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ISSUE NO. 225 JUNE 2019



## FEATURES

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■ Coal Handling Technology

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■ Shiploading Systems

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■ Marine Paints & Coatings

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■ Dust-Free Handling Systems

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■ Netherlands Report

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 ISSN 1466-3643

Insta: www.instagram.com/drycargointernational

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JUNE 2019 issue

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*international*

## Mixed signals for iron ore trade

**P**ositive signs pointing to an increase in global commodity import demand during 2019 have become quite limited and more restraints are now prominent. Some growth in world seaborne dry bulk trade could be seen but a flat outcome is beginning to seem fairly likely.

In a report published towards the end of last month the OECD organization identified a “fragile global economy” which is being destabilized by trade tensions. World GDP growth was revised downwards to 3.2% in 2019 from 3.5% last year. All the main economies are expected to see deteriorating performances. China's GDP is forecast to grow by 6.2%, slowing from 6.6% in the previous twelve months.

### IRON ORE

Although it is not a precise indicator, steel production in countries importing raw materials provides a guide to iron ore and coking coal demand. World Steel Association figures show mixed outcomes in the first four months of 2019. Compared with last year's same period, China's crude steel production was 10% higher at 315mt (million tonnes) and South Korea saw a 3% rise to 24.4mt. By contrast Japan's output was flat at 33.6mt, while in the European Union it was 2% down at 56.6mt.

These figures and expectations for the remainder of this year are reflected in the iron ore import forecasts shown in

table 1. Despite a strong steel industry performance during recent months, China seems unlikely to see a large increase in iron ore imports in 2019. The annual volume could be reduced, amid greater use of scrap in the steel production process, ore stock reductions and other influences.

### COAL

Prospects for solid growth in seaborne coal trade this year have faded, as it has become more apparent that in a number of large importing countries potential for additional volumes has diminished. Within the steam coal sector, comprising over three-quarters of the total, negative signs are prominent in the EU. In China, which is surrounded by great uncertainty, a markedly lower total is possible.

Among positive aspects, India's upwards trend could continue, with some estimates suggesting that steam coal imports amounting to about 170mt last year may increase by 5–7% in 2019. Also, the group of smaller Asian country importers which has been boosting steam coal trade in the past couple of years could substantially raise its 2018 total of about 115mt, perhaps by 10% or more.

### GRAIN & SOYA

Over the weeks ahead one major influence on global grain trade in the new crop year beginning July 2019 will become clearer. Estimates of grain production in northern hemisphere

importing countries are likely to become more reliable, enabling import demand to be assessed with greater accuracy. Currently there are no obvious signs of harvest shortfalls causing large additional purchases.

Grain production changes in Europe, North Africa, the Middle East and China — northern hemisphere countries comprising about two-fifths of global wheat and coarse grains import demand — are currently not expected to sharply boost trade. Together with other mostly limited changes, the latest International Grains Council estimates show world grain trade edging upwards by 1% in 2019/20 to 369mt.

### MINOR BULKS

One of the largest minor bulk sector components, forest products trade (consisting of logs, sawnwoods, wood chips, pulp and other types) evidently increased in 2018, totalling about 380mt. Some signs suggest that strengthening support could result in further growth this year.

### BULK CARRIER FLEET

In the Handymax category of 40–64,999 deadweight tonnes vessels, comprising almost one quarter of the entire world bulk carrier fleet, growth in 2019 could be similar to that seen last year. As shown in table 2, both newbuilding deliveries and scrapping presently seem likely to be fairly flat, resulting in capacity increasing by around 2.5% by year-end.

**TABLE 1: KEY IRON ORE IMPORTERS (MILLION TONNES)**

	2014	2015	2016	2017	2018	2019*
China	933.1	953.4	1,024.7	1,075.4	1,064.9	1,040.0
Japan	136.4	131.0	130.0	126.6	123.9	124.0
EU-28	114.0	109.0	105.0	107.0	106.0	103.0
South Korea	73.5	73.3	71.7	72.4	73.3	74.0
Taiwan	21.3	23.8	23.5	23.7	24.2	25.0
<b>Total of above</b>	<b>1,278.3</b>	<b>1,290.5</b>	<b>1,354.9</b>	<b>1,405.1</b>	<b>1,392.3</b>	<b>1,366.0</b>

source: China Customs, AGDIIS, Bulk Shipping Analysis

\*BSA forecast for 2019

**TABLE 2: HANDYMAX (40-64,999 DWT) BULK CARRIER FLEET (MILLION DEADWEIGHT TONNES)**

	2014	2015	2016	2017	2018	2019*
Newbuilding deliveries	11.4	16.0	13.2	10.8	5.6	6.0
Scrapping (sales)	3.2	3.1	4.3	3.1	0.7	1.0
Losses	0.0	0.1	0.0	0.1	0.0	0.0
Plus/minus adjustments	0.0	-0.1	-0.1	0.1	0.0	0.0
<b>Fleet at end of year</b>	<b>166.8</b>	<b>179.6</b>	<b>188.4</b>	<b>196.1</b>	<b>201.0</b>	<b>206.0</b>
% change from previous year-end	+5.2	+7.6	+4.9	+4.0	+2.5	+2.5

source: Clarksons Research (historical data) & BSA 2019 forecasts

\*forecast

by Richard Scott, Bulk Shipping Analysis, Tel: +44 (0)12 7722 5784; Fax: +44 (0)12 7722 5784; e-mail: bulkshipan@aol.com





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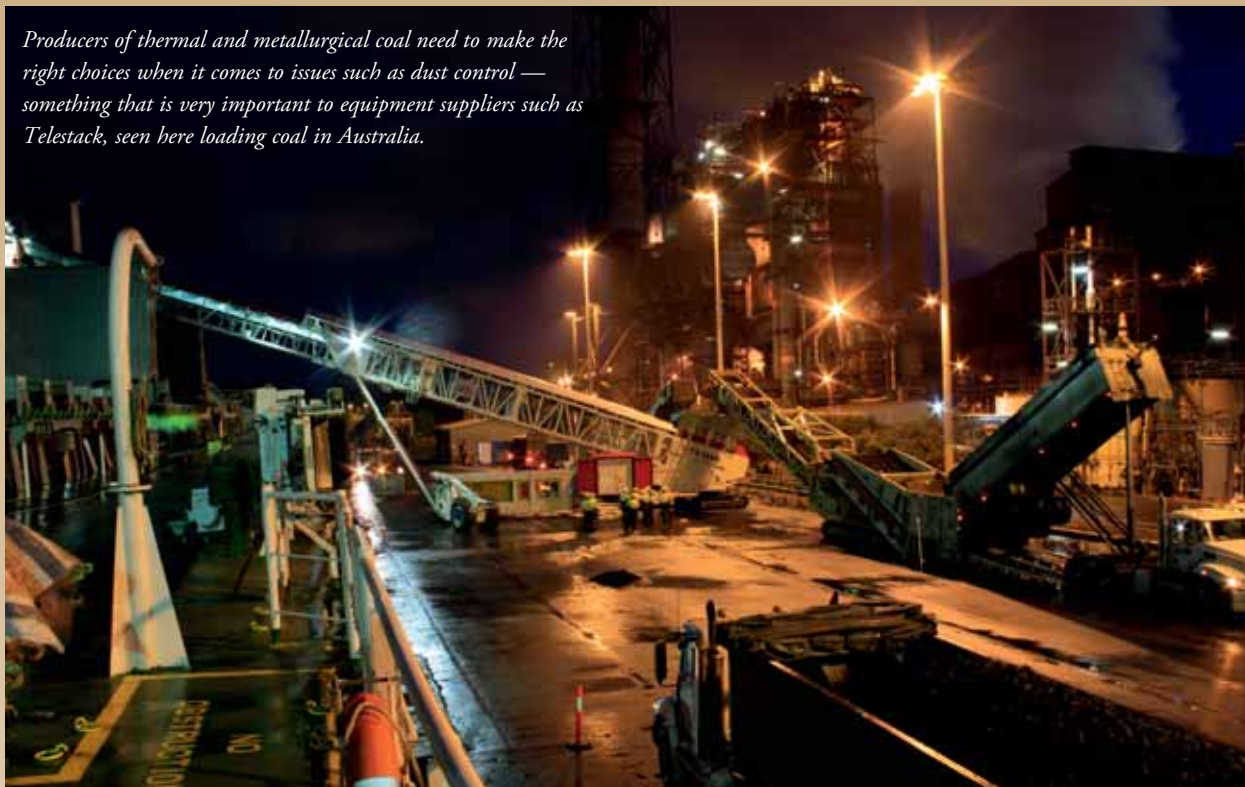
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# The importance of transparency in the global coal supply chain

*Producers of thermal and metallurgical coal need to make the right choices when it comes to issues such as dust control — something that is very important to equipment suppliers such as Teleshack, seen here loading coal in Australia.*



There is a growing desire to know how products are made, where the components come from, what is the carbon footprint of the product you hold in your hands. So far, this has translated into efforts around the responsible sourcing of mined products and in consumer good companies claiming that their products were responsibly sourced through traceability, supplier codes of conduct or going through the Bettercoal assessment.

This high-level accountability is no longer enough in today's world. And as an industry, the whole supply chain needs to work together to not only ensure responsible conduct across the whole value chain, but also to increase transparency.

The challenge with the coal supply chain is threefold:

- ❖ consumers do not want to know that their product required coal for its production;
- ❖ companies that use coal either as a source for power generation, as part of the production process or any other use do not want their consumers to be aware that coal is part of this;

- ❖ there is a belief anchored in most of the West that coal is a sunset commodity and that we do not need to focus on its supply chain and should instead concentrate on other minerals, like cobalt, lithium, gold or diamonds.

Nevertheless, coal is set to remain an important part of our societies for the short to medium term future as a source of electricity, as a key component for over 75% of steel manufactured today and for the production of cement, which requires an average of 200 kilos of coal per tonne.

Producers of thermal and metallurgical coal need to demonstrate that their operations meet international best practice on ESG performance; railroads and port infrastructure and operations need to meet the same standards; the shipping and handling of coal must also demonstrate that it respects these standards; traders need to prove their commitment to safeguarding environmental and social rights in their purchasing of coal. And finally, end users — all end users — need

to be able to demonstrate that their purchasing of coal is responsible.

Bettercoal is currently the only organization which measures the ESG performance of coal sites throughout the world with over 20 mining companies (more than 35 sites). As a supply chain initiative, Bettercoal's work to date has focused on independently assessing the performance of coal mining companies at the mine-site level in order to assure our members that the coal they were purchasing or intending to purchase came from mines committed to continuously improving their operations on environmental, social and governance issues. Through our in-depth assessment process, Members of our organization can truly monitor the ESG performance of the companies they are sourcing coal from. Bettercoal publishes high-level results of the site-assessments against the ten principles of the Bettercoal Code, and Bettercoal Members provide data on the volumes of coal they purchase from Bettercoal assessed suppliers.

*By Anne-Claire Howard, Executive Director, Bettercoal, UK*



## Argentina ready to step into the breach if Trump tariffs go ahead

US President Donald Trump has threatened to impose tariffs on Mexico if that country does not do enough to reduce the number of immigrants making their way to the US. The threatened 5% tariff has been temporarily called off, but if it is revived, it is seen as highly likely that Mexico would respond with tariffs of its own on American farm products.

In the meantime, Argentinian grain exporters are apparently ready to fill the shortfall, and meet Mexico's food

requirements. Says Gustavo Idigoras, president of Argentina's CIARA-CEC chamber of grains exporting companies, "The moment that the US sets up trade duties, we would be there," adding, "right now Argentine corn has a very competitive price, and there is plenty of volume available for export to Mexico."

Mexico has already considered widening its trading partners; when Trump first talked about withdrawing from NAFTA, Mexico was forced to consider other supply

options as, traditionally, the US has supplied nearly all of Mexico's corn imports and approximately 70% of its wheat imports.

"Transport costs from the United States to Mexico are very low," says Idigoras, "which is why we are not there at the moment. But if tariffs are imposed, we should have enough corn to meet Mexican demand," he said. "Right now Argentine corn has a very competitive price, and there is plenty of volume available for export to Mexico."



## Working towards a global responsible coal supply chain.



# Exporters adjust to a slowing world coal market



Richard Scott, Bulk Shipping Analysis

After the brisk growth in world coal trade seen last year, exporters are adjusting to what appears to be slowing momentum in 2019. Activity in recent months, and signs of how the trend may evolve over the remainder of this year, point to a much smaller annual increase or possibly even a flat outcome. For coal exporting countries, attempts to gauge the strength of the global market have become a more complex challenge.

Short-term prospects for coal trade are not necessarily negative and, as witnessed in 2018 when momentum strengthened, fairly solid expansion could be achieved. But in the longer-term it seems unlikely that annual trade volumes will grow. A more likely outcome is a declining trend, perhaps with some big reductions, amid intense political and environmental

pressure to reduce coal consumption as a contribution to cutting air pollution and greenhouse gas emissions.

Several recent forecasts of world coal trade during this year as a whole tentatively suggest a possibility of marginal 1–2% growth. Expanding imports in a number of Asian countries could offset or more than offset decreases elsewhere. Based on such a cautiously positive view, key suppliers to the international market may benefit from higher exports in some cases.

Identifying which exporters are likely to see increased volumes in 2019 is not a simple analysis. The two largest suppliers, Indonesia and Australia with 29% and 26% world market shares respectively, may both raise shipments modestly. Russia's 9% share also could grow. By contrast, the USA (excluding shipments to Canada) is

expected by some forecasters to experience a sharp decline in its 7% share.

## DRIVERS OF ENERGY USE

Among influences on energy consumption, in turn affecting coal usage and associated import demand in the global market, the broad pattern of economic activity is relevant. Over the past twelve months this trend has deteriorated. Growth in economic activity in many countries has slackened, and deceleration looks set to continue through 2019 and into next year, with trade tensions recently acting as a substantial headwind.

According to recent analysis published by the Organisation for Economic Cooperation and Development (May 2019), "the global economy is expected to achieve moderate but fragile growth over





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the coming two years". World gross domestic product (GDP) growth is forecast to decelerate in 2019 for the second consecutive year, from 3.7% in 2017 and 3.5% in 2018, to 3.2% this year.

Within this world outlook, the OECD predicts that its members as a group — the largest part of which comprises the advanced economies of USA, Euro area, Japan and Korea — will grow by an average 1.8% this year, slowing from 2.3% last year. In the non-members group of emerging economies dominated by China and India, where GDP growth is comparatively rapid but also slowing, the OECD predicts a more limited slackening to 4.3% this year from last year's 4.5%.

Looking at prospects from an energy consumption and coal importing viewpoint, numerous individual countries are prominent. Of particular significance is China, which is expected to see GDP growth reducing from 6.6% in 2018 to 6.2% in 2019, amid changes placing less emphasis on heavy industry and more emphasis on consumer services. By contrast, India could achieve a slight acceleration from 7.0% to 7.2%.

In several major coal importing countries, trends in economic activity are a restraining influence on energy use. Japan's GDP could continue growing only

marginally at well under 1% annually. The Euro area may see a further sharp deceleration to 1.2% this year, from 1.8% in the previous twelve months. In South Korea the growth rate is expected to diminish to 2.4% this year from 2.7% last year.

Amid these predictions, implications for coal consumption and imports sometimes diverge. Changes in energy use, resulting from changes in an economy's rate of progress, are not always reflected proportionately in the coal sector. Other influences affect coal imports including in some countries variations in domestic production of coal, while changes in dependence on alternative energy sources increasingly are prominent. Environmental regulations designed to limit or reduce coal-burning are an especially notable feature, with substantial negative effects.

#### GLOBAL EXPORT MARKET FEATURES

Many aspects of the global market for coal exporters in 2019 and further ahead are unclear. In addition to uncertainty about economic and commercial influences, coal trade is affected by politics to a greater extent than other dry bulk commodity movements are affected by this factor. Political influences directly affecting import demand are a key feature.

The latest coal trade forecast published at the end of March 2019 by the Australian Government Department of Industry, Innovation and Science (AGDIIS) is an example of an arguably cautious outlook. These figures suggest that world coal trade — including land movements, but mostly seaborne — could increase by 18mt (million tonnes) or 1% in 2019. From an estimated 1,466mt last year, the total could grow to 1,484mt this year.

A small difference in growth rates between the two main parts is evident. Steam or thermal coal trade, the largest part comprising over three-quarters of the total, is forecast to increase by 11mt (1%) to 1152mt this year. In the metallurgical or coking coal sub-sector, a 7mt (2%) increase to 332mt is predicted for the current year.

Optimism among some other pundits is also limited. A 1–2% addition for world coal trade during 2019 seems a likely outcome based on current signs. Stronger growth is not impossible to imagine, and could result from unexpected political decisions or unforeseen problems with other energy sources. Expectations for two importers, China and India — jointly comprising over one-third of the global import market — are especially hard to assess. However, given the magnitude of restraining influences, brisk expansion in





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**WORLD COAL TRADE — PRINCIPAL EXPORTERS (MILLION TONNES)**

	2016	2017	2018	2019*	2019 % change**
Australia	389	374	386	392	+2
Canada (coking)	28	29	30	31	+3
Colombia#	82	82	80	80	0
Indonesia#	369	389	429	433	+1
Russia	166	181	198	204	+3
South Africa#	75	76	79	81	+3
USA (exc to Canada)	52	88	106	98	-8

\* forecast \*\* 2019 forecast compared with previous year #steam coal only

source: Australian Government Dept of Industry, Innovation and Science, 30 March 2019, and BSA calculations

worldwide coal movements is a receding prospect.

The challenge for coal exporters, attempting to assess the usual range of commercial factors affecting global coal consumption and import demand, is difficult. It is compounded by the unpredictability of government policy changes in some countries, determining consumption patterns and foreign purchases. These changes affect not only short-term cargo flows but also the longer term trend of coal imports.

In coal exporting countries influences

affecting trends in coal production and availability of supplies are numerous. These include the scale and efficiency of mining activity and output, the type of coal produced, and proportion absorbed by domestic demand. Production and internal transport costs have an impact on competitiveness and pricing in the international market. Government policy involvement is more visible in some countries than in others.

Estimated coal export volumes in individual countries in 2018, and forecasts for 2019, calculated by AGDIIS are shown

in the table. Contrasts among the principal suppliers are emphasized and their significance within the broader picture is revealed. The volumes shown represent about 90% of all world trade in coal, and are therefore a useful indication of patterns unfolding.

**EXPORTING COUNTRY PROSPECTS**

Steam coal exports from Indonesia increased by 40mt (10%) from the previous year in 2018, to reach 429mt according to the AGDIIS figures. This total included large quantities of low-grade lignite mainly





carried to China for power station use. During the current year a further small rise of a few million tonnes or 1% is seen as a possibility. Although in the longer term government policy apparently seeks to conserve production and prioritize supplies for domestic users, in the short term export prospects seem positive.

Exports from Australia are fairly equally divided between steam coal and metallurgical coal (the metcoal category includes some steam grades used in the steel industry). In 2018 the 386mt total, which was 12mt (3%) higher, was comprised of 208mt steam coal (54% of overall volume) and 178mt metcoal (46%). In 2019 a 6mt or 2% overall increase to 392mt is forecast, reflecting robust growth in metcoal shipments, more than offsetting a slightly reduced steam coal volume.

While steam coal exports from Australia this year are expected to weaken slightly to 204mt, a 2% decrease, the outlook further ahead evidently is more promising. The latest AGDIIS report outlines several factors which could result in a resumed upwards trend: recovery from adverse weather problems and industrial action, receding technical and infrastructure-related disruptions seen in the past two years; ongoing productivity improvements and capacity enlargement; and new projects being ramped-up.

Australia's metcoal exports growth currently expected, a 10mt (6%) rise to 188mt in 2019, is partly a recovery from the preceding downturn. Over the past couple of years volumes have been held back by the disruptions listed above. As these setbacks are reversed, and higher output from existing mines and additional output from new mines and restarts emerges, rising production could support additional foreign sales.

The third largest supplier to world markets, Russia, predominantly selling steam coal, has seen a briskly rising trend with overall coal exports totalling 198mt in 2018 (including land movements), a 17mt or 9% increase from the previous year. Steam coal exports, almost nine-tenths of the overall figure, comprised 172mt last year after a similar percentage rise. In 2019 a small 6mt or 3% advance in the total to 204mt is envisaged amid infrastructure development progress enabling greater throughput.

Expansion in the USA's exports has been a remarkable feature of the past two years. The total (excluding shipments to Canada) rose again by 18mt (20%) in 2018, reaching 106mt, more than double the volume seen two years earlier. Within this

volume steam coal comprised 51mt accompanied by metcoal shipments of 55mt. The USA is regarded as a swing supplier in world markets and high coal prices have aided competitiveness. However, in 2019 coal exports are expected to decline by 8mt (8%) to 98mt.

According to AGDIIS figures for South Africa, which include only steam coal exports, the total last year was 3mt (4%) higher at 79mt. In 2019 a 2mt (3%) increase to 81mt could be achieved. The outcome may depend greatly on how sales to India evolve, as this is the destination for over half of overall exports. Ongoing infrastructure bottlenecks and subdued mining investments in South Africa are features identified as continuing to restrict potential for foreign sales expansion.

Colombia's exports consisting entirely

of steam coal grades were slightly reduced by 2mt (2%) last year, at 80mt. An unchanged volume is predicted for 2019. Lack of investment in the country's coal sector has been suggested as a constraint on future sales. Also, Europe's import demand, a key element of Colombia's customer base, is likely to weaken as a consequence of rapidly diminishing support for coal consumption in EU power stations.

Among other suppliers, Canada's metcoal exports (excluding shipments to USA) increased by 1mt (3%) in 2018, reaching 30mt and are expected to rise by a similar 1mt volume this year. A relatively minor supplier which has become more prominent is Mozambique, which raised exports of metcoal to 8mt last year, and some steam coal is also supplied. Prospects for a rising trend seem favourable, but

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problems with logistics, coal quality and public opposition have delayed the exports acceleration.

#### SIGNS OF A CHANGING TREND

One interpretation of recent patterns, and indications of how short-term influences may unfold, is that an upwards trend in world coal trade could continue through 2019. A likely outcome seems to be a slower global seaborne coal trade growth rate than the brisk 5% seen last year, possibly decelerating to 1–2%.

Some influences are not easy to predict,

even in the immediate future for which there are more solid indicators available. Partly the overall outcome can only be guessed, after making broad assumptions that may prove unreliable. Consequently there is also a possibility of a flat or even reduced trade volume this year.

Views over a longer period ahead point to a greater probability of diminishing trade volumes. Both general and specific negative influences are visible. The general aspect with wide implications for coal import demand is environmental pressures. These are intensifying, as decarbonization

strategies in many countries are applied with greater vigour, and competition increases from alternative energy sources, some with falling costs, aided by government measures designed to phase-out coal usage.

Specific examples of restraints are seen in the major coal using area of Europe, and to a limited extent in some Asian countries, where weakening coal consumption and imports are already a clear trend or are foreseeable, reflecting government energy policies.

But the picture is not uniformly negative for coal trade as, among several smaller importing countries in Asia, a rapid expansion is under way. Elsewhere, among major importers China, India and Japan, great uncertainty persists although there is potential for reduced volumes.

Many coal exporters may not be able to avoid tougher market conditions in future years, as trade volumes are constrained by downwards pressures affecting import demand. While continued, albeit modest, growth in world trade still seems possible during the current year, evidence points to a change to a weakening trend emerging eventually.

DCi





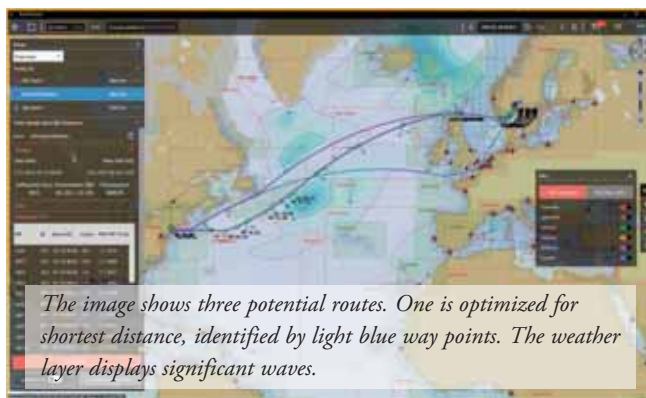
## StormGeo launches new versions of BVS and NaviUpdate at Nor-Shipping

Delivering the only integrated solution that spans navigation and voyage planning, route optimization, weather routing and fleet performance management to improve safety, fuel efficiency and reduce cyber threats.

In early June, StormGeo, a major presence in weather intelligence, weather routing and fleet performance systems, announced new versions of the best-selling route optimization system, BVS, through the launch of NaviPlanner BVS and NaviUpdate.

NaviPlanner BVS simplifies the process of planning and optimizing a route, obtaining the appropriate charts and creating a voyage plan—without switching between different products. NaviUpdate connects NaviPlanner securely to the ECDIS for direct transfer of routes and charts. This addresses a major challenge in the shipping industry — the lack of connectivity between voyage planning, route optimization solutions and shore-based decision-making that impacts operational and fuel efficiencies.

Svein Kåre Gissegjerde, StormGeo VP of



The image shows three potential routes. One is optimized for shortest distance, identified by light blue way points. The weather layer displays significant waves.

Shipping said, “We are addressing customer feedback to simplify ship-to-shore communication. This increases the amount of optimized routes that are actually sailed, improves visibility and transparency between shore-based operations and vessels, and reduces potential cyber threats.” Gissegjerde continued, “Today, BVS is used at approximately 6,000 vessels. With the added functionality of NaviPlanner BVS and NaviUpdate, StormGeo expects this number to double.”

According to Per-Olof Schroeder, StormGeo CEO, “As a participant in the UN Global Compact for Sustainable Ocean Business, we are working to empower

sustainability. Our experts in meteorology, oceanography and our BVS route optimization team aim to optimize our clients’ voyages not just for cost purposes, but also as a benefit to the environment we all work within.” Schroeder added, “In 2018, we provided fuel-efficient weather routing to more than 64,000 voyages. This contributed to a savings of 1mt (million metric tonne) of fuel for our customers and an atmospheric reduction of 3mt of CO<sub>2</sub> as well as 35,000 tonnes of sulphur.”

### ABOUT STORMGEO

StormGeo is a global provider of weather intelligence and decision support services, with solutions for shipping, oil and gas, renewable energy, utilities, cross industry and aviation. More than 12,000 ships rely on StormGeo software or services for navigational planning, route optimization, weather and fleet performance. The company has 26 offices in 15 countries, including six 24/7/365 global operations centers. It is a participant in the UN Global Compact for Sustainable Ocean Business.



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**TTS**

## Less is more with Wilhelmsen's new best in test heavy duty cargo hold cleaner

Tested extensively both in the lab and in the hold, Wilhelmsen's Unitor CargoClean HD further improves on the impressive performance of its predecessor but requires just half the volume of chemicals previously needed.

Refined several times before the Wilhelmsen team felt their complex alkaline micro emulsion cleaner was strong enough to test against the best of the rest onboard a vessel, the new concentrated formula of Unitor CargoClean HD consistently produced the best cleaning results. Specifically designed for the dirtiest cargoes such as heavy coal and petcoke residues, it removes often difficult stains at the first attempt. Doing so with a need for significantly less volume of the product, than other brands, and indeed Wilhelmsen's own Aquatuff HF, the recommended dosage rate is just 10%.

Mark Oliver Wittburg, Product Marketing Manager, Cleaning Solutions, Wilhelmsen Ships Service says "We already had one of the better cleaning products on the market, but we never sit still and there is always room for improvement. Whether it is performance, concentration, composition or packaging, we are always looking for ways to improve our range and its environmental compatibility. The best just got even better".

