



The mining group Anglo American relies on a ship loading system of FAM, a member of the BEUMER Group, for the loading of mined copper ore from the Peruvian plant Quellaveco (see p14).



Ajax Equipment has supplied a leading UK cereal bar and snack manufacturer with a stainless steel twin-screw mixer (see p3).



Handling cocoa powder can be tricky, due to the nature and the fineness of the powder. Gericke has supplied, installed and commissioned a pneumatic conveying, storage, feeding and mixing system for the production of chocolate drinks (see p3).



Lödige's Ploughshare Mixers can meet the specific requirements for the production of chewable tablets for dogs and cats (see p4).



Owl Eye provides real-time volume measurement and management of bulk solids stockpiles. Data is saved in the digital platform and offers analysis functions, such as batch splitting and inventory taking (see p10).

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# ATMOSPHERIC QUALITY

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## Atmospheric Quality Ltd

### Environmental Consultants

- Air Quality
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### CONTACT

Atmospheric Quality Ltd.  
Suite 3, Charter House  
26 Claremont Road  
Surbiton KT6 4QU,  
United Kingdom

Dr William Hicks

T: +44 (0)7766 104206  
E: [w.hicks@atmospheric.uk](mailto:w.hicks@atmospheric.uk)  
W: [www.atmospheric.uk](http://www.atmospheric.uk)

## Welcome to Atmospheric Quality

Atmospheric Quality Ltd specialises in delivering comprehensive environmental research, consulting, and engineering services.

Our goal is to help our clients meet regulatory requirements and minimise their environmental impact.

## What we offer

Air Quality	Noise	Data Science
<ul style="list-style-type: none"><li>• Measurements</li><li>• Dispersion modelling</li><li>• Technical Reports</li></ul>	<ul style="list-style-type: none"><li>• Noise Measurements</li><li>• Noise Modelling</li><li>• BS 4142 Assessment</li></ul>	<ul style="list-style-type: none"><li>• Data Analysis</li><li>• Data visualisation</li><li>• Technical Reports</li></ul>

## Why is Monitoring Important in the Bulk Industry?

Bulk manufacturing and processing can generate dust and release air pollutants which have an adverse impacts on employees and local communities. By monitoring, we can:

- Identify and manage potential risks associated with pollutant exposure
- Determine the effectiveness of mitigation measures
- Inform decisions around site design and operation

Real-time measurements can be used to identify sources of air pollution and potential solutions.

## About Us

Atmospheric Quality Ltd is a leading environmental consultancy based in London, UK, and established by Dr William Hicks.

We pride ourselves on delivering customised solutions that cater to the unique needs of each client, combining state-of-the-art atmospheric measurements, advanced modelling, and cutting-edge machine learning techniques to ensure scientific accuracy and client satisfaction.

Atmopsheric





## Editor

Patrick Hicks

Tel: +44(0)7770 636613

pwh@oakhillmedia.com

## Art and Production

Ray Hodd

denisehodd@btinternet.com

## REPRESENTATIVES IN OTHER COUNTRIES

Germany, Austria, Switzerland:

IMP InterMediaPro e.K.

Mrs. Sounkar Mansal

Tel: +49 202 373294-14

mansal@intermediapro.de

Sven Anacker

Tel: +49 202 373294-11

sa@intermediapro.de

Italy:

Mediapoint &amp; Communications srl

Roberto Ambra

Tel: +39 010 570 4948

roberto.ambra@mediapointsrl.it

Daniela Chiusa

Tel: +39 010 570 4948

daniela.chiusa@mediapointsrl.it

Spain, Portugal:

Elda Guidi

Tel: +39 010 570 4948

elda.guidi@mediapointsrl.it

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www.eurobulksystems.com  
Fax: +44 (0)870 762 0434

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## Separation automates quality control

Separation AG, of Eynatten, Belgium – part of the Greiwing Group and specialises in the sorting of plastic granules, is increasing the quality of its services by offering its customers automated (and thus optimised) quality control using innovative analysing technology from Optical Control Systems (OCS) GmbH.

With the PS25C pellet scanner, both highly transparent and opaque granules are analysed

on a vibration plate by a high-performance colour matrix camera. This method detects contamination within a few minutes, ensuring a smooth production flow.

"We guarantee our customers high-quality services. This makes comprehensive quality controls using optoelectronic sorting indispensable. With the innovative analysing technology of OCS, we can even inspect samples at a resolution of 30 micrometres,"

said Jürgen Greiwing, delegated administrator of Separation AG.

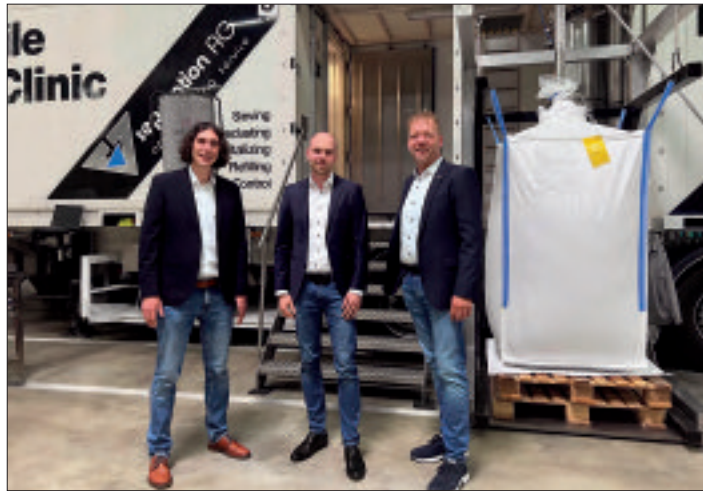
Separation AG has been part of the Greiwing group of companies since 2020 and has specialised in the optoelectronic sorting of plastic granules for the last 20 years. It offers quality improvement processes - in the automotive and pharmaceutical industries in particular, top quality is key since even the slightest contamination can be visible in the end product and

can potentially result in malfunction.

To ensure that the separated goods meet the customer's quality requirements and are free of even the smallest foreign particles, random samples of usually 500 grams are taken during and at the end of the sorting process. The approximately 5,000 granules contained in one of these samples are scanned by the PS25C for any defects within minutes using modern LED technology and a 3-CMOS industrial camera.

At this rate, 12 kilograms of granules can be inspected in less than an hour. A multi-track flap system reliably eliminates contamination as small as 30 micrometres in size across an inspection channel 60 millimetres wide. As Markus Piepenbrink, sales manager at OCS GmbH, explained, "Contaminations are inspected and recorded across the entire RGB colour spectrum. The granules passing through the pellet scanner are captured from every angle by the cameras." If any impurities such as black specs are found in the sample, the goods can be separated again until the required quality is met. Another advantage of the OCS system is real-time data transmission to production and process control as well as subsequent analysis of rejected pellets by additional analytical systems.

www.separation.group  
www.greiwing.de/en



From left: Mario Bortolussi, sales at Separation AG, Markus Piepenbrink, sales manager at OCS GmbH and Jürgen Greiwing, delegated administrator, are pleased with the successful cooperation and increase in quality thanks to the pellet scanner from OCS GmbH.

## Transporting poorly flowing cocoa powder

Cocoa powders are used to provide the characteristic taste and colour of chocolate beverages. Finely ground cocoa powders are usually mixed with the other ingredients to make the beverage powders. Handling cocoa powder can be tricky, due to the nature and the fineness of the powder. Gericke has supplied, installed and commissioned a pneumatic conveying, storage, feeding and mixing system for the production of chocolate drinks.



Gericke pneumatic dense phase conveying system for cocoa powder.

Cocoa powder should be processed at temperatures below 30°C and under dry conditions. The reason for this is that it is a hygroscopic product that would absorb moisture and form lumps, which would affect its flavour and make processing difficult. Therefore, it is advantageous to have a closed processing system that protects the product from possible contamination and interaction with the environment. Gericke uses pneumatic conveying systems in which the product is introduced into a pipeline through a special device and transported by means of a gas flow to a receiving hopper.

In a pneumatic lean phase conveying system, the product is introduced into the pipeline by a rotary valve. The conveying gas is usually generated by a roots blower operating at a pressure of less than 1 bar g. This type of pneumatic conveying system is characterised by high air velocities of usually more than 20 m/s and lean product loading of solids dispersed in the gas stream. Conveying hygroscopic powders containing fat (cocoa powder usually has a proportion of 10-20%) at high speeds can result in product layers within the pipeline, which can ultimately lead to clogged pipes, which is not hygienic at all.

With the PulseFlow PTA pneumatic dense phase conveying system supplied by Gericke, the cocoa powder is conveyed as a slow moving plug of product. The system consists of a pressure vessel and is operated with compressed air from an air supply usually greater than 4 bar g. Since the line is filled with a dense volume of solids, called a high loading, the cocoa powder is transported at velocities well below 10 m/s, only a small amount of compressed gas is required. The air consumed from the air network is cleaned and typically dried with a freeze dryer, resulting in a very low residual water content corresponding to an atmospheric dew point of approximately -20°C. This prevents the product from settling in the pipeline and causing interruption of the flow.

Depending on the supplier of the cocoa powder, the flow behaviour can range from very free flowing to poor flowing. The transport system must therefore be able to convey both types of cocoa powder. The cohesive and poor flowing type exhibits funnel flow in the hoppers, which can result in low performance. To prevent this, the conveying system has been equipped with a special fluidising system that enables uniform discharge.

www.gericke.com

## Continuous mixer for cereal bar production



Ajax's mixers provide the right balance between work input and maintaining the condition of ingredients.

Solids handling equipment specialist, Ajax Equipment, has supplied a leading UK cereal bar and snack manufacturer with a stainless steel twin-screw mixer. The mixer has been supplied with both paddle augers and ribbon augers to provide a variety of mixing options.

