{M} [kg/h] it is sufficient to generate a constant volume flow [m³/h]. This assumption is of course only valid, if it can be guaranteed that the bulk density ρ [kg/m³] of the conveyed material is constant. Since there is no information of the actual mass flow from a gravimetric measurement unit, it is necessary to define a calibration curve \dot{V} or generalised mathematical relation in order to define the dependency between the actual speed of the conveyor v [m/s] and the mass flow. In most

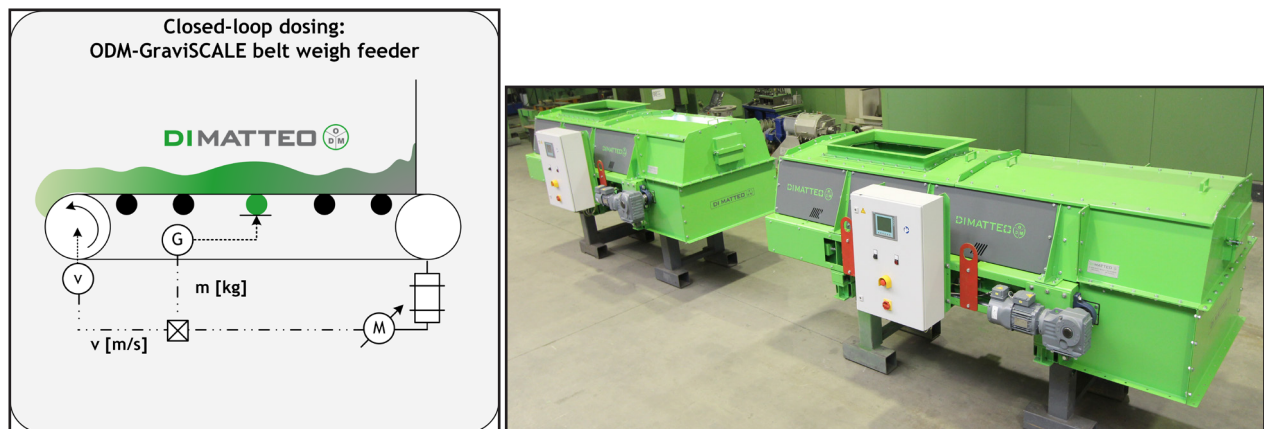
cases volumetric dosing is realised by a screw conveyor, since the usage of a through or tubular screw conveyor guarantees a quite stable volumetric feeding behaviour for different speeds if compared to e.g. a belt.

However, especially for materials with time-varying properties and volatile humidity or density, e.g. for the accurate dosing of alternative fuels, a closed loop dosing method is not applicable.

3.4 Closed-loop dosing – ODM-GraviSCALE and ODM-WeighTUBE®

The most sophisticated and accurate solution for the proportioning of bulk materials is closed-loop dosing, which is often also referred to as gravimetric dosing, since the actual mass flow \dot{M} [kg/h] is determined by means of an integrated weighing unit.

The most prominent example for such a system is the ODM-GraviSCALE belt weigh feeder, as shown in Figure 7 – (b). The working principle for the determination of the actual massflow is similar to the one shown in Equation (II), which means that the actual conveying speed v [m/s], as measured e.g. by an incremental encoder, and the actual material load m [kg] are evaluated continuously. As illustrated in Figure 7 – (a), the closed-loop principle can be interpreted in such a way, that there is a direct feedback from the calculated mass flow to the variable speed drive unit. If there is a deviation between the actual mass flow and the desired setpoint, the actual conveying speed can be therefore continuously adapted. Thus, a high precision of the dosing operation is guaranteed and typically the maximum deviation from the setpoint lies below $\pm 2\%$.



(a)

(b)

Figure 7 – ODM-GraviSCALE belt weigh feeder – (a) methodology; (b) machine

However, the operation of belt weigh feeders in practical applications is characterised by two main aspects: First of all, it needs to be said that belts are by nature non-closed systems. This leads to non-negligible dust emissions and spillage of material, which affects as a logical consequence subsequently the weighing units and their accuracy. DI MATTEO designed the ODM-GraviSCALE in such a way to avoid those effects as much as possible, which is achieved by a smart casing, sealing and scraping concept.

On the other hand and as it was already stated above, all existing dosing methodologies are suffering immensely from possible time-variant material properties of the conveyed bulk. This leads in practical applications to a non-negligible drift in the dosing accuracy over time. Thus, 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.

These two aspects led in the past to the development of a completely novel closed-loop dosing system: the tubular weigh feeder ODM-WeighTUBE®, which is described in detail within the next section.

4. ODM-WeighTUBE® - A Novel Gravimetric Closed-Loop Dosing Unit

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 roundabout one hundred 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 8 provides an overview of the ODM-WeighTUBE® RWS series, in the German production facility of DI MATTEO. Up to now, 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 8- ODM-WeighTUBE® RWS series

The general dosing principle is similar to the classical closed-loop scheme, as it was introduced for the ODM-GraviSCALE belt weigh feeder. The same idea is transferred to a screw conveyor, as shown in Figure 9. The WeighTUBE consists of a tubular screw conveyor, which is continuously discharging material from an intermediate buffer. The material is conveyed to the tube section, which is placed on a set of load cells and decoupled from the main frame of the machine by flexible connections. Therefore it is possible to measure the actual material weight within the tube (tube weight) m_{tube} [kg]. Furthermore, the actual conveying speed of the screw v_{screw} [m/s] is continuously acquired. Similar to the principle shown in Figure 7 – (a), both physical values are processed in order to calculate the actual mass flow \dot{M}_{act} [kg/h]. By taking into consideration the desired mass flow (setpoint) it is possible to determine the actual deviation e [kg/h], which is fed to the continuous dosing controller (CDC), which calculates the necessary adaptation of the screw speed in order to minimize the deviation under all circumstances and at any given time. All software elements are implemented within the ODM-GravitAS control system, which was developed by DI MATTEO as a unified platform for all weighing and dosing applications (see [6]).

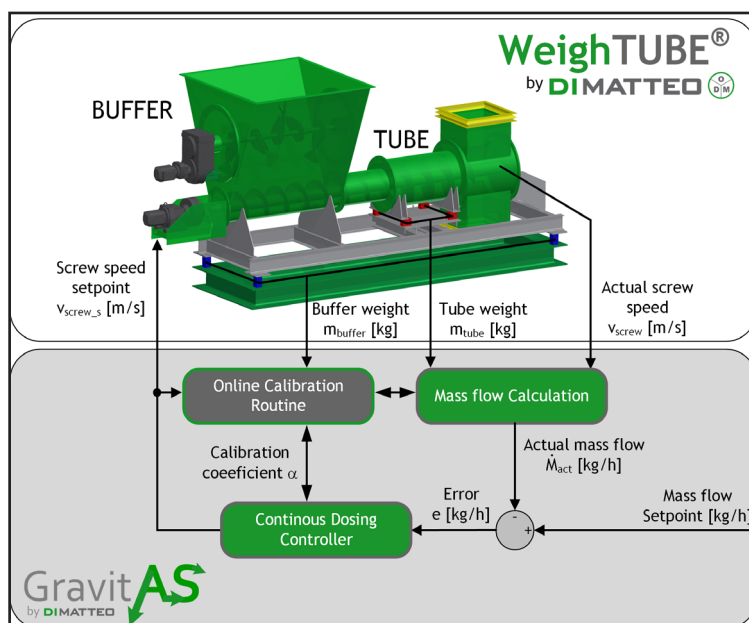


Figure 9- ODM-WeighTUBE® closed-loop control circuit

Furthermore, 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-WeighTUBE 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 (Δm) and the corresponding expired time (Δt), 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 mplant [kg] is visualised over time.

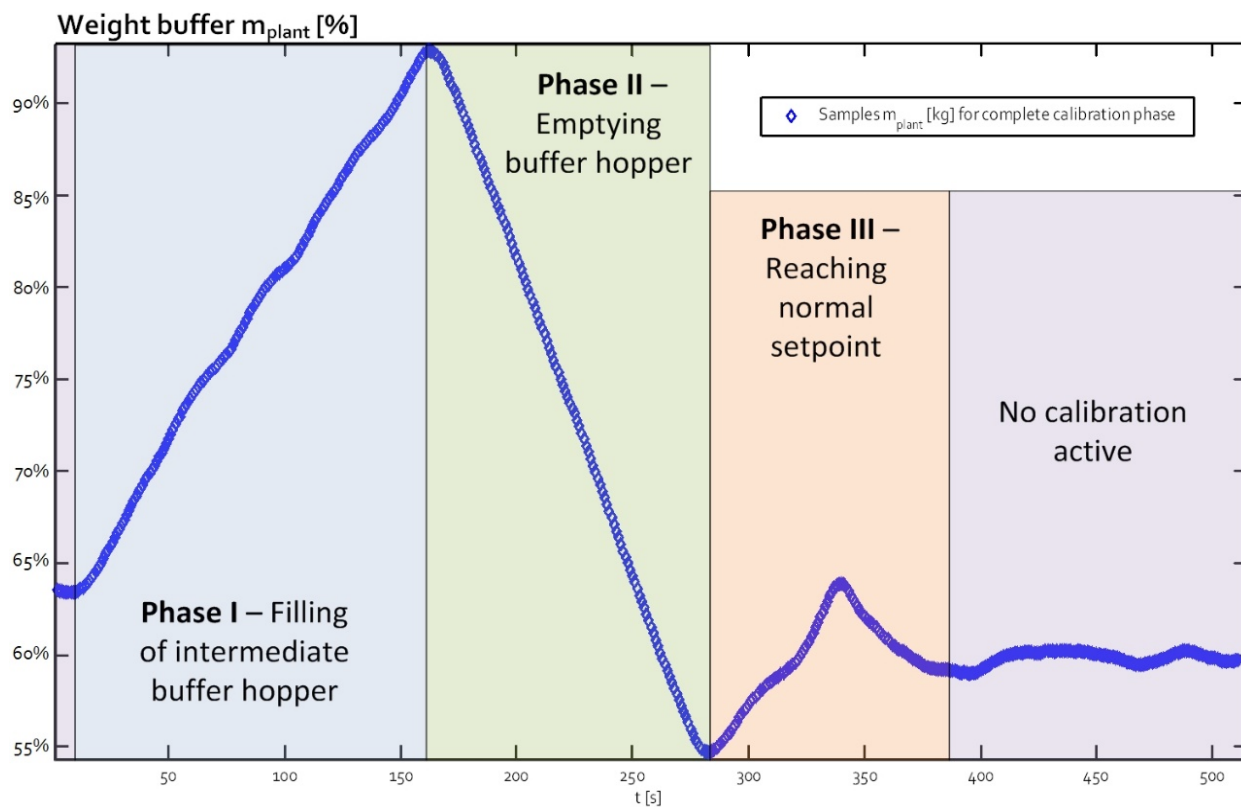


Figure 10- Three phases of a calibration routine

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 mass flow during this phase is evaluated for the probabilistic adaption of the controller parameter.

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 [6]) is taken into account. By the combination of the ODM-WeighTUBE® platform with the GravitAS control system a high dosing precision of $\leq \pm 1\%$ related to the nominal throughput can be guaranteed.

Summary and Conclusion

This article introduced a framework for the systematic classification of dosing and metering equipment for cement plants and relative industries. The defined taxonomy allows a better understanding of the exact nature of a certain type of equipment and can be used as a guideline during the design and implementation of system setups.

Each class of system was defined in detail by using the complete variety of dosing and weighing equipment as offered by DI MATTEO, from static silo scales and weighing hoppers to the latest developments in closed-loop high-precision dosing (e.g. ODM-GraviSCALE belt weigh feeder).

Another important aspect for the selection of adequate dosing equipment is the typical “status-quo decision-making trap” as described in [7]. It mainly states, that the logical consequence of most buying decisions in larger organisations is just the preservation of the current technological state. This is especially observable in relative conservative industries, such as cement manufacturing, since in most cases those systems are unintentionally preferred, that are already known. This has severe consequences on the competitive situation of many organisations, because it might happen that technological developments are adopted too late or even completely neglected.

This article introduced the ODM-WeighTUBE® as the latest development in gravimetric long-term stable high accurate dosing of bulk materials, which has proven its capability to solve many problems and drawbacks of classical proportioning equipment in numerous different application fields. This can be considered to be a possibility to break the wall of the status-quo and guarantee long-term reliability and fast return-on-investment.

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Packaging cement the sustainable way

By: Starlinger & Co. Gesellschaft m.b.H., Austria

*Cement packaging is a significant factor for cement producers and sellers regarding product protection, shelf appearance, cost margins, and sustainability targets. An independent study compared the environmental impact of paper cement sacks, sewn cement sacks made of recycled polypropylene tape fabric, and hot-air welded AD*STAR cement sacks made of coated polypropylene tape fabric.*

Authors: Markus Grabenweger, Sigrid Eder, Starlinger & Co. Ges.m.b.H.

The Life Cycle Assessment (LCA), carried out by the German PE INTERNATIONAL AG (now thinkstep AG) and commissioned by the Austrian machinery supplier Starlinger & Co. Ges.m.b.H., compared sewn sacks made in China and kraft paper sacks made in Saudi Arabia with AD*STAR sacks which were produced in both countries respectively. In the course of the study the entire life cycle of the cement sacks, i.e. from sack production and transport to the cement plant, the use phase of the sacks, to their end-of-life phase, was reviewed. All analysed sacks had a filling capacity of 50 kg cement (see Table 1).

In China, sewn woven sacks made of polypropylene tape fabric are the most widely used packaging for cement. The sacks are manufactured including varying shares of recycled polypropylene as input material, sometimes up to 100 %. The polypropylene-coated tubular fabric is cut and sewn mostly by hand in sack factories. The recycled material used to produce the sacks is in most cases severely degenerated – it has been re-used various times, and often contains high quantities of mineral fillers from previous applications. This means the sack fabric is rather brittle and breaks easier. To increase the sack strength, the fabric weight must be increased. In addition, the sewing process further weakens the material by up to 50 per cent.

Two- and three-layer kraft paper sacks in block bottom shape are the predominant cement packaging on the market in Saudi Arabia. Although the sacks are mostly produced in the country, the raw materials for the sacks – i.e. paper and glue – have to be imported from Europe. To achieve the necessary strength, the sack weight is comparatively high (compare Table 1). Still, sack rupture occurs frequently after dropping, sliding on uneven surfaces, or due to humidity.

AD*STAR sacks are block bottom valve sacks made of woven and coated polypropylene tape fabric. The sack bottom and top are closed in a special conversion



AD*STAR cement sacks are made of coated polypropylene tape fabric. The sack bottom and top are closed by means of a specially developed sealing technology. ©Starlinger

process by means of hot air welding. The use of high-grade virgin polypropylene for fabric production and the tight sealing of the sack bottom and top ensure low breakage even during rough handling, dropping, or after contact with water. AD*STAR sacks are produced and used all over the world and are a wide-spread cement packaging in many African and South East Asian countries.

Table 1: Technical specifications of the sacks used in the LCA

Country	Type of cement sack	Sack weight	Filling capacity	Main basic material
China, Saudi Arabia	AD*STAR block bottom valve sacks, welded	70.58 g	50 kg	Coated woven polypropylene tape fabric (virgin material)
China	woven PP sacks, sewn (50 % recycled content)	75.91 g	50 kg	Coated woven polypropylene tape fabric, produced out of 50 % post-consumer waste and 50 % virgin material
China	woven PP sacks, sewn (100 % recycled content)	75.91 g	50 kg	Coated woven polypropylene tape fabric, produced out of 100 % post-consumer waste
Saudi Arabia	Paper block bottom sacks, pasted (2-layers)	145 g	50 kg	Kraft paper
Saudi Arabia	Paper block bottom sacks, pasted (3-layers)	165 g	50 kg	Kraft paper

Life cycle phases of the cement sacks under study

For the life cycle assessment, the CML (Centrum voor Milieuwetenschappen at Leiden University, NL) impact assessment methodology framework was selected. The impact categories used in this study represent internationally accepted LCIA indicators (see Table 2). One ton of cement of average quality was taken as functional unit for the study. All primary and secondary data were collected specific to the countries under study. Where country specific data were unavailable, proxy data were used. Geographical representativeness is considered to be good. All primary data were collected or assumed for the year 2013.