Unitor CargoClean HD's performance doesn't however come at a cost, like some rival products. Designed and blended to have no residual detrimental effect to common epoxy cargo hold coatings, Wilhelmsen's product does not contain nonyl phenol ethoxylates or other estrogenic compounds.

Along with causing no damage to common hold coatings, the product also



has no direct environmental impact, as Unitor CargoClean HD is not harmful to the marine environment (HME) as per Marpol Annex V. It also complies with EU Detergent Regulation.

So, unlike some rival products containing HME chemicals such as sodium hypochlorite, better known as bleach, Unitor CargoClean HD can be discharged at sea along with wash water, without risk of sanctions from port authorities.

In addition to performance and environmental benefits, a welcome knock-on effect of the product's concentration is that it dramatically reduces both the amount of plastic waste and also the man hours spent transferring new chemicals on board, as less product equals less drums. This may sound unimportant but reducing vessels' plastic footprint is destined to be an increasing focus for authorities and companies alike as sustainability becomes a hot topic for the industry. Lessening the physical burden on crews and freeing up precious space in chemical lockers is

another practical bonus.

Delivering best in class, concentrated performance, but with no unwelcome side effects, Unitor CargoClean HD should become the default choice for forward thinking owners and operators working with dry, dirty cargoes.

### ABOUT WILHELMSEN

With the largest maritime network in the world Wilhelmsen Ships Service is active in 2,000 ports, in 125 countries worldwide. Supplying marine solutions including Unitor products, Timm ropes, Unicool refrigerants, and Unitor and Nal fleet marine chemicals, along with a complete portfolio of ships agency services and maritime logistics, last year Wilhelmsen made product deliveries to 27,500 vessels and handled 75,000 port calls. As a trusted partner in port, on board and offshore, its wide portfolio of products and services are available in every market and region, to every conceivable vessel type. Wilhelmsen Ships Service is part of the Wilhelmsen group.



*Coal in the cargo hold.*



## Rand Logistics' vessels receive AMVER awards for the 2018 sailing season

**CALUMET, MANITOWOC, AND ARTICULATED TUG BARGE DEFIANCE/ASHTABULA** RECOGNIZED FOR COMMITMENT TO SAFETY AT SEA

Rand Logistics, Inc. (Rand), a major provider of bulk freight shipping and ship repair services throughout the Great Lakes region, announced that three of the company's US-flagged vessels have been recognized by the United States Coast Guard for their commitment to safety and dedication to the Automated Mutual Assistance Vessel Rescue (AMVER) System program for the 2018 Sailing Season.

The AMVER System, sponsored by the United States Coast Guard, is a computer-based voluntary global ship reporting system used worldwide by search and rescue authorities to arrange for assistance to persons in distress at sea. Rand's *Calumet* and *Manitowoc* received the AMVER Certificate of Merit for the vessels' second year of participation with AMVER and articulated tug barge *Defiance/Ashtabula* was honoured for their fourth year. The three vessels will continue to fly the AMVER Pennant for their participation with AMVER.

"Rand Logistics is honoured to have been recognized by the US Coast Guard as part of the prestigious AMVER Award Program," stated Michael C. Farrell II, Director of Health, Safety and Environmental (HSE) at Rand. "The safety of our employees, customers, vendors and members of the communities in which we operate is our top priority and is one of our Rand Corporate Values."

Rand Assistant Vice President of Corporate Communications Annemarie Dobler accepted the awards on behalf of the Captains and crewmembers of the *Calumet*, *Manitowoc*, and articulated tug barge *Defiance/Ashtabula* at the AMVER Awards event on Wednesday, May 22, 2019 at the National Press Club in Washington, D.C. as part of the 2019 National Maritime Day celebration.

"Because of the efforts of mariners like our vessel captains and crewmembers who play an active role in the AMVER Program, we can all enjoy the beauty of our Great Lakes and rivers knowing that assistance is available if ever it is needed," Farrell continued. "We look forward to continuing our involvement with AMVER during our current sailing season and beyond."

The AMVER Awards Program was inaugurated in 1971 to recognize those vessels which regularly participate in the AMVER System and the merchant shipping companies that volunteer to be available for maritime emergency response. Vessels in the AMVER Program commit to a minimum of 128 days on the system annually. Rescue coordinators are able to identify participating ships in the area of distress and divert the best-suited ship or ships to respond. Rand's three vessels have a combined ten years of participation in the AMVER Program.

### ABOUT RAND LOGISTICS

Rand Logistics, Inc. is a major provider of bulk freight shipping and ship repair services throughout the Great Lakes region. Through its subsidiaries, Grand River Navigation Company and Lower Lakes Towing, Ltd., the company operates a fleet of three conventional bulk carriers and 12 self-unloading bulk carriers including three tug/barge units. The company is the only carrier able to offer significant domestic port-to-port services in both Canada and the US on the Great Lakes.

The company's vessels operate under the US Jones Act — which reserves domestic waterborne commerce to vessels that are US owned, built and crewed — and the Canada Coasting Trade Act, which reserves domestic waterborne commerce to Canadian registered and crewed vessels that operate between Canadian ports.



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# A lick in time saves nine

## marine paints and coatings



Jay Venter

### Savings you can bank on



With around six months remaining until the International Maritime Organization's (IMO) 0.5% sulphur (SOx) emissions cap comes into force, shipowners must consider how they are going to be able to recoup the cost of compliance in what is a continuously changing regulatory landscape, writes *Andreas Glud, Group Segment Manager, Marine, Dry Dock, Hempel A/S.*

These requirements dictate that from 1 January 2020, ships can only burn bunker fuel with a sulphur content of no more than 0.5%; significantly lower than the

current 3.5% limit. This leaves shipowners with three options for compliance, each of which brings with it a varying degree of additional cost and complication.

As a marine coatings supplier, at Hempel, we know that it is certainly not our place to advise owners and operators on which compliance option is most suitable. However, we do have an important role to play in advising how their choice of hull coating can improve or further impede operating costs. Selecting the optimum hull coating has been proven to reduce fuel usage irrespective of which fuel is being burned and can help to 'payback' the additional cost of compliance.

#### WEIGHING UP THE OPTIONS

After years of debate, the three primary compliance options available to ship owners. Newbuild vessels can be equipped with engines able to burn liquified natural gas (LNG), which contains almost zero sulphur content, and boasts much lower greenhouse gas (GHG) emissions than refined petroleum. The infrastructure for bunkering LNG remains challenging, although improving, but LNG retrofitting is not a sound option for most existing vessels.

Alternatively, owners can also fit an exhaust gas cleaning system (scrubber) on newbuilds or retrofit these systems to younger existing vessels. This means they can continue to burn cheaper heavy fuel oil (HFO)/high sulphur fuel oil (HSFO), for which supplies are expected to remain plentiful worldwide and the cost of which

is widely anticipated to fall further from 2020. For many new and young vessels trading globally, installing or retrofitting a scrubber make sense. But with these systems costing between US\$2–8 million per vessel, they are expensive to install, require time in drydock if retrofitted and — so close to implementation date — yard space is scarce.

The other option is to switch to burning 0.5% SOx-compliant low sulphur fuel oil (LSFO). The benefit for most owners is that LSFO requires no major upfront cost. Yet, over the longer-term, given the significantly higher cost expected for the product, using LSFO as a bunker fuel is also going to push up operating costs considerably. In January 2020, when the regulation comes into force, projections are for the differential between high and low sulphur fuel oil to widen further.

#### ACCOUNTING FOR EVERY FACTOR

Whilst Hempel cannot advise which option to select, we can demonstrate that by applying a premium hull coating, the shipowner is able to offset the associated costs of compliance in a much shorter period of time. Obviously, the price differential between HSFO and LSFO fuel from 2020 is important in calculating the returns provided from hull coatings, and this is where the picture loses clarity. Focusing on the investment in a scrubbing system, if the difference in cost between the price of LSFO and HSFO is wide (as it is expected to be), the payback period relating to the cost of installing the





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scrubber is relatively short, as HSFO will be significantly cheaper. As the price gap narrows, the payback period of installing a scrubber lengthens.

Taking a VLCC as an example, if the shipowner chooses a market average hull coating, the average speed loss over a five-year period would be around 18%. By comparison, if they select a premium hull coating (such as Hempel's Globic 9500 or Hempaguard X7) the speed loss can be significantly reduced to just 1.4% over the same five-year period. This corresponds to the same shipowner achieving a 13.5% fuel

saving over five years simply by selecting a premium hull coating.

This saving will be seen regardless of whether the vessel is burning HSFO or LSFO, meaning the investment in a better coating will reduce the payback time in a scrubbing system, or help to offset the cost of burning more expensive LSFO. If the owner has opted to burn LSFO, the savings achieved by using a premium hull coating will 'pay back' the cost of the coating within a few months and deliver around \$1.5 million a year to help offset the cost of the more expensive LSFO.

It is clear that utilizing a high-performance hull coating delivers significant cost benefits over a market-average alternative irrespective of which sulphur compliance option is selected. Selecting a hull coating which is proven to reduce drag and lower fuel requirements is, then, an obvious solution. Of course, there are costs involved, and this has always been a key consideration for owners in selecting a coating. But in our current operating environment, making a long-term investment in a quality coating is guaranteed to pay dividends.

#### APPLYING A PREMIUM HULL COATING CAN OFFSET THE ASSOCIATED COSTS OF COMPLIANCE IN A MUCH SHORTER PERIOD OF TIME

	SCENARIO 1 Base case	SCENARIO 2 Lower conventional fuel cost	SCENARIO 3 Higher low- sulphur fuel cost	SCENARIO 4 Lower low- sulphur fuel cost
Scrubber installation cost	\$6,000,000	\$6,000,000	\$6,000,000	\$6,000,000
Bunker fuel cost per tonne	\$450	\$350	\$450	\$450
Low-sulphur fuel cost per tonne	\$540	\$420	\$675	\$450
Difference	\$90 (20%)	\$70 (20%)	\$225 (50%)	\$0 (0%)
Cost saving (lifecycle/interval of 15 years)	\$27,216,000	\$21,168,000	\$68,040,000	\$0
Annual saving	\$1,814,400	\$1,411,200	\$4,536,000	\$0
<b>Payback</b>	<b>3.3 years</b>	<b>4.2 years</b>	<b>1.3 years</b>	<b>0</b>

*In these calculations, the daily fuel consumption of the vessel is assumed to be 80 tonnes, with an annual activity level of 70%.*

## Hempel launches highly efficient and versatile antifouling coating

Early in June 2019, global coatings manufacturer Hempel launched Globic 7000, a new antifouling coating with enhanced operational flexibility for all vessel types and a speed loss\* of 4.5%, on average (according to ISO 19030). This contributes to significant fuel cost savings, and a reduction in associated emissions, for owners and operators.

Specifically designed to deliver effective protection for up to 60 months, Globic 7000 incorporates an optimum biocide mix to guard against both hard and soft fouling. With an improved performance against slime and algae, Globic 7000 is suitable for wide operational conditions including slow steaming and long idle periods.

Globic 7000 is built on Hempel's proven Globic technology that has been applied to more than 10,000 vessels since its launch in 2002, ensuring uniform and effective biocide release and a clean hull over the entire dry-docking interval.

Commenting on the launch of the new hull coating, Davide Ippolito, Head of Marine Group Product Management, Hempel A/S said: "Our Globic range is one of our most successful as they offer an excellent return on investment. Globic 7000, our latest addition, has been designed

to offer customers full operational flexibility. In support of the industry's current move towards slow steaming operations this new coating delivers significant fuel savings and exceptional protection for up to 60 months, for all vessel types and a wide range of operational conditions. The high-volume solids in the coating mean that it can be applied more quickly to deliver further cost reductions whilst the vessel is in dry dock."

Hempel's patented Nano acrylate technology is the strength behind the Globic range and provides a fine polishing control mechanism to bring the integral biocides to the surface at a stable rate to ensure a clean hull over the entire service life period.

Globic's unique technology allows the coating to start working as soon as the hull meets the water to deliver full and immediate antifouling protection.

Globic 7000 incorporates Hempel's patented microfibres giving the coating best-in-class mechanical strength. The microfibres increase the coating's resistance to abrasion and impact damage often incurred during daily operations and protects against cracking and peeling. This strengthening of the coating minimizes the

area required for blasting and so significantly reduces maintenance costs during dry docking.

\* Performance is quantified in terms of speed loss (ISO 19030), which is the difference in speed compared to the reference speed divided by the reference speed as a percentage. The greater the speed loss, the more power and consequently fuel is required to move the vessel through the water.

#### GLOBIC 7000 AT A GLANCE:

- ❖ Lasting protection against both hard and soft fouling thanks to smart and efficient biocide package;
- ❖ Suitable for all vessel types and wide operational conditions, including slow steaming and long idle periods;
- ❖ Incorporates proven patented Nano acrylate technology;
- ❖ Effective protection for up to 60 months' service time;
- ❖ Improved colour stability;
- ❖ Low Volatile Organic Compound (VOC) levels — below 400g/L; and
- ❖ Reinforced with patented microfibres for best-in-class mechanical strength to avoid cracking and peeling, significantly reducing maintenance costs in dry dock



## Jotun creates new standard for predictable, long-term antifouling protection with SeaForce and Hydractive™ technology

Jotun has unveiled the next generation of its popular SeaForce biocidal antifouling range, with three new products featuring breakthrough Hydractive™ technology. Developed in-house by the global manufacturer of marine protective coatings, the new solution provides predictable, long-term performance for diverse vessel needs.

Jotun originally launched its SeaForce range in 2004. Since that point the solution has established a market leading position, with some 27,000 vessel applications worldwide.

However, according to Dr. Erik Risberg, Global Marketing Director, Jotun Marine Coatings, evolving customer needs have spurred Jotun to develop an innovative new solution to satisfy industry demands today, and far into the future.

“SeaForce is a cornerstone portfolio in our marine coating range,” he notes, explaining; “but we felt the time was right to push its performance further, providing next level protection for our customers while consolidating its position within the marketplace. Shipping has changed over the past decade and a half, creating a different customer need, and we want to evolve with that demand to keep delivering optimal solutions. That, in essence, led to the idea for Hydractive™ technology.”

Hydractive™ technology is unique. It effectively slows down the water uptake of the antifouling, meaning that biocides are released in a more predictable pattern over the lifetime of the coating. This results in stable, high quality performance



for the long-term, with SeaForce keeping customers' vessel hulls cleaner, for longer.

The range features three core products: SeaForce Shield, offering effective protection; SeaForce Active, actively working to safeguard hulls even when vessels are not in use; and SeaForce Active Plus, delivering premium protection at an affordable price.

SeaForce Active and SeaForce Active Plus also feature a triple biocide package, one of which is the same market leading biocide combination used in the top of the range SeaQuantum product portfolio.

“There is no ‘standard’ shipowner, so there is no ‘one size fits all’ coating solution,” states Risberg. “At Jotun it’s our commitment to provide our customers

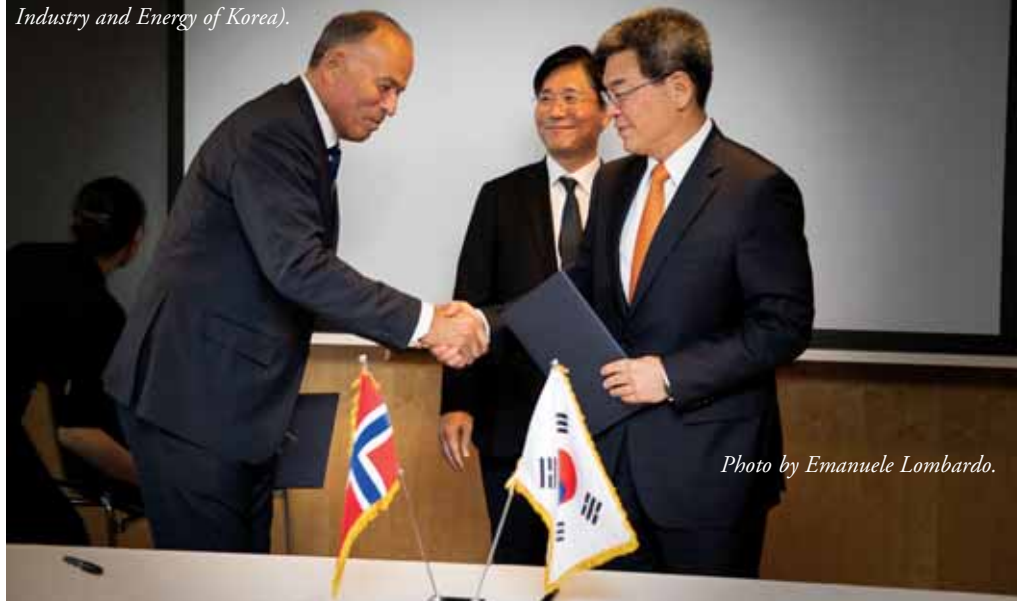
with a variety of solutions to meet their individual requirements, budgets and performance needs. The SeaForce range is living proof of that ambition.”

“With our proprietary Hydractive™ technology we can deliver a ‘best in class’ solution for long-term clean hulls and protection. That translates to competitive advantage for both our customers and us. We’re excited to see industry reaction to what we regard as a significant step forward in antifouling performance within this market segment.”

Jotun is the number one marine coatings supplier globally with an extensive worldwide delivery network. The SeaForce product range is available to the market now.

## Jotun signs agreement with world's largest shipbuilder

*From left: Chairman of Jotun Odd Gleditch d.y. and CEO of Hyundai Heavy Industries Ka Sam-Hyun after signing the memorandum of understanding, in the middle Minister Sung Yun Mo (Ministry of Trade, Industry and Energy of Korea).*



*Photo by Emanuele Lombardo.*

On 13 June 2019, Jotun announced that it has signed a memorandum of understanding with the world’s largest shipyards for a new type of marine paint that reduces solvent emissions by up to 90%.

A memorandum of understanding has been signed with Korean Hyundai Heavy Industries (HHI). This is the starting point of a closer co-operation and the use of a new, innovative solvent-free primer. The signing took place between



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Jotun's chairman Odd Gleditch (Jr.) and HHI's Chief Executive Ka Sam-Hyun during the South Korean President's state visit to Norway in June. South Korea's Minister of Industry Yunmo Song attended the signing ceremony.

"The partnership with Jotun will allow HHI, the world's largest shipbuilder, to be better equipped to meet the new environmental requirements that are aimed at reducing solvent emissions," said Ka Sam-Hyun.

"We are, of course, very pleased with the agreement with the world's largest shipyard, but even more satisfied that our innovation is contributing to a better environment," said Morten Fon, CEO Jotun.

Jotun focuses heavily on research and development of environmentally friendly paints, and the corrosion-protective primer reduces total solvent release by

80–90%. The company has worked on developing the new type of marine paint for 13 years.

It will reduce solvent (VOC) emissions into the air from approximately 250 grams per litre to just nine grams per litre. Shipyards will save hundreds of millions of dollars by avoiding investments in plants related to the combustion of VOC's. VOC combustion also leads to CO<sub>2</sub> emissions, so this innovation provides a double benefit.

"We have conducted research in Korea and in Norway while developing this paint, and after 13 years can conclude that we have succeeded in developing a product that reduces solvent emissions by over 90%," says Erik Risberg, one of the scientists behind the new paint.

"In addition, the product has better corrosion protection than previous systems, which helps extend the life of the

vessels and reduces the need for maintenance. This is also very attractive for shipowners," Risberg adds.

Primers make up 60–70% of the total amount of paint applied to a ship. Risberg has worked in Korea for years, developing the primer in close collaboration with Korean shipyards. He is therefore very pleased with the agreement with HHI.

The new product is currently available for Korean shipyards and selected shipbuilders in Europe who have experience applying single-coat primers that require careful application techniques.

HHI has 16,000 employees and an order entry of \$16 billion in 2018. HHI's CEO accompanied the Korean delegation during the state visit to President Moon Jae-In. Ka Sam-Hyun also visited the Jotun production facility in Sandefjord during his stay in Norway.

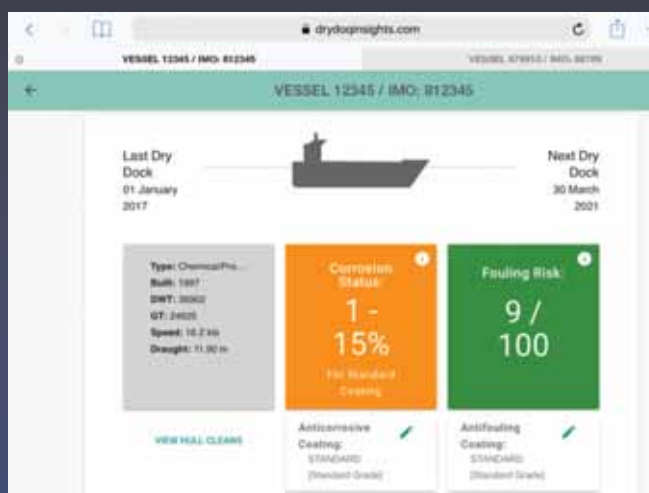
## AkzoNobel's new digital tool helps ship owners improve dry docking efficiency

Owners and operators of shipping fleets can now better control their dry docking costs with an ingenious new digital tool developed by AkzoNobel.

Known as DryDoQ Insights, it closely predicts the condition of a vessel's underwater hull without the need for visual inspection. Using data analytics, it has a unique capacity to build a complete picture of the corrosion and fouling on the surface — helping to improve maintenance planning and increase efficiency.

The technology has been launched as a minimal viable product to one of the world's largest fleet operators, who will carry out testing and provide continuous feedback so that further developments and improvements can be made. The system is simultaneously also available to the wider market.

It's the latest example of AkzoNobel's vision on innovation, exploring new horizons to deliver solutions beyond the expectation and imagination of customers.



"As a premium solution and service provider for the shipping industry, we're always looking for ways to give our customers a competitive edge," explains Michael Hindmarsh, the AkzoNobel Incubator Lead for the UK. "DryDoQ Insights enables vessel owners to make more informed decisions about upcoming dry docking requirements, which in turn will help them to better control their maintenance costs."

Adds Massimo Rubesa, Coatings and Materials Specialist at Stolt Tankers Shipowning: "As a company that sees the

value in exploring the latest innovations in terms of products and services for improving vessel efficiencies, we are pleased to be part of the conception of DryDoQ Insights. We look forward to further developing the tool, which has the potential to bring clear benefits to the industry."

The new tool makes its predictions based on proprietary data enriched with multiple external data sources. It highlights specific areas for consideration, taking into account the specific vessel type, trading pattern and previous dry-docking events.

AkzoNobel's Marine and Protective Coatings business is a leader in big data analysis in the marine industry, with more than 40 years of experience. A range of digital tools has been developed for customers, including Intertrac Vision, which projects the effects that various coating scenarios will have on the hull performance of a vessel before they have been applied.

## PPG SIGMA SAILADVANCE™ RX solves bulk carrier idle time issues

*After a diver survey of Theresa Jiangu, Raffles Technical Services agreed to select PPG SIGMA SAILADVANCE RX antifouling for its entire fleet.*



A clean hull is critical to ensuring vessel efficiency and minimized power consumption. Choosing a reliable antifouling solution is necessary to protect the hull from marine growth and limiting potential increases in operating power, especially when the ship is sailing in areas of aggressive fouling and with extended static periods.

Bulk carriers will experience exactly this combination of conditions and require a coating that can manage the challenges of both long idle times and high levels of fouling.

When Raffles Technical Services required an efficient, long-lasting antifouling for its Kamsarmax bulk carrier *Theresa Jiangu*, it selected PPG SIGMA SAILADVANCE RX™ a high-performance antifouling which PPG believed could meet the vessel's hull protection needs in these highly challenging environments.

*Theresa Jiangu* is a 2012-built 81,680dwt Kamsarmax bulk carrier; after coating with PPG SAILADVANCE RX, its trading patterns included 65 days idle in Indonesia and 71 days idle in Australian waters during loading and unloading.

In order to gauge the effect on the ship's hull Raffles surveyed *Theresa Jiangu* with divers after its extended stationary periods and was impressed by the clean condition of the coating. Following this result, Raffles agreed to select PPG SIGMA SAILADVANCE RX antifouling for its entire fleet.

PPG SIGMA SAILADVANCE RX is an advanced low-friction, self-lubricating antifouling which minimizes operating costs by reducing hull friction when sailing and by providing excellent fouling resistance during extended idle periods, thus ensuring minimal speed loss and improved vessel efficiency.

The coating utilizes Controlled Surface Active Polymers (CSPs) that act as a lubricant on the coating/water interface, supporting laminar flow, which reduces hull friction when the ship is sailing. The CSPs also create a slippery surface that resists fouling when the ship is not sailing. This extends possible idle time by up to 30 days on average, thus improving the hull's performance.

PPG SIGMA SAILADVANCE RX is designed for all vessel types and speeds

and is particularly effective for ships which may be subject to slow steaming. It minimizes operating costs by providing excellent fouling resistance during extended idle periods, thus ensuring minimal speed loss and improved vessel efficiency. Several satisfied customers have reported excellent performance after long idle time periods in aggressive fouling areas.

PPG works closely with its customers to identify challenges and offers innovative solutions that will help shipowners and operators achieve their compliance and performance targets. With nearly \$0.5bn invested annually into coatings research, the company's researchers receive an average of 55 patents and multiple global recognitions for their innovative work every year, with the most important being the INNOVA and the R&D 100 award that PPG has received for 24 years.

Several laboratories around the globe and a major innovation centre in Allison Park, Pennsylvania, are committed to create pioneering solutions for the shipping industry such as the PPG SIGMA SAILADVANCE® range.



## Nippon Paint Marine applies low-friction Hydrogel Technology to its Ecoflex range

Following increased market demand for its low-friction hydrogel-containing hull coatings, Nippon Paint Marine (NPM) has now applied the revolutionary technology to its standard range of antifoulings to provide a cost-effective solution for reducing fuel consumption.

Hydrogel, already used in the company's LF-Sea 150 HyB and A-LF-Sea range of hull coatings, has now been incorporated into its Ecoflex SPC 200 range.

Ecoflex SPC 200 LF has been specifically developed to provide the wider commercial shipping sector with a low-cost, low-friction hull coating with technology proven to significantly reduce hull friction and extend service intervals by up to 90 months.

The original Ecoflex SPC 200 coating, the world's first TBT-Free hydrolysing self-polishing antifouling (SPC), has been applied to more than 10,000 ships since 1990.

Niko Yamanoue, Deputy Managing Director, Nippon Paint Marine (Europe), said: "The new low-friction version of Ecoflex has been developed with the coming global sulphur cap in mind. With the anticipated hike in fuel costs set to impact operations from next year, commercial shipowners will need an economical hull coating capable of helping towards reducing the fuel bill. By adding hydrogel technology to our established antifouling, shipowners can expect to achieve substantial fuel savings compared to regular SPC coatings."

Nippon Paint Marine developed the novel coating technology following extensive research into the skin structure of tuna fish, which was found to contain a mechanism that repels water. The research led to the incorporation of hydrogel, a component that traps a microscopic layer of water on the coating's surface, smoothing the water flow around the hull.