Ajax's twin mixer features quick release couplings making it easy to switch between auger types as well as removing the augers for cleaning. However, in this case it is possible to clean the augers in situ by filling the machine with water. The continuous mixer also features heated screw shafts and

casing. Heating the machine ensures the condition of the ingredients is maintained, allowing materials to be sufficiently mixed to consistently produce the high-quality product desired.

"Continuous mixers are ideal for producing a variety of food products including cereal bars and chocolate," says Eddie McGee, managing director, Ajax Equipment. "Ajax's mixers provide the right balance between work input and maintaining the condition of ingredients such as puffed rice and oats when mixing with syrups and pastes."

www.ajax.co.uk

### Industry Updates – Every Week

Every week, EuroBulkSystems publishes a digest of the latest industry developments:

• New Products • Technical Innovations • Latest Orders •

For up-to-date news on In-Plant Handling and Bulk Processing, visit:

www.eurobulksystems.com

## New vibration sensor from 4B Group

4B Group has unveiled the VibMil Vibration Sensor (VIBMIL), a condition monitoring solution designed for continuous monitoring of vibration levels and temperature in industrial environments and hazardous areas up to ATEX/IECEX Zone 20 and Class II Div 1.

VIBMIL is a current loop-powered accelerometer, delivering vibration RMS velocity readings through a 4-20 mA output. It is encased in a stainless-steel enclosure with a 3/4in NPT thread for conduit connection. It can be supplied with optional inbuilt NTC or PT100 temperature sensors.

The VIBMIL comes equipped with a female 1/4in-28 UNF mounting thread, allowing secure attachment using screws, studs, or mounting studs. Optional converters to M8 and M6 male threads are available.

Integration into control systems is

achieved, thanks to the 2-wire, loop-powered accelerometer, providing linearised output from 4 – 20mA, proportional to the sensor's measuring range.

"The VibMil has been designed with our core markets in mind", explains Sam Payne, 4B Group CTO for electronics. "The mandatory requirement to have ATEX/IECEX/Class II Div 1 approved products within dust hazard location means that many similar products on the market are not suitable. The VibMil can be installed with confidence within the most demanding dust hazard areas. Also, the added temperature sensor option means the condition monitoring applications which were previously surface temperature only, can now add that extra level of analysis and visibility of the running state of a machine."

[www.go4b.com](http://www.go4b.com)



The 4B VIBMIL Vibration Sensor.

## Efficient process technology for dogs and cats



Ploughshare Mixers can meet the specific requirements for the production of chewable tablets for dogs and cats.

The demand for veterinary products is increasing worldwide – and with it the need for efficient, hygienic manufacturing processes for products such as chewable tablets.

From a technical process point of view, such chewable tablets mainly consist of dry raw materials: In the basic recipe, Active Pharmaceutical Ingredients (APIs) or other additives, such as vitamins or flavours, are added to a basic product (e.g. corn starch or protein powder). The first intermediate product is thus a powdery dry mixture.

After this premixing, liquid components such as liquid polymer (PEG or macrogol) or oils (such as soya oil or fish oil) are added and incorporated in a second step. At room temperature, however, these liquids can harden or crystallise in contact with the mixer or the mixed material

before they are completely distributed. Therefore, both the mixer and the dry mix must be tempered beforehand. Usually it is heated to around 50 to 60°C, to optimise distribution of the added liquid components in the dry mixture.

After another mixing process, a very pasty, marzipan-like dough is formed. After emptying the mixer, the mixture is transferred to a moulding machine as a lump or dough strand. Finally, the formed tablets are baked through and packaged.

Both mixing steps take place one after the other in the same machine and in batch operation. Ploughshare Mixers FKM from Lödige Process Technology, with 600 to 3000 litres nominal volume, operate based on the mechanically generated fluid bed that ensures a good mixing performance. It was introduced to

industrial mixing technology by Lödige: the specially developed shovels rotate close to the wall inside a horizontal drum, creating the fluid bed. The process enables a high degree of homogeneity and constant reproducibility.

Ploughshare Mixers come in various different sizes and are also available in an explosion protected version for specific applications. The customer-specific design of machines and machine lines is just as much a matter of course as strict adherence to all current GMP directives and FDA regulations, which also apply to the production of veterinary pharmaceuticals.

However, Lödige does not only supply the mixer(s). As a solution provider, the company also implements entire machine lines.

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

## Lindner expands into France

Manufacturer of recycling solutions, Lindner has expanded into France, with the establishment of Lindner France with Croupe Cimme.

"France is an important market for us. Setting up Lindner France is crucial if we

want to look after our French customers even more efficiently and offer them even better service", says Michael Lackner, Managing Director at Lindner. "Thanks to our mobile shredders and our solutions for waste-to-energy and plastics recycling,

we already have a strong presence on the French market. Through local contact points and service partners, we, as a brand manufacturer, also want to offer our customers the best possible service. That's our declared goal."

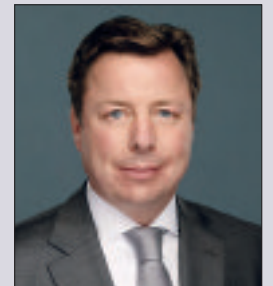


Michael Lackner (right), Managing Director of Lindner and François Defrenne (left), Managing Director of Lindner France and President of Groupe Cimme, one of Lindner's earliest sales partners on the French market. The newly founded subsidiary aims to increase local support for French customers and to increase service excellence further.

## New Managing Director for Schade Lagertechnik

Dr Jan Weckes has been appointed Managing Director of SCHADE Lagertechnik GmbH, of Gelsenkirchen, Germany.

Previously, at IAS GmbH, an international technology leader in the construction of induction furnaces, and member of the SMS Group, he had taken responsibility for strengthening order intake and expanding strategic teamwork within the group of companies. During his tenure at MBE Coal & Minerals Technology he was responsible for developing its global sales and marketing activities.



Dr Jan Weckes.

## Matcon introduces Pilot Scale Blender

Matcon has introduced the new Pilot Scale Blender, with the aim of expanding the capabilities of an IBC Tumble Blending into pilot scale processing.

This blender is specifically designed for mixing smaller recipes of powder with the benefits of a production scale IBC Blender, enabling it to test the proof of concept in recipe development or for producing high-value, low-volume

powder batches.

With the addition of the Intensifier, the blender's mixing capability is enhanced by incorporating high shear into the blend. This feature also extends the range of recipe development possibilities. Furthermore, there is an option to include a MicroNIR Spectrometer, which provides valuable information on blend homogeneity.

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

# 10 Years of Vadias, Lindner Washtech and Erema

Lindner Washtech and Bulgarian plastics recycling company Vadias Recycling are looking back on a 10-year anniversary and, together with Erema, on a successful partnership that has lasted just as long. Back in 2013, when the company had already more than 5 years of experience in the industry, Vadias commissioned the first-ever Lindner

Washtech washing line, which was then put into operation in 2014, followed by a second unit just a few years later. Erema extruders have been used for granulate production ever since then.

The increased use of plastics in a range of industries, in particular the packaging sector, led to a strong upturn in the recycling industry in the 2010s.

Legal provisions, regulations and collection systems began to take shape, the concept of the circular economy and sustainable resource management gained in importance, and the international trade with plastics waste began to grow. Together with Lindner Washtech and Erema, Vadias Recycling recognised the changes on the market and the



Vadias, Lindner Washtech and Erema look back on a successful 10-year partnership. In addition, Vadias and Lindner Washtech both celebrate their 15th and 10th company anniversaries. Clemens Kitzberger (Erema Group), Jochen Zweckmayr (Erema), Asparouh Asparouhov (Vadias), Vasil Asparouhov (Vadias), Harald Hoffmann and Georg Krenn (Lindner Washtech).



From the very start, the focus of the Bulgarian recycling company Vadias Recycling was on the recycling of LLDPE & LDPE films from the dual system – that is, plastics film with a high degree of contamination and soiling. The Lindner Washtech concept and its shredding, washing and drying components make the flakes perfectly prepared for the downstream processes.

importance of recycled plastics early on.

From the very start, the focus of Vadias, a plastics recycling company headquartered in Sofia, Bulgaria, was on LLDPE & LDPE packaging film, already produced in large quantities at the time. Essentially, these are plastics and/or packaging materials that today are primarily sourced from the dual system and that generally have a high degree of contamination. In addition to organic residue, most films also come with labels and residue of aluminium film. The process starts with cleaning and processing plastic flakes and continues all the way to extrusion, with the underlying concept, the washing

components and the wash quality being crucial factors.

The first system for processing packaging film was designed for 1,000 kg/h – the second one, supplied in 2018, for 1,500 kg/h.

With the foundation of Blueone Solutions in August 2023, Lindner and Erema made it their goal to adapt their individual process steps in plastics recycling to their mutual requirements in order to use synergies more efficiently. Ten years ago, Vadias first opted for the Lindner Washtech/Erema duo.

In total, Vadias today processes 4,000 tonnes of raw material and produces 2,850 tonnes of granulate every month.

## Digital interconnection – a “symphony of technologies”

Haver & Boecker is using the analogy of an orchestra – representing a “symphony of technologies” – to describe its depalletiser, bag applicator and packer, which are digitally interconnected and centrally controlled, intended to ensure a consistent and steadily high-performing packing process.

The entire packing system is controlled fully automatically by the bags to be filled. By scanning the QR code of an empty bag, the line receives the information on which product type is to be filled into this bag design. All components of the line and also the product supply adjust fully automatically to this information and this type.

The process: After scanning, the new Amicus

depalletiser picks up the specified bag stacks from the pallet and places them on the holding table at the Radimat. The bag scanner in the Radimat reads the QR code for checking and for data transfer to the Quatro System Monitoring. Next the bags are automatically shot onto the spouts of the Roto-Packer fully automatically, then filled and conveyed.