Table 2: Impact categories indicated in the graphs

Global warming potential	Includes greenhouse gases causing climate change, excluding biogenic carbon (i.e. CO ₂ emissions related to the natural carbon cycle).
Acidification potential	Relates to emissions causing acidifying effects such as acid rain, or the decline of forests.
Ozone depletion potential	Considers ozone depletion in the higher atmosphere.
Photochemical ozone creation potential	Analyses ozone formation in the lower atmosphere causing summer smog. Closely connected to air quality.
Energy consumption non-renewable/renewable sources	– Includes energy consumed from both non-renewable sources such as fossil energy carriers (including nuclear energy) and renewable energy carriers such as solid or liquid biofuels.
Fresh water consumption	Considers the man-made removal of water from its watershed (surface or ground water, not rain water) through shipment or evaporation.

The life cycle phases of the paper sacks, sewn woven polypropylene sacks, and welded woven AD*STAR sacks were defined as

Production of sacks including the transport of raw materials to the production plant;

Transport of sacks to the cement plant (purchaser);

Use phase of sacks – also includes sack breakage and other losses in the entire logistics chain (including a specified recovery rate of cement at the plant and during transport), as well as production of cement to compensate for losses. The cement datasets including all upstream environmental burdens were regionalised for Chinese and Saudi Arabian conditions.

End-of-life of sacks – final treatment of cement sacks. Analysis based on twenty 50 kg sacks needed for the packaging of one metric ton of cement, plus reproduction of broken sacks during filling. Net flows, e.g. emissions from uncontrolled incineration are also considered.

End-of-Life Credits – electricity and thermal energy production by means of incineration, substitution potentials resulting from the net flow of recyclable materials in the end of life of cement sacks. The end-of-life credits were adapted to the regional situation in order to represent realistic conditions.

Energy supply – the electricity grid mixes used in the production phase were regionalized according to the energy supply situation in China and Saudi Arabia.

Low breakage rates - smaller CO₂ equivalent

The term breakage rate refers to the percentage of cement lost due to sack breakage in the entire life cycle of the respective sacks. The study showed that the low breakage rates in the course of the use phase are a decisive factor for the positive results of AD*STAR sacks.

As no reliable data were available from official sources, and in-depth product knowledge is needed for the determination of an applicable breakage rate for the different types and qualities of sacks during their entire life cycle, the study included interviews with experts from the local packaging and cement industries in China and Saudi Arabia. This ensured that the estimations for the breakage rates assessed are realistic and have a valid basis.

A breakage rate of 1 per cent was assumed for AD*STAR sacks, 3.8 per cent for woven PP sacks with 50 per cent of recycled content, 4.4 per cent for woven PP sacks with 100 per cent recycled content, 2.8 per cent for 2-layer paper sacks, and 2.3 per cent for 3-layer paper sacks. The study applies the breakage rates considering that 90 per cent of the cement lost at the plant, as well as 20 per cent (Saudi Arabia) and 50 per cent (China) lost during transport and handling is recovered.

Regional differences of the AD*STAR sacks between Saudi Arabia and China are considered in the study with a number of factors, of which the regionalisation of the cement datasets, the electricity grid mix, upstream supply chain of PP, and the end-of-life scenarios represent the most important.

For the production of the AD*STAR sacks analysed in the study, 100 per cent virgin material was used both in China and Saudi Arabia. Due to the special production process AD*STAR sacks are extremely robust despite their very low weight (compare sack weights in table 1) which also accounts for raw material savings during production.

Because of the strength and resistance of AD*STAR sacks the cement losses caused by sack breakage and other losses are below 1 per cent in the entire use phase, while for paper sacks and sewn woven sacks the cement losses lie between 2.3 per cent and 4.4 per cent. These comparatively high rates are caused by the rough handling and low automatization in the logistic chains, especially in China. In many cases sacks are loaded, unloaded and stacked by hand multiple times until reaching the final destination. If the more robust AD*STAR sacks are used, less cement is lost and must be replaced, and less packaging is needed. Consequently, less greenhouse gases are produced.

China: low quality impairs performance

In China, the world's biggest cement producer, around 20 billion sewn cement sacks made of polypropylene tape fabric with recycled content are produced per year. In the study, sewn coated polypropylene sacks made of 50 per cent virgin material mixed with 50 per cent recycled material, and sacks made of 100 per cent recycled material were analysed because these are currently the most widely used sack types for packaging cement in China. The sacks have an extremely thin coating and are sometimes partially not coated, which reduces their shelf life. Together with non-existent coating, the sewn



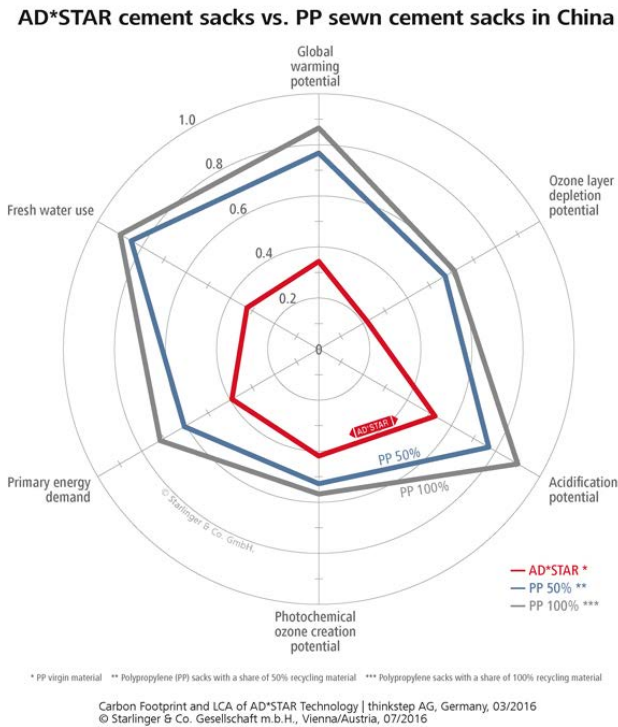
Sewn Chinese cement sacks made of recycled polypropylene.
©Starlinger

top and bottom seams account for increased cement losses during the entire transport chain.

The study concludes that AD*STAR sacks produced in China create lower environmental burdens in each impact category than the sewn sacks made of polypropylene with shares of recycled content. The latter show significantly higher impacts for ozone depletion, blue water consumption, land occupation and primary energy from renewable resources than AD*STAR sacks.

Regarding the global warming potential, the environmental impact during the use phase of the sacks is strongly dependent on the breakage rate. With breakage rates of up to 4.4 per cent the sewn polypropylene sacks with recycled content have a substantially higher environmental impact than AD*STAR sacks. More cement is lost during the use phase and has to be compensated by additional production.

AD*STAR sacks, in turn, are extremely robust due to the special production process and have realistic breakage rates below 1 per cent in their entire life cycle. The sensitivity analysis of the breakage rates during the use phase showed that the global warming potential of both types of sewn polypropylene sacks would still be higher even if they had the same breakage rate as AD*STAR sacks.



*AD*STAR cement sacks vs. sewn cement sacks made of recycled polypropylene, China (based on data researched by thinkstep AG). ©Starlinger*

Changing over to AD*STAR sacks would not only reduce CO₂ emissions caused during production and thus relieve the environment; it would also contribute to the automatization of the entire cement filling and transporting chain. Currently, the manufacture and handling of the sewn woven PP sacks involves a lot of manual activities – starting with the sewing of the sacks in the production phase and the resulting size differences that cause problems on automatic filling lines, from putting them onto the spout during the cement filling process, to stacking, storing and transporting. Considering the current investments in modernizing the Chinese cement sector, the use of AD*STAR sacks which are produced automatically on sack conversion lines and allow fully automated handling of the packaged cement would seem a prudent step.

Saudi Arabia: Import of kraft paper drives up environmental impact

In Saudi Arabia, one of the biggest producers and exporters of plastic granulates worldwide, paper and glue imported from Europe are used for the production of cement packaging. Mostly, two- and three-layer kraft paper cement sacks can be found on the market; these sack types were also used for analysis in the study.

The global warming potential of both AD*STAR sacks and paper sacks in Saudi Arabia is dominated by emissions during the use phase of the product, which is, as discussed before, strongly dependent on the breakage rate of the cement sacks. As the paper sacks show higher breakage rates than AD*STAR sacks – 2 to 3 per cent are very common, under rough conditions they can be even higher – more cement is lost, resulting in a higher impact.

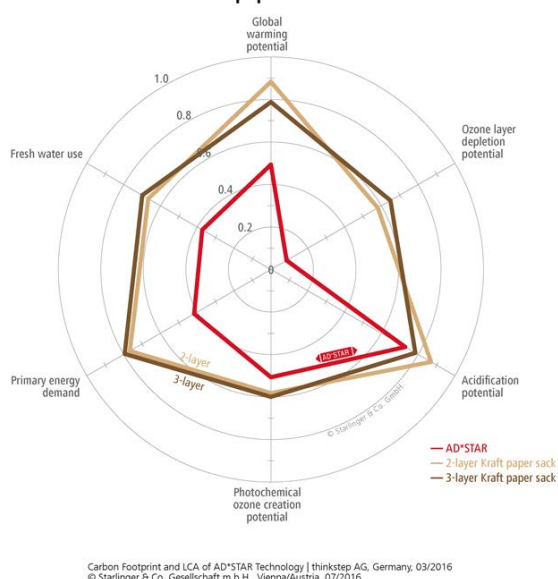


*Broken paper cement bags.
©Apidach Jansawang, Dreamstime*

The production phase represents the second largest driver, in this case especially with regard to the AD*STAR sacks, while the production phase of paper sacks has less impact. Transportation contributes more to the global warming

potential of paper sacks than to the AD*STAR sacks produced in Saudi Arabia because the raw materials for the paper sacks have to be shipped. In total, the two-layered paper sacks produced in Saudi Arabia perform worst in terms of global warming potential, while the AD*STAR sacks show the lowest values.

AD*STAR cement sacks vs. paper cement sacks in Saudi Arabia



AD*STAR cement sacks vs. cement sacks made of kraft paper, Saudi Arabia (based on data researched by thinkstep AG). ©Starlinger

Ozone depletion, eutrophication, blue water consumption, land occupation as well as renewable primary energy show higher values for the paper sacks in comparison to AD*STAR sacks. Only the non-renewable primary energy demand shows lower potentials for paper sacks than for AD*STAR sacks. This is because the polypropylene used for the production of AD*STAR sacks represents a non-renewable resource, whereas kraft paper that serves as input for the paper sacks is based on renewable resources.

For Saudi Arabia, switching over to the more robust AD*STAR sacks would not only prevent the loss of countless tons of cement caused by sack rupture, but also greatly reduce raw material input for sack production and avoid long transport routes. In addition, the entire value created by both raw material and sack production would remain within the country.

Conclusion

The study clearly shows that AD*STAR sacks have lower global warming potential than paper sacks or sewn PP sacks.

For both China as well as Saudi Arabia, AD*STAR sacks do not only show the lowest values regarding global warming potential (also known as carbon footprint), they are also the environmentally friendlier packaging in terms of acidification potential (acid rain), ozone depletion potential, photochemical ozone creation potential (causes summer smog), as well as energy and fresh water consumption.

The study was reviewed by an independent review panel, consisting of representatives from the internationally operating German inspection company Dekra, which held the chairmanship of the panel, as well as Lafarge France and Canada, Dr. Werner Environment & Development from Switzerland, and the Austrian trading company Sack Agency.

"With this comparative life cycle assessment on cement sacks Starlinger & Co. Ges.m.b.H. has presented a carefully researched and detailed study in accordance with the standards EN ISO 14040 and EN ISO 14044. In the course of the critical review the life cycle analysis experts of the review panel have surveyed and discussed the study and the data and stipulations it is based upon in depth with the authors of the life cycle analysis. Based on this comprehensive examination of the study I consider its results and conclusions sound", said Dr. Frank Werner, Dr. Werner Environment & Development, Zurich.

Note: AD*STAR® is a registered trademark. AD*STAR® sacks are exclusively produced on Starlinger machinery.

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Reliable central chains for high performance bucket elevators

By: Dr. Oliver Mielenz – R&D HEKO Ketten GmbH

In the past decades HEKO Ketten GmbH (HEKO) and its enterprise KoWey GmbH & Co. KG (KoWey) has become a reliable partner for bulk solids handling industries delivery of well approved bushed conveyor chains and correspondent equipment for high performance bucket elevators. However, increasing feeding rates, e.g. of modern high performance vertical roller mills and roller presses for grinding of raw materials, clinker and cement, require bucket elevators with higher capacities and, hence, heavy duty bucket elevator chains with highest tensile strength, wear resistance and fatigue strength.

These demands can only be achieved by a fundamental knowledge in chain technology and material science as well as the availability of best material qualities and state of the art manufacturing technologies. This article summarizes the development of a new reliable central chain for high performance bucket elevators. The development has been performed on basis of long term experiences and by applying modern finite element analysis tools.

1. State of the art central chain technology

1.1 Chain Manufacturing

Reliable material quality and state of the art manufacturing technologies are of major importance for achieving the best chain quality. Consequently, HEKO chains are made from high quality steel grades with European origin only and most of the chain components are manufactured in HEKO's production plants.

The main characteristics of HEKO's well approved high performance bucket elevator central chains are:

- CNC machined pins and bushes with highest tolerances in diameter, parallelism and roughness.
- Case hardening of bushes by applying state of the art vacuum heat treatment technology to achieve highest wear resistance and still maintaining a tough core.
- Quenched and tempered pins with induction hardened surface to maintain highest resistance against abrasive wear and retaining a tough core.

- CNC machined bores in link plates to provide continuous high press fit between bushing/pins and chain link plates and to guarantee a straight non twisted chain.

The drop forged link plates of HEKO's high performance bucket elevator central chains are made of boron alloyed quenched and tempered steel and forged in Germany. Drop forging with subsequent quenching and tempering is essential to achieve the best ratio between tensile strength and chain weight.

1.2 Ordinary chain design

For applications with increased abrasive wear HEKO provides bucket elevator forged link chains with well approved labyrinth sealing, as shown in **Fig. 1**.

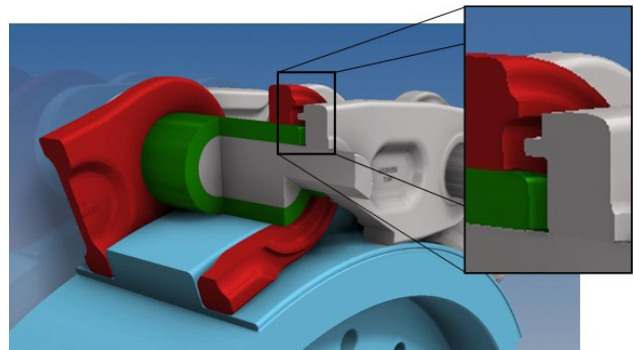


Fig. 1: Chain link joint with labyrinth sealing

The buckets are fixed to the chain by drop forged angular brackets fitted to elongated chain bolts by means of loose fits, as shown in **Fig. 2**.

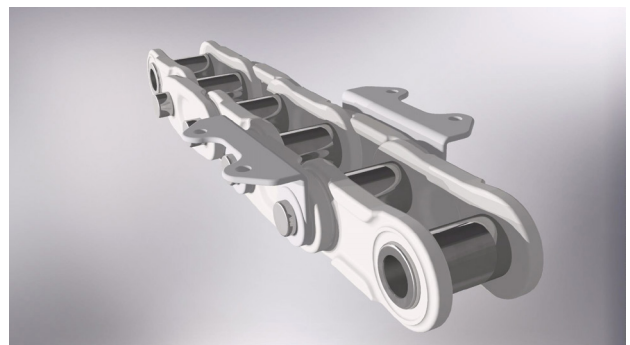


Fig. 2: Central chain with angular brackets for bucket fixation

The drop forged inner and outer link plates are bearing on the shoulder of the drive ring after a certain run-in period. This so called “3-point bearing” of each individual chain link (= bearing of bushing + chain link plates), as shown in Fig. 3, should reduce the bearing pressure on the bushing outer lateral surface and, hence, the wear of the bushing.