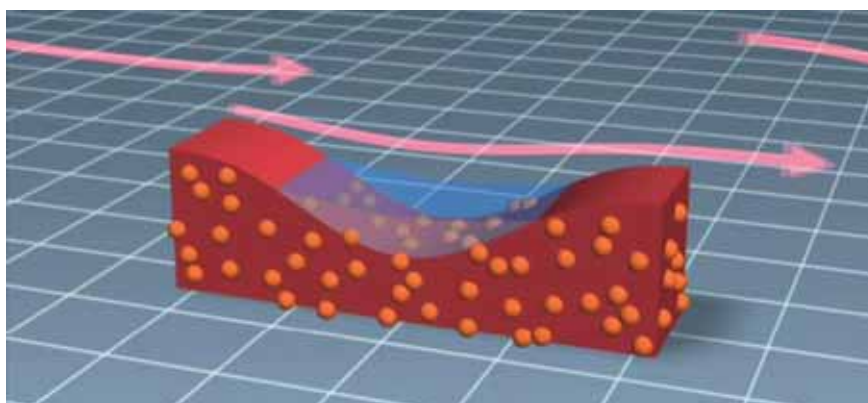
The company first applied the technology to its LF-Sea 150 HyB product, introduced in 2007, and then further developed the technology with A-LF-Sea, launched in 2013.

Since the market introduction of hydrogel-containing coatings, ships using NPM's premium A-LF Sea product have achieved fuel savings of up to 10%, while the 3,000-plus ships that have applied LF-Sea 150 HyB have benefitted from about a 4% reduction in fuel consumption, compared to traditional SPC-type coatings.

"We have amassed more than ten years of data from vessels operating hydrogel-



*Low-friction self-polishing antifouling paints have excellent performance after years of service.*



*Hydrogel (shown in orange) within the antifouling film has a strong affinity with water and its presence in Nippon's antifoulings creates a layer of water on the hull which lowers hull friction.*

based coatings to verify the fuel savings and extended service intervals use of these coatings can achieve," said Yamanoue. "Hull performance monitoring has shown that our low-friction technology is providing a real payback for customers compared to other systems."


While the premium A-LF-Sea product is currently the containership, LNGC and cruise ship sectors' coating of choice, Ecoflex SPC 200 LF is expected to find favour with tanker and bulk carrier operators.

John Drew, Director, Nippon Paint Marine (Europe), said: "For most tankers and bulk carriers these systems with advanced technology incorporated into a competitive, high-solid (62% SVR) SPC

antifouling system will prove a highly effective, commercially-viable way of reducing operational costs and the environmental footprint."

### ABOUT NIPPON PAINT MARINE

Nippon Paint Marine is a subsidiary of Nippon Paint, a top five global paint supplier.

Nippon Paint has been producing marine coatings in Japan since the 1880s and has been developing all kinds of marine paint technology, but especially antifouling paints. Nippon Paint developed and launched the world's first self-polishing (SPC) tin-free antifouling paint in the 1990s and followed that with the launch of the world's first low-friction SPC in 2006. 

## Early-season coal demand high on Great Lakes



Coal shipping on the United States' Great Lakes opened at a brisk pace in 2019.

According to Lake Carriers' Association, which represents 13 American companies operating 46 US-flag vessels on the Great Lakes, coal shipments spiked to nearly 1.2mt (million tonnes) in April 2019, a monthly total that exceeded April 2018 by 61%. Year-to-date through April, the Lake Carriers' total coal carriage on Lake Erie, Lake Michigan and Lake Superior stood at nearly 1.6mt, or approximately 12.4% ahead of the five-year average.

Specifically at the Port of Duluth-Superior, the Great Lakes' top tonnage port, coal carriage was nearly 67% ahead of its 2018 pace through April, totalling more than 900,000 tonnes for the month and easily topping the million-tonne mark year-to-date.

## Port of Dover Cargo makes its Breakbulk Europe debut

The UK's Port of Dover's Cargo team showcased its outstanding cargo terminal facilities at Breakbulk Europe in May in Bremen, Germany. Breakbulk Europe is the world's largest event for cargo specialists. Dover Cargo Terminal's exceptional location, efficiency and fantastic cross-

channel ferry links make it the first choice for many of Europe's leading freight carriers. Its pricing is also amongst the most competitive in the industry.

This year, the port will be delivering one of the most important cargo projects in North West Europe, to supply a new multi-

purpose cargo terminal. This will be followed by a port-centric distribution facility transforming cargo and logistics operations as part of the Dover Western Docks Revival project (DWDR). Currently, the terminal handles 300,000 tonnes annually, with around 9,000 container movements per year. Projected increases in cargo volumes are why the port is delivering the DWDR project, which will provide a golden opportunity to develop the cargo business even further.

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## Port of Rotterdam Authority, GVT and Chengdu work towards higher load factors for freight trains

Port of Rotterdam Authority, Tilburg multi-modal terminal operator, GVT, and Chengdu International Railway Port Investment & Development Group have signed a declaration of intent. The objective of the co-operation is to transport more freight via rail between the largest European ports and Chengdu, the capital city of the centrally located Chinese

province of Sichuan. The declaration of intent was signed on the day of the 800th journey of a direct freight train connection between China and Rotterdam.

The Chengdu-Tilburg-Rotterdam Express currently runs three times a week in 15 days via Kazakhstan and Moscow. The load factor during the westward journey from China to the Netherlands is currently

extremely high. The load factor on the eastward journey still has around 20% available space, according to GVT. The focus is therefore on better connections with the North American market via the Port of Rotterdam. More shortsea freight can also be transported from the United Kingdom, Ireland, Scandinavia and the Baltic States via rail to the Far East.

## Freeport of Riga Authority surveillance camera monitors coal dust

With a view to ensuring the ongoing monitoring of the coal loading process and rapid identification of any potential deviations during coal loading, the Freeport of Riga Authority has installed a surveillance camera opposite the Krievu Island Terminal.

This was a response to complaints from local residents about increased coal dusting observed during the coal loading process on Krievu Island. The Freeport of Riga Authority has conducted an investigation and established that increased coal dusting has occasionally taken place. The reason is that active coal handling began on Krievu Island in February of this year, when operators in the port were still implementing and adjusting their new equipment and loading processes. This is a time-consuming process, when equipment failure may affect the overall loading process, thereby leading to temporary increases in coal dust produced.

It is to be recalled that, aiming to preserve the quality of life of people living in the territories that are adjacent to the terminal and pursuant to conditions formulated by the State Environmental Bureau with regard to environmental impact assessment, the

Freeport of Riga Authority has constructed two new air monitoring stations in addition to a 23-metre wind fence, which was built in the territory of Krievu Island to reduce the impact of prevailing winds on the spread of dust in the local environment. One of the stations is located in the north-west part of the newly constructed terminal of Krievu Island, while the other is situated in the direct vicinity of residential areas near Lielupes Street in Bolderaja. If necessary, the Freeport of Riga Authority may decide to build additional air monitoring stations.

Devices at these monitoring stations (dust analysers) can separate PM10 from other dust particles and measure their concentration in ambient air. The stations conform to all European Commission's requirements and standards, and operate online, ensuring the ongoing transmission of measurement data. Data derived by the monitoring stations can be provided to the State Environmental Service, entities of the Freeport of Riga Authority and undertakings operating in the port, while monthly data are available on the website of the Freeport of Riga Authority.

The Freeport of Riga Authority invites

citizens to call the Operational Control Division of the Port Police if they observe any potential deviations, and all necessary actions will be taken to identify the situation, which will be reported to the State Environmental Service immediately.

In 2012, the Freeport of Riga Authority launched the project "Development of Infrastructure on Krievu Island for the Transfer of Port Activities from the City Centre" to free the centre of Riga from coal cargo and transfer the handling of coal to new terminals equipped with modern technologies on Krievu Island. On 31 December 2015, the construction of the principal infrastructure of the Krievu Island Terminal was completed, which included four deep-water piers (ship draughts of 15.5m) with a total length of 1,180m and the necessary access road and utility infrastructure.

Alongside the construction of additional infrastructure begun by the Freeport of Riga Authority in September 2017, stevedoring companies are building administrative and process buildings and installing special purpose equipment for coal handling, crushing, transportation and loading onto ships.

## First ship makes crossing to Brazilian port of Porto do Açu

The *BBC Amethyst* is the first ship to have made the crossing from Antwerp to the Brazilian seaport of Porto do Açu. Brazil has the seventh-largest economy in the world and is a major trading partner for Port of Antwerp. The new connection will further strengthen trade relations between the two countries.

The *BBC Amethyst* carried a Siemens steam turbine destined for a new thermal generating station in the Brazilian port. The turbine first travelled by barge from Müllheim (Germany) to the Katoen Natie

terminal in Antwerp, from where it was carried to Porto do Açu along with other large parts.

Port of Antwerp International, a subsidiary of Port of Antwerp, has been a shareholder in Porto do Açu since 2017 and also acts as port consultant. The seaport is strategically located in the South-East of Brazil, near to important markets such as Rio de Janeiro. Porto do Açu is expanding rapidly, with a focus on sustainable projects. According to marketing manager Tessa Major the fact

that the first consignment from Antwerp was destined for a sustainable energy project represented a perfect start.

### ESSENTIAL TRADING PARTNER

Brazil is an essential trading partner for Port of Antwerp, with more than six million tonnes of freight annually being carried between Antwerp and the Brazilian ports. The main Brazilian exports are coffee, meat, fruit, timber, tobacco and steel products, while malt, fertilizers, chemicals and potatoes travel the opposite way.



## Tampico offers four new concessions

The Mexican Port of Tampico has issued tenders for four new terminals.

One of these will cover areas 10 and 11, which are to be offered as a multipurpose terminal for the second time after the initial tenderer did not sign the original contract. These sections comprise 576 metres of berthing line and 136,000m<sup>2</sup> of back up land. In addition,

the port authority (API) is also to offer a concession for a chemical, petrochemical, oil and hydrocarbon terminal in the port's Galeana area, which encompasses an operating area of 68,000m<sup>2</sup> and 580 metres of quay.

A third terminal concession is aimed at attracting additional cabotage and short sea traffic, located in sections I and IB.

This has 45,000m<sup>2</sup> of operating area and 215 metres of quay. The creation of a general cargo terminal is the idea behind the fourth concession. This would occupy berths 5 to 9 and encompass a total area of 128,000m<sup>2</sup>, with vessels docking alongside 920 metres of linear quay.

Bids for the tenders must be received by June 27. *Barry Cross*

## New Mangalore inaugurates mechanized coal berth

A new mechanized coal handling facility has been inaugurated by India's New Mangalore Port Trust (NMPT). The Shipping Secretary Gopal Krishna attended the opening ceremony.

The new facility belongs to Mangalore Coal Terminal Pvt Ltd, which has invested \$87 million in the project, which has been built in and around Berth 16. The fully automated operation can handle 10mt (million tonnes) per annum of common user coal. Previously, New Mangalore Port was handling 4mt of this commodity.

As part of the investment, two new ship unloaders have been acquired. These have an engineered discharge rate of 4,000 tonnes per hour. In addition, there are two stacker-reclaimers, which can stack or reclaim similar throughput levels to the unloaders. Coal is transported from the stockpile area to the wagon loading area using a fully



enclosed conveyor belt system.

Up to seven block trains a day can use the wagon loading system when it is operating at full capacity. These block trains can consist of up to 59 wagons, with

individual wagons loaded in under a minute.

The berth, which is 325 metres long and 25 metres deep can handle vessels of up to 100,000dwt and offers a maximum draught of 15.1 metres. *Barry Cross*

## Equipment upgrades at Vostochny and Ust-Luga ports

Vostochny Port, which is located at Primorsky, Russia, and the Black Sea Rosterminalugol facility, at the Baltic Sea port of Ust-Luga are currently revamping equipment used at their respective coal terminals. This was revealed by Irina Olkhovskaya, First Deputy to General Director of Port Management Company LLC.

"The main thing for us is to ensure environmental safety during [coal] handling. For that purpose, the terminals

are conducting comprehensive work and implementing comprehensive environmental programmes. Considerable resources are being invested," she said.

Vostochny Port is Russia's largest dedicated open access coal port, offering customers access to advanced handling technology from a sophisticated rail reception facility to automated dockside ship loading. Of note are the covered facilities put in place for the unloading

and transfer of coal, encompassing the conveyor equipment, rotary car dumpers, shiploaders and multi-stage magnetic coal separation process.

For its part, Rosterminalugol JSC is the largest dedicated coal terminal in the European part of Russia. It almost exclusively handles Russian coal produced in Kuzbass and other coal fields for a portfolio of customers in Europe, Africa, Middle East and Latin America. *Barry Cross*



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ELECTROMAGNETIC PARKING BRAKE	2x200 Nm
ELECTRIC STEERING MOTOR	2x4 kW 400V AC
STEERING GEARBOX RATIO	1 : 178
PINION/CROWN RATIO	1:8.57
TOTAL STEERING RATIO	1 : 1526
MAX STEERING OUTPUT PEAK TORQUE	2x5.000 Nm
TIRE	Pneumatic 16.00-25
TILTING ANGLE	±6°
LIFTING CYLINDER	Bore Ø140mm. Rod Ø90mm
STROKE OF LIFTING CYLINDER	400mm
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**ITALY**



# Steel rolling process streamlined with watertight buckets from CFS Handling

Civettini Italo & c sas — under the brand name CFS Handling — is a major designer and manufacturer of grabs for the handling of bulk commodities. The company's product range includes mechanical, hydraulic and electro-hydraulic buckets as well as hydraulic and electro-hydraulic grabs.

CFS Handling has provided Dry Cargo International with recent photographs of some of the watertight buckets that it manufactures for customers all over the world.

During steel rolling operations, it is inevitable that when the steel is heated, rolling scale is formed. With the reaction of iron with oxygen in the air at the surface, iron oxide



is formed, the so-called rolling scale, which permanently compromises the appearance and properties of steel. Therefore, in the production of high-quality hot-rolled articles it is inevitable that such impurities need to be removed from the metal surface.

In hot rolling plants the descalers guarantee a high surface quality. These remove the scale with high-pressure water jets on the metal surface.

The scale then falls into pits, where there is water and accumulates.

To pick up the scale, electro-hydraulic watertight buckets are used, and those from CFS Handling are especially popular.



## Hägglunds drive systems – a success at the Aitik mine

The air is filled with dust, and the large, heavy rocks pound the equipment hard. Only the toughest survive at the Aitik mine.

Boliden therefore takes great care in selecting suppliers for its new crushing plant. “We make sure we only use suppliers that have experience in this field. This applies to all the investments we have made in recent years, but this project has given us the best results so far,” says Jörgen Larsson, Project Manager at Boliden.

The ore deposits in Aitik contain a copper ore called chalcopyrite, as well as some gold and silver. The ore is refined to produce a concentrate that feeds Boliden’s own smelting works. The rock waste, or overburden, is removed from the pit and sold for road-building and concrete production, for example.

Aitik is not only the largest open-pit copper mine in Sweden, but also the most productive in the world. This is thanks to large-scale production, highly efficient methods and a high degree of automation.

“We can process more low-grade ore than many other mines because of our efficiency. We actually have lower input levels than many other mines have in waste,” says Larsson.

### STRATEGIC INVESTMENTS FOR GROWTH

The Aitik mine has set a long-term goal to raise production from 36 to 45 million tonnes of crushed ore by 2020. To achieve this growth and improve the consistency and reliability of production at the same time, Boliden has invested in a completely new crushing plant with two spindle crushers. In its annual report the company states that this massive investment will ensure “more reliable production planning, lower maintenance costs, better predictability and better profits”.

“Right now we are getting a good price for what we produce. That gives us the opportunity to invest. But one big challenge is that we are greatly increasing



the area of mining, which also involves high costs. We constantly have to fine-tune our mining operations so that we can increase production using our existing equipment. The new crushing plant will enable us to do that,” says Larsson.

Obtaining the permit to expand also placed big demands on the ecological sustainability of the Aitik mine. “We are leading the way environmentally. This will

allow us to ramp up production. The measures we have taken range from electric vehicles to energy recovery and ecological compensation areas,” says Larsson, who stresses that the company is constantly raising its commitment to the environment.”

### A PLANT TO BE PROUD OF

Jörgen Larsson has a great deal of experience in the industry. He has done everything from operating mining machinery to supervising maintenance and installation. He has supervised the crushing project and been involved in commissioning.

“It’s fantastic that we have been able to invest in a totally new plant, where everything is well-planned and we have plenty of access to the equipment.”

Larsson is especially pleased with the completely new feed system. “We originally had inclined apron feeders. They were unreliable in every way. These are the first





conveyors that are completely horizontal. And they look great!”

The feed system was designed by Metso in the US, and is a proven design with many systems already in use around the world. Metso Minerals adapted the system to suit the particular needs of the Aitik mine. This work was done in close collaboration with Bosch Rexroth, which supplied four hydraulic Hägglunds CBm motors.

### **CURIOS ABOUT HYDRAULIC DRIVE**

One of the reasons why Boliden decided to invest in apron feeders with direct hydraulic drive was frequent problems with gearboxes. Another was curiosity.

“We had many gearbox breakdowns over the years and wanted to improve availability. This will be a test of hydraulic technology. I have seen Hägglunds drives in various reference installations around the world, and during my investigations I did not hear of any negative experiences. My visit to the factory in Mellansel was also incredibly interesting. I gained a new understanding of how hydraulic systems work.”

In addition to improved availability, Boliden set high demands on the performance of the equipment. Metso then drew up a specification of requirements based on two motors that share the load on each feed unit, with a capacity of 8,000tph (tonnes per hour), a variable speed of 0–7.46 rpm and a starting torque of around 1,000,000 Nm.

The solution offered by the Hägglunds specialists at Bosch Rexroth was two Hägglunds CBm 2000–1400 motors per apron feeder. It was a welcome solution that easily met the requirements.

“We wanted to have some power in reserve, so that’s good. It gives us a maximum capacity of 9,000tph. It also gives us redundancy for all the main components, so we can drive with one motor if needed,” says Larsson.

### **SUCCESS FACTORS FOR THE PROJECT**

The new plant was commissioned in June and the Aitik mine is now running at full production capacity.

“After a few weeks of testing we went on summer vacation. I was away for five weeks and everything worked perfectly! The plant has now processed more than six million tonnes of ore and there has not been a single incident. The fact that production is running so smoothly at this early stage is an excellent result. Especially when the plant was custom-built specifically for our needs.”

The drive systems take up minimal space and allow fast replacement of components, thanks to the splined couplings. Larsson reckons they make installation incredibly easy.

“The main benefits are that we have improved availability while reducing maintenance costs. The hydraulic drives provide better access from the sides and make the plant easier to maintain.

The way things are looking now, we won’t need to work on them, but if we do have to replace anything, we have really good access. Another big advantage is that we can reverse the hydraulic drives during maintenance.”

All that remains to do now is a few small adjustments and performance tests. Boliden will take both crushers and drive systems up to maximum load and check that they produce the tonnage required. A big part of the performance testing is to ensure that the plant can meet availability targets over the course of a month.

“It all looks good so far. If this turns out well and gives us improved reliability we will probably use hydraulic drive technology elsewhere. For our big conveyor systems in particular, the Hägglunds drives are definite contenders,” says Larsson with satisfaction.



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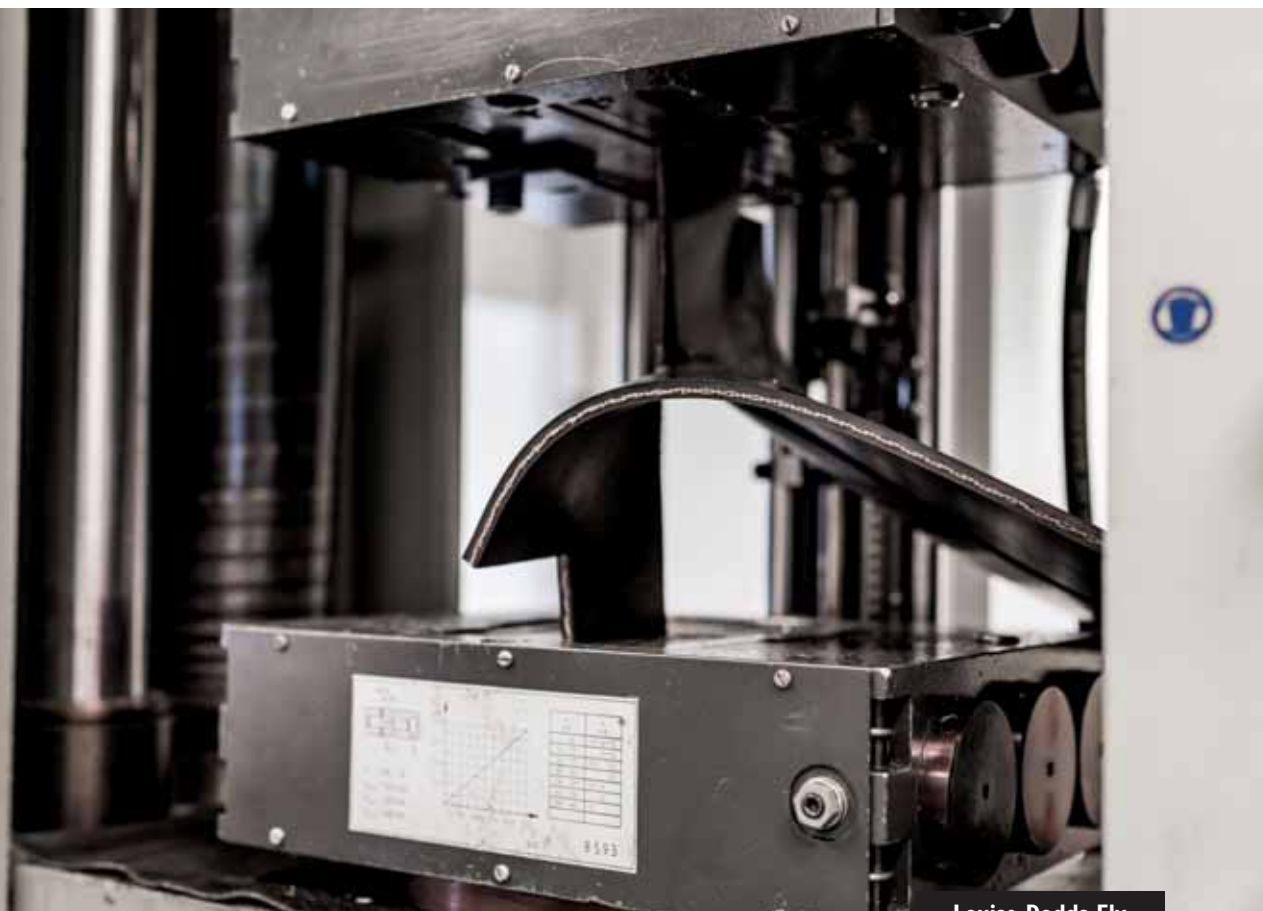
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Louise Dodds-Ely

## Quality standards and testing in the conveyor belt industry

### WHO SETS THE STANDARDS?

The conveyor belt industry is a huge and highly competitive global market. To describe it as being 'cut-throat' would not be an exaggeration. However, such a high level of competition does not always benefit the end-user, especially when the pursuit of winning orders can so easily compromise safety, quality of performance and operational lifetime. To be brutally frank, mistakes can and do prove to be enormously expensive in more ways than one.

Although many view conveyor belts simply as long lengths of thick black rubber, in reality, manufacturing conveyor belts is a surprisingly complex science. Modern-day belts used in the recycling and waste industry have to cope with an enormous



variety of potentially destructive materials, operating conditions. environmental and health & safety factors.

Consequently there are a number of different belt carcass constructions (types of belt) and an even wider range of rubber compounds designed to protect those constructions. This includes everything from straight-forward wear & tear, rip and impact damage to exposure to heat, oil,

chemicals, ozone & UV, extreme cold and fire. And with those differing requirements comes an almost bewildering range of test methods and quality standards. In this special feature, conveyor belt consultant *Leslie David* explains who sets the standards and defines the test methods as well as providing some enlightening guidance as to what to look out for when selecting conveyor belts for specific applications.

## EUROPEAN AND INTERNATIONAL STANDARDS



European Committee for Standardization



Globally there are a number of different quality organizations who set standards for conveyor belting but the most widely accepted standards (for all types of conveyor belt) are those used in Europe. There are EN standards (European Norms), which are maintained by CEN (Committee European de Normalization) and there are ISO standards ISO (International Organization for Standardization). Both CEN and ISO are independent, non-governmental organizations. They are the world's largest developers of voluntary international standards. For example, the ISO membership consists of the quality standards organizations representing 168 countries. It is common to see the use of the prefix EN ISO, referring to ISO standards that have been adopted in full as the European standard.

It should be noted that in many parts of Europe some specific and longer established DIN standards continue to be more commonly recognized and accepted, especially in relation to abrasion-resistant belting. The letters 'DIN' stand for 'Deutsches Institut für Normung', which means 'German Institute of Standardization'. They develop norms and standards as a service to German industry and are a highly respected non-profit organization that has been based in Berlin since 1917. Numerous DIN standards have actually been converted into EN or even ISO standards.

Although standards for conveyor belts vary between different countries, members of CEN are obliged to implement EN (European standards) as their national standards without modifications and have to withdraw any of their own national standards that may conflict with them. The standards applied in countries that are not members of CEN are in many cases found to be significantly inferior or outdated.

### TEST METHODS AND TEST STANDARDS ARE NOT THE SAME

When assessing quality credentials it is essential to differentiate between what is simply an approved method of conducting a particular test (test method standard) and the actual standards attained during that test (quality or performance standard). The fact that a belt has been tested according to a certain method (for example, EN ISO

4649 for abrasion resistance) means very little. What is important is the actual level of performance achieved during the testing compared against the minimum acceptable level of performance dictated by the test standard.

In other words, was the performance standard met? In the case of ENISO 4649 abrasion resistance testing, the performance would typically be measured against the performance standards set within ISO 14890.

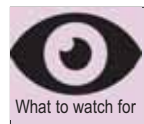
### CE MARKING

Compliance with CE quality standards is increasingly being stipulated by purchasers of industrial conveyor belts. However, CE accreditation does not apply to conveyor belts because they are not a product category that is subject to specific directives that are required to be CE marked. Nonetheless, it is still worth having a basic understanding of the role of CE quality standards and how they can be used to mislead.

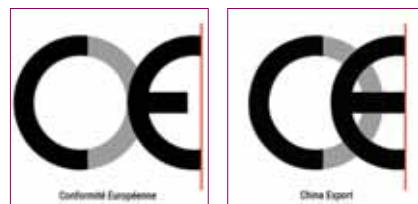
The letters 'CE' used in the CE marking are the abbreviation of French phrase 'Conformité Européenne' which literally means 'European Conformity'. The term initially used was 'EC Mark' but it was officially replaced by 'CE Marking' in the Directive 93/68/EEC in 1993.

By placing the CE marking on a product a manufacturer is declaring, on his sole responsibility, conformity with all of the legal requirements to achieve CE marking. The manufacturer is thus ensuring validity for that product to be sold throughout the EEA, although the mark does not mean that the product was made in the EEA.

The danger is that some conveyor belt manufacturers use CE marking to create an illusion of quality and safety based on the understandable assumption that goods with CE marking is proof that the product meets strict EU standards even though no such standards exist..



Unfortunately, a very similar mark exists which the majority of consumers may mistakenly believe is a



genuine CE mark of European conformity but actually means "China Export", meaning that the product was manufactured in China.

## DIMENSIONS AND TOLERANCES

In terms of dimensional standards and acceptable tolerances such as length, width, thickness etc, all textile fabric ply construction conveyor belts are subject to ISO 14890:2013. These specify the dimension requirements for rubber- (and plastic-) covered conveyor belting for general surface use on flat or troughed idlers.

### DIFFERENT TESTS FOR DIFFERENT DEMANDS

As I touched on earlier, there are many different types of belt and an even wider array of different types of rubber covers (commonly known as cover grades or cover qualities) that are needed to protect the belt carcass from whatever they have to convey. The primary rubber cover grades are:

- ❖ abrasion (wear) resistant;
- ❖ heat resistant;
- ❖ oil resistant; and
- ❖ fire.