Different types of bags can be used, which are provided with a QR code. The code contains the information with which product the bags are filled and gives the entire process even more security. The Roto-Packer can be equipped for sealing the bag valves after filling.

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



Haver & Boecker's symphony of technologies.

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# Safer material handling and ATEX

In 2008, there was an explosion in a sugar refinery near Georgia, United States, in which 14 people died. Sugar production is more dangerous than people realise, involving combustible dust with the potential to explode or burn. The disaster was a turning-point in raising awareness of dust explosions – but are manufacturers doing all they can to mitigate the risks? Stephen Harding, managing director of materials handling specialists Gough Engineering, explains the vital role of materials handling equipment in improving worker safety and reducing the risk of further incidents.

Sugar is combustible when it is finely divided or dispersed as dust clouds in air. Because of this, dust explosions can occur throughout the sugar production process – including during heating, sieving,

transferring, loading or storing. This makes it imperative to apply safety regulations and to meeting a client's requirements in their defined ATEX regulations.

The ATEX directives – short for Atmosphere Explosible – are two EU regulations that, since they were established in 2003, prescribe the minimum safety requirements for workplaces and equipment used in explosive atmospheres.

The regulations have a vital place in the food and drink industry, including flour or sugar plants. Workers in these plants are exposed to daily risks like high temperatures and sugar dust. The potential for another industrial disaster, as seen in 2008, must be avoided at all costs. Fortunately, a solution exists in material handling equipment.

## Lessons learnt

Sugar cane refineries, and sugar beet factories, use a variety of automated material handling solutions like bucket elevators, conveyors and sieves. These systems are used to filter or transport sugar to different areas of the production line, frequently in large volumes.

It's vital that dust leakages are minimised at all times – but how do explosions in sugar refineries occur? To answer this question, a 2008 joint study by the Health and Safety Executive (HSE) and Health Services Laboratories (HSL), Dust Explosion in Sugar Silo Tower: Investigation and Lessons Learnt, examined a dust explosion that occurred in a British sugar refinery in Norfolk, UK, in 2003.

"Evidence suggests that from the very early stages, the explosion progressed through the system in both directions," states the report. "Because of the linking chute, the pressure in the production/bulk export elevators would also have increased during these early stages and airflow and vibration would begin to stir up sugar fines to form an explosive cloud."

Exposure to oxygen and an ignition source caused the cloud of sugar fines to combust. To avoid this, a recommended solution is the use of sealed, or closed, chutes and feeders that prevent dust from escaping and making contact with the air. Closed feeders can also transport the sugar more accurately and consistently without leaks or spillages. The equipment should also be earthed to reduce risk of an igniting electrostatic charge.

But what about the other main contributing factor cited in the HSE and HSL's report: vibration? Vibrations caused by equipment are an issue in food manufacturing, meaning raw materials are prone to spoilage and spillage. Manufacturers can rely on Industry 4.0 technologies, like sensors with condition monitoring, to assess the vibrations caused by equipment. This is useful for preventative maintenance, to predict the health of machinery and anticipate



**Powdered material travels along an inclined conveyor.**

when it might breakdown or require maintenance.

But, vibrations are a more pressing issue than a cause for spillages in sugar refining. In some circumstances, vibrations can create combustible dust clouds.

## Automated conveying

As a manufacturer of materials handling equipment for food processors, Gough Engineering recognises that managing dust emissions is one of the biggest challenges in conveying powders. To address the above challenges, Gough Engineering has developed the Gough Tubular Feeder, an automated conveying system.

Covers, with gaps sealed as much as possible, can reduce dust to reasonable levels during the conveying process. That's why the Gough Tubular Feeder is fully-enclosed to give a smooth, consistent and predictable product feed. The system's enclosed design also means that combustible products, like sugar fines, cannot infiltrate the atmosphere.

The system is driven by twin vibrator motors mounted on roster mounts or coil springs. This gives a smooth vibration that is designed to be for feeding granular and powdered products through harsh environments. The machine has no exposed moving parts,

so risks of damage or contamination are considerably lower than with other open feeders. In terms of cleaning and maintenance, Gough's tubular feeder is fitted with removable end caps to make sure cleaning is as quick and safe as possible.

Choosing the right material handling equipment for a production line depends on varying factors. They include the transported food material's particles, properties and behaviour. But another vital consideration is the equipment's design, such as its vibratory motion type and drive mechanism, and whether it complies with the ATEX directives.

Key ATEX regulations include ATEX Category 2D for hazardous areas categorised by high-risk power and dust, and Category 3D for areas with medium-risk powder or dust.

This is where the support of a material handling equipment specialist is vital for making the right choice. With its own in-house design team and over 80 years of experience, Gough Engineering can provide application knowledge for designing and manufacturing the right solution for material handling. This support is crucial for improving worker safety and mitigating the risk of incidents in sugar refineries.

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

## Eriez names Daryl Leach as CFO and Treasurer



**Daryl Leach: Eriez CFO and Treasurer.**

Eriez has appointed Daryl Leach as Chief Financial Officer (CFO) and Treasurer. Prior to joining Eriez, Leach worked for Zeus Industrial Products in Lexington, South Carolina. His career has

encompassed a variety of finance roles across diverse sectors, including consumer goods, medical devices, and industrial manufacturing, both in publicly traded and privately held companies.

## TUF-LOK™ PIPE & TUBE COUPLINGS

Tuf-Lok ring grip pipe and tube couplings are rugged, heavy duty, self-aligning and self-grounded couplings with a high end pull. They can be used for almost any application where pipe or tube ends need to be connected. The Tuf-Lok self-aligning couplings install quickly and easily with little effort.

### Features

- Self-aligning
- Self-grounding
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- Stainless or mild steel
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## How can ultrasonics benefit the production process?

Adding ultrasonic capabilities to your industrial sieving processes can improve separation accuracy and offer a more efficient material flow, especially when handling powders, says Stephen Harding, managing director at Gough Engineering.

Ultrasonic vibrations, made up of inaudible soundwaves, are created by a special generator and converter that are connected to the edge of the mesh frame of the sieve. The high frequency waves then vibrate the screen to provide additional stimulation in the production process. This is especially effective when handling fine powders or delicate

ingredients.

"While a Gough Engineering sieve can break up any agglomerates or clumped material at its point of input into the production process," says Harding, "adding ultrasonics to this process takes the level of separation one step further.

The mesh within the sieve will be tailored to the customer's inputs. However, the addition of the Gough Engineering Ultrasonics package means that the high frequency sound waves break up blockages and increase throughput and material flow. This keeps screens very easy to clean, and further minimises any downtime.

Ultrasonics can be used in combination with screens sized between 50 and 200 microns. This makes Gough Engineering's Ultrasonics Package ideal for fine powder applications, says Harding.

With ultrasonics, one should expect to see:

- A higher sieving throughput
- No pegging or blockages of the apertures in the screen mesh
- Superior separation accuracy of the sieved product
- A reduction in system downtime
- More efficient material flow

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



**An ultrasonic screening system, shown here attached to a Gough GV550 Batch Sieve, comprises a generator, a converter and a matched screen resonator with screen frame.**

# Mobile bulk bag discharger and flexible screw conveyor

A new mobile frame-mounted bulk bag discharger with flexible screw conveyor has been introduced by Flexicon, designed to permit dust-free discharging and conveying of bulk solid materials at multiple plant locations.

The Bulk-Out BFF Series discharger allows forklift-loading of bulk bags from 914 to 2134 mm in height. A removable bag-lifting cradle with Z-Clip strap holders permits bulk bags to be attached securely at floor level from an ergonomic standing height, and then forklifted into cradle cups atop the discharger's upright posts.

The bag spout is pulled through a 305 mm diameter iris valve which is then closed around the spout, preventing material flow. The spout can then be unfixed, the snap-

action access door closed, and the valve released slowly, allowing controlled flow into the enclosed hopper through the bulk bag interface chute.

Complete discharge is aided by Flow-Flexor bag activators that press against opposite bottom sides of the bag at timed intervals to form a steep "V" shape, and top-mounted Pop-Top extension devices that raise the uprights as the bulk bag empties, promoting the flow of material from the corners of the bag through the bag spout.

The hopper is vented to a Bag-Vac dust collector that creates negative pressure within the sealed system to contain displaced air and dust, and vacuum any particles trapped in bag creases during disconnect. Reverse pulse air

jets on a timed cycle dislodge material accumulated on the filters, returning it to the material stream.

The enclosed 156 L hopper measures 762 mm square by 1067 mm high and is equipped with proximity level sensors, and a pneumatic vibrator assembly to promote flow of material to the conveyor.

The outlet of the hopper charges the inlet of a Bev-Con Flexible Screw Conveyor that propels free- and non-free-flowing bulk materials at a 45 degree incline in user-specified distances for discharging directly into processing equipment or storage vessels through 254 mm diameter downspouting.

Specialised geometry of the internal screw allows handling of materials that pack, cake, smear, seize or fluidise, with no separation of blends. The screw is the only moving part contacting material, and is driven beyond the point of discharge, preventing material contact with seals or bearings, and allowing rapid cleaning.

Mounted on a mobile base with support mast, the self-contained unit can be rolled to feed various locations or to a cleaning station.

A lower clean-out cap on the conveyor tube can be removed to flush the smooth interior surfaces with steam, water or cleaning solutions, or to fully remove the flexible screw for cleaning and inspection.

The system is available in carbon steel with durable industrial coating, with stainless steel material contact surfaces, or in all-stainless steel finished to industrial, food, dairy or pharmaceutical standards. Its NEMA 4 control panel with PLC allows manual and automatic start/stop and speed adjustment.