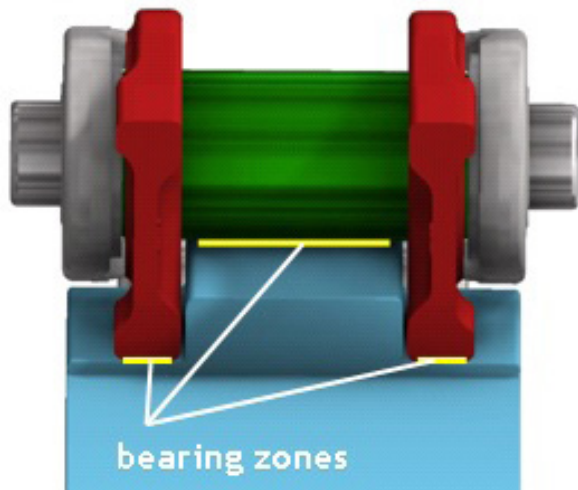


Fig. 3: 3-point bearing of an inner chain link on shouldered drive rim

The bearing of the inner and outer chain link plates on the drive rim shoulders led to the requirement for reinforced contact areas on the drop forged link plates, as shown in Fig. 4.

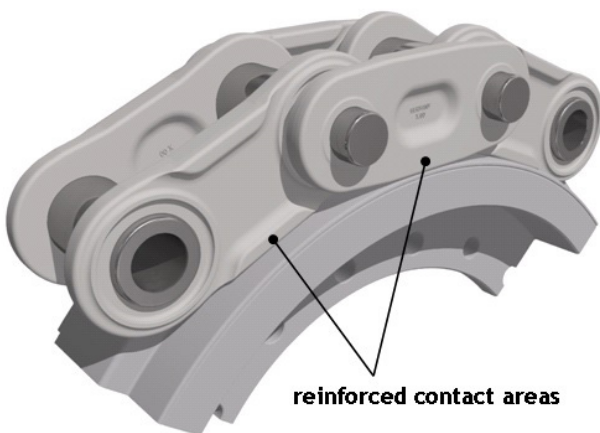


Fig. 4: Ordinary bucket elevator chain with reinforced contact areas on the drop forged inner and outer link plates.

2. Motivation for improvement of central chain design

The above mentioned ordinary bucket elevator central chain design is well approved and established in different kinds of high capacity applications and industries all over the world. Hence, the question is:

Why HEKO has further developed this well approved central chain design?

2.1 Theoretical considerations

Undoubtedly, the additional bearing of the inner link plates on the shoulders of the non-toothed drive ring led to significant reduced bearing pressure on the bushing lateral surface and, hence, to reduced bushing wear. The additional transverse load of the inner links is compensated and no additional lateral bending will occur on the inner link plates due to the mechanical stiffness of the bushes.

However, in case of the outer link plates, the situation is totally different, as schematically presented in Fig. 5. The pins will be deformed under load leading to a deformation of the forged link plates. Due to the fact that the forged link plates have a reduced flexibility in the region of the labyrinth sealing and in the region of the reinforced contact areas, the only region where such an outer link plate can flex is the very small gap between labyrinth sealing and reinforced contact area. This, in turn, will lead to alternating increased tensile stresses on the inside of each outer link.

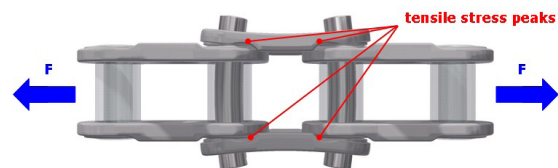


Fig. 5: Schematic view of bolt and outer link plate bending under load (raised representation of bolt and link plate deformation)

This situation will be amplified if the reinforced contact surfaces of the forged outer link plates get in contact to the drive ring shoulder and the lateral movement of the reinforced contact areas is hindered.

2.2 Experiences of plant operators

In the past few years, plant operators reported frequent chain fractures on bucket elevator central chains with the above mentioned old design, i.e. drop forged chain link plates with labyrinth sealing and reinforced contact surfaces. In each individual case the cause of the chain failure was a fracture of the drop forged outer link in transition to the reinforced contact area.



Fig. 6 Exemplary photographic images of broken outer links of bucket elevator central chains with old design

2.3 HEKO’s conclusion

As a result of the above mentioned findings and plant operator experiences HEKO decided to modify the above mentioned old chain geometry in order to maintain a reliable and fatigue durable high performance bucket elevator chain family. Thereby, the good properties of the old chain design have been combined with new approaches to maintain long service chain life.

3. Improved high performance bucket elevator central chain

3.1 Requirements specification for the development

The development of a new modified high performance bucket elevator central chain with drop forged link plates has been performed on basis of the following requirements specifications:

- Maintaining 100 % compatibility to old chain
 - o Labyrinth sealing of the chain link joint
 - o Connection size of angular brackets and buckets
 - o Identical dimensions and quality of pins and bushes
 - o Drop forged link plates
 - o Minimum breaking load from 1.250 to 1.950 kN

A comparison of the old and the new improved chain design is shown in Fig. 7. In the improved chain design the 3-point bearing is limited to the inner links only by introducing optimized geometry of the reinforced contact areas. The drop forged outer link plates are engineered as pure tension plates with optimized geometry to avoid contact with the shoulder of the drive rim.

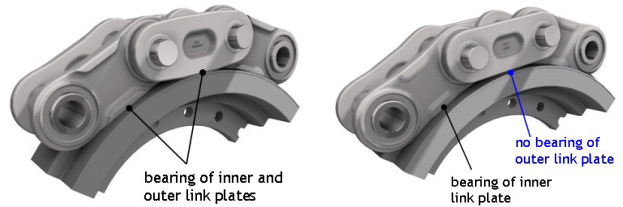


Fig. 7: High performance bucket elevator central chain with old (left) and improved new (right) design

3.2 Finite element (FE) analysis of the old and the new improved chain design

The old chain design and the improved chain design have been converted into a 3D finite element model, as shown in Fig. 8.

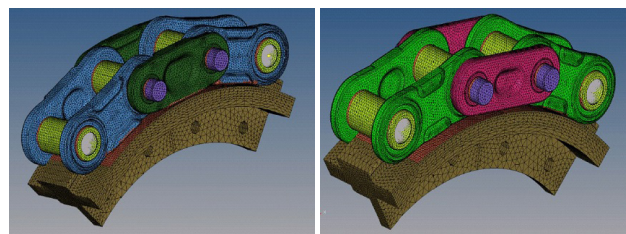


Fig. 8: FE-models of the old (left) and new improved (right) chain design

In Fig. 9 the comparison of the von Mises equivalent stresses on the outer links of the old and the new improved chain design are shown. Obviously, the modified geometry of the drop forged outer link plate leads to a reliable homogenization and reduction of the stress distribution by avoiding significant alternating tensile stress peaks induced by bending of the chain pins under load.

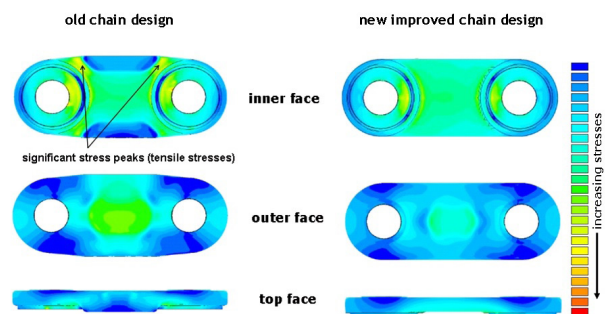


Fig. 9: Von Mises equivalent stresses on the inner links of the old and the new improved chain link design

Moreover, by avoiding the reinforced contact areas, superimposed tensile stresses induced by inevitable smallest discontinuities in the transition to the reinforced surfaces of the old chain design resulting from the manufacturing process, like e.g. tensile stress peaks due to link plate distortion caused by drop forging and heat treatment or permissible discontinuities in forging surface due to increased wear of the forging die, will be eliminated reliably.

In **Fig. 10** the resulting von Mises equivalent stresses on the inner links of the old and the new improved chain design are shown. In comparison to the old inner chain link geometry the new improved geometry leads to a significant reduction of the stress levels in the transition to the reinforced contact areas.

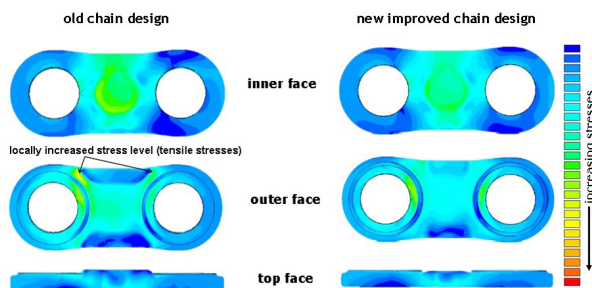


Fig. 10: Von Mises equivalent stresses on the inner links of the old (left) and the new improved (right) chain link design

Additionally, the influence of the modified 3-point bearing to the bearing pressure between bushing and drive rim has been investigated in order to avoid premature wear of the bushes. In **Fig. 11** a comparison of the von Mises equivalent stresses on the lower side (in contact to the drive rim and drive rim shoulders) of the chain link plates and the bushing is shown.

The improved chain design yields a homogenized and

reduced stress distribution at the outer links. Moreover, avoiding bearing of the outer link plates do not lead to a significant increase of the bearing pressure on the inner link contact areas and bushes. Consequently, the new improved high performance bucket elevator chain is as durable against abrasive wear of the bushes lateral surface as the old chain.

4. Summary and conclusion

HEKO has developed a new high performance bucket elevator central chain family with drop forged chain link plates, labyrinth sealing and reinforced contact surfaces by applying modern finite element analysis. This evolutionary development has been encouraged by customers reporting of frequent chain fractures on bucket elevator central chains with the above mentioned old design. In each individual referred case the cause of the chain failure was a fracture of the drop forged outer link in transition to the reinforced contact area.

The new improved chain design is characterized by avoidance of the so called 3-point bearing of the outer chain links, i.e. avoidance of outer chain link plates bearing on the drive ring shoulders. This new improved chain design is not less than a paradigm shift in high performance bucket elevator chain design. The results of a comparative finite element analysis show that the stresses on drop forged inner and outer chain link plates of the new improved chain design are significantly lowered and homogenized yielding an increased chain reliability and chain fatigue durability. Moreover, the avoidance of the outer link plates bearing on the drive ring shoulder yields no limitations in chain bushing durability against abrasive wear.

Consequently, HEKO/KoWey offers the most reliable high performance bucket elevator chain in the market.

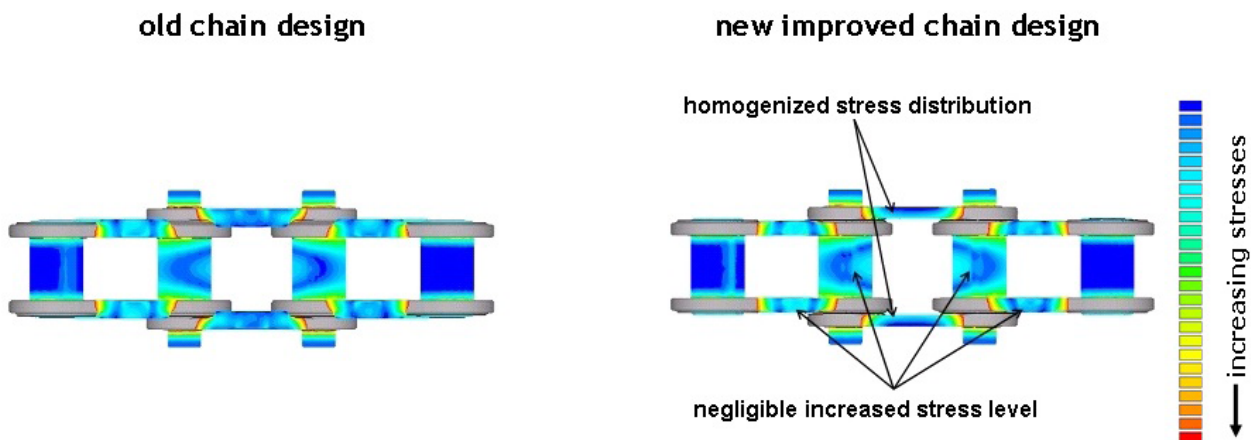


Fig. 11: Comparison of von Mises equivalent stresses on link and bushing bearing between old (left) and new improved (right) high performance bucket elevator central chain design

Vecoplan-optimised conveyor belt: Best cleaning result and new variants VecoBELT – The true all-rounder for transporting bulk materials

By: Vecoplan AG, Germany

With high operational reliability and flexible application possibilities, conveyor belts are indispensable for the transport of bulk goods in industry today. Transportation lines and material streams are important aspects of every production plant. They need to be cost-effective, efficient and above all reliable in continuous operation. A true all-rounder in transport systems for bulk materials is the VecoBelt pipe conveyor from Vecoplan.

The VecoBelt is ideal for conveying bulk materials over long distances either horizontally or on a slight incline. The components transport all kinds of bulk materials such as wood chips, refuse-derived fuels, meat and bone meal or wood shavings. The forward-moving VecoBelt conveyor runs inside a tube and not on rollers like with normal conveyor belts. The belt runs on cushion of air. Low friction losses and quiet operation are therefore guaranteed. The fully enclosed system is particularly suited to the safe transportation of dust-laden materials.

In recent years, Vecoplan has made some optimisations to the components and further developed the technology of the VecoBelt series (500 / 800 and 1000 belt width). The return belt now also runs in an enclosed housing, supported by a return air duct. This gives customers 100% certainty that no material can fall or trickle down, for example in the area of the return rollers.

Another new addition is that Vecoplan equips the VecoBelt with

two scrapers at every drive station. The pre-head scraper and hard metal scraper can be adjusted from the outside, and tensioning the scraper with the ratchet is quick and easy to do. The pre-head scraper is flexible, yet stable enough to remove impurities on the belt. The hard metal scraper prevents substances such as resin from sticking to the belt.

A further technical improvement has been added to the weight tensioning stations. Additional scrapers on the drive stations have been added here too to prevent impurities from adhering to the belt. For customers, these measures mean fewer maintenance costs, fewer downtimes and less material carry-over on their conveyor line.



Picture 1: Additional scrapers mean fewer maintenance costs, fewer downtimes and less material carry-over.

Vecoplan also offers customers an optional bunker attachment filter. At material transition points, where material is passed to the next conveyor and loaded into this, a

radial blower has been installed to extract air containing dust.

To date, these conveyor components have built transportation lines worldwide covering a total length of more than 10 kilometres. The longest stretch is 430 m long and is driven by two 30 kW geared motors.

The VecoBelt conveys bulk materials over a distance of up to 450 meters and with a capacity of up to 1260m³/h at 2.5 m/s. The conveyor belt is quick and easy to assemble and it can span inclines up to 20 degrees. The individual support struts can be spaced up to 75 metres apart. The power consumption of the VecoBelt is only about half that of similar conveyor belts.

Vecoplan AG is a leading manufacturer of machines and systems for the resources and recycling industry for shredding, conveying and reprocessing wood,



Picture 2: The fully enclosed system is particularly suited to the safe transportation of dust-laden materials.



Picture 3: The VecoBelt is ideal for conveying bulk materials over long distances either horizontally or on a slight incline.

biomass, plastics, paper and other recyclable materials such as domestic and industrial waste. Vecoplan develops and manufactures the systems and components, and sells them worldwide in the wood reprocessing and waste processing industries. It currently has around 380 employees at its locations in Germany, the USA, Great Britain and Spain.

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BEUMER offers extended conveying, loading and filling systems for cement plants:

Solutions that you can build on

By: BEUMER Group GmbH, Germany

As a system supplier, BEUMER Group develops solutions perfectly adapted to meet cement plant requirements. This includes conveying, loading and filling systems that are offered in different versions for various tasks, which are continuously optimised by the engineers in Beckum, Germany. The goal is to make the customers' operations more efficient. Users have to face for example less maintenance, an increase in bucket elevator capacity and achieve more precise filling results. BEUMER provides innovative solutions to international cement companies who are looking for sustainable and cost-efficient ways to modernise their plants.