Rubber covers often need to be able to cope with a combination of factors, such as fire and oil. However, one that is common to all is the ability to resist abrasion (wear). The most commonly used belting also happens to be abrasion resistant, so that seems to be the best place to start.

### ABRASION — STANDARDS

The wear-resistance quality of a conveyor belt is usually the single most important factor that will determine its operational lifetime and consequently its cost-effectiveness. There are two internationally recognized sets of standards for abrasion, EN ISO 14890 (H, D and L) and DIN 22102 (Y, W and X). As mentioned earlier, in Europe it is the longer-established DIN standards that are most commonly used. Generally speaking, DIN Y (ISO 14890 L) relates to 'normal' service conditions and DIN W (ISO 14890 D) for particularly high levels of abrasive wear. However, DIN X (ISO 14890 H) is regarded as the most versatile because in addition to resisting abrasive wear it also has good resistance to cutting, impact (from high drop heights) and gouging, usually caused by heavy, sharp materials.

### ABRASION — TESTING

The test method for abrasion (ISO 4649/ DIN 53516) is actually quite simple. Abrasion resistance is measured by moving a test piece of rubber across the surface of an abrasive sheet mounted on a revolving drum. It is expressed as volume loss in cubic millimeters, for instance 150mm<sup>3</sup>.





ISO 4649 / DIN 53516 abrasion testing.

The most important thing to remember when looking at abrasion test results is that higher figures represent a greater loss of surface rubber which means that there is a lower resistance to abrasion. Conversely, the lower the figure the better the wear resistance.



The technical data-sheets provided by manufacturers and traders will almost invariably show the minimum standard demanded by a particular test. Unless stated otherwise, the data shown does not reflect the actual performance achieved during the test. In other words, not the expected level of performance. This fact applies to the data shown within the vast majority of technical datasheets provided by suppliers.

### RIPT AND TEAR RESISTANCE — TESTING

Although not a cover grade in its own right, the ability to withstand the forces that rip and tear belts is often more important than any other physical attribute. This is especially true when it comes to conveying coal. Even the strongest, heaviest belts can be punctured and ripped by a foreign object becoming trapped. A 'rip' is best described as what happens when a sharp object punctures the belt and cuts the belt longitudinally as it is pulled against the trapped object. In contrast, a 'tear' is best described as what happens when a section of belt is pulled apart in opposing directions.

There are currently no internationally accepted test methods or standards for testing rip resistance. Fenner in the USA uses a round pin or bolt that is pulled



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— Trey Poulson | Fairplay Gold Mine, Colorado, USA

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*Dunlop's 'Jack the Ripper' rip test in action.*

through the belt whereas Dunlop in the Netherlands pulls sections of belt through a right-angled piece of metal, which they have nicknamed 'Jack the Ripper'.

Fortunately, an international standard for tear strength does exist. The ISO 505:2017 test method measures the propagation resistance of an initial tear in textile conveyor belts, either in full thickness or of the carcass only. This test is intended for application to textile belts in installations where there is a risk of longitudinal tearing.

Although it is a defined method of testing there are no standardized performance requirements. The test basically consists of mounting two cut ends of a test piece of belting in the jaws of a tensile testing machine. An initial tear made in a test piece, which is then pulled apart in opposing directions. The force necessary to propagate the tear is then measured. Examination and analysis of the multi-peak tear resistance test traces is made in accordance with ISO 6133.



Most manufacturers make little or no mention of the rip and tear resistance of their belts. In many cases, even very thick, heavy belts can rip like paper because the fabric ply simply is not designed to cope with such forces.

**HEAT RESISTANCE**

Of all the demands placed on industrial conveyor belts, heat is widely regarded as the most unforgiving and damaging. High temperature materials and working environments cause an acceleration of the ageing process that results in a hardening and cracking of the rubber covers.

Heat also has a very destructive effect on the carcass of the belt because it damages the adhesion between the covers on the top and bottom of the carcass and also between the inner plies contained within the carcass. If the core temperature of the carcass becomes too high then the belt will quite literally start to fall apart. This is commonly referred to as



*The effects of heat damage.*

'de-lamination'.

The temperature limits that a belt can withstand are viewed in two ways — the maximum continuous temperature of the conveyed material and the maximum temporary peak temperature. The two main classifications of heat resistance recognized in the conveyor belt market are

T150, which relates to a maximum continuous temperature of 150°C and T200, which is for more extreme heat conditions up to 200°C.

**ISO 4195 TESTING**

To provide the most accurate measurement of heat resistance, accelerated ageing tests are conducted by placing rubber samples in high temperature ovens for a period of seven days. The

reduction in mechanical properties is then measured. The three 'classes' of ageing within ISO 4195 are: Class 1 (100°C), Class 2 (125°C) and Class 3 (150°C). In order to maximize temperature-resistance qualities, at least one manufacturer (Dunlop) also carries out testing at 175°.

There are three key factors to consider



*Oil resistance lab testing.*



when choosing a heat-resistant belt. The most critical considerations are the actual temperature range of the materials being carried; the level of ambient temperatures of enclosed running environments and the length of the conveyor. All of these factors can have a major influence on the speed of the ageing process. Success or failure will depend on two factors; having accurate temperature data to give to potential belt suppliers and ultimately the heat resistance qualities of the belt they supply.

### OIL RESISTANCE

Waste of all kinds, especially household waste, contains a wide variety of oil (including fats and greases). These are divided into two distinct sources — mineral and vegetable/animal. When oil of any kind penetrates rubber it causes it to swell and distort. This results in serious tracking and steering problems, premature wear and ultimately premature replacement. There are two recognized test methods for oil resistance, both of which involve almost identical test procedures. These are ISO 1817 (2015) and the comparable, slightly less elaborate but equally tough American ASTM 'D' 1460.

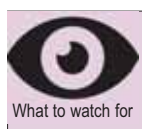
Even some of the biggest manufacturers of belting in the world use the DIN reference number 22102 G when referring to oil-resistant belting. This can be very misleading because the letter 'G' is simply used to denote oil (or grease) resistant belting. The fact is that DIN 22101 G does not actually contain any requirements, test methods or limits specific to oil-resistant belting. This is a classic example of how the practice of simply indicating a test method reference number is designed to provide reassurance to the buyer but in reality is meaningless in terms of actual performance.

### TEST METHODS

The ISO 1817 and ASTM 'D' 1460 test methods are both used to measure the effect of oil (and other liquids and chemicals) on vulcanized rubber. Samples of rubber (eg. 100mm x 1.6mm x 2mm strips for the ASTM test) are fully immersed in the relevant test liquid for a specific period of time. The duration of immersion and the temperature at which the liquid and sample are kept can be varied but the most common is either three or seven days at ambient or 70°C.

The ambient temperature of the environment is controlled within specific guidelines. Changes in the geometry and dimensions of the specimen caused by absorption are then measured when the

samples are removed.



Although there are no actual performance standards in existence, it is still important to look for actual references to the test methods used by the manufacturer/supplier. During my research I found it quite disturbing to note that only one manufacturer (Dunlop again, I have to say) that makes any mention whatsoever concerning the actual test methods used to determine the oil resistance qualities of their belts.

### EXTREME COLD

When the ambient temperature falls below -0°C, rubber begins to lose its elasticity. As the temperature falls, the rubber continues to lose flexibility and its ability to resist abrasion, impact and cutting. Eventually the belt is unable to trough and pass around pulleys and the belt covers and the rubber in the carcass begins to crack. Ultimately, the belt will break because frozen rubber becomes as brittle as glass.

### TESTING FOR COLD RESISTANCE

There are no current internationally recognized test methods for specifically determining a conveyor belt's ability to function in extremely cold conditions. Laboratory testing involves the use of a liquid nitrogen freezing cabinet to test samples at extreme low temperatures.

The elastic modulus of samples of rubber belts are first measured at an ambient temperature of 20°C. The samples are then placed inside the cabinet. The temperature in the cabinet is then gradually reduced by stages of 5°C. The elastic modulus is measured at each stage to determine when the decrease in flexibility of the rubber becomes too great, thereby identifying its lowest permissible ambient temperature.



Where there is a risk of extremely low temperatures, always ask for confirmation of the minimum operating temperature. Abrasion-resistant belts can typically withstand -30°C to -40°C. Other cover qualities (such as oil or fire) are usually only able to withstand a minimum temperature of -20°C. For temperatures lower than this, conveyors need to be fitted with belts especially designed to withstand extreme cold.

### FIRE-RESISTANT BELTING

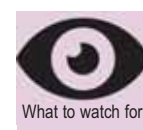
Because fire safety is such an important issue there are numerous safety

classifications and international standards for which there are many different tests used to measure the self-extinguishing properties of conveyor belts. Test methods and performance standards vary enormously depending on whether a belt is for use above or below ground. For recycling and waste handling, I will obviously focus purely on the requirements for belts being used above ground.

### BASIC TESTING

The basis of most tests for belting used in normal industrial applications is EN/ISO 340. This standard makes the distinction between fire resistance with covers (K) and fire resistance with or without covers (S). The relevance of "with or without covers" is that wear reduces the amount of fire resistant rubber that protects the flammable carcass. Although no longer used in the current EN ISO 340, the market still commonly refers to grades 'K' for testing with covers and 'S' for testing with and without covers. This originates from DIN 22103 that was used as the basis during the creation of EN ISO 340.

EN/ISO 340 tests involve exposing six individual samples of belt to a naked flame causing them to burn. The source of the flame is then removed. A current of air is then applied to the test piece for a specified time after the removal of the flame. The time it takes for the belt sample to self-extinguish after the flame has been removed is then measured. The duration of continued burning (visible flame) should be less than 15 seconds for each sample with a maximum cumulative duration of 45 seconds for each group of six test samples. This determines how fire can be carried along a moving belt.



Even if a manufacturer states that its fire-resistant belt has passed the ISO 340 test, the buyer should still exercise caution. A blazing conveyor belt can easily spread fire more than 40 metres in 15 seconds. If you are at all unsure of what level of fire resistance you need, then it is recommended to seek more detailed guidance

### OZONE & ULTRAVIOLET RESISTANCE

Along with abrasion resistance, another quality common to all rubber belting is the ability to resist the damaging effects of ozone and UV. Although not an actual cover grade in its own right, there is no question that all rubber belts need to be fully resistant to ozone and UV light. This is because at low altitude ozone becomes a

pollutant. Exposure increases the acidity of carbon black surfaces and causes reactions to take place within the molecular structure of the rubber.

This has several consequences, such as surface cracking and a marked decrease in the tensile strength of the rubber. Likewise, UV light from sunlight and fluorescent lighting also accelerates deterioration, because it produces photochemical reactions that promote the oxidation of the surface of the rubber, resulting in a loss in mechanical strength.

**EN/ISO 1431 INTERNATIONAL STANDARDS**

To scientifically measure resistance to ozone, samples are placed under tension (eg. 20% elongation) inside the ozone testing cabinet and exposed to highly



*Belt samples are frozen using liquid nitrogen.*

concentrated levels of ozone for a period of time (eg. up to 96 hours).

Samples are closely examined for

evidence of cracking at two-hourly intervals and the results carefully measured and recorded. Experience has determined that to be adequately resistant, the pass criteria needs to be that the rubber sample does not show any signs of cracking after 96 hours (@ 40°C, 50pphm and 20% strain) inside the ozone cabinet.

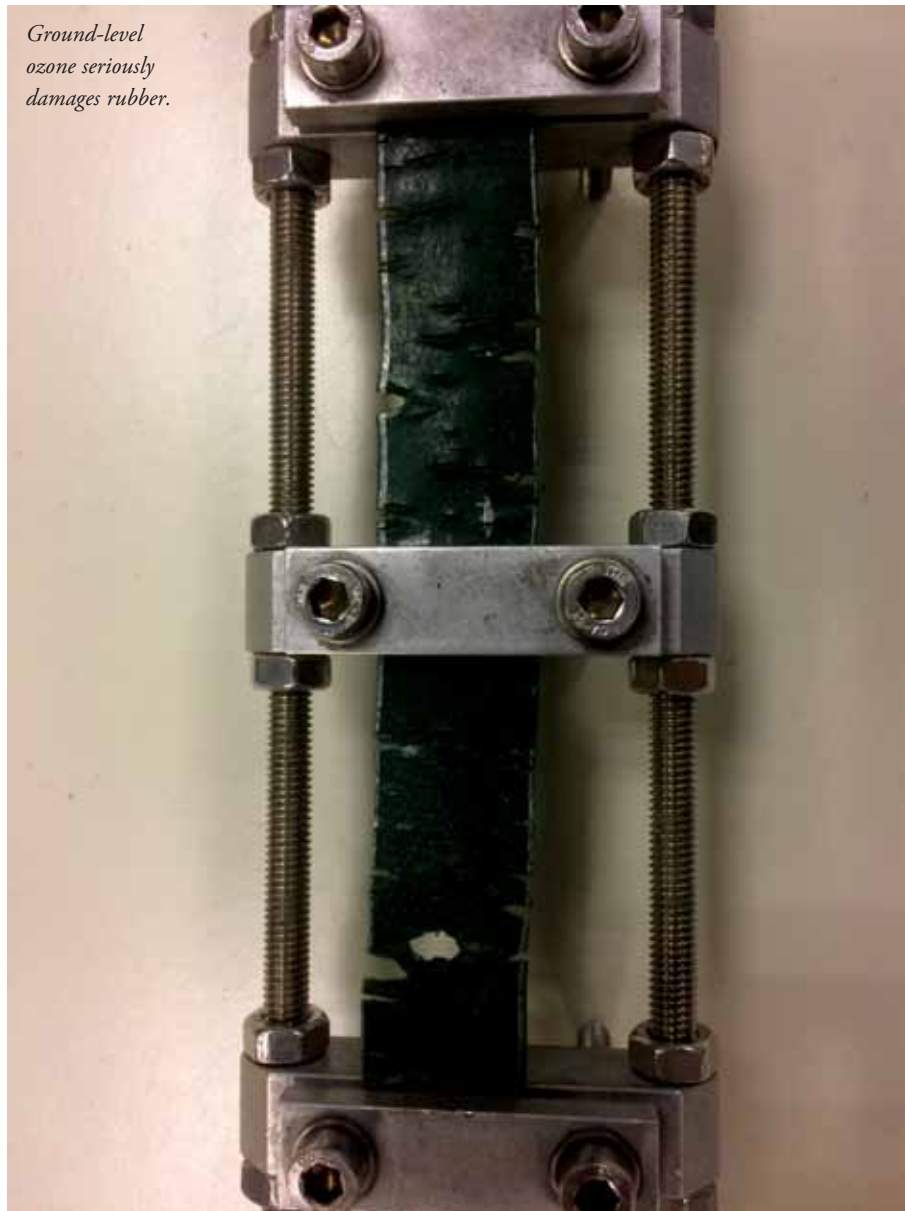


What to watch for

Despite its crucial importance, my research has revealed that ozone and UV resistance is very rarely, if ever, mentioned. This is almost certainly because anti-ozonants need to be used during the mixing process of the rubber compounds and that, of course, costs money. My advice is to make ozone & UV resistance a constant requirement when selecting any rubber conveyor belt.

**AUTHOR'S COMMENT**

Quality standards and testing in the conveyor belt industry is a huge and often complex subject. In compiling this technical feature I have simply tried to provide a basic guide. Consequently, my final piece of advice would firstly be to never assume that seeing the presence of test method reference numbers or the logos of quality organizations necessarily means what they are designed to indicate. Secondly, it is always worthwhile to ask questions and request evidence of good practice and actual performance. Taking that little bit of extra care could easily save your company an enormous amount of time and money.



*Ground-level ozone seriously damages rubber.*



# Elecon supplies major conveyor to Kumaraswamy iron ore project in India



Figure 1: NMDC downhill conveyor.

Elecon Engineering Co Ltd. has designed, manufactured, erected and commissioned a major downhill belt conveyor for NMDC for the Kumaraswamy iron ore project in India.

This giant piece of equipment is known to the locals as ‘The Anaconda’, and with good reason. Spanning from the Kumaraswamy crushing plant to Donimalai screening plant 5.2km away, this conveyor embodies the true purpose of conveyor technology.

The downhill portion of the conveyor

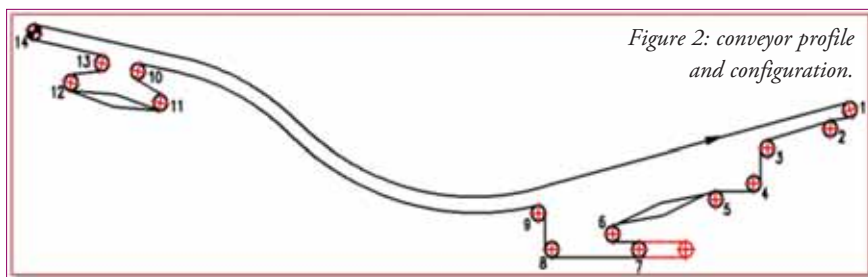


Figure 2: conveyor profile and configuration.

spans 3.5km of the 4.9km, with a total drop of 350m and maximum slope of 11°. It is a high-speed (6m/s), trough conveyor,

suspended inside a triangular gantry, transporting product at 2,000tph (tonnes per hour). This has proven to be one of the most complex conveyor routes and technological combinations.

The NMDC downhill conveyor has been a feat in conveyor belt technology. It has combined years of technological developments in order to create a well-balanced system. Methods of design and construction which have been met with tentativeness have proven themselves here.

With progress in mind and heart, Elecon has created a system which improves on the total efficiency of conveyor systems by holistically addressing each aspects of the project including

- ❖ reducing environmental impact on the ground;
- ❖ reducing impact on local communities;
- ❖ reducing total power absorbed;
- ❖ reducing civil works for transfer towers;



Figure 3: gantry construction.

## BRAKING RESULTS WITH VARIOUS LOAD CONDITIONS AT 100% DESIGN CAPACITY

	E	FL	DL	IL	
Coasting time	38	-178	-36	21	s
Coasting result	to rest	run-away	run-away	to rest	
Brake time	12	33	75	10	s
Brake force	208.1	220.0	221.1	215.6	kN
Brake torque (LS)	119.65	126.51	127.12	123.99	kNm
Brake torque (HS)	9.57	10.12	10.17	9.92	kNm

- ❖ reducing steel works for gantries; and
- ❖ increasing safety for personnel and locals.

### OVERLAND BELT CONVEYOR PROFILE

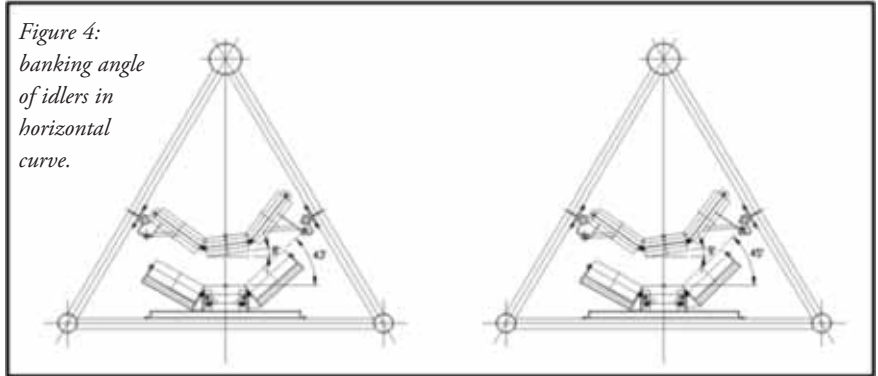
Figure 2 on p39 shows the profile of the NMDC downhill/overland belt conveyor system from the tail (left hand side) to the head (right hand side).

The belt conveyor has four horizontal curves as follows:-

- ❖ Horizontal straight part of 1.019km, then a horizontal curved section of 0.742km with a radius of 2.5km, followed by another straight section of 0.471km;
- ❖ then a horizontal curved section of 0.497km with a radius of 2.5km, followed by another straight section of 0.093km;
- ❖ then a horizontal curved section of 0.289km with a radius of 2.5km, followed by another straight section of 0.450km; and
- ❖ then a horizontal curved section of 0.726km with a radius of 1.2km, followed by another straight section of 0.589km to the head pulley.

Gantry design has been a proud part of Elecon history, the introduction of the triangular gantry has been a huge mass and cost saving. In addition this allowed for the conveyor path to pass over gorges and similar topography without major cost implications. Considering the elevated structure, walkways would have been required for maintenance. However with Elecon triangular gantry an electrical maintenance trolley was chosen to replace the walkways. This has major cost and mass savings which would have a ripple-down effect into the design of the trestles. This

Figure 4: banking angle of idlers in horizontal curve.



has allowed for smaller trestles and longer gantry spans.

The downhill conveyor is supported by a combination of concrete and steel trestles. This design has multiple advantages, including reduction of costs, reduction in contamination of transferred

material, reduced impact on local farming and villages. With large trestles being erected, gorges and other sheer drops were avoided; this reduced the overall length of the conveyor and improved the system efficiency.

The long downhill belt conveyor operates at a speed of 6.0m/sec; it improves the cost effectiveness of the conveyor as follows:

- ❖ narrow belt width, 1,050mm instead of 1,400mm;
- ❖ four horizontal curves thus eliminating transfer towers;
- ❖ increased idler spacing; and
- ❖ compact triangular gantry design.

Due to selection of high speed for the conveyor, a small belt will allow the design of a lightweight technological structure, small curve radius and low material load on belt. With reducing material load, the idler spacing can increase, therefore minimizing the idler quantities and also idler roll raw material cost.

Using modified belt simulations/ controls and improved banking angles, the downhill conveyor was able to negotiate tighter horizontal and vertical curves. This improvement allowed for the profile to be extended and thus remove the need for transfer points.

Figure 5: As build maintenance trolley.





Figure 6: tail end braking system.



Dynamic analysis uses a two dimensional wave theory to study time dependent transmission of large local force and displacement disturbances along the belt. The belt is divided into a series of elastic springs and masses that deform along the belt's axis. Rheological laws determine the joints between the springs. Damaging shock waves and large local belt displacements can be resolved, which cannot be determined using static (rigid body) analysis.

All the high-speed conveyors are designed with variable frequency drives (VFDs). There are some advantages as per below:

- ❖ VFD system allows the operator to run the conveyor in creep mode, which is more important for inspection of high-speed conveyor belt;
- ❖ VFDs do not decouple the motor from the belt during stops. So, flywheels are not required;
- ❖ a fluid coupling with conventional motor consumes more power than the equivalent VFD system;
- ❖ starting, stopping & load sharing of the conveyor is more predictable with VFDs; and
- ❖ maintenance time of VFD system is less than the equivalent motor with fluid coupling.

The conveyor has two low-speed tail brake systems to assist with the control of the conveyor. The braking system design is unique as it incorporates both proportional and digital braking designed to bring the conveyor from full speed to rest in 38 seconds at 2,000tph.

The maintenance trolley design went through many iterations to find the optimal power-to-weight ratio. This trolley automatically provides full access to the conveyor belt for inspection and maintenance purposes.

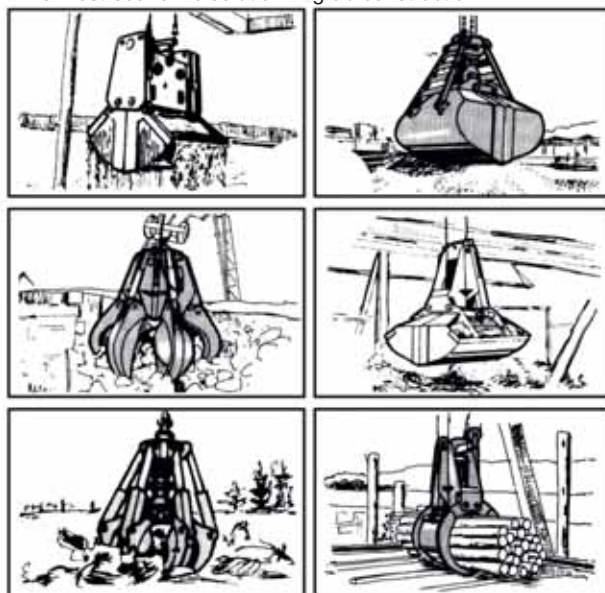
The trolley is used by site personnel to travel the full extent of the conveyor belt on a daily basis. So, for long belt conveyors, this is the best way while eliminating walkways access throughout the conveyor.

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## RBL-REI relishes the challenge of highly complex conveyor systems

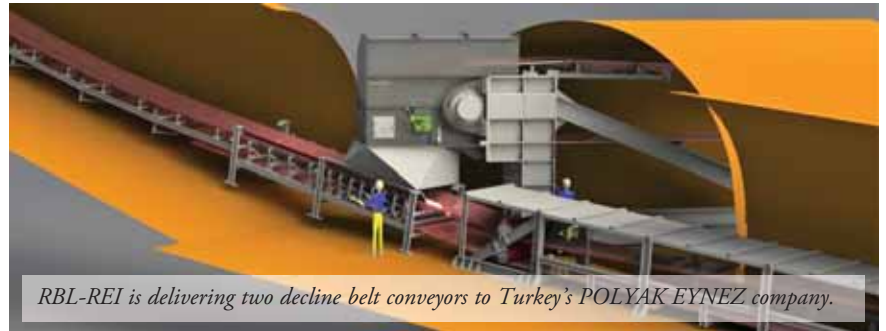
The France based company RBL-REI, renowned worldwide for the design, manufacturing and construction of overland belt conveyors with technical complexities, is still proving its skills and capabilities for such challenging work. Several outstanding overland belt conveyors are under construction or have recently entered into operation.

RBL-REI has been appointed as the contractor to perform the design, supply, and supervision of construction works for a 26km coal overland conveyor system for East Mining Company (EMCO). This conveyor system in the territory of Uglegorsk Region in Sakhalin Region will be the most extensive in Russia. It will connect the key production assets of Solntsevsky Coal Mine Ltd with Coal Sea Port Shakhtersk Ltd. The construction of the conveyor is one of the key measures to further increase of coal production and export shipment from 7.5mtpa [million tonnes per annum] (as per 2018) to 20mtpa by 2022. After few months of intensive engineering works, the production of the conveyor system will start this month (June 2019) with a planned start-up in early 2021.

On the other side of the world, RBL-REI will supply a complete belt conveyor system for the Lagunas cement plant, belonging to the Mexican Cooperativa La Cruz Azul. The solution proposed by RBL-REI's engineers has been chosen due to the ability to eliminate transfer points between belt conveyors by offering belt conveyors with horizontal curves, an important asset while conveying very dusty material like coke or limestone. Three different curve belt conveyors in the same plant will be supplied to eliminate as much as possible chutes and their corresponding issues (dust, noise, wear and heavy



*The EMCO conveyor system will be the most extensive in Russia.*



*RBL-REI is delivering two decline belt conveyors to Turkey's POLYAK EYNEZ company.*

maintenance), and optimize crossings over or around obstacles into the quarry and the cement plant.

Belgium-based and mineral supplier LHOIST has also entrusted to RBL-REI the design and construction of a 3.5km overland belt conveyor which will deliver lime to the existing process plant based in Tarnow, Poland. Due to the narrow corridor available between the quarry and the plant, RBL-REI had to engineer a system including a transfer point between the origin and the destination of the mineral. However the innovative solution developed by the French engineering company consists in a single flight system, meaning the same belt is working upstream and downstream the transfer point. A belt deviation system without motorization has been specially developed for this project in order to unify the two sections. The

following benefits are achieved: no chute clogging as no stopping time difference between the two sections, and CAPEX optimization by elimination of drives and sub-station at the intermediate transfer point.