[www.flexicon.co.uk](http://www.flexicon.co.uk)



**Flexicon Mobile Bulk Bag Discharger with Flexible Screw Conveyor allows rapid, dust-free transfer of abrasive and high-density bulk solid materials to process equipment and storage vessels at multiple plant locations.**

# Simplified feeding process integration with preconfigured controllers



**Gericke GUC Feeding Controller.**

Feeding processes can often present challenges. Using its knowledge of integrating feeding, dosing, and weighing technology, Gericke ensures that processes meet both accuracy requirements and also integrate into existing systems.

The GUC (Gericke Universal Controller) is equipped with sophisticated algorithms that filter out environmental effects, to ensure accuracy even under challenging conditions. Supporting both analogue and digital weighing cells, the GUC allows users to choose weighing technologies tailored to their application and accuracy preferences. It is also capable to control multiple feeders with one electronic.

An important element of Gericke's approach is the user-friendly Human-

Machine Interface (HMI) featuring a modern and intuitive design. This design promotes efficient operations by enhancing the overall user experience. Gericke's technology arrives preconfigured and tested alongside the loss-in-weight feeder, offering a comprehensive and ready-to-deploy package.

Furthermore, Gericke simplifies integration through pre-configured fieldbus communication to frequency inverters, saving time and eliminating the need for additional programming. The GUC empowers users with full local control over essential devices and options, including refilling with volumetric feeding mode, intromitters, agitators, and closing devices for feeding tubes.

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

# Busch Vacuum Solutions acquires centrotherm clean solutions

Busch Vacuum Solutions, one of the largest vacuum pump manufacturers worldwide, has acquired centrotherm clean solutions, a technology leader

in industrial gas abatement systems. The strategic acquisition underlines the commitment of Busch Vacuum Solutions and Pfeiffer Vacuum to sustainability and

will help to further strengthen the position as a proven solution provider in the semiconductor industry and other related sectors.

Centrotherm clean solutions has its headquarters in Blaubeuren, and is also present at other locations in Europe, America and Asia. As a provider of technologically leading gas abatement systems especially for the semiconductor and high-tech industries, the company employs over 300 people worldwide, who can draw on the experience of a thirty-year company history. The company's headquarters and production site in Blaubeuren, as well as all worldwide locations and jobs, will be retained after the acquisition.



**The centrotherm clean solutions campus in Blaubeuren.**



**Feeding of peanuts.**

## Industry Updates – Every Week

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# GO WITH THE FLOW



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## Weighing bellows from BFM

Weighing bellows are commonly used in the food and pharmaceutical industries as the flexible transition between mixers, feeders, dosing equipment and other machinery where accurate weighing is required.

Designed to minimise any resistance created by vertical movement or vibration on the weighing/load-cells, they are commonly made from highly flexible, moulded silicone rubber.

Although moulded silicone rubber is widely used, it does have two significant drawbacks for use as a flexible connection – very poor tear strength and a high price tag. They are usually fastened using manually adjusted system like hose-clamps which means they can be difficult to fit. This makes moulded silicone connectors a particularly high-risk option from an overall cost efficiency perspective: they are expensive to stock, but easy to break.

Many customers have often



**BFM Weighing Bellow on 2 spigots.**

experienced product failures during installation as one small slip with a screwdriver or hose-clamp can tear the material – a costly mistake.

The new patented BFM fitting Weighing Bellows, which combine the snap-fit installation and seal of a BFM fitting connector with their urethane-based Seeflex material.

"Seeflex is a proprietary material exclusive to us and is manufactured in a way that maximises its mechanical strength while still providing excellent flexibility" said Blair McPheat, inventor of the BFM fitting system and CEO of its manufacturer, BFM Global Ltd.

<https://www.bfmfitting.com/products/weighing-bellows>



**BFM Weighing Bellows.**

## New Palamatic building

The FIDEIP Group inaugurated the new premises of Palamatic Process, based in Brécé, Ille-et-Vilaine, on Wednesday October 4, 2023.

This extension is designed to support

the company's growth. The inauguration of the new buildings concluded with an open day for employees and their families to discover the company's new facility and business activities.



**Front view of Palamatic Process after the 2023 extension.**

## Other Valves Fight Friction, We Designed it Out

Unlike other valves that seal with friction, Posi-plate's unique butterfly valve uses an inflatable seat to seal with air pressure. Thus it requires less torque and a smaller actuator, resulting in lower cost. Plus, the seat automatically compensates for wear, providing longer life. Some users have reported over six million cycles and the valves are still going strong.

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- Low torque
- Low maintenance
- Lower actuator costs
- Longer valve life
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## ICL Boulby upgrades magnetic separators

ICL is making significant upgrades to its magnetic separators at its mine in North Yorkshire, UK. The company is replacing an existing single air-cooled Overband Electromagnet with four ElectroMax Overband Magnets, designed and built by Bunting-Redditch.

The ElectroMax Overband Magnets are an improvement over the previous model, providing a more efficient and effective way to separate magnetic materials from non-magnetic materials.

ICL Boulby is the largest employer in the East Cleveland and the North York Moors National Park. In 1968, ICL Boulby, then known as Cleveland Potash, started underground mining of potash and salt. By 2017, the mining company had mined 1 million tonnes of polyhalite at Boulby.

The project to upgrade the magnetic separators at Boulby started in May 2023 when Bunting's Technical Sales Engineer, Tom Higginbottom, undertook an onsite review of the existing installation. Material transported on three feed conveyors converged onto one conveyor where the in-situ Overband Electromagnet, installed many years previously, was failing to capture some tramp ferrous metal including small bolts and heavy steel bars.

The tramp metal damages processing equipment such as crushers and screens,



**ElectroMax Plus with an armoured belt.**

resulting in significant repair costs and costly production downtime.

In operation, Overband Magnets sit over conveyors to magnetically attract and remove tramp ferrous metal from the mined material. A heavy-duty rubber belt rotates around two large pulleys mounted either side of the central electromagnetic block and transports captured ferrous metal away from the magnet face and into a separate collection area.

The underground location of the Overband Magnet meant that any replacement had to be air (and not oil) cooled. Even the switchgear had to be oil-free.

Bunting's applications engineers assessed the project and compared new designs of air-cooled Overband Magnets

with the installed unit. At a suspension height of 450mm, the new Overbands would have over double the Gauss, the unit of measurement of magnetic induction, also known as magnetic flux density. However, the Force Density Factor, which relates to the rate of change in Gauss and the ability to lift a ferrous metal part, was over four times higher.

Bunting's engineers concluded that the optimum solution was to install four air-cooled ElectroMax-Plus Overband Magnets instead of a single large unit. Three of the ElectroMax-Plus Overband Magnets would remove tramp ferrous metal on the three feed conveyors, with the fourth replacing the existing Overband where the conveyors merged the material into a single stream.

The suspension height of all four ElectroMax-Plus Overband Magnets (model EMAX-X-140) is between 400 and 450mm across a 1400mm wide conveyor belt. Each Overband weighs 3.3 tonnes and measures 950mm long, 1641mm wide (with the motor to drive the self-cleaning belt), and 764mm high. The ElectroMax Overband Magnets also feature bearing rotation sensors, belt tracking switches, and bespoke guarding.

The order for all four ElectroMax Overband Magnets was placed in September 2023 with delivery agreed for January 2024.

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



**ElectroMax Plus Overband Magnet.**

## Twin-screw extruder for energy-efficient manufacturing of ABS blends

Coperion has developed a process solution for energy-efficient manufacturing of acrylonitrile-butadiene-styrene copolymer (ABS) blends, with the Coperion ZSK Mc18 twin screw extruder playing a key central role. Thanks to short raw material residence time in the ZSK extruder and gentle product handling, Coperion claims that its process solution achieves an "extraordinarily high ABS blend product quality".

ABS is a thermoplastic engineering plastic which combines numerous positive mechanical properties and chemical stability, which make it ideal for multiple uses in the electric and automotive industries.

Technology licensing and engineering company Zhejiang Zonopet Petrochemical Technology Co. Ltd. located in Hangzhou City, Zhejiang Province, People's Republic of China, is a licensor for the emulsion grafting-bulk polymerisation ABS blend method which allows for the production of ABS blends in general grade, food grade, flame retardant grade and electroplating grade. For this solution the company has permitted to design several large installations with multiple ZSK 133 Mc18 twin screw extruders.

Two systems have recently started production: one plant is at Lihuayí Lijin Refining & Chemical Co. Ltd. with an

output of 200 KTA, and the other at Zhejiang Petroleum & Chemical Co. Ltd. with an output of 400 KTA.

ABS blends consist of synthetic rubber polymers HRG and SAN (styrene-acrylonitrile). Coperion has developed a process solution for manufacturing ABS blends. The ABS emulsion emerges wet from a reactor following its manufacture. In Coperion's solution, it passes through a screw press before the HRG – still damp – is introduced downstream via a Coperion ZS-B side

feeder into the process section of a ZSK extruder. The energy-intensive thermal pre-drying of the ABS is thus eliminated.

Using gravimetric Coperion K-Tron feeders, SAN and additives are likewise introduced into the ZSK extruder. SAN, additives and HRG are intensively and homogeneously mixed in the ZSK process section, all the while handled very gently, so that the product does not yellow, nor does the polymer break down.

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



**Coperion has developed a process, built around the ZSK Mc18 twin screw extruder, for manufacturing ABS blends.**

# Continuing development through 2023

With ever growing demand for product quality, consistency and production efficiency, Magnetic separation has been used across a wide range of sectors for many years, to remove ferrous metal.

From heavy industries - such as mining and recycling - through to more refined process sectors, magnetic separation is an essential, non-contact solution to ensuring that a product is free from ferrous metal contamination.

More recently, with the increasing use of powerful rare earth magnets, it is now possible to remove even small metal contaminants as low as 30 microns from product streams. Magnetic separators are now considered to be critically important process equipment in the food and pharmaceutical sectors, which is why the BRC (British Retail Consortium) insists that they are audited on a regular basis.