The conveying system has to meet high requirements to ensure safe and economic clinker transport in cement plants. The cement clinker leaves the clinker cooler of the kiln line at temperatures of up to 200 degrees Celsius, or up to 600 degrees Celsius if the coating collapses, and is temporarily stored in the clinker silo. To ensure a trouble-free transport of the clinker, the conveying system must withstand these high temperatures. This is where BEUMER apron conveyors are used. They are extremely robust and can navigate through complicated routings and considerable conveying heights. "We generally use the heavy-duty BEUMER double sprocket chains as traction elements," explains Michael Brachthäuser, Director Business Unit Cement at BEUMER Group. This makes it possible to handle inclinations of up to 60 degrees at a speed of 0.3 metres per second. "In order to increase performance we developed a version with the cells mounted to a belt instead of a chain," explains Michael Brachthäuser.

More compact and more powerful

The basis for this variant is the proven BEUMER belt technology, which is also used in bucket elevators. The belt is reinforced with steel wires and can be designed in different widths. In the material feed area, special deflector plates protect the belt against hot coating that collapses when the kiln is not in continuous use. "With up to 1,300 cubic metres of clinker per hour, belt apron conveyors achieve a higher conveying capacity than conventional apron conveyors," describes Michael Brachthäuser. This can be attributed to a higher running speed of up to 0.6 meter per second. Angles of inclination of up to 60 degrees are also possible.

Wear and tear that occurs frequently on a chain can be practically eliminated when using a belt and lubricating the system is not necessary. The lighter and more compact design of this solution reduces the costs for the steel structure and the entire project. The entire belt lies with its surface on the drive and return pulley, thus, the unwanted polygon effect caused by the central chain is avoided. This ensures quiet running and low noise emission, and prevents additional exposure of the plant and adjacent buildings to load vibrations and noise.

The BEUMER belt apron conveyor is an optimal choice for system modernisations. Thanks to faster conveying speeds, higher quantities of material can be transported while keeping the existing conveyor frames and steel bridges. "A concrete example: An apron conveyor with a chain of 1,600 millimetres width and 131 meter centre distance weighs 128 tons," explains Michael Brachthäuser. The steel structure weighs about 80 tons. An 800 x 131 metre belt apron conveyor capable of conveying the same capacity weighs only 90 tons – that is 38 tons less than the chain version. For the belt version, the net costs for the equipment are 25 percent lower, as the steel structure is approximately 30 tons lighter and weighs only 50 tons. A smaller drive unit can be used due to the reduced size, which further lowers the operational costs compared to conventional apron conveyors.

How to increase the capacity of belt bucket elevators

Modernisations are an important aspect to consider for bucket elevators. Cost-efficient production requires bucket elevators with low investment costs, a long service life and easy maintenance. The buckets are mounted either to a belt or a central chain. Belt bucket elevators are best suited for fine-grained bulk material, because coarse material could fall between the bucket and the belt and damage the belt. Central chain bucket elevators, however, are designed to transport all types of coarse, hot or abrasive bulk material. The fine dust of the material causes faster wear and tear on the chains as opposed to a belt. The user has to maintain the bucket elevators and replace the chains frequently. During repair, the operation has to stop. Additionally, replacement chains are very expensive. "That's why we have developed the innovative high-capacity belt

bucket elevators type HD," says Michael Brachthäuser.

They are designed to eliminate the space between the individual buckets and the belt. This prevents coarse material from getting stuck during the scooping and filling process, which is often the case. This increases the service life of the belt considerably. The buckets are mounted firmly to the back of the belt with segments and bolts especially developed by BEUMER Group. As with all belt bucket elevators by BEUMER Group, BEUMER belts with wire-free zones are also used on the high-capacity belt bucket elevators. Holes for the bucket mountings can be placed here without damaging or cutting the steel wires. The traction forces of the belt are maintained to the fullest extent. The current belt has a tensile load of 2,500 N/mm; the new BEUMER belt with wire-free zones has a tensile load of 3,300 N/mm. The special BEUMER bucket shape also allows for smoother running and therefore less noise generation. Depending on the material to be conveyed, BEUMER Group offers special buckets or mounts a dynamic bottom into the bucket elevator boot. This prevents wet and sticky material in the bucket elevator boot. Belt bucket elevators with this equipment have a much longer service life when handling highly abrasive material than central chain bucket elevators.

These bucket elevators are already successfully used by many international cement manufacturers including Dyckerhoff, Yamama Cement, HeidelbergCement, LafargeHolcim. BEUMER Group converted their existing bucket elevators into high-capacity belt bucket elevators type HD in a simple and cost-efficient way. This became necessary because the kiln systems had been modified, increasing their capacity. This meant that the bucket elevators to the raw mills had to increase their capacity as well.

"One of our German customers had the problem that coarse-grained material was falling between the bucket and the belt, damaging the belt," describes Michael Brachthäuser. Along with the modernisation of the plant, throughput as well as the running time of the bucket elevator per day increased, adding to this challenge. The belt started to get porous already after two years of use. Initially, it was planned to replace the old belt bucket elevator with a chain bucket elevator. But then the operator of the plant opted for the BEUMER Group HD technology. The requirement was that the existing bucket elevator housing including the drive unit should remain for the retrofit.

This special BEUMER bucket elevator technology is used for example for circulating bucket elevators in raw mills and cement mills for material with grain sizes of up to 120 millimetres and a humidity level of up to

six percent. Conveying capacities of more than 1,500 tons per hour can be reached.

Not too much, not too little - the optimal filling

For filling cement into bags, BEUMER Group offers the BEUMER fillpac. It uses rotating filling spouts to fill any type of cement into different bag types. It can be individually integrated into already existing packaging lines and adapted to specific parameters. Specific weighing electronics are utilised to ensure weight accuracy of the bags. There are practically no rejects caused by too high or too low filling weights. The weighing unit communicates permanently with the filler neck via specific software. The automatic bag weight control determines the exact filling weight while filling. This way the machine always achieves accurate degrees of filling. The entire packaging line works more efficiently now as it is no longer necessary to remove bags with an incorrect weight from the material flow. In addition, the quantity indicated on the bag always corresponds to the real volume.

BEUMER Group offers this construction series both as air and turbine filling machines. The turbine process is the perfect solution for fine-grained materials such as cement. The result is filled bags which are compact and dimensionally stable so that the user is no longer required to vent them. Depending on the task, BEUMER Group offers BEUMER fillpac R with six, eight, ten, twelve, 16 or 20 spouts. The smallest version fills up to 1,800 50 kilogram bags or 2,250 25 kilogram bags per hour, the biggest version fills up to 6,000 50 kilogram bags or 7,500 25 kilogram bags, and all of the machines can be used for diverse bag types. In order to fill HDPE bags reliably BEUMER Group offers the BEUMER bag placer as an exclusive feature. The filling impeller is characterised by its speed and maximum material throughput. BEUMER Group also offers the turbine filling machines with inline design. The filling modules are placed next to each other for ready access, which makes them extremely easy to maintain. The inline filling machines are best suited for production environments with low throughput rates.

Onto the truck bed

With the BEUMER autopac, BEUMER Group offers a system that loads cement bags directly from the filling machine onto the truck bed without manual intervention. Bags can be palletised automatically in stacked rows or patterns – without using pallets. Depending on the performance class, the system stacks between 2,400 and 3,000 50 kilogram bags per hour. The loading height, including the height of the truck bed, can be up to 3.5 meters. The user can freely select the formation of the layers depending on bag size and bag material.

CONVEYORS

The machine can load bags in double patterns of five or ten bags. In order to attain a high degree of stability for the whole load on the truck, and in order to optimally utilize the truck bed, two mirror-inverted layers are always stacked next to one another. The bags are flattened by the loading process using two stacked belt conveyors, which releases the air from the bags. After being positioned, the bags are also pressed by the loading head, which makes the stack more compact and more stable. The bag feeding lines can be adjusted to the installation conditions. Corresponding technical solutions are available for variable conveyor lines. Unlike on the systems where bags are suctioned and lifted, the bags are not deformed by the BEUMER autopac. In contrast with loading and palletising systems from other manufacturers, the BEUMER autopac is equipped exclusively with electrical drive units in its standard design. This means significantly less maintenance costs for the user. On vacuum drive units and hydraulic drive units, leaks that pollute the load and the system are inevitable. Additionally, the energy-intensive vacuum pumps and hydraulic drive units require additional cooling units, a fact that clearly increases the purchase and operating costs, as well as the energy consumption. The BEUMER autopac uses just 0.15 kilowatts per hour at full capacity. The drive units and machine parts are clearly arranged and easily accessible. This facilitates maintenance considerably.



Photo 1: The rotating filling machine BEUMER fillpac R with sophisticated weighing electronics.



Photo 2: In the scope of the modernisation at Lafarge, the belt bucket elevator has been upgraded with the BEUMER heavy-duty technology. The new bucket shape ensures smoother running and less generation of noise.



Photo 3: Michael Brachthäuser, Director Business Unit Cement at BEUMER Group: "The belt apron conveyor moves up to 1,300 cubic metres of clinker per hour, which is more than conventional apron conveyors with chains."

Reliable level measurement can improve screen-house productivity and reduce downtime

By: Hycontrol Ltd, United Kingdom

Introduction

Reliable level control is essential in the harsh environment of the quarry screen-house, where freshly-mined and crushed stone is sorted by size. However there are many challenges that this vital monitoring equipment will have to withstand, both in terms of the environment of the screen-house and the characteristics of the product being monitored. In this white paper level measurement experts Hycontrol examine the issues surrounding level monitoring in screen-houses and outline the optimum measurement solutions for this challenging environment.

Screen-houses are a standard fixture in the quarry industry. Designs and sizes of screen-houses will vary from site to site, but they all fulfil the same basic function. Usually, belt conveyors are used to drop in processed, crushed stone from the quarry site at the top of the screen-house. The rock is then passed over a series of different-sized vibrating grilles which initially allows the smallest pieces of dust and stone to fall through into a bin below.

As the remaining unsorted rocks descend a ‘staircase’ of slightly angled, vibrating screens, progressively larger pieces of rock up to a size of 60mm are allowed to pass through into the appropriate bins. After screening, the

sorted stone can be released from one of the discharge points at the bottom or the side of the bin for use in a wide range of potential applications including aggregate, the production of concrete, roadstone and general construction.



Hycontrol Screenhouse Interior



Hycontrol quarry screenhouse



Hycontrol Screenhouse

The challenges of screen-house level monitoring

Screen-houses are large, difficult, noisy environments full of potential hazards for workers, including high levels of dust, limited visibility and large oscillating plant. As such, appropriate goggles, filter masks and ear defenders must be worn at all times by staff working in the buildings. Clearly this abrasive environment will have a detrimental effect on any equipment that is used, including the vital level measurement instrumentation used to monitor the sorted stone in the bins. Reliable level control is essential not only for inventory purposes when the stone is removed, but more importantly for preventing overflowing of the bins. Product overflow will inevitably lead to equipment damage, plant downtime and a costly clean-up, not to mention the potential for Health & Safety issues. The worst-case scenario is if excess product lifts the screens off their vibrating mountings. Bearing in mind that they can be mounted up to 30 metres above ground level, this is nothing short of a catastrophic event. It will likely cause extensive damage to the screen-house, creating a hazardous working environment and leading to significant downtime whilst the very difficult and potentially dangerous task of repairing the screens is carried out. The cost of such an event is horrendous with lost production and repair charges.

The nature of the screen-house environment also restricts the level measurement options available.

Strain-gauge load-cell and force-based systems, which work by fitting special strain sensors to key parts of the load-bearing structure of a vessel, are highly sensitive devices unable to cope with the constant vibration of the screen-house structure.

Contact-based level measurement technologies such as TDR (Time Domain Reflectometry, sometimes erroneously called ‘radar on a rope’) and out-dated plumb-bob meters are both unsuitable for the screen house environment. Whilst both technologies have many other successful applications in the quarry environment, in the screen-house they are far too likely to be damaged by the falling stone and so would be limited to use on the dust bins only.

Therefore we are left with a choice of two technologies that are suitable for screen-house level measurement, namely ultrasonics and radar.

Ultrasonics

Ultrasonic technology provides a highly cost-effective, easy-to-install, non-contact solution for a wide range of solids level measurement applications. The transducer, mounted at the top of the vessel, emits sound waves that

are reflected back from the surface of the material. The instrument measures the time-of-flight of these waves in order to calculate distance, from which is discerned the level of product in the vessel.

Frequencies as low as 5 kHz are used on long range solids materials and higher frequencies at 40 kHz or above are used on shorter ranges. The latest low frequency ultrasonics can be used for ranges of up to 60 metres, although a number of environmental and operational factors within the silo can reduce this range. Traditional ultrasonic devices struggled with the effects

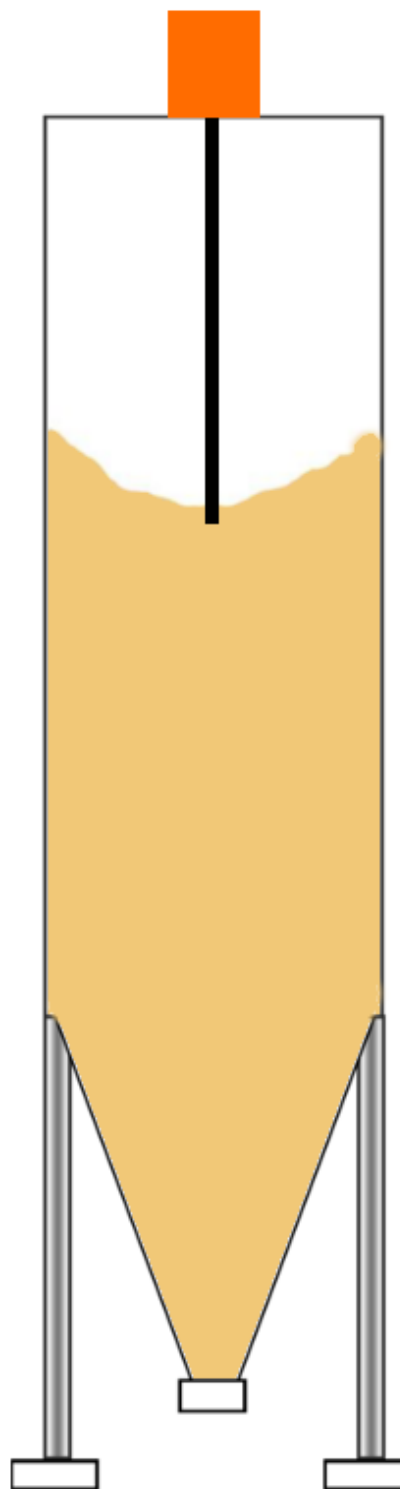
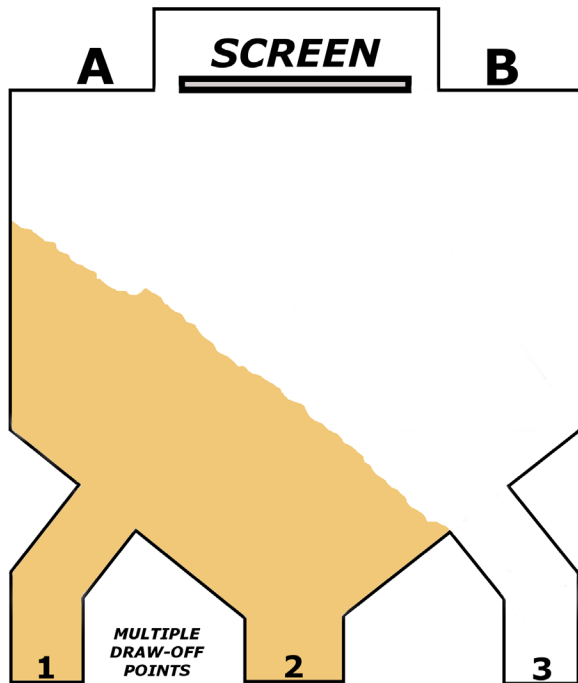


Figure 1

Example 1:



Example 2:

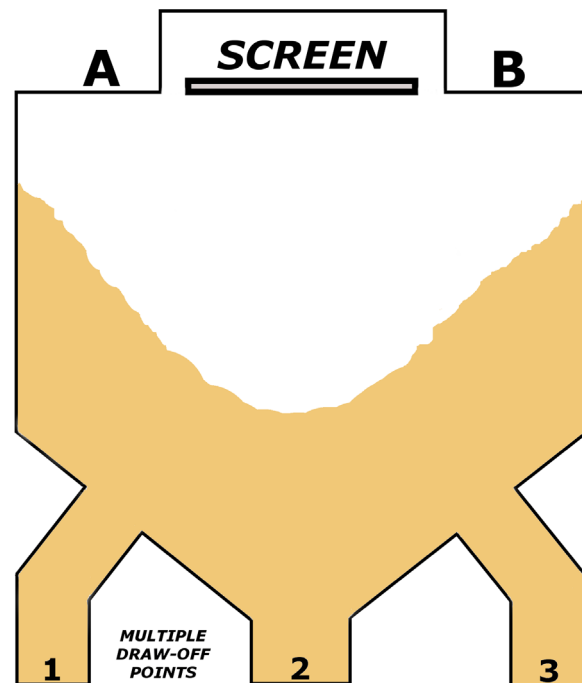


Figure 2

of false echoes and temperature changes. However, the latest corrective software can compensate for a number of adverse operational factors relating to weak and false echoes caused by dust, internal silo structures (for example ladders or cross braces) and temperature changes affecting time-of-flight.