And last but not least, RBL-REI is currently delivering two decline belt conveyors for coal extraction in an underground mine based in Soma coal basin, owned by the Turkish energy company POLYAK EYNEZ. This system designed to convey run of mine coal from 650 metres underground up to the coal washing plant on surface will be the most important of its kind in the Turkish market as it will be fitted with cumulated 9,000kW powered drives and high resistant belts ST6600.

These remarkable belt conveyors will enter in operation in Q4 of 2019.

*The LHOIST overland belt conveyor will deliver lime to a plant in Tarnow, Poland.*



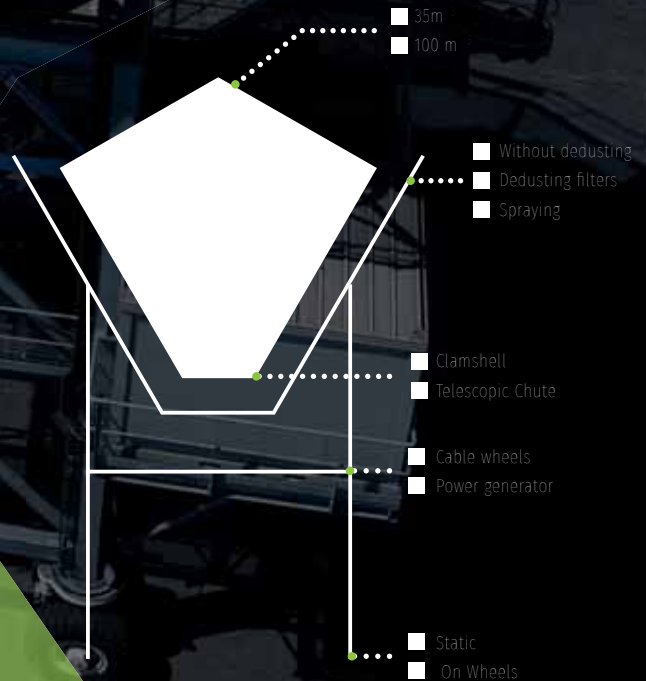




## STAND HOP

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Opening diameter with dedusting filters	7.5m	8m



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## TBK Group for total solutions: keeping conveyors on track



The TBK Group is a respected group of companies in The Netherlands that has been offering innovative solutions since 1956 to companies that operate in the mineral processing, mining, bulk handling and recycling sectors. The company offers total solutions to its customers for complex problems relating to conveying, screening, separating, breaking, grounding and storing bulk products.

### TBK GROUP'S EXPERTISE INCLUDES:

- ❖ reducing spillage, dust and wear at transfer points;
- ❖ conveyor belt cleaning;
- ❖ conveyor belt tracking;
- ❖ industrial dust vacuum cleaning and complete dust control systems;
- ❖ rubber and polyurethane screens panels;
- ❖ vibrating conveyors, -screens, recycling machines and magnetic separators.

### CENTRAX KEEPS BELTS ON TRACK

TBK Group's latest product is the CenTrax multi roller belt tracker. It corrects mistracking of conveyor belts, both in the load-carrying strand and the return strand. CenTrax ensures that even under the most

extreme conditions, the belt remains on the right track, regardless of the direction of rotation.

### CENTRAX SOLUTION FOR RWE EEMSHAVEN POWER PLANT

RWE Generation's Eemshaven power plant is the largest coal and biomass power plant in the Netherlands. Covered conveyor belts ensure dust-free transport of the coal from ships to the power plant or the storage yard. This process was always accompanied by jerks and jolts due to

frequent belt mistracking. The constant downtime of the conveyor belts caused delays in supply and additional costs. RWE consulted TBK Group, after which it was decided to install the CenTrax tracker rollers for a trial period. Within a month, it was already clear that CenTrax was the solution to the mistracking problem.

Gert-Jan Arkema, Maintenance Engineer Bulk Handling at RWE Generation Eemshaven, explains, "We use several conveyor belts at our power plant. We use a hopper to transfer the coal from one







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conveyor to another, but coal from the US and Russia is often damp, which means it sticks to the walls of the hopper. As a result, the load is then skewed when it reaches the conveyor belt, resulting in mistracking. Previously, we had to stop the conveyors several times a day. Our downtime frequency is currently many times lower, resulting in huge cost savings. Reports of mistracking have dropped from 250 times per month to only three times per month. The investment soon pays for itself."



### EXPANDING TBK'S DISTRIBUTORS

Finding foreign distributors is very important for TBK Group now that demand from abroad is growing. This is why the TBK Group went in search of an export manager and welcomed Micha Bermentloo, who will search for the best

distributors to handle CenTrax, Spillage Control and Dust Control. His work will concentrate on Europe in the coming year, with countries such as Belgium, Norway, Sweden, Germany and Spain high on the list. "The focus is now mainly on Europe, because at the moment we do not have a

dealer in every country," Bermentloo explains. "And, naturally, you should expand in the countries around you before you start looking beyond the European borders. This is what I want to do first."

### TARGETS

TBK Group hopes to take the next step of moving into countries outside Europe by 2020. "Export has a somewhat longer-term planning of about three years. Our goal is to increase export turnover by at least 50% during that time. We also want to have an additional four to five distributors. Exciting goals to work towards," says Bermentloo.

### MORE DISTRIBUTORS NEEDED

TBK Group is still looking for distributors for various countries, so anyone interested should get in contact.





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## DemcoTECH Engineering: designing fit-for-purpose conveying systems



*NPC fly ash silo:  
20tph tandem  
screw conveyors.*

With well-designed conveying systems comprising the heart of an efficient materials handling operation, the numerous factors to consider in technology selection include the material characteristics, the overall system with respect to capacity, distance and ground elevation and terrain, as well as future operational requirements.

As a respected supplier in conveyor design and engineering, DemcoTECH Engineering provides a comprehensive range of advanced conveying technologies, for a broad range of materials from coal, gold, iron and manganese ore, bauxite, diamondiferous material and tailings, through to industrial products such as cement, limestone and sulphur. The conveyor systems supplied range from troughed, air-supported 'Aero conveyor' and pipe conveyors through to stacking, shuttle, mobile and grasshopper conveyors, and feeders. DemcoTECH's extensive track record in the supply of belt conveyors includes downhill, extendable and inclined systems, while, in line with its total solutions approach, a full range of

supporting and auxiliary equipment is provided. This includes trippers, stackers and load-out equipment. Turnkey multi stream sampling plants are also designed and supplied by DemcoTECH, with references including Khumani Iron Ore and a sampling facility at the Saldanha iron ore terminal in South Africa.

Underpinning its services are advanced testing and modelling/simulation tools to design fit-for-purpose systems.

"Critical elements include determining the chute geometry to give the desired capacity, providing a flow pattern with acceptable characteristics, and thorough

design and detailing of the conveyor plant," says DemcoTECH Engineering GM, Paul van de Vyver.

Offering services from conceptual design through to project completion, DemcoTECH's project services are tailored to the needs of small to mega contracts.

"Our projects demonstrate the flexibility of our services, ranging from providing a shuttle conveyor and installing it during a plant shut of seven days working 24 hour days for a miner in South Africa through to a massive four-year contract for Vale's multimillion-dollar iron-ore import/export facility in Malaysia. We have also just completed a turnkey project in Malaysia for the prestigious Petronas RAPID project, with the main feature of our system being a 2.2km pipe conveyor. Here we actually tested the belt on our in house pipe conveyor test rig to determine and select the specific belt for the specific application," adds van de Vyver. The multi-million dollar RAPID contract included the materials handling for offloading



*Pipe conveyor providing  
environmentally friendly materials  
handling at the RAPID project.*



and stockpiling sulphur for storage and then loading onto ships for export purposes, with materials handling system comprising, mainly, the multi-curved pipe conveyor feeding a jetty belt conveyor, which in turn feeds the rail-mounted ship loader.

“The pipe conveyor provides an environmentally friendly solution, being fully enclosed on both the carrying and return sides, also eliminating transfer points thus reducing the potential for any spillages and dust generation,” adds van de Vyver.

DemcoTECH's conveyor expertise has also been applied widely on diamond mines, as demonstrated for Lihobong and Lētseng mines in Lesotho.

At Lētseng, DemcoTECH was contracted for the tailings disposal system, providing a conveyor with fixed tripper and multiple discharge points, a 1.6km overland conveyor and a 1km-long tail-driven regenerative downhill extendable conveyor with a rail-mounted tripper and spreader, and also incorporating an emergency dump system.

“The overland conveyors had to accommodate Lesotho's high altitude mountainous terrain, requiring engineering solutions, such as inclusion of a regenerative braking system on the tail pulley of the extendable conveyor to prevent the conveyor from running away,” says van de Vyver.

DemcoTECH's work included the mine's expansion initiatives covering the upgrading of the run-of-mine (ROM) stacker and the conveyor design and expansion layout to increase the tailings dam.

At Lihobong, DemcoTECH designed and constructed a system to dispose of between 3mtpa (million tonnes per annum) to 4mtpa of dry tailings.

“As with Lētseng, the system had to be flexible enough to be re-routed, extendable and capable of withstanding the extreme weather and conditions associated with the mountainous terrain,” says van de Vyver

The existing system discharged material onto the tail end of the new 320m-long extendable downhill conveyor. The layout of the conveyor system ensured that tailings can be routed to two discharge points, that is to a shiftable conveyor depositing tailings along the dump wall or onto a standby slewing conveyor.

DemcoTECH was also responsible for



*Grindrod Maydon Wharf: mobile ship-offloading and warehouse distribution system.*

the materials handling systems of the expansion to Grindrod's multi product terminal at Richards Bay in South Africa. DemcoTECH utilized both belt and pipe conveyors to convey various materials, but mainly rock phosphate and coal, from the three Richards Bay terminal sites.

At Grindrod's Maydon Wharf terminal in Durban, South Africa, DemcoTECH applied mobile conveyor technology in the form of 'grasshopper' conveyors for the mobile ship offloading and a warehouse distribution system for a fertilizer storage facility. The system replaced a trucking system in order to improve productivity. Four 800tph (tonnes per hour) grasshopper conveyors are positioned on the jetty to satisfy the ship's docking arrangements and, in addition, the existing warehouses were modified to incorporate five reversible, multi-point discharge shuttle conveyors that feed individual bays. Fully sequenced automatic starting and stopping ensures a seamless operation, with no blockages or hang-ups, with the ability to handle different types and grades of fertilizer.

The expansion of a manganese export facility for Assmang at its Cato Ridge Alloys plant in South Africa included rail tippler upgrades, troughed conveyors with transfer houses, and an elevated travelling tripper discharging onto a stockpile. The ore is then reclaimed for the stockpile and feeds a highly automated road load-out facility. The turnkey project was done with DemcoTECH being responsible for the materials handling and Kantey & Templer

providing the civil works and structural steelwork.

An import terminal project at the Port of Ploce in Croatia also drew on DemcoTECH's advanced conveyor and load-out station design skills. “The multi-product terminal handles coal and iron ore, with the very different material properties introducing design implications for the system, particularly for the chutes and train rapid rail load-out system,” notes van de Vyver

Screw conveyors were used for handling the fly ash discharge from the silo. The contract was for the leading South African based cement producer, NPC-Inter cement at its Simuma Plant. DemcoTECH provided the detailed design and layout, as well as the structural, mechanical, electrical, control and instrumentation engineering and supply.

## ABOUT DEMCOTECH

DemcoTECH Engineering is a specialist bulk materials handling and niche process plant company, offering services to the power generation, cement, mining, metallurgical, manufacturing and port handling industries. Services include conceptual design, feasibility studies, design, engineering, procurement, expediting, construction and commissioning. After-sales services include spares, maintenance, refurbishments and operational readiness packages covering procedures, systems and workplace tools required to successfully operate and maintain a new or upgraded plant.



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# Conveyor covers offer protection for personnel, energy saving & reduce dust emissions

Recognized globally for the high quality of its products, Capotex is well-known in the conveying sector. The company's team has designed, manufactured and commercialized more than 450,000 metres of covers for belt conveyors in over 50 countries around the world.

This excellence and innovation has been recognized with various awards and distinctions, such as the SMOPYC Award for Innovation, which was won by Capotex in 2008 and 2014.

## ENGINEERING AND INNOVATION AT THE SERVICE OF PROTECTION

Design, protection and innovation are essential values for Capotex, which is why it is constantly looking for alternative solutions in order to adapt and create new products that respond to the challenges and scenarios presented by the needs of its customers.

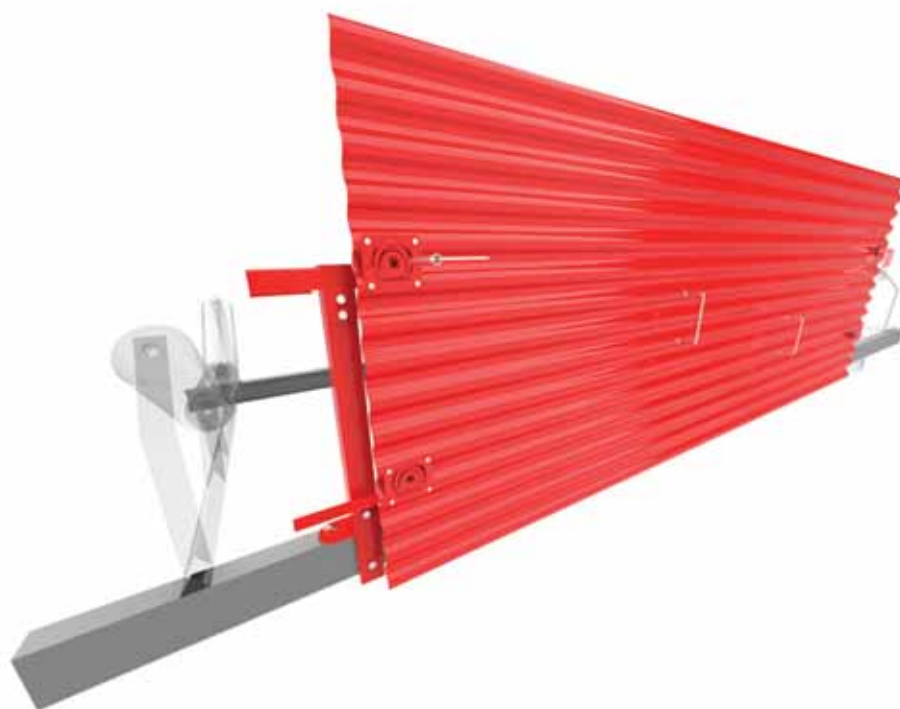
In recent years, market trends have revealed a need to protect workers' health, local surroundings and the environment in a more efficient and sustainable way.

In 2019, Capotex has launched its Capoguards Capotex® intelligent solution. These Capoguards have safety at the forefront of their design, and are a SMART solution:

- S:** Safe
- M:** Modular
- A:** Adaptable
- R:** Reliable
- T:** Time Efficient

The side guards are prefabricated structures that allow for simple and fast

CAPOGUARD: MODELS		
<b>Metal – Sheet:</b>	This model arises from the need to minimize entrapment risks, protect the environment and avoid material losses.	It can be used on the top and bottom of the tape side.
<b>Mesh:</b>	This mesh model prevents entrapments and facilitates the vision of the conveyor belt.	Both models ensure consistency and comply with regulations.  Personalized solutions ensure correct installation.



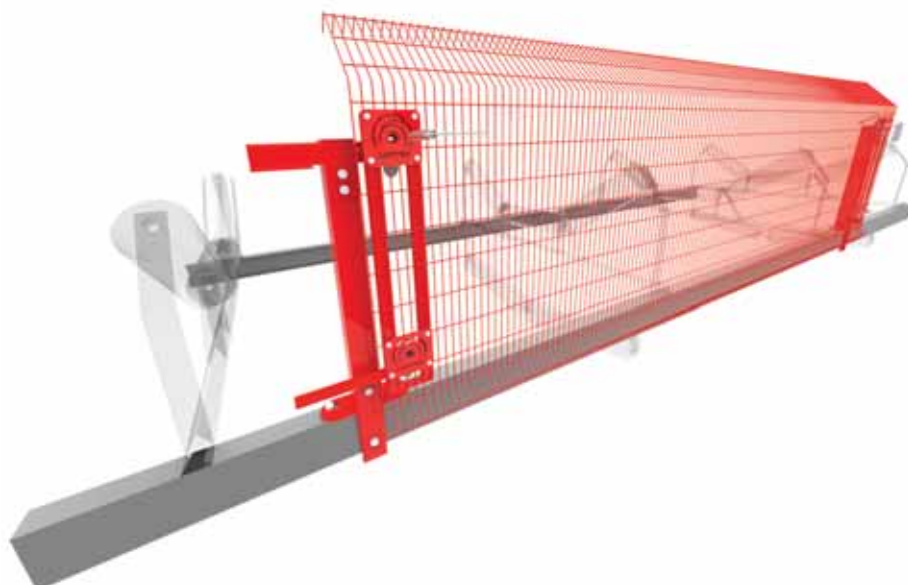
installation. With them, Capotex has also developed new assembly schemes and different fixings. These guards are installed

on the sides of the conveyor belt in order to protect it effectively against external factors such as wind, snow and rain.

The new Capoguards ensure workers' security from injuries due to the new system that prevents people from approaching to the conveyor belt while it is moving.

- ❖ **CAPOGUARDS:** Inferior and Superior.
- ❖ **Materials:** steel, pre-lacquered, HPS 200, Polyester, Inox Steel.
- ❖ **Models:** sheet, mesh.

Capotex designs solutions that guarantee the safety of workers and their jobs. The Capoguards are designed to limit access to moving parts of the conveyor belt, drastically reducing work accidents, consumption and environmental pollution.



## ROXON's conveyor components smooth the way in material handling

Since the rebirth of traditional material handling company ROXON in November 2017, when it was purchased by Australian NEPEAN Conveyors (for more details, on this acquisition, please see the September issue of *Dry Cargo International*), the company has gone from strength to strength.

ROXON's expertise is wide-ranging, and it offers a range of equipment, but it offers particular expertise on material handling in general and conveyors and their components in particular. The company is constantly supplying equipment to old and new customers, and regularly comes across ROXON conveyors that are 20 or even 30 years old, and still in operation, at its customers' premises. This proves that its systems are well worth the investment, and that ROXON provides excellent after-sales service throughout the whole life of its material handling systems — from new delivery to modernization and redelivery a few decades later.

As well as standard systems — one of ROXON's most popular is the HC100 belt conveyor, which has sold over 700 units over the years and has been delivered around the world — it also offers customized equipment, to meet the needs of all of its customers. No project is too small or too big — ROXON's reference list includes material handling projects ranging from a single conveyor to large-scale material handling plants and equipment outputs from a few kW to dozens of MW. ROXON's customers range from sand and gravel plants with relatively small conveyors to harbours with shiploaders to large-scale overland conveyors where a single conveyor might have 10MW motor.

ROXON would not be able to call itself a 'conveyor company' if it did not have component expertise as well. Customers



*HC100 standard conveyor ready for delivery.*

can source all conveyor-related vital components — pulleys, rollers, belt cleaners — from ROXON. The component portfolio includes not only these traditional components, but also includes new technologies. These include the Belt Condition Monitoring system, which saves its customers time and money,

### CONDITION MONITORING EQUIPMENT

Condition monitoring and measuring have become increasingly important in industrial maintenance. This has also made condition monitoring a significant means to enhance profitability. The greatest benefits are achieved through an automated belt condition monitoring system is based on optical 3D measuring technology.

The need for constant monitoring of conveyor belts was recognized in 2008 in the mining industry, where unexpected breakage and ripping of the conveyor belt could result in major financial losses. At first, belts were monitored manually during inspection rounds, but this to be proved impossible. There was no equipment available at the time that would enable

continuous monitoring and be able to detect all types of belt damage in both fabric and steel cord conveyor belts — and even today, there is only one such system on the market. All other available solutions for monitoring the condition of conveyor belts are less accurate than 3D scanning. ROXON HX270 was developed to provide a solution for the problems detected in these other solutions. Optical 3D measurement enables fully automated and continuous overall monitoring of conveyor belts. The system is also capable of detecting all types of damage with millimetre accuracy in all smooth belt types (fabric and steel cord belts).

### AIMING AT EFFICIENT MATERIAL FLOWS

Transferring large volumes of material quickly and reliably by means of conveyor belts enables efficient production. Conveyor belts are, however, subject to hard wear: loading of materials onto the conveyor belt, sharp materials, bending and stretching, and the location in challenging conditions tests the durability of the belts. The condition of the belt reduces over time due to the stretching and wearing of the material, and the stress placed on the belt by constant use. A belt that is in poor condition also wears other parts of the conveyor and increases the number of risks related to material transfer. Belt breakage causes undesirable disruptions in the operations of the production plant and in material deliveries. In addition, it can pose a hazard to the staff, other equipment, and the environment.

### A RISK THAT CAN BE MANAGED — COMPLETELY AUTOMATICALLY

Management of production plants involves profitability monitoring and recognizing and managing risks. When conveyor belts run



*The ROXON HX270 uses optical 3D measurement for fully automated and continuous monitoring of conveyor belts. The system can also detect all types of damage with millimetre accuracy in all smooth belt types.*



at full speed, monitoring is often challenging and the optimal timing of servicing is subject to guessing. This challenge can be addressed through modern technology. Automated real-time 3D scanning of conveyor belts by ROXON HX270, enables continuous monitoring of the belts and prediction of servicing needs. The condition of both the top and bottom surfaces of the belt is being scanned constantly in order to monitor their wear and tear.

The most critical parts of the belt in terms of damage are the loading and unloading points. It is essential to monitor their condition. Even a belt that is reaching the end of its lifespan can be used for as long as possible when its condition is monitored. When the monitoring system detects a problem or a major deformation in the conveyor belt, it can stop the belt at the predetermined inspection or servicing point (belt repair station) for repairing. The monitoring system stops the belt automatically if critical damage is observed or there is a risk of belt breakage.

#### SAVINGS IN MAINTENANCE EXPENSES

Automatic monitoring works untiringly around the clock, for which reason no staff are needed for monitoring the conveyor belt. The user interface of the system is installed in the control room on the computer that is used to operate it. The system works automatically and does not require any action from the operator in normal use. If anything out of the ordinary is observed in the belt, the system reports this to the operator. The scanning is completed as part of each belt cycle. There is no need to stop the conveyor belt for inspection, allowing it to be operated productively around the clock. The system detects any new damage on the belt or changes in old damage, and reports them to the operator through messages displayed on the screen. Replacing the belt can be prepared for, removing the need for expensive emergency servicing. This enhances work safety and creates savings in servicing and staff expenses.

#### AVOIDING PRODUCTION LOSSES AND SAVINGS IN WAREHOUSING

One unexpected conveyor belt breakage at a mine or a material processing plant has the potential to cause damage worth millions of dollars. Expenses that reduce productivity are caused by the unexpected belt breakage, damage to equipment, and unexpected disruption of operations — not to mention possible personal injuries. Conveyor belts are often located in places



where detecting the damage or repairing the belt is difficult, expensive, and even dangerous. At mines, conveyor belts can be located hundreds of metres below ground level or high above the production facility.

Automatic 3D scanning of the belt also makes the work of the person responsible for company finances easier, as capital no longer needs to be tied to spare belts stored in the warehouse. The number of spare belts can be reduced because the need for belt replacement can be predicted more accurately. This can be included in the savings facilitated by the automatic system.

#### COMMENCEMENT OF THE SYSTEM

Automated condition monitoring can be integrated with both new and old systems. The monitoring equipment can be taken into use either in a single line or in the entire conveyor system. The installation of the conveyor belt monitoring system is quick: if no structural changes are needed in the line, the average downtime required by the installation is only one day. The width of the belt to be monitored can vary between 800mm and 2,500mm [from 34" to 95"]. The maximum rotation speed of the belt is 10m/s [1,968ft/min].

#### CASE STUDY: LKAB MALMBERGET: WORLD-CLASS MINING AND IRON ORE PROCESSING IN SCANDINAVIA

Luossavaara-Kiirunavaara AB publ is abbreviated to LKAB. LKAB is a Swedish company and is one of the world's foremost producers of processed iron ore products used for steelmaking. LKAB has three mines in Northern Sweden, namely Kiruna, Malmberget and Svappavaara, together with two harbour storage depots in Narvik and Luleå. LKAB mines 78% of

the iron ore in Europe and is thereby Europe's largest iron ore producer.

In 2017 LKAB, which has a reputation for high quality, was able to produce 27.2mt (million tonnes) of finished iron ore products. The iron ore pellets contain about 67% iron, and the fines produced by the Malmberget mine are considered to be among the world's best. Malmberget is the world's second-largest underground iron ore mine, and the Kiruna mine is the world's largest and most modern. The iron ore mining in Malmberget takes place at several levels, and the ore is transported on conveyor belts to hoists located 815 metres below the ground level. From there the ore is then hoisted to the surface and fed by more conveyors into the processing plant.

#### INVESTING IN BELT CONDITION MONITORING IS ESSENTIAL

"Condition monitoring and proactive maintenance of all production critical machinery is crucial, and belt conveyors are one of those", says Malmberget's Mine Maintenance Engineer Peter Gustavsson. "We have a 'red-line' in iron ore transfer. Production critical belt conveyors transfer the valuable ore to the processing plant. About 85% or about 14mt of the annual ore production in Malmberget is being transported on these conveyors. Continuous failure-free operation of these conveyors is crucial for the mine production."

"As an example, in August 2014 and before the ROXON HX270s were installed, we had critical belt damage on the first conveyor in the 'red-line'. There was an about 150m belt split that cost us roughly 27 million SEK (approximately €2.9 million) in lost profits due to the unplanned

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stop. On top of the loss of production comes the cost of the conveyor belt and repair work. It's clear that investing in belt monitoring is essential", concludes Gustavsson.

#### FAST RETURN ON INVESTMENT

"We had a belt monitoring system, which was not working efficiently. It was based on sequential detection of conductive wires vulcanized inside the belt surface rubber. Wires got broken without any belt damage and conveyors were stopping. Replacing those wires all the time was not possible. That technology is not suitable for hard rock mining," points out Gustavsson.

"After we had installed the first ROXON HX270s and assessed the performance and value of the system, it was an easy business decision to acquire more 3D belt surface scanners. We invested in the ROXON HX270 for all three critical conveyors on the 'red-line'. Now a total of seven belt condition monitoring units have been installed. The return of investment can be rationalized in many ways. Prevention of unplanned production stoppages caused by critical belt damage pays back the investment quickly. One case alone can be enough."

"In addition, storage of belts can be reduced. We have value of about 28 MSEK (approximately €3 million) of running belts in the 'red-line'. Without automatic real-time optical 3D belt surface scanning we should have an entire belt set in storage to secure our production in every case. That amount of belt production lead time is several months and still, if we would need to replace a whole belt, in the worst case of the longest 1.7 kilometre conveyor, it would take about four weeks. That would cost way too much in terms of production. Also belt storage is not that easy. Setting up an underground warehouse where the belts can be stocked in the right temperature and humidity would be a quite big effort."

"With the ROXON HX270 we can have about 25% of the total spare belt. That can be considered as an instant return of investment in our case. These cost savings will continue also in the future, since the spare belt on stock should be renewed due to belt aging in every five years to maintain reasonable remaining running lifetime for the belt."

"In addition, ROXON HX270 enables proactive belt maintenance, which increases belt lifetime. Due to its auto-

mation, there is no need for manual belt inspections anymore, which together with the efficiency of belt repair is saving money continuously", concludes Gustavsson.