Magnetic separators are commonly used as a screen for ferrous contamination in the primary (raw material intake) and secondary (production) processes to remove any extraneous material as quickly as possible. As well as ensuring clean product flow, this screening reduces the risk of costly machinery damage.

Furthermore, these systems can remove metal entering the production line because of equipment failure.

As a final check, metal detectors are regularly used at the end of the production process.

Magnets are normally considered as an additional safety check in conjunction with metal detectors.

### Custom Solutions

Greenwood Magnetics has its own in-house design department which works alongside its dedicated manufacturing team. The company has been designing, building, and supplying bespoke magnetic separators for over 75 years, including a wide range of industries and sectors - food processing and production, pharmaceuticals, powder handling, ceramics, glass, plastics, recycling, textiles, wood, oil and gas, and animal feed.

With such a wide scope of manufacturing systems and processes across such a broad range of sectors, it is not realistic to assume a 'standard' magnetic separator will be suitable for any given production line. Greenwood separators are specifically designed to suit the client's process.



Gauss Test underway.

### Continual Research & Development

Our R & D team consistently works to

develop new solutions to meet the specific needs of our customers. Ease of use is a key feature, as demonstrated in this semi-automatic grid-box developed and manufactured by Greenwood.

The unit benefits from an easy clean facility with magnets that are tested and certified to 12,000 gauss.

Another project delivered a semi-automatic easy-clean Rotary Magnet with ATEX 20 approval for use in designated hazardous environments.

### Certified Gauss Testing to BRC requirements

Food companies are now required to test

and document their magnetic separator systems on a regular basis. The testing regime can include procedures for the inspection, cleaning, strength testing and integrity of magnetic separators.

Greenwood Magnetics offer a full range of Gauss testing and magnet system support services. The company reports that it is constantly exploring new markets which can open up opportunities to deliver expertise.

The EV sector is an example – the company is working to design and build a magnet system for a new vehicle traction battery plant.

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



Greenwood's semi-automatic grid-box.

# Sowing with the help of a vacuum pump

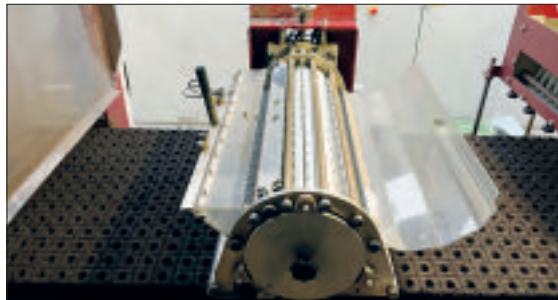
At Jud Bio-Jungpflanzen, field vegetable seedlings are grown for the Swiss market.

500 boxes of seedlings per hour instead of the previous 300 are being stocked by the Swiss organic nursery Jud Bio-Jungpflanzen (young plants) AG. This is thanks to a new seeder that uses a vacuum pump from Busch Vacuum Solutions.

Beat Jud founded his company in 1990, and it has been a joint stock company since 2016. Today, with a team of 21 employees, he cultivates young vegetable plants, herbs and strawberry plants in a greenhouse area totalling 29,000 m<sup>2</sup>. He has 40 different vegetable and herb varieties in his assortment. Depending on demand, the company offers seedlings in various pot sizes or on cultivation plates and sells them to vegetable producers and

nurseries throughout Switzerland. These grow the plants and then deliver them to retailers or distribute the organic products themselves at markets around the country.

Seeders have been in use at Jud Bio-Jungpflanzen since 1995. The first one could load up to 300 boxes per hour with seeds. In 2009, the company purchased the first soil blocking machine with an automatic box stacker. This new development worked with a vacuum pump from Busch and could manage 400 to 500 crates per hour. With each rotation of the seed drum, a precisely defined number of seeds fall into pre-cut hollows in cubes of soil, known as earth press pots. The machine at work here is called a soil blocking machine. Piece by piece, the soil cubes move further forward on a conveyor belt, the drum rotates continuously, and the next seeds fall into the prepared earth.



View of the seed drum from Busch Vacuum Solutions.

### Automated seeding process

This process is made possible by vacuum. The seed drum has tiny holes, with spacing that exactly matches the hollows of the soil press pots. This makes sure that the

seeds are optimally deposited. A dry MINK MM claw vacuum pump from Busch Vacuum Solutions evacuates the air from inside the hollow seed drum, causing seeds to adhere to the holes on

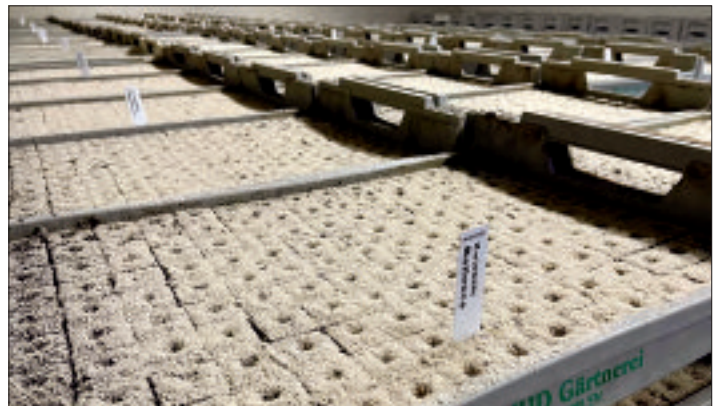
the outside. These are then scraped off by a metal sheet above the soil press pots. Depending on the type of plant, different seed drums are available. Each is perforated differently and can be replaced as needed.

An employee uses an easy-to-operate touchscreen to set the vacuum required for each type of plant separately. This is important to ensure that the desired number of seeds is placed in each soil press pot. This in turn enables uniform growth of the plants for their later sale.

Once a box filled with soil cubes has been loaded with seeds, it is automatically sprinkled with sand to protect the seeds from drying out. The boxes are stacked and finally moved to a special germination room. Once the seeds have germinated, the pallets are laid out in the greenhouses, where the seedlings are grown.



500 boxes of seedlings per hour – instead of the previous 300 – are being stocked by the Swiss organic nursery Jud Bio-Jungpflanzen AG, thanks to a new seeder that uses a vacuum pump from Busch Vacuum Solutions.



The boxes containing the soil press pots are sprinkled with sand and taken to a special germination room.

# Volume measurement and digital management of bulk solids stockpiles

*Owl Eye is an innovative system for real-time volume measurement and management of bulk solids stockpiles. Data is saved in the digital platform and offers analysis functions, such as batch splitting and inventory taking.*



**The Owl Eye Monitoring System is an innovative and technologically advanced tool that enables volume measurement and digital management of bulk solids stockpiles. The system uses a combination of advanced technology and proven algorithms to measure the volumes of bulk solid stockpiles in real time with an accuracy of over 98%.**

In this process, different sensors are used and combined in a unique way to obtain an optimum result. The data obtained is stored in the Owl Eye digital platform and can be retrieved at any time on a computer or mobile device. There is an innovative dashboard and a user-friendly web interface that enables users to view all the data at a glance and

quickly access important information.

The system offers benefits for the operators of bulk solid stockpiles, including lower costs, as it can help to avoid excess stock and support efficient utilisation of raw materials and other materials. In this way, production processes can be optimised and operating costs reduced. The system's digital platform facilitates collaboration and communication between different company departments and operational sites.

Developed for use in the bulk solids industry, it offers a solution for volume measurement and digital management of bulk solids stockpiles. It enables precise inventory-taking and efficient management of materials, leading to an improvement of the production processes and a reduction of the operating costs.

## Independent sensor hardware

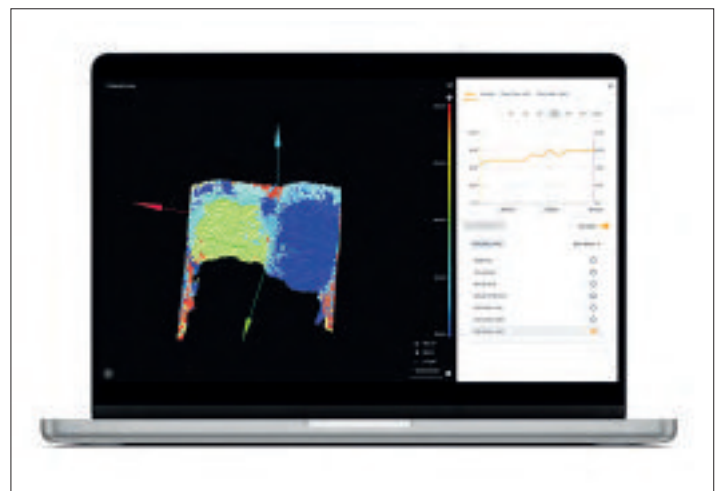
Measurement of bulk solids volumes by means of LiDAR technology has made considerable advances in recent years and is used increasingly in industry. With the use of LiDAR sensors, volume measurements can be completed with high precision and speed, leading to a considerable improvement in efficiency in the management of bulk solids stockpiles.

A key question that companies have to ask themselves is, however, whether to depend on one single sensor manufacturer or whether they should choose software that is independent of sensor manufacturers.

The advantage of applying such software is that the best available sensors on the market are used without any dependence on a particular manufacturer.

Moreover, a focus on the development of software solutions for measuring bulk solids volume enables greater flexibility and adaptability to customers specific requirements. The solution can therefore be tailored individually to the needs and circumstances of each company to ensure maximum efficiency and accuracy.

Sachtleben Technology GmbH employs experts in





sensor engineering and has conducted extensive benchmarking analysis to identify and sell the best sensors on the market. The analysis takes into account a large number of factors – such as accuracy, reliability, interfaces, integration as well as price-performance ratio. With the application of the best available sensors, higher precision and accuracy are achieved, which is crucially important in applications like the measurement of bulk solids volumes with LiDAR.

**Volume measurement and batch splitting**

By connecting analogue activities in the storage facility with digital data management and analysis with Owl Eye, the user can utilise value-creating analysis functions for more efficient stock inventory.