It should be noted that when using ultrasonics, consideration has to be given to the so-called dead band, a range directly below the transducer face where measurement is not possible. This area can vary from 300mm to 1500mm depending on the frequency being transmitted. However this usually only presents a problem for applications with shorter measurement ranges, rarely affecting screen-house applications.

Radar

FMCW (Frequency Modulated Continuous Wave) Radar level measurement systems use high frequency microwave signals (2426- GHz) that are unaffected by dust, pressure, temperature, viscosity, vacuum or foam. The measured level is proportional to the difference in frequency between the transmitted microwaves and those reflected back from the product surface.

This technology is suitable for measurement ranges up to 80 metres and provides high levels of accuracy for certain applications. However the effectiveness of radar technology is dependent on the dielectric constant of the material in the vessel. Radar usually works better

on products with a dielectric constant of greater than 2.0 and in the instance of rock in a screen-house this is not generally an issue. Radar equipment is more expensive than ultrasonics which may be a deciding factor for certain applications.

Effects of Filling and Emptying

It is important to understand the way in which vessels are filled and emptied when installing level measurement systems in order to optimise performance. This is especially important given the unusual shape and properties of a screen-house. In a normal silo with a width of less than 3 metres, with centrally-located single fill and draw-off points, the way in which material behaves is usually repeatable. A single level sensor, located away from the fill point, will usually provide reliable and consistent results (See figure 1). Please note that, depending on the size of the vessel and properties of the material, it may be necessary to locate the sensor an equal distance between the centre and outer edge of the vessel.

Complications can occur with vessels that have multiple fill and draw-off points, as in the case of quarry screen-houses (See figure 2 below). Typically bins have three discharge points and this will result in unpredictable product level behaviour. This means that a single sensor located on one side or the other of the vessel will not provide an accurate gauge of the contents – for example product may come to rest largely on one side

of the bin, and a sensor located on the opposite side may erroneously show the tank to be empty or near-empty. Using the vessel shown in example 1, this would be the case for a sensor located at point (B). With the 'staircase' of screens that runs down the centre of the building it is not possible to centrally-locate a sensor in a screen-house - the falling product would soon erode it away. Whilst covers could be fitted it would be totally impractical to gain access in order to service and conduct maintenance on the sensor.

The most effective solution is to mount two level sensors meters, each an equal distance from each side – in the examples above this would be at points (A) and (B). The readings from each sensor are then used to discern the average product height in the vessel. This is done simply by feeding the information from the two probes to a site PLC or locally-mounted display panel where the readings from (A) and (B) are added together then divided by two, giving an average contents level for the vessel. This also provides the user with separate levels for both sides of the screen, making it easier to decide which point to draw the product from – for instance, in example 2 above the product should be taken from draw-off points (1) and (3) to lower the product height at the sides of the bin.

Maintenance

As we have seen, level equipment in a screen-house is exposed to potentially damaging abrasive material, dust and vibration throughout its working life. Not surprisingly the cleaning and maintenance of level equipment in this unpleasant environment is often neglected.

This is a fundamental error and one that will ultimately accelerate the failure of the equipment. For process-critical equipment, maintenance is essential to ensure ongoing functionality and should be regularly scheduled. This should include not only cleaning and visually checking that the equipment has not become damaged, but also a thorough check of the functionality and calibration of the sensors. This will ensure optimum output levels and eliminate the risk of signal drift. The best solution is for this to be carried out by experienced specialist engineers as part of a regularly scheduled maintenance programme.

Conclusion

The need for reliable level control in screen-houses is clear and well-understood by quarry staff. However achieving that reliability in such a harsh environment continues to be a challenge. It is now accepted that the use of a single sensor will not provide sufficient accuracy, but two sensors will give optimum performance. The chosen instrumentation must provide the precision and reliability required to monitor through a dusty atmosphere, whilst having the robustness and durability to cope with damaging environmental conditions. Ultrasonics and radar both meet these different challenges and, when correctly installed, provide reliable level measuring solutions for the screen house. In parallel, regular maintenance is essential for maintaining and prolonging the working life of this equipment. By ensuring all these factors are considered, better screen house performance and a lower overall cost of ownership can be achieved.

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Getting your heads down!

By: Mark Mutter and Lawrie Evans – JAMCEM Consulting, UK

Introduction

Getting the headcount right on a cement plant is an on-going process and one that is essential to maintaining good profitability by managing fixed costs. Indeed, many of the largest consultancies in the world have made their name by cutting headcount for their clients under the name of “Operational Improvement” (and before that “Time and Motion” studies). However, getting the headcount right isn’t always about reducing – in some cases additional resources may be required for either the short or long term. In addition, in a department that is deemed to be overmanned, resources can be assigned elsewhere within the organisation where they still have something to contribute.

An alternative to full time employees has always been the contracting out of services, or to use the more fashionable and less job-threatening term “outsourcing”. Contracting out has been around in the cement industry for years, primarily on the basis that the contractors are lower cost per head or are more flexible in that they can be simply downsized if the business environment worsens. The key to contracting out when seeking to right-size the workforce is to contract out the right services, make sure that the contractor has the capability to complete the task and ensure that key skills are not being lost from the business.

Determining the effectiveness of the workforce and the areas in which fixed cost savings may be possible needs prior thought both with respect to how to assess the workforce as well as to plan for how each department will operate should numbers have to be reduced.

Assessing the current situation and initial benchmarking

Whilst it might sound obvious, the starting point is to fully understand how many people are operating

within the plant. This assessment needs to cover not only the directly employed personnel at the site but also the number of full time equivalent employees at the site employed as contractors. This can be quite simple when there is a contractor who works the same shift pattern as the own employees. However, some contractors may work 12 hours whilst a direct employee only works 8 hours – in this case a contractor working 12 hours is 1.5 Full Time Equivalent (FTE). There will be other cases where the contractor numbers are not specified, only the function to be performed. In this case the cost of the work has to be translated into a number of equivalent FTEs before the full numbers on the plant can be determined.

Once the headcount has been fully counted – and this needs to be completed both as a total and by department – the number of employees should be benchmarked against other companies to identify how the company compares to others and therefore what should be achievable. As this kind of exercise is not something that a cement producer is particularly specialised in or will have a database to compare against, it will be necessary to bring in an outside consultant to complete this phase of the task. Different consultants will have different ways of completing this benchmarking phase so we will describe the methodology used by JAMCEM to achieve this objective.

JAMCEM has developed a methodology to assess the benchmark headcount for a plant based on several varied factors including capacity of the plant and the complexity of the operation. The complexity of a plant covers factors such as number of quarries operated, number of mills and kilns to achieve the production and the proportion of cement sold as bag compared to bulk. The manning level for over 100 plants worldwide is contained within the unique database and therefore the actual manning level can be compared on a like-for-like basis taking into consideration the scale

and complexity of the plant. This benchmarking is completed for the total employees as well as for the mechanical and electrical functions, in all cases with and without contractors.

It is important to point out at this stage that the location of the plant must be considered in any comparison – so for example there is very little point in projecting the same end result in a plant in a low labour cost environment such as Africa with that of a plant in a high labour cost environment such as Europe. Local regulations such as having to employ a certain number of locals compared to expatriates also have an influence on the overall headcount and therefore these factors also must be taken into consideration. Once this assessment and benchmarking phase has completed, the company can assess whether further study is required as well as the specific areas on which to focus.

Detailed site assessment

To assess where improvements can be made to the manning levels, a site visit by the external resource is required. Again, many of the major consultants claim to have experts in this area but often their “cement expert” has only been on one or two cement plants during their career and therefore becomes the “in-house specialist”. The importance of having a consultancy from the cement industry itself cannot be stressed enough for several reasons. Firstly, the people on the plant will be able to tell within the first few minutes of meeting the consultant whether they know what they are talking about – therefore if the “cement expert” cannot demonstrate this there is a significant credibility gap and the entire process is likely to fail before it has started. Secondly, if the consultant does not understand how the process works and what can be done to reduce or eliminate tasks, then they cannot perform the role correctly and they will reduce headcount without reducing tasks and therefore it is likely that both the productivity and reliability of the plant will be reduced.

Taking the production shift department as an example, one of the tasks that may take much of the shift personnel’s time is cleaning and removal of build-up in the riser. A non-cement consultant will not know how long this should take, what technologies and equipment would be best to use (high pressure water jets, air cannons), what other technical options may exist (bypass use and optimisation, elimination of reducing conditions in the burning zone etc.) and will therefore have no idea how to maintain the effectiveness of the shift department with less people by implementing different solutions.

The purpose of the visit from the external resource is to fully understand how the site works, the practices that are in place, the manning structure of the plant, the cost structure of the employees and contractors, the culture of the plant and the level of skills of the employees. To really understand the “life” of the plant, a visit of around two weeks is generally required. Whilst it may be considered that this assessment could be done internally, there are two reasons why an external resource is required:

- The internal resources are often too close to the day-to-day operations and therefore do not think that there are other ways of performing the daily tasks.
- An external resource brings experience from other cement companies and other locations not seen by the local plant.
- The external resource will be aware of what can be achieved in labour productivity which will not impact on the reliability of plant operations or the quality of the final product.

The purpose of the visit should be explained to the management of the site and the Senior Management of the company must fully support the study and ensure that the site Management understand that changes to manning levels are an essential part of remaining competitive and staying in business. Ultimately, it is the site management team that must both implement the changes in headcount and ensure that operations continue to perform after the reduction in headcount. By involving the site management at this stage, they have the opportunity to put forward their own proposals of what they think will work in the future. In addition, they also have the opportunity to express their requirements for the future when headcount is reduced. This could be in the form of capital investment to reduce the time taken to do the tasks within the department or it could be for training of personnel in the department to be able to do additional tasks under the new structure.

What the visit should not be is something similar to the practices of the larger consultancies when undertaking their studies – evaluating the tasks performed by the personnel and the frequency of the tasks to give a final number of required people. Such studies fail to consider the true day-to-day events of operating a cement plant as well as giving an unrealistic representation of the true requirements of the headcount required. For example, when assessing the laboratory by recording the time to prepare the concrete prisms and multiplying the number of prisms to assess the time required per day does not allow for:

- Human error
- Delays in samples being delivered to the laboratory
- Breakdown of machinery
- Staff breaks and absence
- Additional, one of testing when a quality problem arises or when new products are being developed

In addition, such studies create animosity and distrust within the organisation which can destroy the whole assessment process before it has started.

Seeking the opportunities

Each of the department heads works with the external resource to challenge themselves to identify the tasks that are completed within the department, the number of people that are used and the effectiveness of these people. In addition, providing the department heads of examples of what has worked on other plants and discussing how it can be implemented is a further benefit of using the external resource. As all plants are different, it is impossible to provide a generic list of opportunities. However, some examples of initial areas that can be assessed are as follows:

- The department structure and the use of assistants to Managers where there is no real functional requirement.
- The use of computerised systems to improve the workflow in purchasing and the planning of maintenance as well as improving the overall reliability of the plant.
- Day to day planning and preparation of parts for maintenance teams to start the assigned repairs on time with the right tools.
- Physical layout and location of control rooms and remote laboratories.
- Use of contractors for cleaning and the monitoring of areas that are being cleaned. .
- Contracting out specific maintenance tasks if cost effective and a local resource is available.
- Identifying significant and repetitive tasks which require significant man hours which seem out of step with normal practices such as short refractory life, filter bag frequent changes, excessive wear patterns etc.

The key to this stage is gaining agreement with the department head as to the changes that they can accept within their department. A further outcome of this stage of the process is that certain tasks may be switched to

different departments where they are more appropriate and the role of the external resource is to take an overview of all the departments to find the optimal solution. At the end of this department-by-department assessment, the action plan can be developed, which in many cases can be spread over 12 to 18 months.

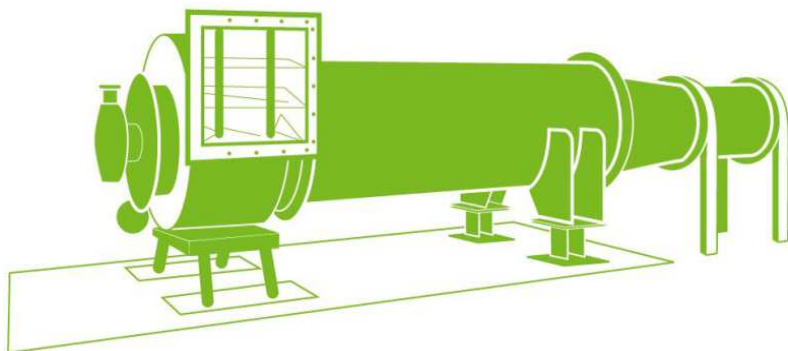
A note to Senior Management

When undertaking a manpower assessment, it is essential that the Plant Management team are on board with the requirement to reduce headcount to remain competitive. Generally, Managers understand this requirement and cooperate to find a solution and a new way of working. However, Senior Management need to consider:

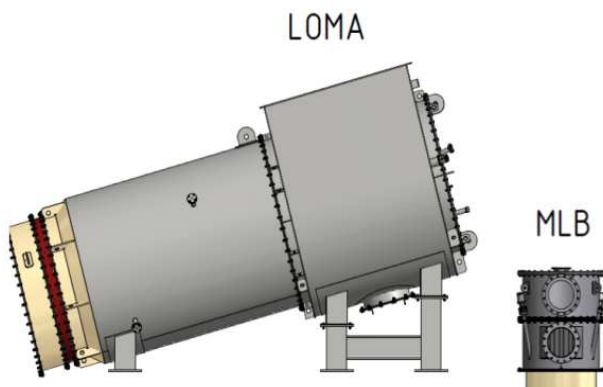
- Major step changes do not always happen overnight. It takes time to progressively reduce headcount, allow the department to adapt to the new way of working before taking the next step.
- The process will not come without a cost – generally implementing changes in headcount will require some capital investment or operational cost, which can include providing training for personnel to give them the tools to perform in their new roles.
- It is essential to get the right consultant or the process often fails before it starts – the consultant must have an extensive experience of the industry, be able to come up with solutions to eliminate tasks and get the buy-in of the managers within the company, so that they can implement the solutions and maintain reliability and productivity.
- Often the people that leave the company (often on early retirement) are those with the most experience and therefore instead of allowing these people to leave taking all the experience with them, a programme of training, hand-over and mentoring should be put in place to transfer this knowledge.

For the assessment and subsequent implementation, the Senior Management needs to support the Plant Management team and actively listen to them and support their requirements for plant performance to remain the same after headcount reductions have occurred.

LOESCHE repositioning itself in the thermal application sector



LOESCHE products in the thermal application sector: LOESCHE hot gas generator



LOESCHE LOMA® heater and MLB burner

The business of combustion systems, drying systems and hot gas generators will in future be brought under one roof by LOESCHE GmbH under the name "LOESCHE Thermal Applications".

Düsseldorf - The LOESCHE group will in future merge their activities in the combustion systems and drying systems sector into a central location at their main centre under the name "LOESCHE Thermal Applications". Alongside the established hot gas generators (LOMA®, HGG), the business incorporates combustion systems for solid, liquid and gaseous fuels as well as complete drying systems for a wide variety of industrial applications. By uniting the core competencies in the thermal applications sector, the LOESCHE group seeks to strengthen their market position. With the engineering resources available at

the head office in Düsseldorf, efficient and optimised complete system solutions can be centrally implemented for customers in accordance with the LOESCHE's quality standard.