#### ROXON

ROXON is the brand of NEPEAN Conveyors Oy. NEPEAN Conveyors Oy offers under ROXON brand materials handling projects and equipment, conveyor components and customer services. It's most popular products include:

- ❖ **HCI100 belt conveyors:** ROXON's most popular belt conveyor system;
- ❖ **overland conveyors:** high-end conveyor system expertise;
- ❖ **tailored solutions:** unique equipment for special needs;
- ❖ **feeding applications:** even for the roughest environments;
- ❖ **belt condition monitoring:** excellent solution for belt condition monitoring;
- ❖ **fast component deliveries:** ROXON has more than 500 different conveyor components in its warehouse.

ROXON's maintenance contracts bring peace of mind to its customers. It also manufactures power plant equipment, and can replace old chain conveyors.

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## Maintenance service contracts: optimizing conveyor uptime and reducing costs

Likely, there is a coffee machine in the break room and no matter how automated it is, at some point, someone has to add the beans, writes *Daniel Marshall, Product Engineer, Martin Engineering*. As mundane as that seems, the same goes for service on industrial conveyors. Technological advancements in bulk handling equipment over the last few decades have increased throughput and reduced downtime, while limiting worker exposure to hazards. However, at some point the system always requires a real person to assess issues, make decisions and implement proper solutions. The question is, who adds the beans?

In many industries, operators are increasingly turning to outside contractors to take advantage of consistent maintenance schedules and ongoing service that's conducted safely by an experienced and well-trained technician from a specialty contractor to better improve safety and control costs. Many of these specialty firms also design and produce bulk handling components which are actually superior to the standard parts provided by Original Equipment Manufacturers (OEMs). Specialty contracting may be a better choice for service than contracting with the OEM, since the specialty technicians are fully trained on the newest equipment



*Expert maintenance teams are trained to recognize possible trouble spots.*

designs, able to implement solutions that adhere to the warranty and ensure a Production Done Safely™ approach. Moreover, specialty contractors may be able to secure replacement equipment more quickly during periods of unscheduled downtime due to their industry-wide contacts.

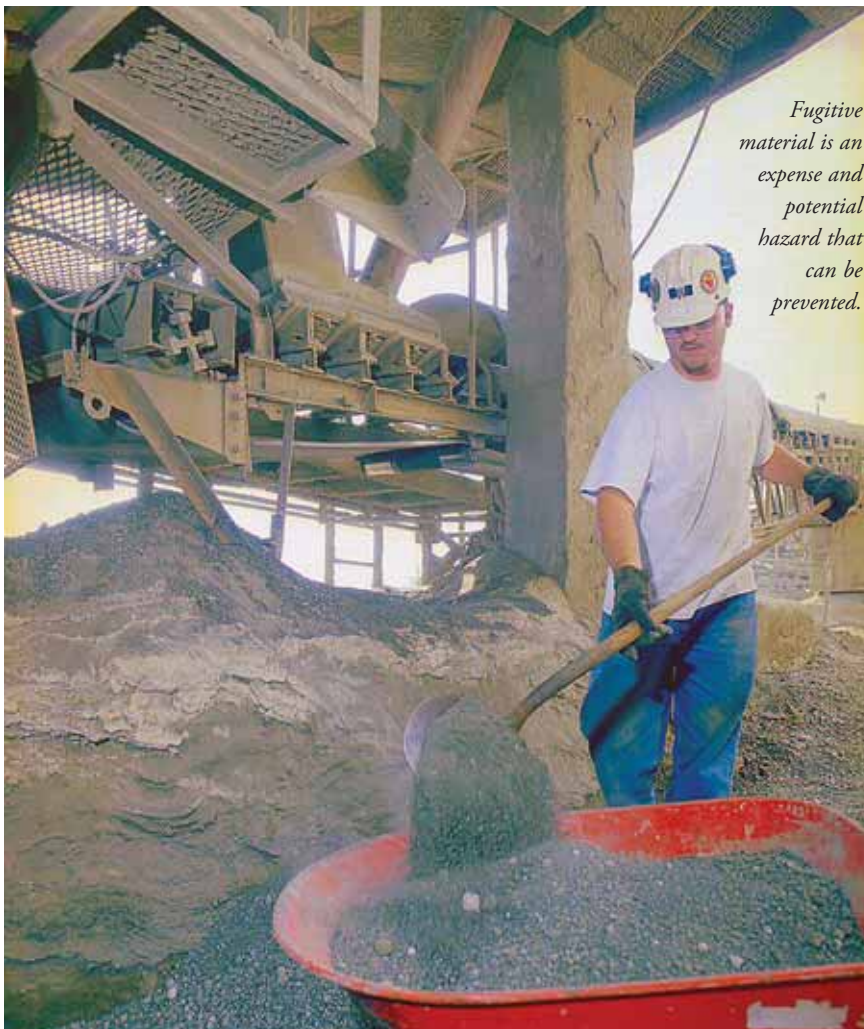
Although internal resources can be used as support, it's recommended that the component manufacturer or contractor install the equipment on both new and retrofit applications. Many performance problems with new components and systems are due primarily to improper

installation. A second leading cause of serious performance problems is lack of proper maintenance. Using a specialty contractor for installation and ongoing maintenance contributes to safer and more efficient production — with less unscheduled downtime — and in the long run saves money and lives. (Another term is 'certified contractor' for the same thing)

### REGULATIONS, TRAINING AND RETENTION

According to the U.S. Occupational Safety and Health Administration (OSHA) and most global government safety organizations, a safe and compliant workplace around conveyors includes open walkways clear of debris, dust-free air, guarded belts with safe access points, signage and sufficient lighting.[1] Violations can result in fines and downtime, but a workplace injury can carry substantial penalties affecting operations and insurance. Hazardous conditions can easily be missed by employees who work in the environment on a daily basis, but as an independent outside party, service contractors are trained specifically to recognize potential violations and offer practical solutions.

The time and resources required to train an employee on equipment and certify them to conduct certain procedures such as confined space entry, electrical work, etc. can be a significant ongoing expense. As workers become more experienced and gain certifications to properly maintain efficient systems, their value in the marketplace rises, and retention can become an issue. In contrast, contractors must be experienced, knowledgeable and certified to conduct the appointed maintenance, and it's up to the contracted company to retain and train that staff.



*Fugitive material is an expense and potential hazard that can be prevented.*



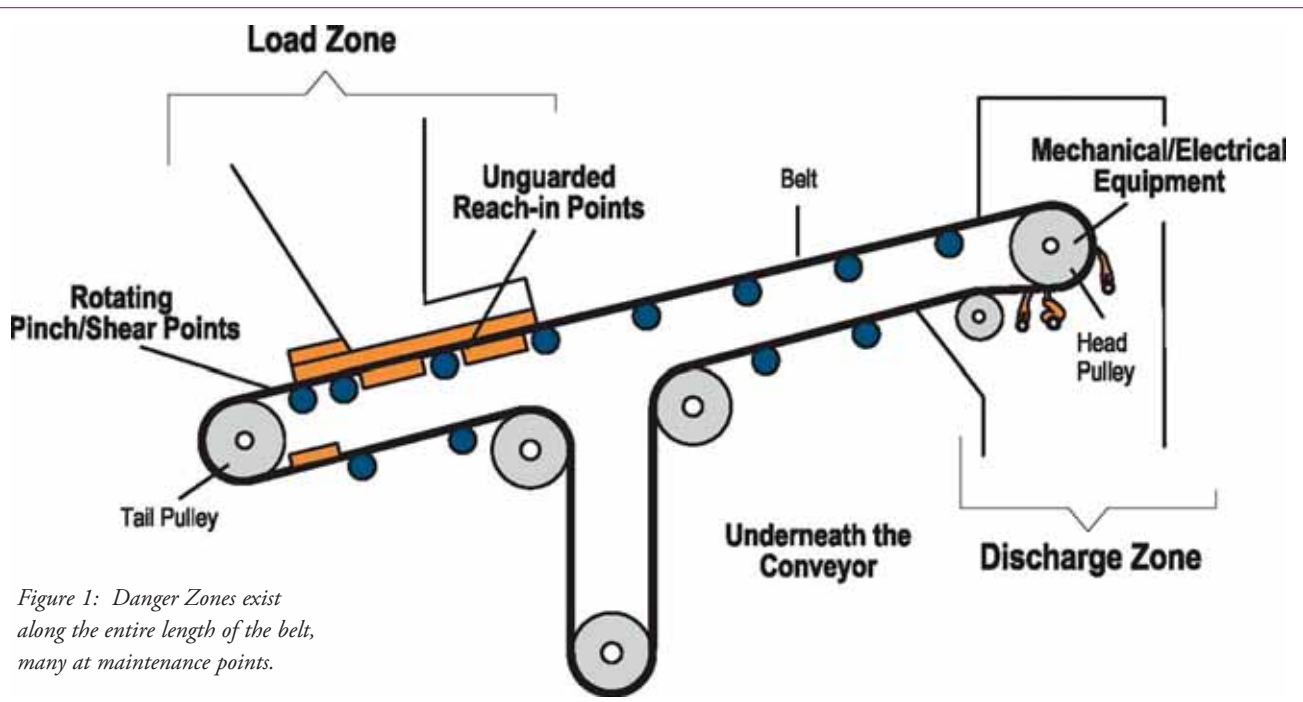


Figure 1: Danger Zones exist along the entire length of the belt, many at maintenance points.

**MAINTENANCE DANGER ZONES**

Exposed to punishing industrial environments and harsh weather conditions, in the past conveyors generally were left to run until they stopped working. But, due to a greater emphasis on safety and the expensive consequences of unscheduled downtime, bulk handlers are being more meticulous about conveyor operation and maintenance. This increased scrutiny includes regular cleaning of spillage, improved dust control, and additional monitoring and maintenance, exposing employees to a moving system more often. These changes introduce a variety of hazards.

Conveyor danger zones where work injuries are likely to occur (see Fig. 1, above):

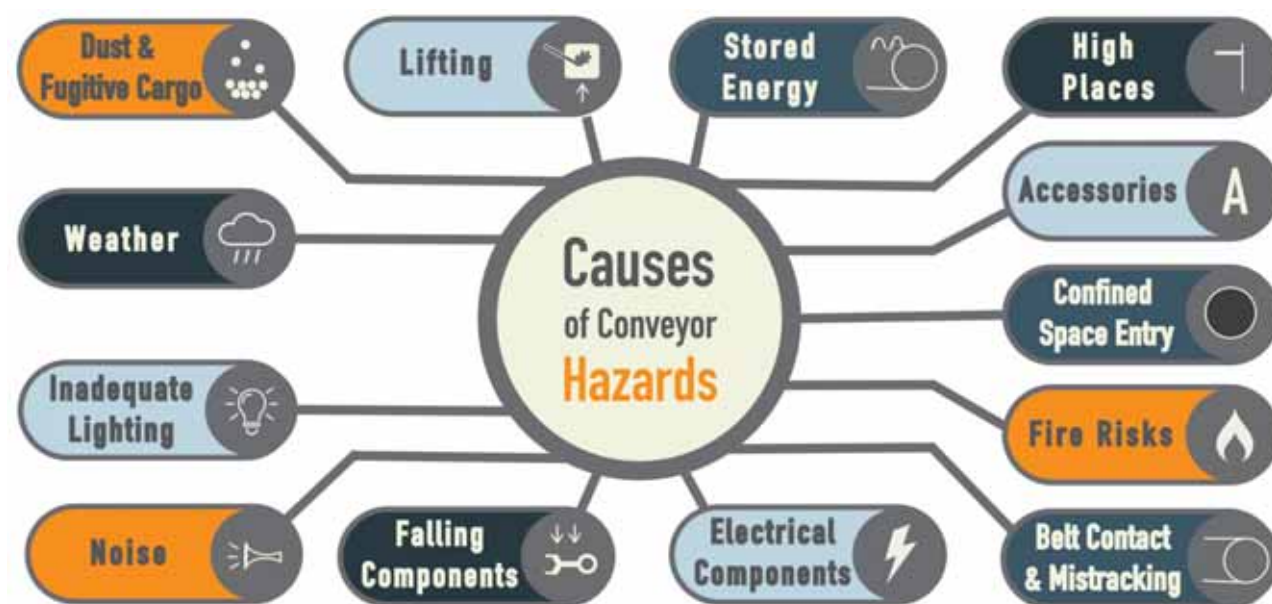
- ❖ loading zone;
- ❖ discharge zone;
- ❖ mechanical/electrical equipment;
- ❖ rotating pinch/shear points;
- ❖ underneath the conveyor; and
- ❖ unguarded reach-in points.

Some hazards are industry- and application-specific. A mine may be concerned primarily with dust, while other industries might have serious issues with tacky carryback, for example. However, most common conveyor-related issues are

found across bulk handling operations. Personnel who work around the equipment on a daily basis often become comfortable with conditions, viewing these issues as an unavoidable outcome of production rather than abnormalities in need of resolution.

A component manufacturer or experienced maintenance contractor views these issues with a different eye and — having serviced many other sites — may present solutions that internal resources have overlooked. These improvements are designed to reduce employee exposure, improve workplace safety and maximize productivity.

Figure 2: The list of potential sources of hazards is long and varied.



## THE INJURY BLAME GAME

Why are service contracts safer? Because service and maintenance around a moving conveyor is one of the main causes of injury and fatality in all of bulk handling, as well as presenting tremendous liability to operators, poor work practices around danger zones can lead to catastrophic results. A 1999 US Mining Safety and Health Administration (MSHA) "Fatalgram" provides an excellent example. A worker went into an unguarded area and entered a confined space alone near an operating conveyor that was not locked out. There, the individual's clothing became trapped in the conveyor's moving tail pulley, drawing the person in and killing him. Any of these poor work practices could have resulted in a fatality, but combined with lack of safeguards, they may be an indicator of a larger safety issue within the company.

Following an injury, company officials and workers can play the blame game, which deteriorates morale. Herbert W. Heinrich's 1931 book, *Industrial Accident Prevention, A Scientific Approach*, was based on summarizing thousands of accident reports. Heinrich concluded it was the workers' unsafe acts that were the primary cause of accidents, a mode of thought that continues to dominate the opinion of managers and supervisors. Yet many safety professionals have realized for some time that the root causes of accidents are not that straightforward.

In many cases, concluding that the incident's root cause was an unsafe act is a simplistic excuse for a less-than-thorough investigation. Often, the employee's action is not the only — or even the most significant — root cause. The real root



*Experienced inspectors provide an outside perspective on conditions and operations.*

causes are usually more involved and require a more complete accident analysis, followed by thoughtful corrective action. It's been observed that there are five root causes which lead directly to an increased release of fugitive materials. This release results in scenarios that encourage workers to react the way they do. These five root causes are:

- ❖ a 'production first' culture;
- ❖ 'low bid' purchasing;
- ❖ needlessly complex designs;
- ❖ over-regulation; and
- ❖ understaffed or undertrained personnel.

The written company policy is (of course) one of 'safety', but the company culture can dictate the unwritten rule of using the lowest bid on any conveyor improvement project. This inevitably comes at the detriment of workplace safety due to inferior design, low quality materials and/or inadequate training.

Lowest-bid policies are an industry-wide epidemic, since most engineering and construction project contracts are awarded primarily on that requirement. A common supplier practice is to base a bid on the price per kilogram (or per pound) of fabrication in order to be competitive in the low-bid system. To minimize expensive design time, it's not unusual for suppliers to recycle specifications, drawings and designs, producing what is essentially a 50-year-old design at state-of-the-art prices.

Since the system was designed with old thinking, it will likely fail to meet today's expectations. Maintenance on a low-bid design can cost more in labour and materials in the long run and compliance issues may become more common as the equipment succumbs to wear and tear. Leading engineering firms recommend companies make a higher capital expenditure for a customized holistic, longer-lasting and safer solution, then contract experienced, trained technicians to maintain it.

In industrial settings, many managers and shift supervisors use a 'management by edict' style, which may be effective in a military environment, but has proven unproductive in other settings. Resisting authority is human nature, so written policy and rigid directives can quickly become "stupid rules" that are easily ignored by employees. In contrast, service contracts are typically explicit about the scope of work and procedures required for technicians to conduct the maintenance safely, often exceeding the standards set forth for employees by the corporation or in applicable regulations.

As seen in the MSHA example, individuals are certainly not beyond culpability for injuries. Belt conveyors are powerful and fast, with many potential



*Strict operational protocols focused on safety ensure that procedures are executed properly.*



hazards, and should never be worked on or around without the proper safety procedures. When a worker loses respect for the power and constant changeability of a conveyor — either through overconfidence or cutting corners — accidents and death can result. Maintenance staff should have the training and foundational knowledge about the specific equipment to properly perform service on the system. This is another benefit provided by a service contract.

### PM, PdM AND SERVICE CONTRACTS

Modern equipment designed with a Production Done Safely™ approach often integrates best practices (guards, training, etc.) with innovative autonomous technology to reduce worker interaction with equipment by predicting and even preventing issues before they reach crisis status.

Preventive Maintenance (PM) uses historical data from similar applications and environments to determine a component's general equipment life and when it should be retired, replaced or restored. Often equipment is replaced on a schedule whether it needs to be replaced or not in the PM model, increasing exposure to risks.

Predictive Maintenance (PdM) uses sensors to monitor equipment performance to anticipate failure. Cloud-based software collects and aggregates data and relays the result to technicians in the field via mobile app. A pre-set range of factors creates alerts that are sent to technicians and operators who are able to assess causes and recommend proactive solutions, rather than reacting to the outcome.

Some service contractors maintain data bases on customers' conveyors, recording system specifications, status details and service procedures performed. The collected information is helpful in scheduling maintenance activities and in determining when outside resources should be utilized. This data can be used to better manage an operation's equipment and budget.

### TYPES OF SERVICE CONTRACTS

Performance analysis and maintenance programmes, implemented by in-house departments, are seldom seen as a priority, due to the overwhelming daily challenges presented to the facility. The easiest way to get results from an investment in conveyor equipment is by awarding a service contract to a specialist in the supply, installation, maintenance and analysis of bulk handling systems. Maintenance

*Contracted services, such as mobile belt cleaner maintenance, help reduce component failures.*



programs differ by provider and may be customizable, but they generally fall into three categories: inspection/report, cleaning/servicing and full service.

A scheduled inspection and report contract sends a specialty contractor to thoroughly examine a system — from belt health to equipment function to surrounding environment — and identify potential issues. A report is produced that presents findings and offers solutions. This can remedy the issue of in-house personnel deprioritizing inspections and routine adjustments in the face of an ever-mounting workload, labour shortages and/or time limitations. Through daily exposure, in-house inspectors may see conditions such as dust, spillage and carryback as “normal,” rather than operational issues in need of resolution. There is also the danger that what is perceived as a minor problem may be intentionally ignored in the “walk the belt” survey, because the employee conducting the survey knows that he or she will be called on to fix the problem, adding to a seemingly insurmountable list of tasks.

The cleaning and servicing contracts are perhaps the most common. From spillage and silo cleaning to monitoring and changing belt cleaner blades, services can be very specific and fill gaps where maintenance crews might be overstretched. Using contract personnel for data census, site survey and routine maintenance activities offers several advantages. The first is that a conveyor can be surveyed without requiring the attention of plant personnel, freeing them to go about their usual tasks. A second advantage is that the outside surveyor is an expert in proper conveyor practices and current governmental regulations. This

objective resource will be able to tell plant personnel when the “standard” plant practices are not the best way to do things.

At the highest level, a full service and maintenance contract sends trained technicians who take accountability for monitoring, maintaining and reporting on every level of system function. They replace wear components when needed and propose required upgrades in order to maximize efficiency, safety and uptime. This provides operators with cost certainty, making it easier to project and manage the cost of operation.

### RETURN ON INVESTMENT (ROI)

Maintenance service contracts are an answer to increasing market pressure in several bulk handling sectors. Demands for more output result in faster belt speeds, higher cargo volumes and longer uptime, but may require operators to improve or replace current conveyor technology. Increasing speeds and volumes on older conveyor systems designed for lower production levels contribute to workplace injuries and increased downtime.[2] Capital investments in newer semi- or fully-automated systems designed for higher throughput require less labor, but maintenance staff need to be highly trained and specialized technicians. This is where maintenance service contracts deliver the best ROI through a series of factors:

- ❖ **compliance:** prior to performing regular scheduled maintenance, the contractor may point out compliance issues and offer solutions. This avoids expensive fines and violations that could result in excessive downtime.
- ❖ **injuries/liability:** working in several locations, contractors avoid the ‘comfort factor’ and rely on a strict set

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*Cleanup under a conveyor can divert essential staff from more productive tasks.*



Occupational Safety and Health Administration (OSHA), Department of Labor, Washington, D.C.

[2] Swinderman, Todd; Marti, Andrew D.; Marshall, Daniel: Foundations for Conveyor Safety, Sec. 5, pg 426 (2.7), by Martin Engineering, Worzalla Publishing Company, Stevens Point, Wisconsin, 2016.

[3] Swinderman, Todd; Marti, Andrew D.; Marshall, Daniel: Foundations for Conveyor Safety, Sec. 6, pg 472-476, "Case Study Return on Safety at a Coal Mine" by Martin Engineering, Worzalla Publishing Company, Stevens Point, Wisconsin, 2016.

### ABOUT MARTIN ENGINEERING

Martin Engineering is a global innovator in the bulk material

of safety procedures to conduct maintenance. This minimizes injuries and their effect on insurance premiums, while reducing liability.

- ❖ **efficiency:** maintenance service contracts focus on improving and sustaining uptime with the least capital investment possible.
- ❖ **consistency:** contractors have a clear directive and are not affected by internal factors (labour disputes, morale, etc.). The priority is maintaining safety, production levels and preserving the customer relationship.
- ❖ **cost of operation:** with a defined scope of work on a set budget, along with clear reporting and recommendations on pending needs, operators can better forecast improvements and control labour costs, further improving ROI as time passes.

### CONCLUSION

Maintenance service contracts are not just a way of controlling and potentially reducing the cost of operation; they are also a safety mechanism. For example, one case study showed a 79% reduction in lost time incidents and a 40% improvement in production using specialty services, which demonstrated paybacks in days from an annual specialty maintenance contract.[3]

Regulators do not differentiate between employees and contractors when inspecting equipment and workplace compliance. Workloads may preclude staff from maintaining proper compliance or they just might not notice some violations. Conveyor equipment manufacturers and certified contractors are highly-trained

independent third parties who can assess and offer practical solutions on a regular schedule.

Outside resources take ownership of the plant's efficient and productive use of the conveyor system. They must demonstrate a dedication to the operation and to their responsibilities and duties. Wisely chosen and effectively used, these outside personnel will improve conveyor efficiency, maximize equipment life and add value to the operation.

At the core of the issue is lower operating costs and improved production. The work should match or improve efficiency regarding downtime and throughput. If the criteria of compliance, cost savings and efficiency are met, then the maintenance service contract has provided a tenable ongoing solution.

### REFERENCES

[1] "Standards: 1926.555 - Conveyors" U.S.

handling industry, developing new solutions to common problems and participating in industry organizations to improve safety and productivity. The company's series of *Foundations* books is an internationally-recognized resource for safety, maintenance and operations training—with more than 20,000 print copies in circulation around the world. The entire 500+ page volumes can also be downloaded as free PDFs from the Martin web site. Martin employees take an active part in ASME, SME, VDI, CMA and CEMA, and the firm played a pivotal role in writing and producing the 7th edition of the CEMA reference book, *Belt Conveyors for Bulk Materials*. Martin Engineering products, sales, service and training are available from 18 Martin facilities, including factory-owned business units in Australia, Brazil, China, Colombia, France, Germany, India, Indonesia, Italy, Mexico, Peru, Russia, Spain, South Africa, Turkey, the USA and UK.



*Scheduled maintenance from outside experts helps maximize equipment life and reduce downtime.*

## BEUMER Group supplies tailored curved belt conveying systems for the mining industry

### SIMPLY OVERCOMING OBSTACLES

In the mining industry, modern cropping technologies require systems capable of transporting bulk materials efficiently from the quarry to their destination, through rough terrain and populated areas. BEUMER Group supplies customized systems such as open troughed belt conveyors and closed pipe conveyors. The systems operate quietly and only minimal amounts of dust or exhaust gases are emitted. Compared to trucks they are often more energy-efficient and can be adjusted to the structure of the premises. They are also able to safely handle steep sloping routes, rivers or road crossings. The system provider determines the optimum conveying route, then takes over project planning and installation. BEUMER Group also ensures that the owner remains sustainably competitive — with cost efficiency and comprehensive customer support.

“With our belt conveying systems, we design comprehensive system solutions for the mining and cement industries worldwide,” says Dr. Andreas Echelmeyer. The head of the Conveying & Loading Systems sector at BEUMER Group, located in Beckum — Germany, mentions an example: The cement plant of the manufacturer Sichuan Yadong Cement Co., Ltd. is located in the Chinese province of Sichuan, near Pengzhou, some 8,000 kilometres from the BEUMER headquarters. Since 2009, the company has been using a 12.7km-long



*Project Sichuan: BEUMER Group built a 12.7km-long conveyor through hilly terrain and unstable ground.*

conveyors and the open troughed belt conveyors to the respective situation. In order to reduce the noise emissions, as required at Sichuan Yadong Cement, we're installing special idlers and low-noise bearings, and select the correct conveying speed for the application,” describes Echelmeyer.

An essential feature of the technology is that it enables horizontal and vertical curves. Angles of inclination of up to 15° are possible, depending on the characteristics of the material to



*Sichuan project: whenever technically possible, the routing of the conveyor has been adapted to the topography.*

*Sichuan project: the troughed belt conveyor runs through rough terrain and over instable ground.*



BEUMER Group overland conveyor, to transport limestone from the quarry to the intermediate bin. The troughed belt conveyor runs through hilly terrain and over rivers and unstable ground. In 2016, in a second project, the system provider installed two more overland conveyors, this time with an overall length of 13.7 kilometres. These overland conveyors transport the limestone to the cement plant. “Unlike with the first order, our task now was to build the conveyor through a populated area,” explains the division manager. “No material should be lost during the process and in addition, no dust was allowed to escape; the prescribed level for noise emissions was not to be exceeded.”

### REDUCTION OF NOISE EMISSIONS

The requirements could not have been more different, even for one and the same customer. However, the system provider can optimally adapt the closed pipe

be transported and the topography, with lengths of more than 12km. Due to the ability to navigate curves, considerably fewer and in some cases no transfer towers are required. This results in substantial cost savings for the customer and the system continuously transports the material even over challenging ascending and descending sections.

The open troughed belt conveyors are particularly suitable for high throughputs. Conveying capacities of up to 10,000 tonnes per hour are usual.

Using BEUMER calculation programmes, a team of experts precisely calculates the static and dynamic tractive forces of the belt during the development phase of the system. This is the prerequisite for the safe dimensioning of the curves. BEUMER engineers select the type of drive technology and conveyor belts needed on the basis of these calculations. This ensures longevity of the entire system.

BEUMER Group has also installed a pipe





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conveyor in the Belgian town of Flémalle. It transports large quantities of fly ash from a former coal-fired power plant to the Maas river, about two kilometres away, for shipment. “We have not only adapted the conveyor to the sections of very steep mountains, but just like Sichuan Yadong Cement, the route runs over public motorways, railways and residential areas,” describes Echelmeyer. “In order for the construction of the plant to be approved at all, we had to ensure that the closed transport would protect the environment from the dry and dusty material. “The fly ash had to be prevented from exiting or falling on the ground, even the smallest quantities.” The noise emission played an important role too. In order to minimize the noise to an extremely low level, the



*Sichuan project: view of the enclosed conveyor flight in the area of the bridge.*



*Flémalle project: the technicians are mounting the suspended elements of the conveyor to the steel structure. Cranes are used to exactly manoeuvre the assembly.*

experts developed special sound-absorbing elements and used them for example to encase the bridges of the pipe conveyor. In addition, special idlers and low-noise bearings were installed.