One practical example shows how these functions can be utilised could be for an operator of a glue factory which makes wood glue from urea and formaldehyde.

- You manufacture the formaldehyde in-house based on the catalytic oxidation of methanol while you buy in the urea from suppliers worldwide.
- The urea varies in density, particle size and moisture content.
- The material is hygroscopic and is supplied via a seaport. Especially in the case of sea port deliveries, it is crucial to know how much storage space is available to ensure smooth and efficient processing.

Without this information, there is a risk that the bulk solids will have to be stored outdoors, which can lead to contamination caused by humidity or rain and therefore to impaired quality and financial losses. The continuous sampling of the material for quality control presents a challenge. With Owl Eye, any information can be input into the 3D stockpile. For this purpose, an algorithm is used that subdivides the stockpile into small cubes. Each cube can be tagged with information individually or in groups. The stockpile can be coloured according to time stamp or any other information. With this system, you can see instantly where to find which material and how much of the material is available.

A stratification of material properties is also possible to see from which area the wheel loader driver loads the material. The software reliably identifies when a new consignment is added, and labels it as “new”. Corresponding information is then assigned to the new zone for instance, that the material there has not yet been sampled. Once a sample is taken and analysed, the relevant information can be input into the system. It is always possible to output quantities of the individually stored information or even display individual items of information from in the middle of the stockpile while hiding everything else.

The Owl Eye system is a tool that can be used not only for stock management and analysis but in other company areas, too, for example for optimisation of the production process. The system provides real-time information on progress in the production process and

the location of materials, and in this way avoids bottlenecks and improves the productivity and efficiency of the production process overall. On account of its versatility and adaptability, the Owl Eye system can offer companies valuable functions for optimisation of stock storage and production:

- Efficient storage of stocks based on valuable analysis functions
- Avoidance of quality losses and financial losses thanks to better monitoring of stock levels
- Improved quality control based on easy storage and retrievability of sample data in the 3D stockpile

**Flexible measurement campaigns**

The implementation of the Owl Eye in the bulk solids industry offers diverse possibilities for application. It enables not only the measurement of stockpile and silo volumes, but also of the material volumes on heavy-duty dumper trucks.

An interesting potential application is the benchmarking of different dumper trucks based on volume and fuel consumption, which was carried out at a crushed stone plant. In this case, the Owl Eye was installed at a crusher building and every delivery on truck or heavy-duty trucks measured over a certain period. The different vehicles were stored in the software with the empty-scanned dumper body to obtain reliable results. The volume between the empty and full measurement was calculated automatically and summarised in a report.

The analysis of volume data with the Owl Eye system can help operators lower their operating costs and enhance their efficiency. They can calculate and compare the fuel consumption per unit of volume for various dumper trucks to enable the choice of the most cost-efficient vehicles for the specific operation.

**Digital inventory**

Digital inventory is becoming increasingly important today. One of the biggest challenges in stockkeeping is to “always keep an eye on” and efficiently manage stock levels. This is where digitalisation comes in as it enables precise and automated acquisition and logging of stock levels and therefore provides the basis for efficient stock management.

Another important benefit of digital storage is the objectification of the stocks. Often stock is managed by people with many years of experience in this area. These people have built up and perfected their knowledge and skills over many years. That makes up a huge resource for a company, but comes with the risk of the company becoming dependent on the expertise of a single operative. Digital tools, like, for example, automated inventory systems or inventory management software, enable companies to utilise the knowledge and expertise of their experienced employees and at the same time to reduce dependence

on a single operative. Digitalisation enables standardisation of procedures and processes, which increases efficiency and flexibility in storage operations.

In addition, with digital inventory systems, costs can be saved in the long term as automated processes save time and entail fewer sources of error than manual processes. It offers the possibility for precise analysis of stock data, which leads to more effective planning and control of stock levels. Overall, a digital inventory system therefore offers numerous advantages and is an important component for efficient and successful inventory management in companies.

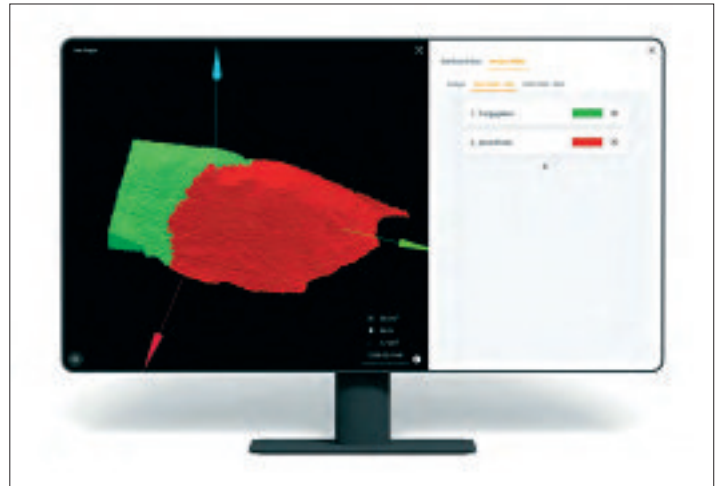
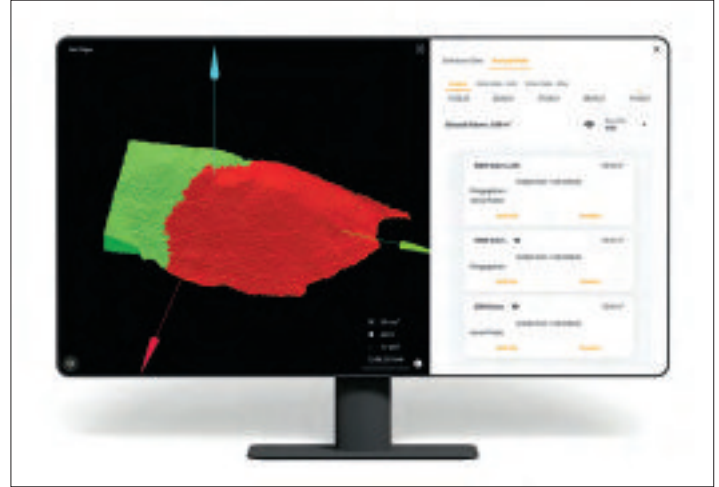
**Dust chamber tests**

To ensure that the Owl Eye monitoring system functions reliably in every environment, Sachtleben

Technology GmbH offers individual dust chamber tests. Here the cleaning system is adapted to the specific requirements of the customer and material that the system has to work with. In these tests, the material is placed into a special dust chamber and the sensors of the Owl Eye system are exposed to it. Then the cleaning system is tested to ensure that it works effectively and reliably so the sensors stay clean.

With these individual dust chamber tests, Sachtleben Technology GmbH can ensure that its customers optimally profit from the Owl Eye monitoring system in every environment and with every material. The dust chamber tests also offer an excellent possibility to test the efficiency and, if required, optimise the cleaning methods to obtain the best possible cleaning performance.

[www.sachtleben-technology.com](http://www.sachtleben-technology.com)



**Sachtleben expands into the UK**

Sachtleben Technology has appointed a dedicated agent in the UK, to permit the company to better serve its UK clients, offering personalised project support and in-person consultations upon request. “Our UK agent will play a vital role in ensuring efficient project management and top-notch customer service as we continue to grow in the region,” the company said in a statement.

# Ready for the gigafactories of the future

*Battery production: a new mixing concept enables significant reduction of process times in the production of lithium-ion electrode slurries.*

The strong increase in sales of electric vehicles – and an unparalleled surge in demand for lithium-ion batteries – has required battery production designed for high capacities. A new technology for the production of lithium-ion electrode slurries induces powders dust-free under vacuum into a liquid stream, thereby enabling dispersion of the powder particles within milliseconds. On a production scale, the new solution achieves a more than tenfold higher productivity compared to conventional planetary mixers.

## Conventional mixing technologies

A planetary mixer requires a high viscosity (several million centipoise) to generate the shear stress required for dispersion. As the shear rate is determined by the rotational speed of the mixing blades, the possible shear stress increases in line with the viscosity (Newton's law on the viscosity of liquids: shear stress = viscosity shear rate). However, with very high viscosities, the motors required for the movement need a high torque and capacity.

As only a fraction of the capacity is available for dispersion at a time, a large part of the capacity is wasted in an inefficient process. To maintain this shear stress, the solvent must be retained fully or in part, leading to wear and metal contamination caused by hard cathode powders. The binding agent is normally pre-dissolved at higher temperatures, cooled down, filtered, and slowly added to the already dry mixed active and conductive materials using a High Speed Dissolver, an inefficient powder wetting technology. This step is performed in the planetary mixer in which HSDs are also installed, whereby viscosity decreases with an increasing quantity of binding agent. The planetary mixer and HSDs must perform mixing and dispersion together in such a process.

Production of battery slurries with these conventional technologies is energy-intensive, slow and associated with an enormous space requirement. Industrial planetary mixers might achieve batch sizes of approx. 3,000 litres by now for the production of electrode slurries. However, the mixing time is now more than 3 hours, and adding to this still one to three hours for cleaning between individual batches. Meeting the extremely strong increase in demand for storage batteries will be barely possible through linear scaling of traditional batch mixing technology.

## Dispersion within milliseconds

Against this background, the mixing and dispersion technology specialist ystral has developed the mixing platform YSTRAL Batt-TDS, which overcomes the limits of traditional processes, enabling the production of battery slurries with a significantly lower time, energy and space requirement.

The Batt-TDS mixing concept for electrode slurry consists of a circulation process with an inline mixer, which induces powders dust-free into a liquid stream and disperses them, as well as a 3D mixer, which achieves fast batch homogenisation in the vessel with low energy consumption and low shear rate.