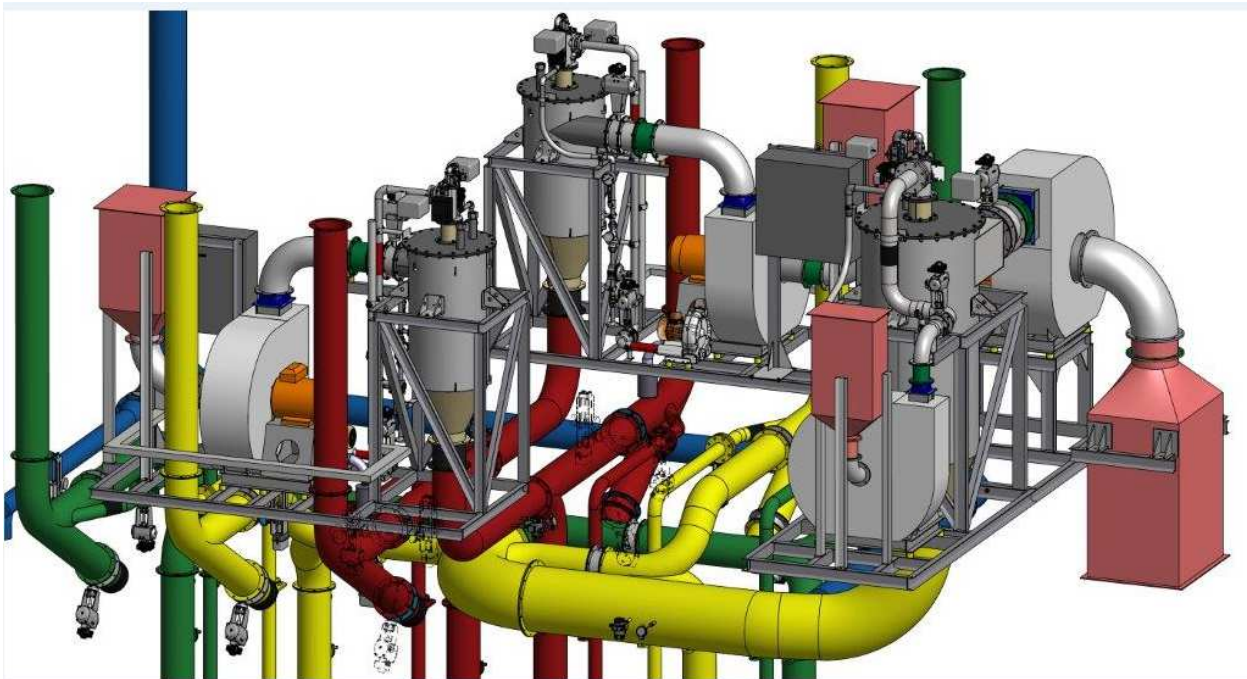
Furthermore, pooling marketing, project management, purchasing, processing technology and proactive development together with an individual burner test facility in the in-house test centre contributes to this goal.

LOESCHE hot gas generators (HGG) have already been used successfully worldwide for decades in the cement and power plant industries. But in addition in other industrial drying processes too, such as fluidised-bed furnaces and dryers as well as flash dryers to heat up fresh air or return gas.

LOESCHE HGGs distinguish themselves from burner systems with refractory linings with

reliable high temperature-resistant steel combustion chambers for heat flow adjustment with virtually no delay when power varies. This means no heating phases whatsoever, barely any heat exchange with the surroundings and a high energy efficiency thanks to optimally designed heating processes. More than 640 LOMA® HGGs have proved themselves during use for fuels in gaseous, liquid, and powder form with a hot gas output temperature of up to 750°C and a combustion thermal output of 0.5 MW to 60 MW.

Furthermore, the advanced LOESCHE steel combustion chambers also work in combination with a multiple lance burner (MLB) developed and patented by LOESCHE specially developed for combusting lean gases. It features a short flame with stable combustion and a large control range of up to 1:70, which enables



total combustion of lean gas without a supporting flame. More than 50 of these MLBs have been successfully deployed worldwide.

Further technical developments of the burner systems are carried out using the in-house burner test facility in the test centre currently, for example, an expansion for solid fuels such as coal or wood dust. Recently, the first LOMA[®] hot gas generator operated using black coal dust was able to be successfully put into operation in Asia with an output of 30 MW and black coal dust as the primary fuel.

By merging LOESCHE with A TEC GRECO Combustion Systems Europe GmbH and thus pooling together competencies in the area of combustion technology, customers all over the world are provided with highly efficient solutions anywhere where the generation of process heat is needed. Even temperatures over 750 °C are possible with hot gas generators with refractory linings.

Furthermore, LOESCHE GmbH not only has the ability to deliver single hot gas generators, but is also able to plan and manufacture complex thermal processing equipment. The hot gas generators for the customer MANFRED BLIND GmbH are one such example of this. Over 10 generators with various designs have

already been put into operation since 2012. The picture below shows the type of generator in the newest generation and was rolled out in February 2017.

Please contact our team, who will promptly respond to your requests:

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New Remote Terminal Unit expands scope for telecontrol applications

- **Simple implementation and monitoring of measurement stations for process data**
- **Cyclically controlled and event-driven transmission of process values**
- **Flexible link to control center and rapid integration in Sinaut plants**
- **Web-based engineering simplifies commissioning**

The new Remote Terminal Unit Simatic RTU3010C and the functions added to the Simatic RTU3030C are extending the application scope of compact RTUs for telecontrol applications. These can be used for the simple implementation and monitoring of measurement points for important process data such as level, flow and fill level, as well as pressure and temperature, even for plants spread over a wide geographical area. The transmission of process values can be cyclically controlled or event-driven. The RTUs can be connected to any control center using different telecontrol protocols – also standardized protocols. With the support of telecontrol protocols such as Sinaut ST7, the two compact RTUs can be ideally integrated into new or existing Sinaut ST7 and Scada systems. By means of integrated inputs and

outputs, sensors can be directly connected. Together with web-based engineering, this helps simplify commissioning. Fields of application for RTUs include the water and wastewater industry, agriculture and asset management.

To connect to the control center, instead of an integrated UMTS modem the Simatic RTU3010C uses external industrial routers such as Scalance M for network connection over an Industrial Ethernet interface. This lends greater flexibility when it comes to choosing a communication medium, with scope for mobile wireless network or wired network connection for instance over DSL. Power is supplied to both the compact RTUs over a DC12-24 volt interface, by a solar panel with rechargeable battery or simply using conventional batteries. The RTUs are also capable of powering the connected sensors. The new firmware version 2.0 enables additional batteries to be used, increasing the capacity to more than 70 ampere hours (Ah) and allowing significantly longer operating times without the need to change batteries.

Its robust design allows the RTU to be used under harsh ambient conditions at temperatures of between -40°C and +70°C, and when fitted with an additional IP 68 rated protective housing, even under flood conditions. The RTUs can be remotely configured and updated with new firmware via web-based engineering. As the new firmware version V2.0 supports autoconfiguration in Sinema Remote Connect, the VPN connections to the RTUs can be simply configured using this management platform for remote networks.

The new Remote Terminal Unit Simatic RTU3010C and the functions added to the Simatic RTU3030C are extending the application scope of compact RTUs for telecontrol applications. These can be used for the simple implementation and monitoring of measurement points for important process data such as level, flow and fill level, as well as pressure and temperature, even for plants spread over a wide geographical area.





XIX INTERNATIONAL CONSTRUCTION FORUM

CEMENT. CONCRETE. DRY MIXTURES

November, 29 — December, 1, 2017. Moscow. Expocenter



XVIII International Specialized Exhibition
“Cement. Concrete. Dry mixtures”

ConLife

IV Global Conference on Chemistry
 and Technology of Concrete

MixBuild

XIX International Scientific Conference
**“Modern Technologies of Dry Mixtures
 in Construction”**

GypMeet

IV International Scientific Meeting
 on Gypsum



International Seminar-Contest for the young
 scientists and post-graduates working in the field
 of binders, concrete and dry mixtures

6500 exhibition
 visitors

450 conference
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150 exhibitors

70 speakers

15 countries



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Compact, flexible Profinet switches for process automation

- Scalance XF-200BA product line for enhanced environmental conditions
- Selection of electrical and optical bus adapters for flexible use
- Integration of S2 devices in high availability R1 systems
- NAMUR/NE21 approval

Siemens offers Scalance XF-200BA, a new line of compact switches. The flexible use of various bus adapters allows users to set up electrical and optical line, star and ring structures. Bus adapters are available with RJ45, SCRJ and LC connection systems. Two types of switches are available: Scalance XF2042-BA, a standard switch for universal, cross-industry use, and the Scalance XF2042-BA DNA Y-switch for special tasks in process automation. An extended temperature range from -40 to +70° C together with approval for use in hazardous areas (ATEX Zone 2, IECEx) allow reliable use, even in harsh environments.

Both versions support up to four ports and various firmware-functionalities. For example, virtual LANs (VLANs) divide the physical network into several virtual sections to minimize the number of broadcasts in the network. Redundancy protocols such as Highspeed Redundancy Protocol (HRP) and Media Redundancy Protocol (MRP) permit a high availability of machines and plants: If the communication fails, there is a switchover to the redundant path within milliseconds.

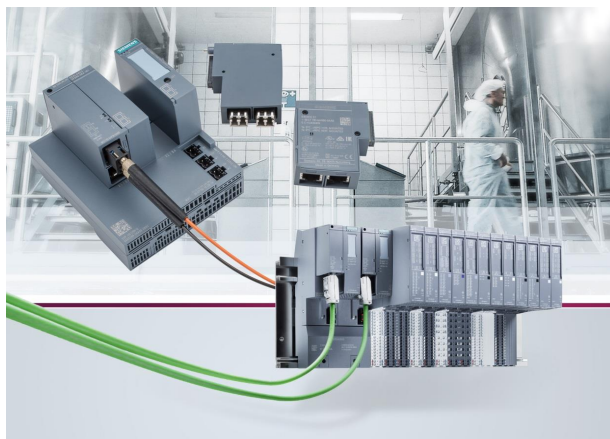
Additional functions, such as Link Aggregation and Remote Network Monitoring (RMON), round out the firmware range of the Scalance XF-200BA line of products. The switches are characterized by a compact enclosure that was developed following the design of the Simatic ET 200SP HA. As well as mounting on a wall or a standard rail, the Scalance XF-200BA is ideal for mounting in a control cabinet alongside the new Simatic ET 200SP HA. Siemens is exhibiting the new product line, together with the new version of the Simatic PCS 7 V9 process control system, at the Hannover Messe 2017.

The Simatic ET 200SP HA I/O system enables optimal use to be made of the properties of Profinet. The remote I/O line is specially designed for the process industry, is highly available, and can be used directly in the field up to and including Ex-Zone 2. The Simatic Compact

Field Unit (CFU) is a field distributor connected via Profinet and combines easy handling of familiar 4 to 20 mA technology with the advantages of digital field technology. The Industrial Ethernet/Profibus(IE/PB)-LINK PNIO provides an additional gateway for connecting a Profibus DP slave to a Profinet controller. One great advantage is the flexible use of the bus adapters with all the products mentioned. The user can rely on many automation and network components having the same design, technical setup, and mounting options.

All these components are networked with the Scalance XF204- 2BA and XF204- 2 BA DNA switches, which are equipped with coated printed-circuit boards (Conformal Coating). They also meet the requirements of NAMUR/NE21, which specifies the immunity requirements for process and laboratory control equipment. The Scalance XF204- 2BA DNA also offers Y-switch functionality for connecting S2 devices to a high availability R1 system.

As well as the two Y-switch ports, two other switch ports are available. With their aid, the S2 devices are connected to Scalance XF204- 2BA DNA via a redundant ring. A five-year warranty applies to the new Scalance XF-200BA switches, as for all Scalance products.



Siemens offers Scalance XF-200BA, a new line of compact switches. The flexible use of various bus adapters allows users to set up electrical and optical line, star and ring structures. Bus adapters are available with RJ45, SCRJ and LC connection systems.



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Ceramic machinery: Italy grows by +60%

Industry 4.0 is driving a boom in Italian ceramic technology, with rates of growth never seen before. Sales of ceramic machinery to domestic clients has grown by double digits over the last three quarters.

In late September 2016, the Acimac (Association of Italian Manufacturers of Machinery and Equipment for Ceramics) Study Centre reported industry-wide growth of +35.5% over the same quarter of the previous year, followed by growth of 21.8% in the last quarter of 2016.

The first three months of this year have registered record breaking figures, with growth in domestic sales turnover of +60.6%, over the first quarter results for 2016.

These outstanding domestic sales figures have driven the overall figures for the quarter, which closed with an increase of +13.3%. Exports, which account for 80% of total sales, remained stable, after registering a positive trend of +48% in the last quarter of 2016.

For more information, please contact:

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Marketing & Communication Department:

Gian Paolo Crasta

Tel: 334 664 9534 - comunicazione@acimac.it



PROJECTA ENGINEERING: THE SUCCESS OF G5 AND EVO DRY FIX

Projecta Engineering has developed an efficient, high-performance digital tile decoration system capable of interacting with the entire production process. This includes G5 technology which was launched onto the market in May 2015 and is now used by the top Italian players.

The machine is not only the first fully modular digital decoration system on the market but is also completely customisable as it enables users to choose from any kind of inkjet technology and printhead.

Based on the Industry 4.0 system, G5 is able to recognise production defects by means of Automatic Sorting with an Intelligent Vision system. This technology is installed at the end of the belt and establishes a dialogue with the machine, enabling it to automatically detect malfunctions and take appropriate action.

EvoDRYFIX XXL, the first digital printer that combines drop-on-demand inkjet technology with dry application technology, has proved another big international success and is capable of applying grits of various particles sizes with guaranteed maximum stability and repeatability. The fact that the machine is used in all the main ceramic production areas worldwide demonstrates the important pioneering role played by Projecta Engineering, which has been anticipating industry trends for years.