**TAKING ALL ASPECTS INTO ACCOUNT**

“To ensure that our customers remain competitive over a very long period of time, we always dimension our plants and systems as well as the associated production processes with regard to their long-term benefits,” says Echelmeyer. It is important that the user considers not only the overall costs when making investment decisions. Therefore BEUMER Group is committed to evaluating its products comprehensively on the levels of economy, ecology and social responsibility. Usually, the total cost of ownership (TCO) is the primary focus of business activities, therefore defining sustainability solely from an economical perspective. “However we also incorporate ecological and social aspects,” the division manager points out. Therefore, we follow a total value of ownership (TVO) approach. This means, we consider the conveying system in its

their limits: they require well-developed roads and fuel, for example and the costs of construction, maintenance and possible extensions are significant. The ecological aspect needs to be considered as well: new roads and access roads have a serious impact on the landscape. And then there’s fuel consumption. The emissions caused by truck traffic are high, both with regard to toxic substances and noise and dust,” explains Echelmeyer.

BEUMER Group provides its belt conveyors with environmentally safe electric drives and low-energy belts.



*Project Flémalle: the line runs across country, over steep rocks. The pipe conveyor navigates easily over these inclines and gradients.*

entirety, not only from its cost side.” For example we continuously look to reduce energy and resource consumption in the production cycle and in operating the machine, as well as reducing emissions to a minimum.

**THE ENERGY QUESTION: BELT CONVEYOR OR TRUCKS?**

A comparison with trucks, which are still frequently used for transporting bulk materials over long distances, shows exactly what this means. Depending on the nature of the terrain, they can rapidly reach

Therefore, especially in these times of climate change and increasing greenhouse gas emissions they are considered a preferred option. The installed motors are mostly adjustable which permits the loads to be optimally distributed on the drive units under various operating conditions. If the belt conveying system conveys downhill, the system works in generative operation. The generated electric energy is fed back into the public network by a regenerative feedback unit. This way the owners can further reduce the operational costs of the entire system.



*Flémalle project: assembly work was continuously monitored by drones (all photos: Beumer Group GmbH & Co Kg).*



Belt conveyor or trucks? For Sichuan Yadong Cement this question was already posed during the first project, which implied the transport of limestone from the quarry to the intermediate bin. “Depending on the project, the belt conveying systems require up to 90% less primary energy than comparable truck transports,” confirms BEUMER expert Echelmeyer and refers to the concrete project-related comparison. Trucks operated with diesel fuel require a specific primary energy of 11.4kWh for each tonne of transported material. The belt conveying system which was built later on required on the contrary only 1.44kWh. If, as in this case, 7.5 million tonnes of raw material are transported annually, the use of belt conveyors means a total saving of 74 million kWh per year. This corresponds to a yearly energy consumption of more than 20,000 single-family houses. This can be noticed also from a monetary viewpoint: solely by saving diesel fuel, the operational costs of the company are reduced by more than €5.5 million per year.

### COMPLEX AND CURVED

TVO also means transport route optimization. This can become very challenging when dimensioning the belt conveying system, depending on the terrain conditions. Echelmeyer’s team was asked for example to design and supply an overland conveyor in Indonesia to transport clinker from the quarry to the cement plant. “The line ran through the rain forest, and the topography made it very challenging, remembers Echelmeyer. The team developed and compared different route options. “The very long land corridor in particular required highly complex planning.” The team has to assess and evaluate the project properly before making a concrete offer. There is usually very little time to do this, not enough to

send out an entire expedition crew. An effective alternative are aerial photographs that are evaluated with the right software on the basis of topographical data. This means that drones are becoming an increasingly important tool for BEUMER Group.

### DRONES — LITTLE HELPERS IN THE AIR

Using unmanned aerial vehicles on sites or quarries? That might sound futuristic- but it’s not. “They are already part of our everyday work routine when planning, executing and documenting construction projects,” the BEUMER expert reveals. And the significance of these aerial vehicles is increasing. The technology is becoming more and more sophisticated and easier to operate. They can be used quickly, without much preparation, in difficult-to-access areas and on building sites, without obstructing traffic or hindering operation. “We used a drone for example for the project in Flémalle, Belgium,” reports Echelmeyer. “So we were able monitor the entire progress of the construction process.”

BEUMER Group has been using drone technology for about three years now. There are two different designs. The functionality and features of copters are similar to those of helicopters. Their rotors keep them hovering in the air. Fixed-wing aircraft, on the other hand, are more like aeroplanes. They also have a higher range. Once in operation, they are constantly moving. Copters are particularly suitable for narrow take-off and landing areas or when they have to perform at low speed. They mainly fly over medium-sized and small building sites. In addition, they are used for quarry faces in quarries and construction inspections such as lower sides of bridges. BEUMER Group opted for a copter that the team uses to work on

specific projects.

### FROM THE PC IN THE AIR — AND BACK

The employees can plan the route from their computer. They calculate the exact flight path by using the specialized software. Then, the drone flies its pre-determined route. Smartphones and tablets can also be used to control the drone. The recorded aerial photos are corrected with regard to their perspective and evaluated photogrammetrically. The software calculates a point cloud in order to generate 3D models from the two-dimensional views, i.e. digital terrain models.

### LONG-TERM AND STRATEGIC CLIENT PARTNERSHIPS

With BEUMER Group, the customer receives everything from one single source, starting with the query to technical dimensioning and the installation on site. If desired, the system supplier continues to support the operator with its comprehensive range of services, after the conveying system is in operation, to ensure high levels of machine availability during the entire running time. This is ensured by the BEUMER customer support with its more than 1,000 employees world-wide. “We offer various solutions,” explains Echelmeyer. “They are matched individually to the respective needs of the customer, including service intervals and response times as agreed by contract.” In the event of a system standstill, qualified customer support technicians arrive quickly on site to prevent long downtimes. Customer Support offers around-the-clock telephone support every day of the year, helping to further reduce downtime to a minimum. The technicians perform remote analyses, indicate corrective measures and offer quick and reliable solutions to correct malfunctions.

# Schulte Strathaus's conveyor solutions including cleaning, tracking, transfer point seals and much more



The company Schulte Strathaus GmbH was established as a trading office in Unna, Germany in 1952. The company is divided into three different business units that are active worldwide. The STARCLEAN® conveyor technology and FIRE-SAFE fire protection technology are located in Werl, Germany. The other business unit, Cyrus GmbH vibration technology, is a newer one, that was established in 2003 and has one location in Recklinghausen, Germany and another one in Pune, India.

Schulte Strathaus is an expert in the area of conveyor belt cleaning and spillage control. It is a member ofVDMA (German association of Plant and Machinery Manufacturers), certified under ISO 9001:2015 and also BGH "Safety with system".

For Schulte Strathaus it is very important to have close contact with its

customers. The company has made great development efforts to achieve today's modern range of supplies. Its main focus is on providing products and processes to a market which demands higher material efficiency and greater economical use of resources. This is especially important in times of scarce resources and rising raw material prices, when resource-saving operations make sense.

All processes and products guarantee an efficient use of materials and an intelligent material flow planning. Schulte Strathaus also puts an emphasis on the optimal recycling of raw materials, the modular design of machines and system components and that every product should show a high operational safety.

With all these aspects the company follows the philosophy 'Solutions –

Clean and green', which stands *inter alia* for an optimum cleaning of conveyor belts in a sustainable and safe way and also an optimum material flow in the field of bulk material handling.

## STARCLEAN® — SMART CONVEYING SOLUTIONS

The product range of STARCLEAN® includes conveyor belt cleaners, tracking rollers, transfer point seals, impact stations and also the closed conveyor belt system SAFEBELT®. All these products help reduce dust emissions and spillage of material.

## STARCLEAN® — CONVEYOR BELT CLEANERS

The STARCLEAN® primary and secondary



STARCLEAN® — conveyor belt cleaners.





SAFEBELT® — closed conveyor system.

scrapers provide ideal belt protecting and cleaning properties from the first to the last minute of the blade's lifespan — regardless of belt width, belt speed or type of material conveyed.

The conveyor belt cleaners are equipped either with polyurethane or tungsten carbide blades, but always with a polyurethane base, whose special form enables flexibility as a requirement for TWIST-SWING. This feature ensures, that each scraper blade adapts perfectly to the belt and reach highest lifespans of the conveyor belt. The STARCLEAN®

secondary scrapers all have overlapping segments, so that no material can flow around. Many types of both, the primary and secondary scrapers, are also suitable for reversible belt installations and mechanical belt joints.

To ensure a quick, safe and especially toolless maintenance of the conveyor belt cleaners, all scrapers provide a plug-in foot. They are inserted into the shaft without use of any tools. Due to this feature and also the one-touch quick-tensioning device, carrying out maintenance work is possible within a few minutes.

**SAFEBELT® — CLOSED CONVEYOR SYSTEM**

The closed belt conveyor SAFEBELT® is able to run curves optimally and is an ideal way to circumvent obstacles easily. Due to the fact that this conveyor is completely enclosed, it carries the bulk material in a dust-free, saving and protected manner. The belt loop remains closed from the material feed to the product discharge. Any array with a discretionary number of



horizontal and vertical radii up to 30° inclinations can easily be dealt by the SAFEBELT® system.

It is suitable for many different industries, including wood and paper, agriculture, recycling, cement, power stations, mining and many more.

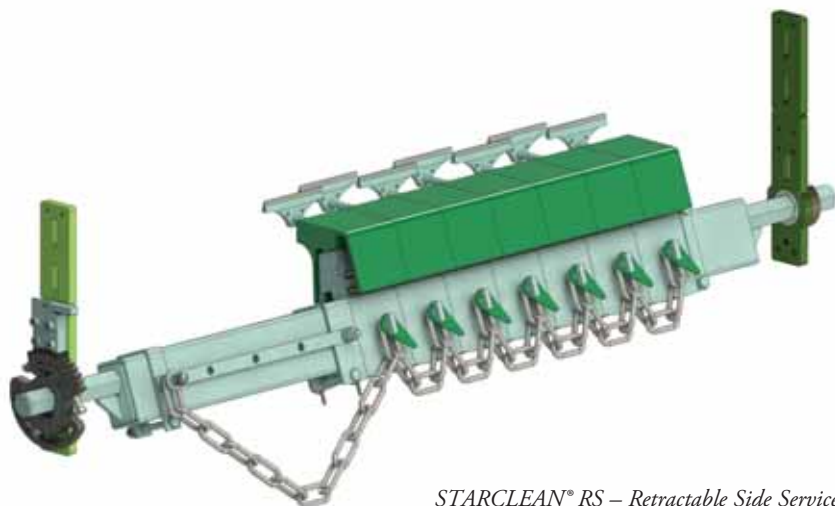
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- ❖ safe against unauthorized access; and
- ❖ available in three different sizes:
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  - ❑ Size M: 405 x 375mm
  - ❑ Size L: 520 x 465mm.

**STARCLEAN® RS – RETRACTABLE SIDE SERVICE**

- ❖ quick and safe maintenance from outside the chute
- ❖ comfortable lateral blade change
- ❖ drastically reduced pull-out forces
- ❖ low lateral space requirement
- ❖ greatly decreased downtimes
- ❖ enormous increase of productivity
- ❖ multifunctional combination with tungsten carbide segments from modular STARCLEAN® system
- ❖ “Industrie 4.0” ready by optional electric drive of the tensioning device
- ❖ suitable for reversible belt installation (with electric drive).



STARCLEAN® RS – Retractable Side Service.

# Issues of unloading ammonium nitrate prill are eliminated with tubular drag conveyor system

## HAPMAN CASE STUDY

### THE ART AND SCIENCE OF HANDLING CONTROLLED, FUNCTIONAL EXPLOSIVE MATERIAL

Dyno Nobel manufactures explosives and offers explosion management services to customers in mining, oil and gas exploration, fertilizers, construction, and concrete and building materials. The core of Dyno Nobel's operation is manufacturing ammonium nitrate prill in bulk and safely transporting it in specially designed trucks to the point of use. When the company decided to shift its plant in Donora, PA from a manufacturing facility to a distribution hub, plant engineers knew the transition would require a safe, automated way to off-load the bulk material from railcars.

The system previously used for the rail car unloading consisted of screw

with Hapman and the tubular drag chain conveyor for use in applications with demanding variables. Due to the schedules of product delivery, and the inadequacy of their existing system, Dyno Nobel was "truly in an emergency mode to find the right solution," stated O'Connor.

Engineering, operators, and management worked together to understand the needs and challenges the conveyor would face in the ammonium nitrate prill unloading application. For this project, and for the material being handled, several considerations required addressing. First and foremost the system must handle the prill as gently as possible, maintaining the integrity of the product. The performance of the ammonium nitrate, for its intended purposes, requires that the material remain in prill form. Multiple transitions from



*Carry and return sides of conveyor on either side of the pit.*



*Overview of tubular drag conveyor: elevates up from the railcar house (right side photo), and then moves material to discharge point at the belt conveyor tunnel (left side photo).*

conveyor-to-conveyor, or rough handling of the material will cause the prill to degrade thereby reducing the value of the product. The second consideration is that the system must be dust-tight. Allowing outside elements in, or inside elements out is not acceptable. Third, the system must be able to start and stop under a full load of material. And finally, the installed system must be absolutely dependable. "Due to the requirements of this project, we determined early in the feasibility process that the Hapman tubular drag system was the only way to go," continued O'Connor.

Hapman designed a stainless steel tubular drag chain conveyor in a gooseneck circuit. The conveyor housing is

conveyors, bucket elevators, and belt conveyors. The system was very inefficient, created an unacceptable level of product degradation, and became a maintenance problem.

## PARTNERSHIPS BRING PROJECT SUCCESS

To assist with this process, Dyno Nobel hired Venture Engineering, a multi-faceted engineering firm that provides clients with front-end feasibility studies through design and construction. "Very early on during our first visit and inspection", stated Kevin O'Connor, Venture Engineering's Project Manager, "we realized that their existing equipment was totally inadequate for the goals of the system and the rates required." Several Venture engineers had experience



*Railcar interface seals the discharge of the railcar.*





*18" rotary feeder control feeds the prill into the tubular drag conveyor.*

constructed of 8" diameter sch.40 stainless steel piping. Inside the fully sealed housing, the chain consists of stainless steel sealed-pin design with a 6" pitch and U.H.M.W. polyethylene flights on 12" centres.

The stainless steel provides the necessary corrosion resistance and the heavy-duty chain selection allows the conveyor to easily start and stop under full load, a critically important feature when unloading rail or truck cars. The process of loading and unloading of bulk material poses variables that may not exist for an in-plant operating condition. To ensure the material was not exposed to the open air upon discharge from the railcar, the engineers at Hapman sourced an air-driven interface assembly. With the push of a button, operators activate the sleeve and easily attach it to the railcar discharge. The interface assembly provides a safe, sealed discharge for material to flow. From the railcar the material flows into an 18" dia. rotary feeder, located in the underground

pit below the tracks, which control feeds the ammonium nitrate into the tubular drag. The conveyor then elevates the material nearly 83' and moves it horizontally another 54'. The material is discharged onto a belt conveyor for final distribution in the storage building.

Hapman provided a complete turnkey system wherein fell the responsibility for the removal of the old system, the engineering and design of the new, as well as the installation, start-up and commissioning. "The system is living up to expectations and more," notes Matt Graves, plant manager at Dyno Nobel. Upon arrival of the conveyor, Graves and others at the plant were unsure if the system would work in their application. "The flights were smaller than the pipe and I did not think it would work," Graves explained. All operating concerns were quickly dispersed as the tubular drag chain conveyor began to efficiently move the ammonium nitrate prill from the railcar

into the storage silo.

#### DELIVERING EFFECTIVE BULK MATERIAL: RAILCAR OFF-LOAD

The railcar off-load system at Dyno Nobel is a success because each party involved in the engineering, design, implementation and start-up worked together to understand the challenges of the application. The engineers at Hapman took those challenges and applied more than 70 years of bulk material handling experience to design the most comprehensive, fully automated conveying system. The number of chain and flight options offered in the Hapman tubular drag chain conveyor allowed designers to select the chain that would be corrosion resistant and not permit material to get trapped in the knuckles of the chain. The conveying system provided the safe, gentle handling, trouble-free, and effective bulk material off-load which Dyno Nobel was seeking.

"Hapman and their local representative worked very hard to ensure the successful completion of our client's project," stated O'Connor. "Their efforts helped identify and implement the optimum solution in order to meet our client's needs on schedule, scope, and budget."

#### ABOUT HAPMAN

For over 70 years, Hapman has provided manufacturing plants around the world with the most technologically advanced powder and bulk handling equipment and systems, offering custom engineered equipment and systems for chemical, food, pharmaceutical, plastics, building, minerals, and other industries.



*The prill is discharged into the storage facility.*

## Sackett-Waconia's fertilizer handling expertise extends to conveyor systems



Sackett-Waconia is a diversified manufacturer of equipment for the fertilizer industry. It engineers systems and solutions for all aspects of fertilizer including process, handling, blending, and loadout. Belt conveyors are integral to the vast majority of projects that it takes on, and its equipment can be found on six continents, operating in nearly every environment.

Belt conveyors represent a vast and varied category of equipment. They are

one of the most diverse and ubiquitous types of equipment on the market today and can quite literally be found everywhere from your local grocers to miles underground.

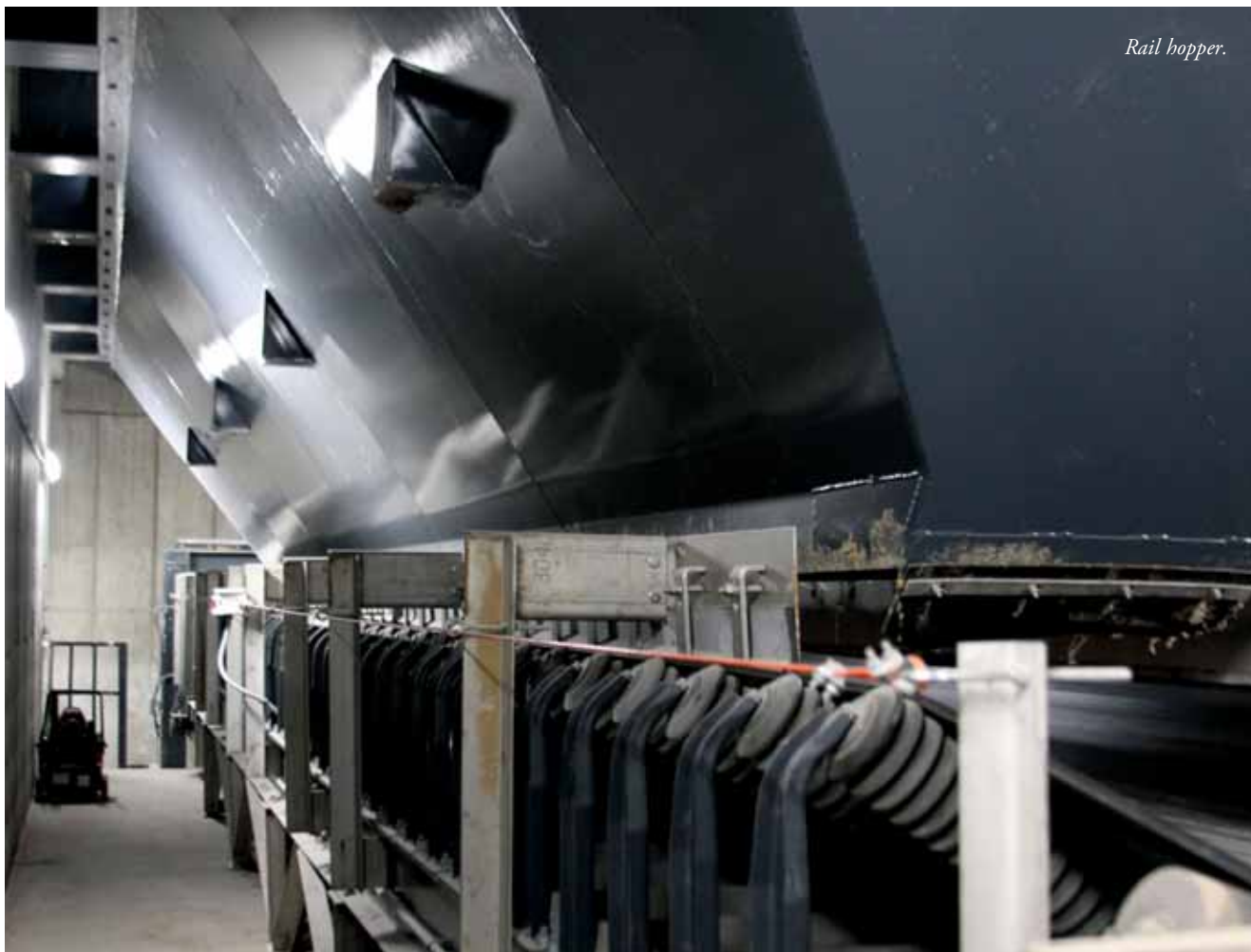
Since Sackett-Waconia specializes in the fertilizer industry, it engineers its equipment to the unique challenges and opportunities the industry affords. Most fertilizers are corrosive, abrasive, and hygroscopic. As such, Sackett-Waconia's

belt conveyors are engineered to be simple, easy to maintain, and contain as many corrosion-resistant materials as is feasible and affordable.

The basic structure Sackett-Waconia employs is built around a stainless steel formed channel design, that allows flexibility in both design and production. It also reduces weight compared to some older methods. Beyond the basic frame, each conveyor may have an individual and





*Rail hopper.*

unique design. For example: two conveyors may be handling the same material, operating at the same speed, and in the same manner — but as every environment is different, the operation and maintenance of the conveyors could be completely different depending on where they are geographically located.

This is why Sackett-Waconia takes the time to listen to, and understand, each customer's needs and discuss applications. It enables the company to customize the equipment to suit its customers' needs.

Given the wide range of applications it encounters, Sackett-Waconia's value lies in its experience. After more than 120 years, there aren't many challenges that it hasn't encountered. For example, it designs belts to handle low tonnage in process plants under harsh conditions, and also designs conveying systems to handle thousands of tonnes per hour.

Sackett-Waconia has engineered metering and feeder conveyors, which have dosing rates measured in ounces and that handle highly fluidized powder materials. It also engineers systems designed to receive entire railcars (all gates), at 1,200+ tonnes per hour, based around heavy duty belt conveyors. The latter can generally be

found at larger fertilizer terminals and on loop tracks. Time is money, after all, and Sackett-Waconia understands that its customers need to move material as quickly and efficiently as possible to meet shrinking windows of opportunity. They also need equipment engineered to be operated safely and reliably for many years.

Sackett-Waconia has a full line of conveyors optimized to handle all types of fertilizer applications. Its product lines include fixed belt, tripper belt, shuttle belt, loadout conveyors, as well as belt-walled conveyors for some applications. It also engineers and fabricates its supports and trusses, for both inland and marine applications. Its experience and expertise has been developed in process plants, inland terminals, ship and barge receiving as well as blending facilities throughout the world.

Due to the abrasive and corrosive nature of fertilizer, Sackett-Waconia engineers conveyors to use many corrosion-resistant materials, such as 304 or 316 stainless, HDPE, and UHMW. To meet project demands, it also uses various styles of belting from PVC to multi-ply heavy duty rubber, smooth top to cleated top, and oil resistant to fire retardant. Sackett-Waconia designs conveyors to be

OSHA-compliant, and works with its customers to ensure they meet all safety standards, such as additional guarding or safety switches, that may be required for their site beyond general safety requirements.

What makes Sackett-Waconia's materials handling systems different? "The Devil's in the Details" and correctly engineered systems are critical. Conveyors can be deceptively simple. It's just a frame, pulleys, idlers and drive. But in the end, they need to work in the application they are designed for. Sackett-Waconia's goal is to build a system that, with proper maintenance, does exactly what it promises and does it for a very long time.

Sackett-Waconia also prides itself on its long term commitment to its customers. The relationship doesn't end at delivery or commissioning. The company was founded as The A.J. Sackett & Sons company in 1897. It has been around for more than 120 years and didn't get there by leaving its customers behind. Sackett-Waconia likes to think of customers as partners, and wants nothing more than a solid, long standing, relationship. The company wants to do more than just sell equipment — it is also there to support its customers and their businesses.

## Continued demand for TAKRAF Africa's range of technologies from across the commodity spectrum

Key equipment supplier, TAKRAF Africa, part of the global Tenova TAKRAF group, is handing over a complete woodchip conveying package as part of an expansion to a specialized cellulose production facility in South Africa. The facility produces Elemental Chlorine Free (ECF) dissolving wood pulp, mostly for the export market.

The fast-track contract covered the design, engineering, installation and commissioning of 24 trough conveyors, three Redler en-masse chain conveyors, transfer towers and related systems.

The TAKRAF Africa conveyors were integrated into both current and new lines to handle the increased production made possible by the expansion, with the conveyor system comprising three stockpiles fed by shuttle conveyors. With the new system, woodchips are conveyed from the existing and new chipping lines to the relevant stockpiles and then, using reclaim and associated conveyors, conveyed to existing infeed digester conveyors.

A number of new and/or unique features were designed by TAKRAF Africa and incorporated into the conveying package, including reversible belts to ensure that material could be conveyed to both stockpiles from the different chipping lines. All the chutes were designed and assessed using Discrete Element Method (DEM) technology as woodchips tend to exhibit airborne behaviour when they reach certain velocities.

In addition, stockpile stacking is to be conducted through automated zone

control, using a combination of instruments and sensors to ensure equal spreading of the different wood species.

Various bypass systems have been planned and provided for, including that from the stacking route to the reclaim conveyors in the event that a reclaim machine is undergoing maintenance or unplanned downtime. The bypass conveyors are based on a self-supported design requiring no intermediate trestle support. In addition, a bypass plough mechanism diverts material temporarily from the existing chipping line to a newly supplied conveyor.

A set of Redler conveyors was installed for the conveying of fines generated by the screening system, which greatly assists in dust control. "The Redler conveyors were selected for a number of the benefits they offer, including their ability to fit in with the current layout of the screening building, as well as space constraints within the plant," says Richard Späth, General Manager – Technologies, TAKRAF Africa. "The Redler conveyor also boasts multiple discharges, facilitating the building of a "cone-shell type" stockpile, while also assisting in loading a truck evenly."

Another uncommon feature designed and installed by TAKRAF Africa is the four-conveyor walk-in type gallery, with some of the conveyor gantries being required to span between 45m and 50m due to space constraints and existing infrastructure.

Since this was a brownfield project, the system was required to be installed in an

operational plant where certain tie-ins had to be completed during limited shutdown windows. In addition, the fast-track nature of the contract called for precise and tight planning of the in-house engineering, which was complicated by the challenges of interfacing with new and existing services on the plant. In order to best mitigate associated risk with such a complex project, TAKRAF Africa split the detailing and fabrication of steelwork amongst various fabricators.

"In total, structural steel of approximately 1,700 tons was required to be designed, fabricated and installed within a 12-month project duration, which included mechanical installation, commissioning and handover, without compromising at all on safety and the quality of the equipment provided," says Späth.

### CONTINUING DEMAND

This recent contract highlights the continuing demand from a wide range of industries, from the mineral processing to biomass sectors, for TAKRAF Africa's material handling expertise, notes Späth.

TAKRAF Africa attributes its continuing success to a comprehensive and evolving product and service offering that is ideally suited to the operational realities that local industrial operations face.