Dispersion in the inline mixer takes place under vacuum in this process. Instead of high viscosity, the inline mixer operates with a significantly higher shear rate, thereby achieving high shear stress, which is



**YSTRAL Batt-TDS navi, a 12-litre unit for fast formulation and process screening.**

inversely proportional to the sub-mm gap between a rotating rotor and the stator. Strong speed gradients are generated in this dispersion area, which correspond to the shear rate. The specific capacity can be increased 10,000-fold, and the shear stress can be concentrated to a few milliseconds of dispersion time in the active mixing area – instead of hours as for conventional mixers.

## Broad process window

The inline mixer of the YSTRAL Batt-TDS mixing platform is specifically tailored to the requirements of battery slurry production, as rotor-stator systems are usually limited to viscosities that are lower than those relevant to electrode slurries. With a large stator diameter, the inline mixer is designed in such a way that it can receive the high viscosities and control the exposure time with high shearing, by decoupling the

individual powder, so that a shear stress- and energy-optimised process is possible in a certain sequence, without the need to use different devices for each type of powder.

## From R&D to production scale

The mixing platform YSTRAL Batt-TDS is available in four sizes – from a 12-litre unit for fast formulation and process screening up to a production system for large-scale production processes for cathode or anode slurries with a batch size of 10,000 litres. Results from the trial scale can be easily scaled up to the production scale here.

At the production scale, the new technology achieves a more than 10 times higher productivity compared to conventional technologies, and a productivity that is twice as high compared to available extruders. Figure 4 shows a comparison of conventional planetary mixers



**Batt-TDS mixing concept for electrode slurry, which includes an inline mixer for powder induction and dispersion in a liquid stream, as well as a 3D mixer with low shear rate in the vessel for batch homogenisation.**

shear rate from the controlled powder and liquid throughputs.

With the ability to generate shear stress independent of viscosity if required, the gentle, but efficient separation of agglomerates enables the dispersion of powders almost in real-time in a broad viscosity range, whereby the viscosities can also be lower than those required for effective dispersion in a planetary mixer. A crucial advantage of this concept is that the shear rate can be tailored to the process requirements of an

and the Batt-TDS Pro systems mid and supra for the production of electrode slurries at the scale of currently planned factories (40 GWh/year), illustrated for NMC 622/graphite batteries. As large factories for cathode processes must be air-conditioned, the option to produce large quantity of slurry in a small space results not least in significant savings potential with regard to energy consumption and the costs for buildings in which the machines are housed.

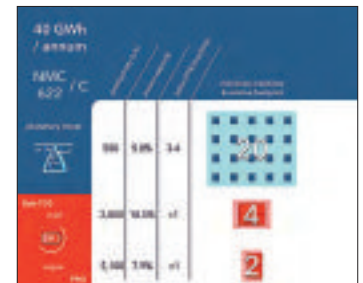
## Increase of long-term cycle capacity

Tests conducted by the Karlsruhe Institute of Technology (KIT) in Germany have shown that Batt-TDS cells have a better conductive morphology and thus lower internal resistance with increasing throughput than conventionally produced cells. For this purpose, NMC-622 cathodes were coated from slurries, which were produced separately in 12- to 15-litre batches with a Batt-TDS navi, as well as with a planetary mixer for comparison.

Cells, which were produced by the KIT with Batt-TDS cathode slurry and an identical anode, showed a 27-percent increase of the long-term cycle capacity compared to the materials mixed in the planetary mixer. No metal contamination by iron (ICP-OES, detection limit: 8-ppm Fe) was detected in the NMC slurry of the liquid-lubricated Batt-TDS process.

Probably from the end of the year, battery manufacturers will be able to perform tests on an R&D system with the YSTRAL Batt-TDS navi dispersing system within the scope of the project "Battery Cell Research Manufacturing (Fraunhofer FFB)" in Münster, Germany.

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



**Productivity and space requirement of planetary mixers as well as the YSTRAL Batt-TDS Pro systems mid and supra for the production of electrode slurries at the scale of the currently planned factories, illustrated for NMC 622/graphite batteries.**

## Further information

YSTRAL Batt-TDS: <https://ystral.com/en/machines/inline-dispersers/batt-tds/>

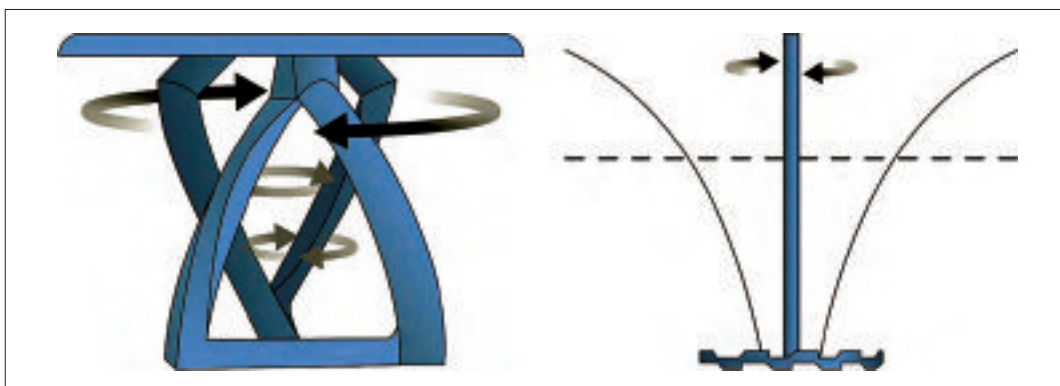
Karlsruhe Institute of Technology (KIT) – Research Group Electrode Development: <https://www.iam.kit.edu/ess/english/1237.php>

Fraunhofer Research Institution for Battery Cell Production FFB: <https://www.fhb.fraunhofer.de/en.html>

## About the Author



David Manke is Chief Technology Officer and Managing Director, ystral gmbh maschinenbau + prozesstechnik



**Illustration of a planetary mixer and a High Speed Dissolver (HSD), conventional mixing machines for electrode slurries.**

# “Guarding by Location”: danger and compliance

*Under dispute is the idea that putting conveyor equipment out of reach or inconveniently placed away from workers – known as “Guarding by Location” – is a valid form of safety. After decades of safe equipment design and comprehensive conveyor safety training in the bulk handling industry, Martin Engineering experts have witnessed where “guarding by location” has led to a lapse in workplace safety, resulting in injuries and – in some cases – fatalities.*

Most people readily accept that conveyors and other machinery require safety guards when positioned near workers or walkways. “Guarding by location” is the assumption that when hazards, such as moving conveyor belts, are positioned beyond the normal reach of a worker they don’t require a guard. Yet they can still present a serious hazard.



Unguarded return rollers over walkways can fall and produce a serious hazard.

### Worker risks

Some regulations define a general safe height for components based on the average height of workers. This means taller employees (1.82 m/6 ft. in height or more) can easily suffer an injury reaching up into a moving component that is 2.13 m/7 ft above the ground. Working above machinery that is considered guarded by location exposes workers to increased severity of injury if they slip or fall to a lower level.

Most regulations do not account for the potential buildup of spillage underneath the conveyor or in walkways, which can easily change the distance between the working surface and a hazard.

It is also fairly common practice to purposely collect a pile of material or fill a bin to gain access for service or inspection of an elevated component. Using tools and methods that extend a worker’s reach while the belt is running is a hazardous activity that can contribute to serious - and possibly fatal - accidents.

### Hazards from above

By not requiring a physical barrier, guarding by location creates what is considered by some to be an



Height prevents a worker from reaching hazardous areas until the reality of bulk operations proves otherwise.

exception to the general requirements for the guarding of hazards in the workplace.

Several hazardous locations are beyond the normal reach of staff when working or walking under or around elevated conveyors. These hazards are commonly found in or around nip points between the belt and return rollers or drive components such as pulley shafts, couplings, drive belts, gears and chains. Additional hazards from falling components may be inadvertently ignored if considered guarded by location.



Return roller guards ensure detached rollers don’t pose a hazard to workers or harm the system.

### Guarding best practices

The logical solution to guarding by location is to simply

install guards and baskets to protect workers from lateral and overhead hazards, while still offering safe and easy access. For maximum risk reduction, all nip points, shear points and moving or rotating components should be guarded, regardless of location or access.

However, there is also no global standard for guard mesh sizes and mounting distance from the hazard. Most standards use a gauge to measure the distance which varies by mesh size. When a bulk material handling guard is placed relatively close to a hazard it greatly reduces the ability to inspect components without removing the guard, thereby encouraging guard removal for routine inspections.

It would be far better (and safer) to standardise on a few mesh sizes and mounting distances allowing maintenance workers to build guards to a short list of materials, using standard mounting distances and eliminating the use of the gauges. Below is the recommendation included in Martin Engineering’s book FOUNDATIONS for Conveyor Safety.

### Put an end to the “myth”

Despite its nearly global acceptance as a concept in



All moving or rotating components should be guarded, regardless of location.

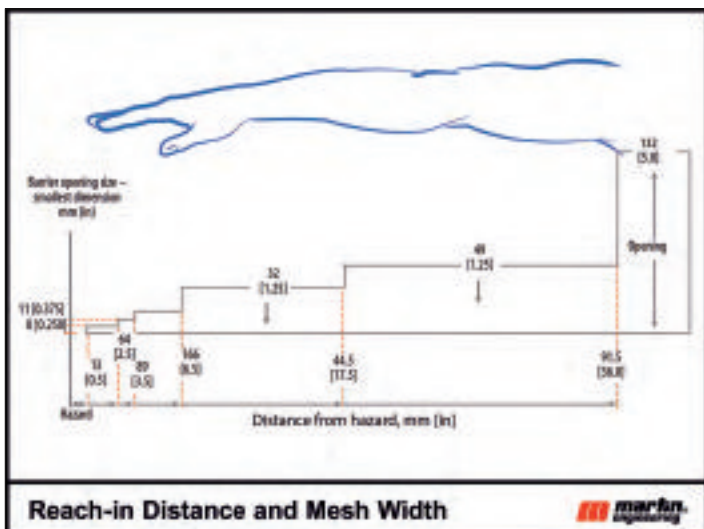
industrial safety, the practice of guarding by location remains a particular problem for overhead conveyor applications. It’s time to accept that as far as conveyors are concerned, ‘guarding by location’ is a myth. As such, it’s a concept that should be abandoned in order to make conveyors - and those who work on and around the equipment - safer.