Global Cement: Events 2018

Details: www.GlobalCement.com

3rd global boards

The 3rd Global Boards Conference and Exhibition will take place in January 2018, looking at global market trends in cement-based boards, at advances in production technology and at how producers can add value to their products worldwide. In addition to equipping delegates with the latest information, news and developments, the networking opportunities will once again be excellent. *If you are interested in cement-based boards, then you should attend!*

22-23 January 2018,
London, UK



12th global cemfuels

The popular Global CemFuels Conference will visit Berlin for the first time in 2018 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 your business is in fuels and alternative fuels for the cement and lime industry, then you should attend!*

20-21 February 2018,
Berlin, Germany



1st global gypsupply

The inaugural Global Gypsupply Conference will look at the different supply sources of gypsum worldwide, including natural gypsum, synthetic gypsum and recycled gypsum, will examine transport and shipping options, and will match up miners, syngyp producers and recyclers with buyers and users of gypsum including cement producers, wallboard and plaster manufacturers, and agricultural users. *If you use gypsum in your process, then you should attend!*

13-14 March 2018,
Brussels, Belgium



13th global slag

The 13th Global Slag Conference will take place in North America, close to the heart of the American 'slag universe'. Slag producers and users are expected to attend from throughout North and South America 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!*

April 2018,
North America



2nd global cemprocess

Following the success and popularity of the first Global CemProcess Conference and Exhibition on process optimisation, de-bottlenecking, production maximisation and troubleshooting in the cement industry, the event is to be repeated, and (by popular demand and after a global survey of potential participants) will once again take place in London. *If you would like to maximise cement production while decreasing costs, then you should attend!*

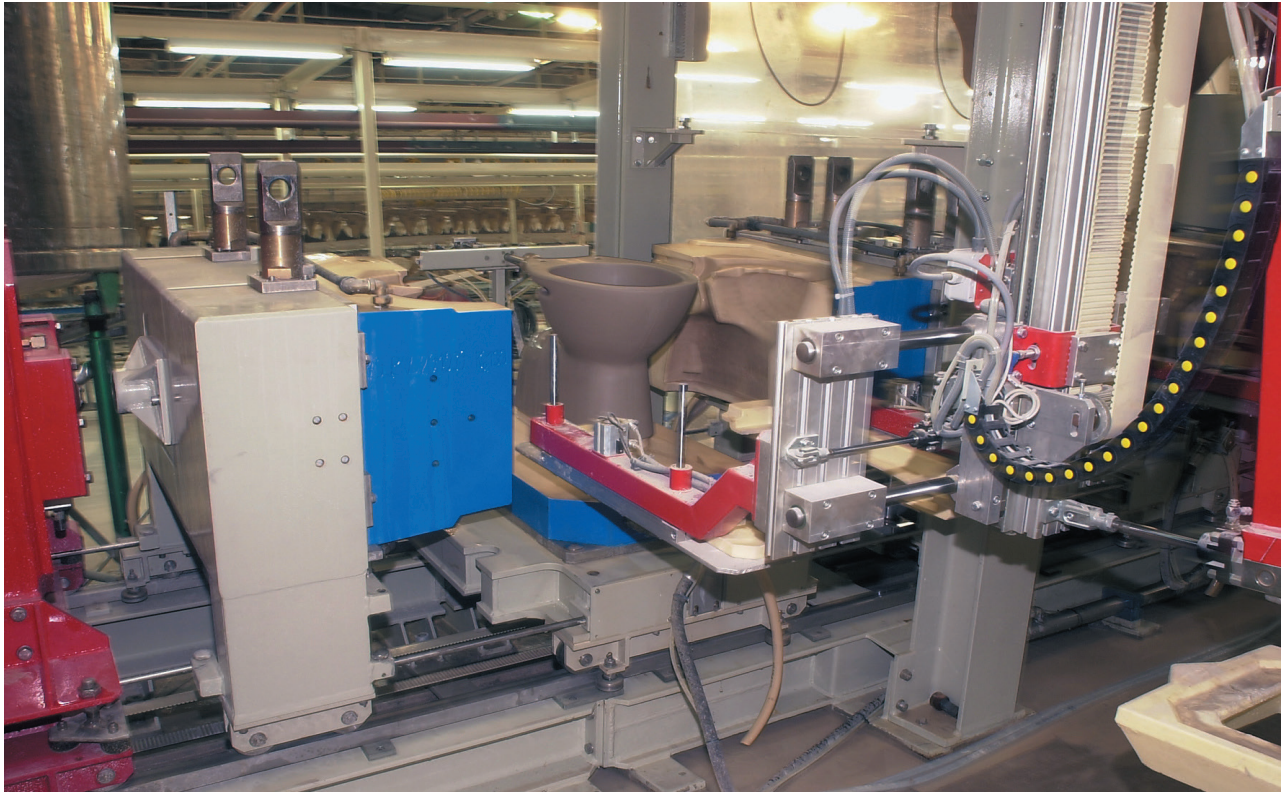
May 2018,
London UK



Our conferences have taken place in the following world cities: Aachen, Abu Dhabi, Ankara, Antwerp, Bangkok, Barcelona, Berlin, Brussels, Cancun, Chicago, Dresden, Dubai, Düsseldorf, Geneva, Hamburg, Hanoi, Helsinki, Houston, Istanbul, Jeddah, Krakow, Kuala Lumpur, Las Vegas, London, Miami, Moscow, Mumbai, Munich, New Orleans, Paris, Prague, Puerto Rico, Riga, Rio de Janeiro, Riyadh, San Francisco, Shanghai, Strasbourg, Sydney, Tehran, Toronto, Vienna and Washington DC.

Volgogradskij Keramicheskij Zavod Russia expands its high pressure casting department with Sacmi

Two new WC high pressure casting plants successfully tested



Volgogradskij Keramik, in Volgograd (Russia), the first producer to introduce high pressure ceramic sanitaryware casting technology to Russia, has responded to growing market demand by recently starting up two new Sacmi castings systems for high-end WCs, an AVE 040 system and an AVM 150 integrated production centre.

The AVE 040 casting system, which will be used to boost output of currently manufactured models, has been supplied together with a multi-level piece storage conveyor (the pieces are simultaneously de-moulded and deposited on suitable polyurethane supports). The conveyor ensures there is an adequate ‘firming up’ time prior to final finishing of the pieces and their subsequent deposit on drier cars. Piece handling is automatic and lifting is performed by elevators/descenders, allowing vertical storage of pieces and thus reducing floor space requirements.

The second plant is a mono-mould AVM integrated production centre for complex WCs cast in resin moulds; it is served by a transfer unit that de-moulds and deposits the piece at the finishing station. The AVM offers the best solution for complex WCs, which require highly specific finishing operations and flexible production arrangements.

Mould changeover is fast and independent: so once the second casting module is installed it will be possible to change the mould on one machine without stopping production on the other.

This integrated production centre is also suitable for small-scale production runs, a must for meeting the needs of a market that is often fast-changing.

Completing the order is a full set of new moulds; these supplement the originally provided ones, which are still in use more than 10 years after plant start-up. The outstanding duration of the moulds was made possible not only by the resin and the special Sacmi modelling and mould-making technology, but also thanks to timely, skilled maintenance by the technicians of Volgogradskij Keramik. Resin moulds, in fact, work like filters and need regular cleaning. The machine wash cycles are indispensable for proper day-to-day operation but, depending on slip and water characteristics, periodic counter-washing is also required to eliminate any clogging. For this purpose, then, periodic use of the DFS1 liquid specifically produced by Sacmi for this mould counter-washing task helps keep them free from impurities and internal occlusions which, unless removed, would cause gradual deterioration.

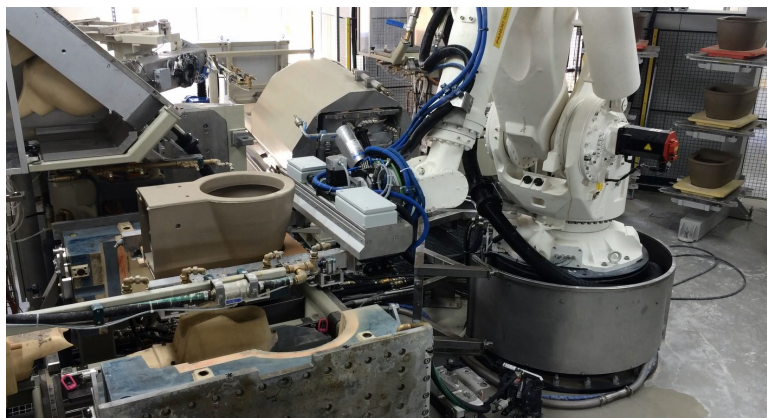
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Duravit impressed by Sacmi's AVI Concept

Major German company - internationally renowned for its high quality, well-designed sanitaryware - won over by Sacmi's revolutionary high pressure sanitaryware casting method. A new casting cell, equipped with two AVI units and a robot, has been installed and successfully started up at the main headquarters in Hornberg



Duravit, the world leader in high-quality, designer sanitaryware, has chosen the AVI Concept, the Sacmi-developed high pressure casting system that has revolutionised sanitaryware manufacturing. The new casting cell, equipped with two AVI units and a robot, was installed and successfully started up between April and May 2016 at the company's main facility in Hornberg, Germany, in the heart of the Black Forest.

Launched on the market two years ago, AVI stands out from competitors' solutions due to its excellent productivity and, more specifically, the revolutionary fast mould changeover system that slashes the time needed to change the mould - and thus start production of different article types - under one hour (as opposed to the several hours needed with traditional systems). It is these characteristics, together with the low maintenance requirements and AVI's compatibility with existing moulds designed for AVM and AVE, that attracted the attention of this international high-quality sanitaryware brand.

The new casting cell with the two AVI solutions, which joins the two Sacmi AVM units already in use at the German firm for some years now, will be used to manufacture complex 7-part WCs with stick-on rims. Now, just a few months after start-up, the customer has expressed enormous satisfaction thanks to a series of AVI Concept plus-points; these range from a machine cycle of less than 20 minutes (in practice, these two newly installed solutions allow Duravit to produce a new article every 10 minutes) to the revolutionary fast mould changeover system (which really comes to the fore in the manufacture of complex WCs as it completely eliminates long manual handling tasks that provide little added value, tasks that can, with products like these, take several hours).

With the AVI Concept, all mould handling operations are managed by an anthropomorphous robot that can extract and handle all the mould parts, picking them directly from the machine. Further added value comes from AVI Concept's compatibility with existing moulds originally designed for the AVM and AVE; Duravit is able to make good use of this advantage thanks to the previous installation of Sacmi AVM units and the availability of an extensive mould pool.

This order - placed by one of the industry's brand leaders in terms of quality, design and manufacturing excellence - sees Sacmi reach for the future while drawing on over 30 years' experience in the design and marketing of ceramic sanitaryware manufacturing solutions, especially as regards the development of the high pressure casting cells with which Sacmi leads the world. At the same time, this latest purchase reinforces a long-standing partnership between the Sacmi Group and Duravit; in addition to the AVI and AVM solutions already employed at the Hornberg plant Duravit has, in the past, also purchased a Sacmi AVE cell, currently installed at its French production facility, and robotized glazing solutions, the last of which was recently added to the Duravit plant in China.



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THINKING FOR TOMORROW



CEMBUREAU releases Cement Standards of the World publication

The European Cement Association has published an updated version of its Cement Standards of the World publication, with a complete overview of all standards for cement from across 84 countries.

In 1991, CEMBUREAU had previously published an edition of the Cement Standards of the World. Since then, there have been many changes in the standards for cement around the world:

- In Europe, the Committee for Standardisation (CEN), comprised of all countries of western Europe (ECC and EFTA members), produced a harmonized standard for common cements EN 1971:2000-. This standard was updated in 2011 to include cements with specific performance characteristics.
- Several countries have adapted this European standard and transposed it into their national standards.
- The majority of national standards of countries outside of Europe have been updated

The reviewed publication provides the latest information on worldwide cement standards and includes key countries such as US, China, the Russian Federation, Canada and Australia. In view of the large number of different types and strength classes of common cement now available, the format of the publication is such that the same specification requirements are to be found in the same tables for each country to allow comparisons if desired.

In order to assist those wishing to obtain copies of the individual standards referred to, an additional section is provided listing the names, acronyms, addresses, telephone numbers, e-mail addresses and websites of national Standards Bodies.

For more information about purchasing the publication, please contact c.roeland@cembureau.eu

About CEMBUREAU: The European Cement Association based in Brussels is the representative organisation of the cement industry in Europe. Currently, its Full Members are the national cement industry associations and cement companies of the European Union (with the exception of Cyprus, Malta and Slovakia) plus Norway, Switzerland and Turkey. Croatia and Serbia are Associate Members of CEMBUREAU. A cooperation agreement exists with Cyprus.

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Green petcoke market to reach USD 13 billion by 2021

According to [CW Research's World Green Petcoke Market Demand Forecast Report](#), green petroleum coke global consumption is projected to grow 2 percent per year on average through 2021.

Green petcoke demand will expand both on supply-side factors as well as on expanding end-user industrial demand. In 2017 alone, demand for global green petcoke will surpass 137 million tons. A new important driver for the sector is Reliance India's gasification project in Gujarat. This large gasification project has been in the work for a long time, but it seems like the first units will finally come on-line in the second half of 2017 and, when fully up and running, will absorb 810- million tons. Longer-term, petcoke demand growth will be driven by fuel-grade petcoke from the cement sector, albeit slow growing, and anode-grade petcoke (in calcined form) from aluminum.

Robert Madeira, CW Research's Managing Director and Head of Research stresses: "We don't see any major changes in the world outlook for green petcoke, but especially petcoke demand from the cement sector is at increasing risk; reducing cement-clinker ratios, alternative fuel substitution, CO₂-NO_x-SO_x emissions pressures, all combine to provide a negative long-term outlook for petcoke use. While nothing is likely to happen overnight, this poses a big strategic challenge for petcoke producers / refiners and marketers to grapple with – the time is now to tackle this seismic shift."

With structural price headwinds, we expect that the fuel grade sector will be under more pressure as additional supplies come online. CW Research's petcoke price forecast implies that weaker prices will not be offset fully by expanding volume growth, leading to a flag-to-negative trend in the USD market size. The anode grade segment is however expected to see stronger pricing, given the tight calcining market.

Environmental constraints to dampen petcoke demand

Globally, cement manufacturing, which uses petcoke to pyro-process limestone, is the most intensive green petcoke demand segment, accounting for almost 40% of total consumption. China is the largest cement producer and also the largest petcoke user worldwide, although petcoke figures only as a minor share in the Chinese cement sector's fuel portfolio.

Anode petcoke is the predominant type of petcoke used in China, specifically by the aluminum manufacturing sector. The Chinese aluminum sector alone uses 11% of the global supply of anode grade petcoke. Manufacturers in the Chinese cement sector prefer the cheaper and more readily available coal to fuel clinker fuels, in the detriment of green fuel grade petcoke.

"There is tremendous uncertainty around the future of green petcoke, particularly fuel grade petcoke," asserts Raluca Cercel, CW's Senior Consulting Analyst. She adds: "anode grade petcoke often has no substitute in its applications, making it an indispensable commodity. Logically, we see this dynamic play out in pricing for the two product types and we expect this trend to persist."

Several factors are expected to impact marketable production of petcoke in the long term. Among them is the International Maritime Organization's regulation on heavy fuel oil that will lower demand for heavy fuels and require potentially more upgrading in the refineries of the feedstock and in turn produce more petcoke. Additionally,

environmental scrutiny in key markets such as China and India have introduced uncertainty around the future path of petcoke in those countries. While we don't expect outright bans India is making the case for much stricter

environmental regulation and/or tax. China is also guiding away from high sulfur petcoke, even though it is debatable if it can be classified as a “ban”.

Nonetheless, globally speaking, despite the pick-up in alternative fuels within the cement sector and the application of environmental regulations, CW Research expects the petcoke sector to show a moderately growing trend.

According to Raluca Cercel, “compared to the demand growth rate between 2010 to 2016 CAGR, we expect growth to slow down. The cement sector, the largest user of fuel grade petcoke, will decrease its petcoke usage in the fuel mix. Still, this reduction will not offset the volumes of fuel grade anticipated to be absorbed by Reliance’s gasifiers.”

Specialty petcoke product segments, including needle coke, are expected to show the highest growth in the coming years, jumping from a share of 1% of green petcoke consumption to 2%. With few substitutes and facing lower price sensitivity due to their premium nature, end-user industries, including titanium oxide manufacturing, graphite electrode production for steel applications, will drive up higher volumes and values for these products.

Cement production captures 40% of petcoke consumption

Petcoke is currently produced at more than 140 refineries worldwide with the largest producers being ExxonMobil, Phillips 66 Company and PDVSA. Around 10% of the global coking production comes from fluid or flexicokers, whereas 90% of the cokers are delayed cokers.

In the next five years, multiple new coking units are being built at refineries around the world, including Duqum Refinery in Oman and Bharat Petroleum’s Cochin Refinery. The new cokers will largely be of flexicoke design and add to longterm supply-side growth. Over time, this sets a backdrop of pressure on long-term petcoke prices.

Apart from producers, marketers have an important role in the value chain in providing the commercialization of petcoke. Global marketers, such as Koch Carbon, Garcia Munte Energia and Oxbow, complement the petcoke supply chain, playing a decisive part in stimulating petcoke consumption and place 68% of total marketable petcoke.

Out of the 137 million tons of marketable petcoke produced in 2016, more than 65% has historically been traded internationally. The US is, by a large margin, the main supplier, accounting for 83% of global exports in 2017. The country trades largely to China, India, Japan and Turkey. Compared to 2010, India’s petcoke imports of US supplied petcoke increased five-fold.

For more information, placing an order, or interview inquiries, please contact:

Liviu Dinu, Market Services & Marketing

Consultant, CW Group, by phone at +40 -744 -67- 44- 11, or e-mail at ld@cwgrp.com.

About CW Group

The Greenwich (Conn.), USA-headquartered CW Group is a leading advisory, research and business intelligence boutique with a global presence and a multi-industry orientation. CW Group is particularly recognized for its sector expertise in heavy-side building materials (cement), light-side building materials, traditional and renewable power & energy, petrochemicals, metals & mining, industrial minerals, industrial manufacturing, bulk cargo & shipping, among others. We have a strong functional capability, grounded in our methodical and quantitative philosophy, including due diligence, sourcing intelligence, feasibility studies and commodity forecasting.

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Mobile: +40 722 764 802
 Mr. Ali Assad, Business Development Executive
Email: aga@gmiforum.com
Mobile: +40 754 023 330

VDZ Training: Process operator training
 Date : 04 - 22 September 2017
 Venue: VDZ's premises, Düsseldorf, Germany
 For more information please visit:
www.vdz-online.de/en/training

INTERCEM Asia
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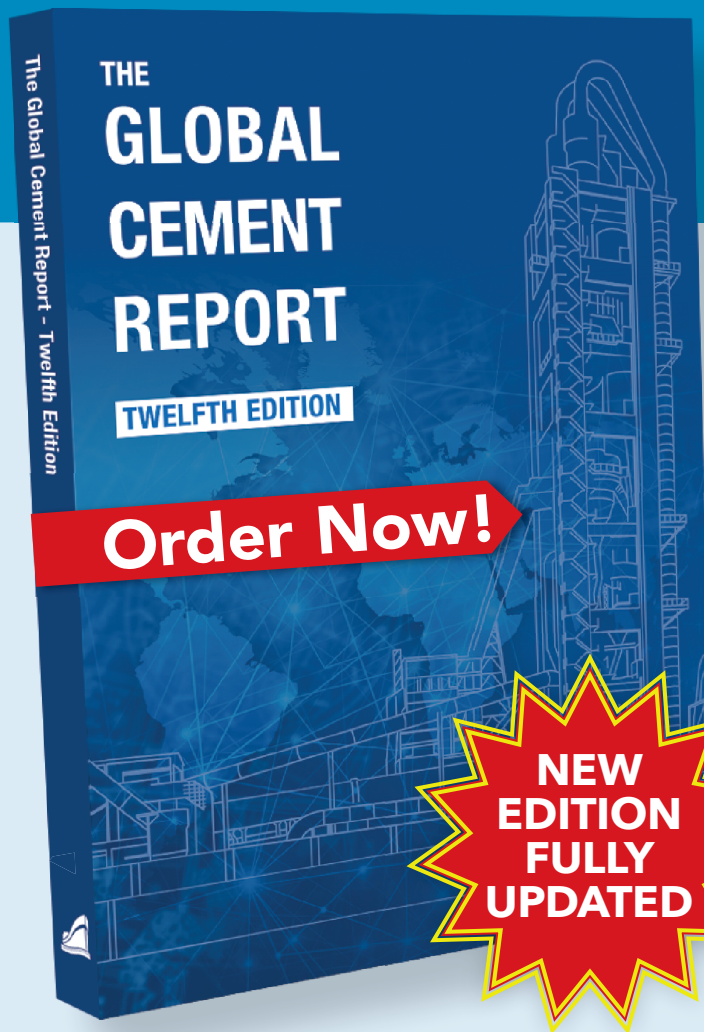
VDZ Training: Cement manufacturing course -
 Module 2
 Date : 25 September - 20 October 2017
 Venue: VDZ's premises, Düsseldorf, Germany
 For more information please visit:
www.vdz-online.de/en/training

4th Alternative Fuel Symposium
 Date : 26 - 28 September 2017
 Venue: Hotel Wyndham, Duisburger Hof, Duisburg,
 Germany
 For more information please contact:
 Mr Dirk Lechtenberg
Marketing@lechtenberg-partner.de / sales@lechtenberg-partner.de
<http://www.lechtenberg-partner.de>

Cement.Concrete.Dry mixtures 2017
 Date : 29 September - 01 December 2017
 Venue: Moscow, Russia
Email: a.sidorova@alitinform.ru
 For more information please visit:
www.infocem.info/eng

Cement Business & Industry Africa 2017 (CBI
 Africa 2017)
 Date : 04 - 05 October 2017
 Venue: Johannesburg, South Africa
Email: communication@gmiforum.com

14th TÇMB International Technical Seminar &
 Exhibition
 Main theme: "Sustainable Environment & Energy"
 Date : 10 - 13 October 2017
 Venue: Kaya Palazzo Golf Resort, Belek, Antalya,
 Turkey
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1st International Conference on Cement & Concrete Technology

Date : 20 - 22 November 2017

Venue: Military Technological College, Sultanate of Oman

For more information please visit:

www.concreteconference.org.uk

24th international conference CONCRETE DAYS 2017

Date : 22 - 23 November 2017

Venue: Litomyšl, Czech Republic

Email: cbsbeton@cbsbeton.eu

15th NCB International Seminar on Cement, Concrete and Building Materials

Date : 05 - 08 December 2017

Venue: New Delhi, India

Mob.: +91 9818604898

Email: cisimb@ncbindia.com

3rd Global Boards Conference and Exhibition

Date : 22 - 23 January 2018

Venue: London, UK

For more information please visit:

<http://www.propubs.com>

12th Global CemFuels Conference & Exhibition on alternative fuels for cement and lime 2018

Date : 20 - 21 February 2018

Venue: Berlin, Germany

For more information please visit:

<http://www.cemfuels.com>

1st Global Gypsupply

Date : 13 - 14 March 2018

Venue: Brussels, Belgium

For more information please visit:

www.globalcement.com

13th Global Slag

Date : April 2018

Venue: North Africa

For more information please visit:

www.globalcement.com

2nd Global Cemprocess

Date : May 2018

Venue: London, UK

For more information please visit:

www.globalcement.com

8th 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

www.vdz-congress.org

15th 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>

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Zvenigorodskaya Str., 22A, office 438
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Tel./fax: +7(812) 242-11-24
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DIARY DATES

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9th Buildint Tanzania Expo 2017

Date : 14 - 16 July 2017

Venue: Dar Es Salaam, Tanzania

For more information, please visit:

www.buildtanzania.com

HR Metrics and Analytics training Workshop

“Evidence Based Approach to HR Metrics and Analytics for Today’s Dynamic Workforce”

Date : 17 - 21 July 2017

Venue: Premier Hotel, OR Tambo Airport,

Johannesburg, South Africa

Tel: +27 11 015 7282

Fax: 0027 86 616 2079

www.acaeglobal.com

Evidence Based Policy Making and Implementation

Date : 24 - 28 July 2017

Venue: Johannesburg, South Africa

105B Morningside Manor Office Complex, Sandton,
2198, South Africa

Tel: +27 11 051 3602

Tel: +27 11 011 0100

Fax: +27 86 616 2079

Email: events@forumis.co.za

www.forumis.org

Intelligent Buildings and the Impact of IOT Training
Course

Date : 26 - 27 July 2017

Venue: Goodwood Park Hotel, Singapore

For more information please contact:

Trueventus

Mr. John Karras

Tel: +603 2775 0001

Fax: +603 2775 0005

Email: johnk@trueventus.com

2nd Annual Mixed-Use Development Australia

Date : 26 - 27 July 2017

Venue: Brisbane, Australia

For more information please contact:

Trueventus

Casey Lee

Tel: +603 2775 0067

Fax: +603 2775 0055

Email: caseyl@trueventus.com

Irexpo

International Real Estate & Investment Exhibition

Date : 26 - 28 July 2017

Venue: Tabriz International Fairground, Iran

Tel: +90 212 273 18 18

Email: info@irexpo.net

www.irexpo.net

Advanced Financial Modelling For Multi-Let

Commercial Real Estate Investment

Date : 16 - 17 August 2017

Venue: Hong Kong, China

For more information, please visit: [http://](http://colloquiumevents.com/FTP/MKTCL/BF155_MODELHK.pdf)

[colloquiumevents.com/FTP/MKTCL/BF155_](http://colloquiumevents.com/FTP/MKTCL/BF155_MODELHK.pdf)
[MODELHK.pdf](http://colloquiumevents.com/FTP/MKTCL/BF155_MODELHK.pdf)

HR Metrics and Analytics training Workshop

“Evidence Based Approach to HR Metrics and Analytics for Today’s Dynamic Workforce”

Date : 21 - 25 August 2017

Venue: Premier Hotel, OR Tambo Airport,

Johannesburg, South Africa

Tel: +27 11 015 7282

Fax: +27 86 616 2079

www.acaeglobal.com

Evidence Based Policy Making and Implementation

Date : 21 - 25 August 2017

Venue: Johannesburg, South Africa

105B Morningside Manor Office Complex, Sandton,
2198, South Africa

Tel: +27 11 051 3602

14. ULUSLARARASI INTERNATIONAL TEKNİK TECHNICAL SEMİNER SEMINAR

10-13 EKİM / OCTOBER ANTALYA / TURKEY, 2017

TÇMB 2017
TÜRKİYE ÇİMENTO MÜSTAHİLLERİ BİRLİĞİ

14. TÇMB International Technical Seminar & Exhibition 10-13 October 2017 Kaya Palazzo Golf Resort, Belek, Antalya/ Turkey

Main Theme: Frugal Innovation

Concrete Roads, Concrete Barriers & Concrete | Tunnels Alternative Fuel & Alternative Raw Material
Energy Optimization | Renewable Energy

Main Sponsors

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Opening Cocktail: **GCP Applied Technologies**
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Networking Cocktail: **ABB**
Seminar Luncheon: **Aybars Makina**
Refreshment Breaks: **BP Petrolleri A.Ş. (Castrol)**
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Tel: +27 11 011 0100

Fax: +27 86 616 2079

Email: events@forumis.co.za

www.forumis.org

Spectrum Masterclass Training Course

Date : 23 - 24 August 2017

Venue: Kuala Lumpur, Malaysia

For more information please contact:

Trueventus

Casey Lee

Tel: +603 2775 0067

Fax: +603 2775 0055

Email: caseyl@trueventus.com

3rd Annual Transit-Oriented Development Asia

Date : 23 - 24 August 2017

Venue: Hong Kong, China

For more information please contact:

Trueventus

Casey Lee

Tel: +603 2775 0067

Fax: +603 2775 0055

Email: caseyl@trueventus.com

Brownfield Asia Summit

Date : 23 - 24 August 2017

Venue: Hong Kong, China

For more information please contact:

Trueventus

Casey Lee

Tel: +603 2775 0067

Fax: +603 2775 0055

Email: caseyl@trueventus.com

Big Data and Data-driven Innovation: Business impact and Opportunities

Date : 29 - 30 August 2017

Venue: Singapore

For more information please contact:

Trueventus

Mr. John Karras

Tel: +603 2775 0001

Fax: +603 2775 0005

Email: johnk@trueventus.com

Risk Management and Value Management

Date : 29 - 30 August 2017

Venue: Goodwood Park Hotel, Singapore

For more information please contact:

Trueventus

Mr. John Karras

Tel: +603 2775 0001

Fax: +603 2775 0005

Email: johnk@trueventus.com

Financial Modelling for Urban Master Planning Projects

Date : 29 - 30 August 2017

Venue: Goodwood Park Hotel, Singapore

For more information please contact:

Trueventus

Mr. John Karras

Tel: +603 2775 0001

Fax: +603 2775 0005

Email: johnk@trueventus.com

The Modern B2B Customer Training Course: How to Engage, Acquire and Retain Them

Date : 29 - 30 August 2017

Venue: Mandarin Orchard, Singapore

For more information please contact:

Trueventus

Mr. John Karras

Tel: +603 2775 0001

Fax: +603 2775 0005

Email: johnk@trueventus.com

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

Date : 12 - 14 September 2017

Venue: Johannesburg, South Africa

For more information please visit:

www.ifat-africa.com

Evidence Based Policy Making and Implementation

Date : 18 - 22 August 2017

Venue: Dubai, UAE

Email: events@forumis.co.za

www.forumis.org



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Second Asia Mortar Summit

Date : 19 September 2017

Venue: Shanghai, China

For more information, please visit:

www.drymix.info

Venue: Addis Ababa, Ethiopia

For more information, please contact:

Ms. Burcu Uca / Sales Representative

Tel: +90 212 356 00 56 (Ext:1530)

Email: burcu.uca@expotim.com

HR Overcoming the Challenges of Digital Transformation Training Course

Date : 20 - 21 September 2017

Venue: Singapore

Tel: +603 2775 0067

Email: mikej@attendingyourevent.com;

6th International Congress of Mining Machinery and Technologies (IMMAT)

Date : 18 - 21 October 2017

Venue: Izmir, Turkey

For more information, please visit:

www.immat.org

11th Global Insulation Conference & Exhibition

Date : 25 - 26 September 2017

Venue: Kraków, Poland

For more information, please visit:

www.GlobalInsulation.com

17th Global Gypsum Conference & Exhibition

Date : 25 - 26 October 2017

Venue: Kraków, Poland

For more information, please visit:

www.GlobalGypsum.com

Strategic Challenge for Petcoke Producers

Date : 27 - 28 September 2017

Venue: Dubai, UAE

For more information please contact:

Ms. Beatrice Ene

Client Development & Marketing Director
(International)

Email: be@gmiforum.com

Mobile: +40 722 764 802

Modern Warehousing

Date : 25 - 26 October 2017

Venue: Singapore For more information please contact:

Trueventus

Mr. John Karras

Tel: +603 2775 0001

Fax: +603 2775 0005

Email: johnk@trueventus.com

Mr. Ali Assad

Business Development Executive

Email: aga@gmiforum.com

Mobile: +40 754 023 330

3rd Annual Vehicle Fleet Management

Date : 25 - 26 October 2017

Venue: Singapore

For more information please contact:

Trueventus

Mr. John Karras

Tel: +603 2775 0001

Fax: +603 2775 0005

Email: johnk@trueventus.com

International Symposium on Mining and Environment (ISME2017)

Date : 27 - 29 September 2017

Venue: Kefaluka Resort Hotel, Bodrum, Turkey

Email: isme@maden.org.tr

For more information, please visit:

www.isme.org.tr/defaulten.asp

Managing Dark Data

Date : 25 - 26 October 2017

Venue: Goodwood Park Hotel, Singapore

For more information please contact:

Trueventus

Mr. John Karras

Tel: +603 2775 0001

8th Addisbuild International Construction,

Construction Materials and Technologies Exhibition

Date : 13 - 16 October 2017

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Fax: +603 2775 0005

Email: johnk@trueventus.com

Fifth Latin American Drymix Mortar Conference
ladmmc five

Date : 26 October 2017

Venue: São Paulo, Brasil

For more information, please visit:

www.drymix.info

City Road Ukraine 2017 Int. Exhibition & Conference

Date : 28 - 29 October 2017

Venue: Kiev, Ukraine

For more information, please visit:

www.cityroad-ua.com

International Symposium on Occupational Health and
Safety in Mining 2017

Date : 2 - 3 November 2017

Venue: Adana, Turkey

Email: maden@maden.org.tr

Cement. Concrete Dry Mixtures 2017

Date : 29 November - 01 December 2017

Venue: Moscow, Russia

Email: a.sidorova@alitinform.ru

Cameroon Build Construction and Construction
Materials Exhibition

Date : 30 November - 03 December 2017

Venue: Cameroon

For more information, please contact:

Ms. Burcu Uca / Sales Representative

Tel: +90 212 356 00 56 (Ext:1530)

Email: burcu.uca@expotim.com

India Energy Week 2017 (IEW 2017)

Date : 6 - 8 December 2017

Venue: New Delhi, India

For more details, please contact

Yuan Chang at yuanchang.yu@argusmedia.com

4th Arabiamold 2017

Date : 11 - 14 December 2017

Venue: Sharjah, UAE

Tel: +971 6 5770000

Fax: +971 6 5770111

Email: info@expo-centre.ae

For more information, please visit:

www.arabiamold.com

SteelFab 2018

The Middle East premier trade show for the metal
working, metal manufacturing and steel fabrication
industry

Date : 15 - 18 January 2018

Venue: Expo Center Sharjah, UAE

E-mail: info@expo-centre.ae

For more information please visit:

www.steelfabme.com

4th Iraq Building Fair

Date : 10 - 13 May 2018

Venue: Baghdad, Iraq

Tel: +90 216 575 28 28

Email: info@pyramidsfair.com

8th International VDZ Congress 2018

Date : 26 - 28 September 2018

Venue: Duesseldorf, Germany

For more information, please visit:

www.vdz-congress.org.

Bauma China 2018

Date : 27 - 30 November 2018

Venue: Shanghai, China

For more information, please visit:

www.bauma-china.com

Bauma 2019

Date : 08 - 14 April 2019

Venue: Munich, Germany

For more information, please visit:

www.bauma.de