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Nominal Guard Mesh	Mounting Distance from Hazard	Typical Applications
Woven Wire Mesh 12.7 x 12.7 x 2 mm [=1/2 x 1/2 x 0.08 in.] wire	50 mm [=2 in.]	Couplings, belt and chain drives, guard area of less than 0.5 m <sup>2</sup> [=5.38 ft <sup>2</sup> ]
Flattened Expanded Metal 13-Gauge 12.7 x 12.7 x 2 mm [=1/2 x 1/2 x 1/8 in.]	50 mm [=2 in.]	Couplings, belt and chain drives, guard area of less than 0.5 m <sup>2</sup> [=5.38 ft <sup>2</sup> ]
Welded Wire Mesh 2 x 2 x 0.12 or 0.16 in. [=50 x 50 x 3 or 4 mm] wire	200 mm [=8 in.]	General area guarding, barrier guards on idlers and pulleys, guard area of less than 0.5 m <sup>2</sup> [=5.38 ft <sup>2</sup> ]
Laser-Cut Sheet Metal Guard 11-gauge	200 mm [=8 in.]	Floating guard panels designed for frequent removal, guard area of less than 0.5 m <sup>2</sup> [=5.38 ft <sup>2</sup> ]
Chain Link Fence 9-gauge woven fabric 2 x 2 in. normal size [4 mm wire, 50 x 50 mm normal size]	500 mm [=20 in.]	Falling material guards up to 200 mm [=8 in. in any dimension] minus nominal bulk material size. Use 6-gauge wire for larger lump sizes.

Guarding Mesh Sizes & Mounting Distances

Mesh sizes and mounting distances.



Reach-in hazards (“breaking the plane”) can apply to both the mesh size and the height of the barrier.

### About the Authors



R. Todd Swinderman, CEO Emeritus, Martin Engineering served as President of the Conveyor Equipment Manufacturers’ Association and is a member of the ASME B20 committee on conveyor safety. Swinderman retired from Martin Engineering to establish his own engineering firm, currently serving the company as an independent consultant.



Daniel Marshall, Process Engineer, Martin Engineering has presented at more than fifteen conferences and is sought after for his expertise and advice. He was also one of the principal authors of Martin’s FOUNDATIONS™ The Practical Resource for Cleaner, Safer, and More Productive Dust & Material Control, Fourth Edition, widely used as one of the main learning textbooks for conveyor operation and maintenance.

# Ship loading mined copper ore – with no material entering the environment

*The mining group Anglo American relies on a ship loading system of FAM, a member of the BEUMER Group, for the loading of mined copper ore from the Peruvian plant Quellaveco.*

**D**emand for lithium-ion batteries continues to grow in the electromobility sector. This increases the demand for raw materials, such as copper. One of the world's largest and best-known deposits with estimated reserves of 1.1 billion metric tons of copper ore is located near the port city of Ilo – just under 37 kilometers northeast of Moquegua in southern Peru. Anglo American, one of the world's largest mining companies, operates the Quellaveco copper mine there.

Anglo American is headquartered in London. Through subsidiaries and shareholdings, the Group mines platinum, diamonds, copper, nickel, iron ore and coal. It also operates plants for the extraction of manganese and niobium as well as steel mills.

## Ready for the increasing demand for copper

The Quellaveco project was developed jointly by Anglo American and the Mitsubishi Corporation. The ambitious goal: The plant is expected to mine 1.1 million metric tons of copper annually. To ship this enormous amount of raw material to the target countries, Peru is investing heavily in the country's infrastructure – for example, in a new port terminal located just under 20 kilometers south of the city of Ilo. The terminal is operated by the energy company Engie. In search of a suitable partner to supply the ship loading system, the project managers selected FAM Minerals & Mining GmbH.

The globally active company headquartered in Magdeburg, Germany, is a traditional manufacturer of conveyor systems. Its history dates back to the 19th century. As a leading supplier, the company provides equipment for the entire bulk material handling chain – from extraction, conveying, loading and storage to the processing of various raw materials for different industries. Since the summer of 2022, FAM has been wholly owned by the Beumer Group, headquartered in Beckum, Germany.

## Dust-free to the destination

The Quellaveco open pit mine relies on a high level of automation to protect workers and minimise dust pollution. The copper ore is transported via a conveyor belt to the truck loading station. Sensors signal when a truck arrives for transport. The gate opens automatically and closes again behind the truck. An extraction system is activated to prevent dust from escaping during loading. Once the raw material has been loaded and hermetically sealed on the truck, the gate opens again. Now the truck continues to a tyre wash facility. "The facility is automatically activated



*At the end of the boom is the loading device with a belt conveyor.*

via sensors – until the tyres are 100% clean," explains Martín Cabrera, port project manager at Anglo American.

No dust formation is to be expected when the copper ore is received, stored and shipped. To be on the safe side, however, the plant operator has installed systems that can capture the particles. "These efficient systems work similarly to large vacuum cleaners," explains Karen Huaraca, Anglo American's environmental officer. "They filter the dust and then release the clean air into the environment."

All the information collected by the sensors is sent to the operations centre in real time, enabling the plant to be controlled automatically. The operations centre is located about 90 kilometres from Quellaveco.

## From the mainland on to the ship

The trucks transport the raw materials to the port. There, the copper ore is stored in a warehouse, which

has a capacity of more than 80,000 tons. A conveyor system conveys the material from the mainland and transfers it to the new SL1320.51/30 ship loader. The loader has a swiveling superstructure. At the end of the boom is the loading device with a belt conveyor. The material slides down a telescopic tube into the cargo hold. This means that there are no major environmental emissions during loading. The telescopic tube can be swiveled hydraulically to reach every corner of the cargo hold. The ship loader has a conveying capacity of around 1,320 tons per hour.

FAM successfully commissioned the system at the

end of 2022. The supplier also handled the installation of all the mechanical components, as well as the electrical and control engineering, project planning, production, transportation and consulting.

FAM Project leader Alexander Kammerer: "This project was challenging in many ways. We had to deal with both high seismic loads and COVID-19 pandemic delays. But thanks to the support of our colleagues from FAM América Latina Maquinarias Limitada in Chile, we succeeded in implementing the project within the given parameters."

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



*The copper ore is transported from the mainland to the ship loader via a conveyor system.*



*The material slides down a telescopic tube into the cargo hold.*



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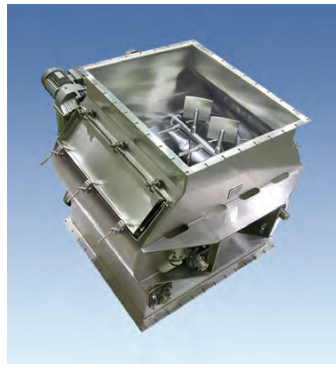
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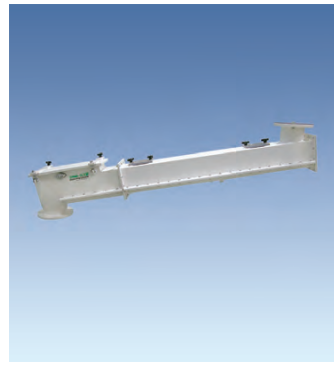
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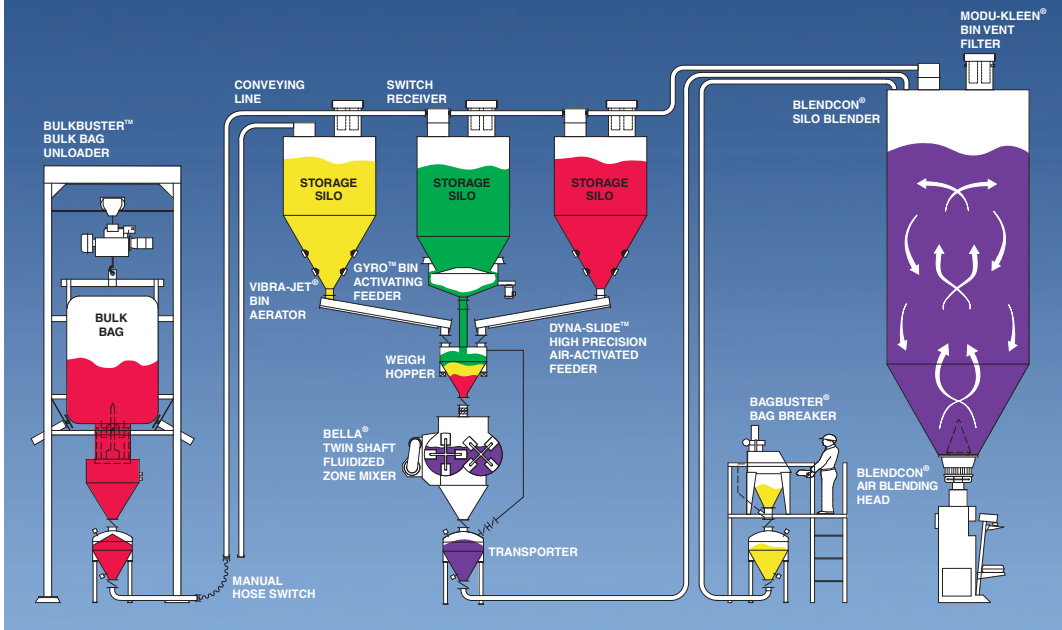
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