"Our commitment to innovation has meant that, while we offer the best of global technologies, we have tailored them to operate efficiently in local conditions, as

*The Redler conveyors were selected for a number of the benefits they offer, including their ability to fit in with the current layout of the screening building, as well as space constraints within the plant (source: TAKRAF).*





well having developed products specifically for the African market. This has enabled us to continuously advance our technology offering and remain ahead of the curve," says Späth.

The Redler en-masse conveyors and elevators are one such example. Proven over decades, Redler machines convey a wide range of solids, including wood chips, sand, lime, cement, fly-ash, sunflower seeds, maize, wheat, flour, grain, coal and much more. They convey particulate solids cleanly, gently and economically by inducing material to move like a liquid through dust-tight casings. As a result, these low maintenance systems ensure minimal product degradation, while the dust tight casings protect the conveyed material and the environment from mutual contamination.

A recent in-house innovation by TAKRAF Africa has resulted in new-design Redler chain conveyors, six of which have already been supplied to a major Fast-Moving Consumer Goods (FMCG) manufacturer. Combining the proven Redler brand with a lighter, more cost-effective design of the casing, the conveyors utilize the high quality Redler chain housed in a structure manufactured from laser-cut, relatively light-weight plate-work. This

unique fabrication approach has eliminated the expensive and time-consuming welding process, enabling the delivery time to be reduced by up to four weeks. Furthermore, laser-cut plates eliminate boilermaker tolerances and ensure a perfect fit on site. In addition, TAKRAF Africa is now able to assemble the conveyors utilizing its in-house capacity, providing a valuable upskilling opportunity for its employees.

TAKRAF Africa is the exclusive licence holder/supplier in Southern Africa of the trade-marked Redler range of equipment, and has supplied more than 5,000 Redler en-masse conveyors and elevators throughout Southern Africa over the past 40 plus years.

#### LONG-ESTABLISHED BUSINESS RELATIONSHIPS

"TAKRAF Africa's association with the industrial sector stretches way back into the past century when, as part of the Bateman group before it was acquired by Tenova in 2012 and integrated into Tenova TAKRAF, it established a firm foothold both in the mining, the power generation and the FMCG sectors, amongst others," concludes Späth. "Such long-term business relationships underscore TAKRAF Africa's

ability to service its products over their complete product lifecycle, even installations from more than three decades ago."

#### ABOUT TAKRAF

TAKRAF, a Tenova Group company, is an integrated solutions provider to the global mining, bulk material handling, minerals processing and beneficiation industries, offering innovative technological solutions as well as process and commodity knowledge along the industry value chains. With the integration of the well-known DELKOR and Tenova Advanced Technologies (formerly Bateman Advanced Technologies) brand of products into TAKRAF as specialized product lines, our portfolio for the minerals processing and beneficiation sectors has been considerably enhanced.

Tenova, a Techint Group company, is a worldwide partner for innovative, reliable solutions in metals and mining. Leveraging a workforce of over three thousand forward-thinking professionals located in 22 countries across five continents, Tenova designs technologies and develops services that help companies reduce costs, save energy, limit environmental impact and improve working conditions.

## Vendig: serving the conveyor market since 1979

Vendig AB is a major Swedish (Scandinavian) manufacturer of belt cleaners and conveyor components for the global bulk handling industry and is part of the Lagercrantz Group.

#### VENDIG: CELEBRATING 40 YEARS IN 2019

Since 1979, Vendig's team has proudly and gratefully served customers with passion and high-quality equipment.

More and more customers around the world have discovered the advantages of choosing a safe, stable and service-oriented partner like Vendig AB for components for belt conveyors, crushing and screening machines.

Vendig started as an engineering company in 1979, with the development of belt cleaners and sales of spare parts for belt conveyors.

The big breakthrough came in the 1980s with the belt-scrappers Pontus® and Rasmus®. In the early 1990s, Vendig acquired the rights to the SICAB-scraper which later on led to the development of the Hampus® scraper series.

In the late 1990s, Vendig closed a deal with Metso Tampere for the delivery of

scrapers to Nordberg-Lokomo mobile crushers. Ever since, ten thousand scrapers and ploughs have been delivered from Skara to Tampere and subcontractors to Metso.

In the late 1990s, Vendig also delivered the first scrapers to LKAB ore mines. LKAB now has about 400 Vendig scrapers in operation in the various mines in the very North of Sweden.

Today, Vendig has distributors in 11 countries in Europe and direct sales to several other countries on the export market and supplies to customers around the world. Every year Vendig breaks its own sales record and is constantly growing.

#### THE IDEA OF SIMPLICITY AND EFFICIENCY

The development of each and every product revolves around the needs of the customer and focuses on some key characteristics:

- ❖ easy to assemble;
- ❖ easy to maintain;
- ❖ high performance and effectiveness;
- ❖ safety;
- ❖ excellent cost benefit for the user; and
- ❖ fast service,

In recent years, several new products like the Sirius pre-scraper and the return idler safeguard have proved that Vendig's technical specialists have taken these key notes seriously.

#### SIRIUS HM PRE-SCRAPER 9930



The attachment of the scraper segments is a unique and easy design and therefore has been patented by Vendig.

The Sirius pre-scraper 9900 is a belt cleaner made from durable polyurethane with individual segments mounted in a removable cassette. Each segment is easy to remove for exchange or cleaning purposes. The segments snap into the



*Sirius HM pre-scraper 9930 in action.*

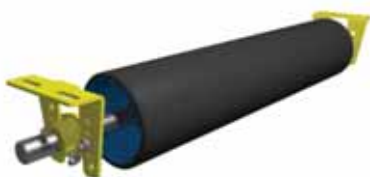
aluminium profile easily or can be threaded into the profile sideways. The attachment of the scraper segment is unique and therefore patented.

Vendig's unique spring lever ensures that the correct pressure is maintained against the belt, which reduces maintenance and prolongs the lifespan of both the scraper and the conveyor belt. The spring lever simplifies service work and reduces maintenance time.

The pre-scraper is positioned against the drive pulley, immediately below the material flow. All steel parts are galvanized as standard.

From belt width(B-W) 1000 the scraper is supplied with dual lever arms. From B-W 1600 the scraper is supplied with Holder HD, 8388-HD.

**NEW: VENDIG PRIME TRACKER**



A belt guide is a roll that guides the conveyor belt back to the centre when it

starts to misalign. Even small deviations from the centre line cost energy in the form of wear of rolls and strips.

**MOVES HORIZONTALLY AND VERTICALLY**

Vendig Prime Tracker runs by the conveyor's returning belt and always has full contact with the belt; therefore the steering force is high and the start friction low. Note that the belt also moves vertically when it is misaligning. Therefore Vendig Prime Tracker is designed to handle movements in both directions to keep the contact surface on the belt at all times.

Vendig Prime Tracker works great for reversible operation and can be installed under or over the returning belt. The product has a long life span.

**RETURN IDLER SAFEGUARD 3600**

**INCREASES SAFETY ON THE CONVEYOR, FITS MOST CONVEYORS**

A simple and easily assembled safeguard. It is adjustable to fit a big range of conveyors

and return idler lengths for belt widths of 500–1,400mm and installations widths of 540–1,810mm. It can be used for return idlers with a maximum diameter of 133mm.

It is designed to be compliant with the Machine directive 2006/42/EG, Safety equipment for belt conveyors EN-620 & EN-618 and ISO 13857. As a safety component, Vendig's return idler safeguard is CE-marked.

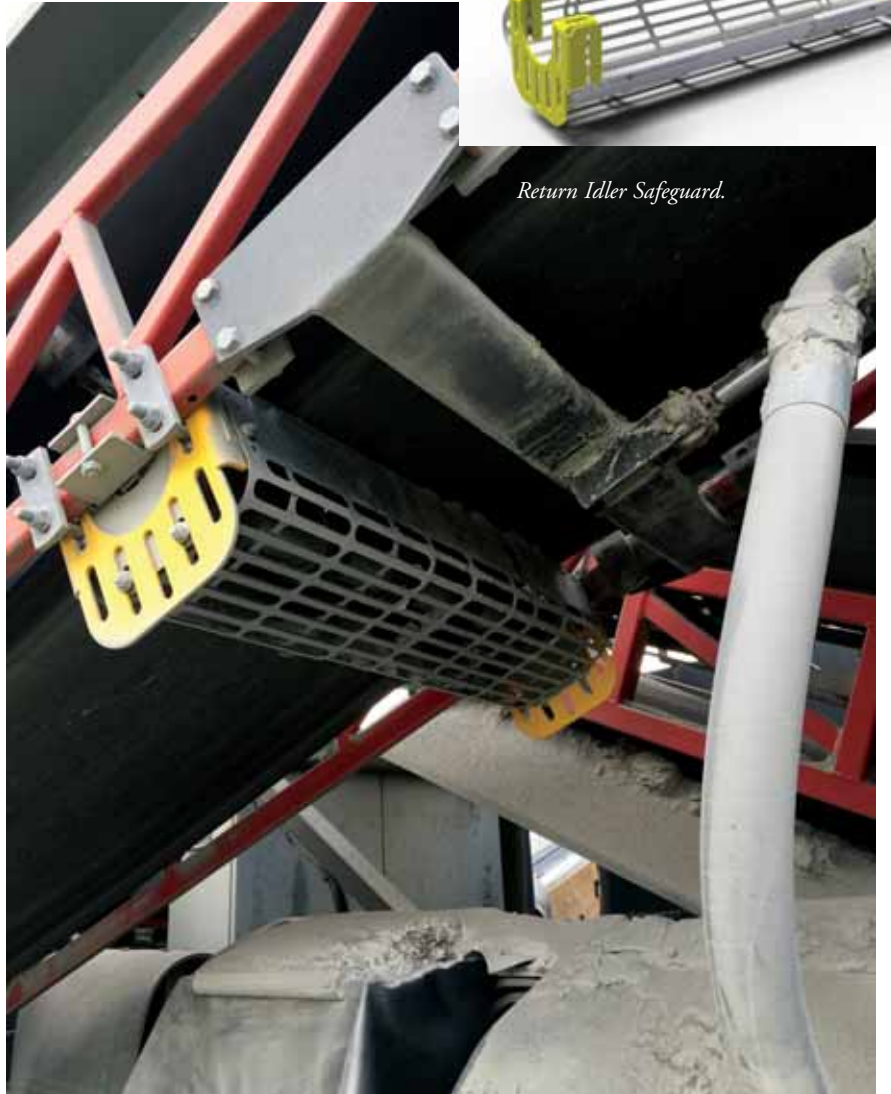
The purpose of the product is to prevent the hazard of broken rollers falling down in case of failure due to wear or frozen bearings but it is also to eliminate nip points on the in-running side, blocking access to the danger zone and nip-point between the belt and an idler from all sides.

It is stable, made of galvanized steel to be fastened in the conveyor frame. Its openings are maximized according to the requirements of the norm in order for return material to fall through. It comes along with the CE declaration so customers can easily update their conveyor documentation.

When the safeguard needs to be opened, open the two screws to swing open the guard that will stay in place in the one-sided hinges.



*Return Idler Safeguard.*





# Stemm expands digital offering

Stemm, revolutionizing industry 4.0.

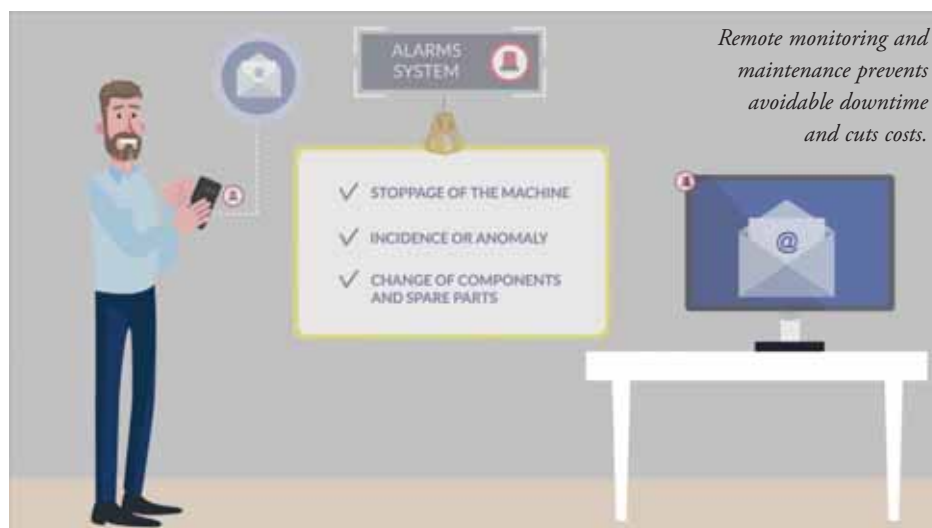


Major grabs manufacturer Stemm is taking full advantage of today's digital environment to improve its offering to its customers.

## GRAB CONNECT: REMOTE CONTROL SERVICE

The first of Stemm's new digital initiatives is its Grab Connect remote control service.

Stemm recognizes that, at times, production processes suffer stoppages due to problems generated by the inadequate maintenance of machines. These stoppages involve the loss of time and the use of

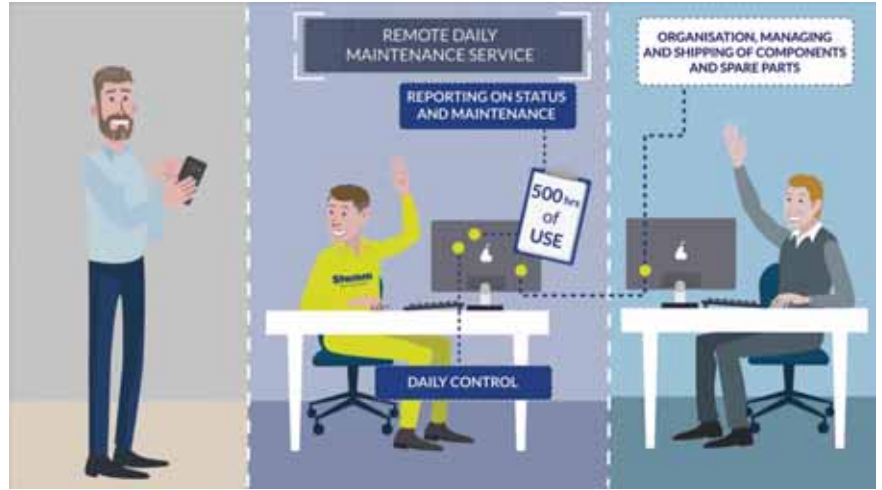


resources to restart the production process.

Stemm has been working on how to optimize the preventative maintenance policy and make production processes more efficient. The result is the Grab Connect remote control service.

Grab Connect offers customers continuous remote monitoring, assessment and control of their machines, and they can also programme it and adjust it in real time.

Stemm's grabs incorporate an automaton that allows for the visualization in real time of the operating pressure, the oil temperature and level, the opening and



Customer control: taking the worry away.



closing commands and times, the number of manoeuvres and the hours of work... among other parameters.

In addition, it notifies, by email and text message, each time an event occurs, any incidence, stoppage or anomaly is detected. In this way, any change of components or need for spare parts is foreseen.

Thanks to the remote continuous maintenance service, Stemm's Technical Support Service team is always available. Customers' machines are controlled daily and, after every 500 hours of use, a report about status and maintenance is generated.

Furthermore, customers no longer have to worry about the supply of necessary components and spare parts, as Stemm's maintenance service organizes and even manages the shipment of those components and parts.

This service is an ideal tool to carry out preventative maintenance and the control of operations, including the setting up, adjustment and modification of parameters, to keep customers' grabs always controlled and operational and to never stop working,



its customers. When planning a major purchase — and buying a grab is no different — there are many factors that have to be considered. The process can be difficult and inefficient, especially due to the huge amount of information that we have to deal with.

Large catalogues of products and different suppliers all need complex comparative analyses that are time-consuming and, sometimes, hard to carry out.

Stemm aims to make that process easier for its customers with the introduction of its On-Line Prices service, which allows potential customers to evaluate and calculate their projects and investments in a practical, rapid and efficient way, finding out immediately the current prices and delivery dates.

The procedure consists of various steps:

- ❖ First, the customer needs to access the On-Line Prices tab.
- ❖ Then the customer needs to REGISTER on the database.
- ❖ After registration has been accepted, customers will receive an e-mail confirming USER and PASSWORD details.
- ❖ Customers will also be invited to REQUEST ACCESS TO THE ON-LINE



**ON-LINE PRICES**

The second new digital initiative from Stemm relates to its On-Line Prices system, developed to make life simpler for



PRICES, which will be authorized immediately.

- ❖ Once ACCESS TO THE PRICES has been authorized, the customer needs to indicate:
  - ❑ the type of machine required;
  - ❑ the density of the product to be manipulated;
  - ❑ the machine's capacity;
  - ❑ the number of machines and delivery dates required;
  - ❑ the country of destination and a brief description of the project or installation.
- ❖ Once the customer has filled out the form, the details are sent to Stemm's Central Server that is connected to the computers of Production, Metalworking, Purchasing and to the databases of its main suppliers of components and raw materials.
- ❖ In a few seconds, the customer will have a first provisional offer on their screen, and they will also receive this via e-mail. Also, in less than 24 hours, Stemm's sales personnel will send the definitive net offer, which is more detailed, including the full technical description and a fact sheet with links to videos of similar machines.

Stemm's new service for On-Line Prices allows the customer to make multiple enquiries, at any moment and from any place, until they find the optimal and appropriate solution for their needs.

It is a formidable work and management tool that is used by the whole international network of Stemm's representatives and distributors, as well as by all in-house staff.

### ABOUT STEMM

Since 1984, Stemm has designed and manufactured a wide range of grapples, clamshell grabs and other types of grabs and tongs for many different sectors, including the iron and steel, marine, crane, overhead cranes and cement industries and the environmental sector.

Stemm boasts a vastly knowledgeable team with excellent technical skills and proven experience in the sector. This ensures that it can be highly flexible and can respond to all its customers' needs.

There is fluid and constant communication between the management, engineering and manufacturing departments, ensuring rapid reaction times that allow them to respond quickly and efficiently to customers' needs.

DCi



# One of the Longest Pipe Conveyors in Brazil

Pampa Sul  
Thermoelectric Power Plant  
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4,17 km long with a  
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**Design project,  
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fabrication, tests and  
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turn-key order.**

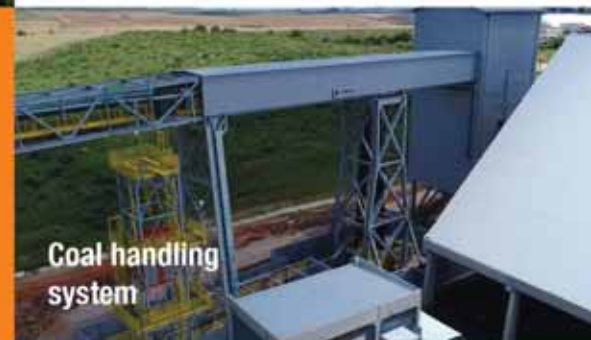
Supply of pipe conveyor, transfer and take-up towers, power and control room integrated to the power plant operation and control center.

Ultimate generation mid-voltage frequency inverters, driving system with automatized load sharing type distribution control.

Standalone LED lighting system using incorporated solar plates.

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**TMSA, benchmark in high capacity  
and long distances bulk material  
handling equipment.**



**Coal handling  
system**



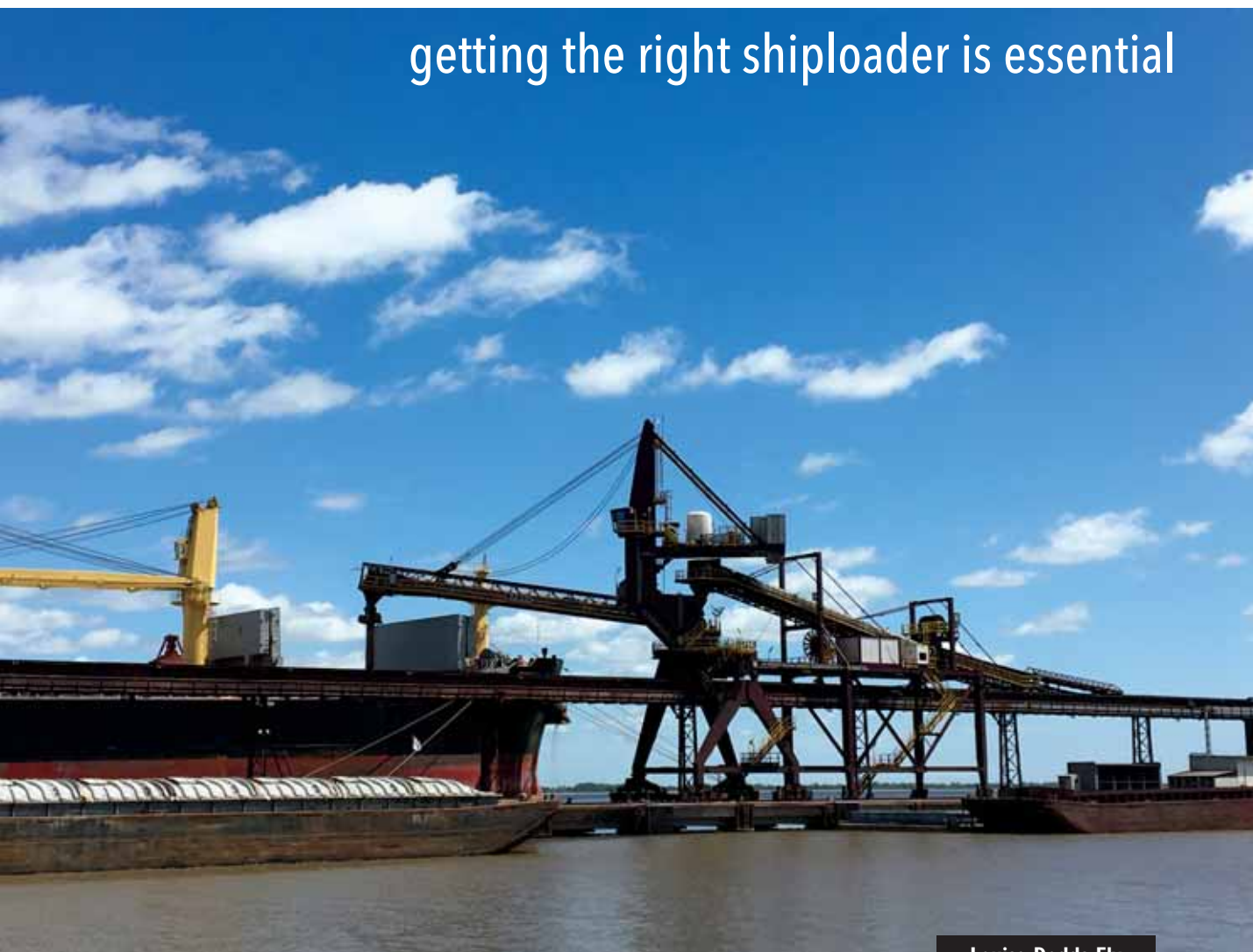
Brazil: Porto Alegre RS | Belo Horizonte MG | São Paulo SP  
Argentina: Buenos Aires

[www.tmsa.com.br](http://www.tmsa.com.br)



# Steady the ship

getting the right shiploader is essential



Louise Dodds-Ely

## TMSA: the shiploading specialist

TMSA – Bulk Handling Technology S/A is the biggest Latin American manufacturer of bulk solid material handling equipment, especially to port terminals, including shiploaders and high-capacity, heavy-duty and long-distance conveyors.

Founded in 1966, the company designs, engineers and fabricates tailor-made equipment for agriculture and minerals commodities, according to each customer's specific requirements and needs. Its product portfolio has been constantly improved and includes the latest innovative solutions of dedusting systems and IoT (Internet of Things) data management applied to shiploading units.

With more than five decades in the

business, three of them manufacturing shiploaders, TMSA has supplied and commissioned almost 100 units globally, and has been recognized for its continuous operation design, easy maintenance and very low downtime, all under ISO 9001 standards.

Some of TMSA's major projects include:

- ❖ **Corporación Navíos Shiploader, Nueva Palmira — Uruguay (see picture above):** travelling shiploader capable of handling iron ore at 3,900tph (tonnes per hour) or grains at 2,400tph. These are two completely different commodities, and operations take place in an environment-controlled facility

very close to a populated area. The shiploader's 260° slewing boom loads 150,000dwt Baby Capesize vessels on the west side of the pier or 80,000dwt Panamax vessels on the east side. This machine was designed and built following high-class standards, being audited and approved by an international accredited company.

- ❖ **IoT — TMSA shiploaders:** the use of the IoT-embedded concept allows the customer to make a real-time analysis of the shiploader's operation at the touch of a monitor or cellphone screen. This innovative solution can predict and prevent losses and damages, providing



*Slewing boom shiploader and FEM — Finite Element Analysis (TMSA, Brazil).*



alerts for maintenance stops based on historical data and analysis reports, processing information from sensors or from the PLC system, including total time in operation, drive usage, wind

speed, temperature, number of cycles, among others.

❖ **ADM shiploaders, Santos-Brazil:** each of these two slewing boom shiploaders

loads soybean and meal at rates of up to 2,000tph. The new concept aims to take into account the stringent environmental restrictions on the emission of fine particulates into the air. This aspect

*The enclosed belt conveyor inside the shiploader boom (TMSA, Brazil).*





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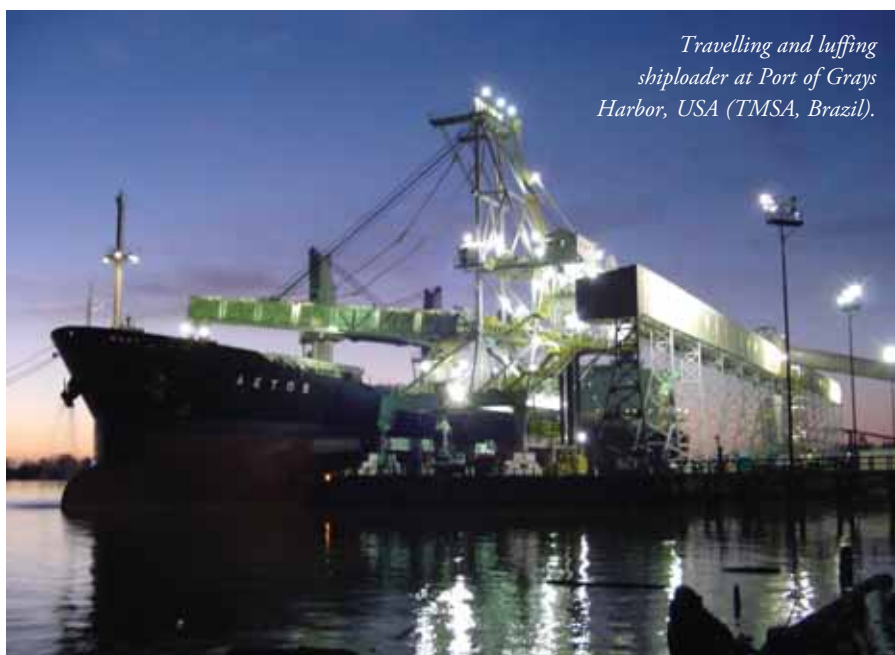
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is especially critical in Santos port, due to its proximity to the city. TMSA designed and engineered enclosed belt conveyors that reduce dust emissions to the vicinity. This new approach demanded a shiploader capable of combining the high operating design loads in a lighter machine to be installed on an old pre-existing pier. Due to these requirements, finite element method and analysis has been widely used in all structural elements of this shiploader, focusing on optimization of the weight in the main structural elements.

❖ **Dust suppression, retrofitting:** port terminals are being much stricter in terms of environmental protection, which is intended to reduce the impact of the loading operation on the surrounding area. The most recent port authorities' restrictions regarding the emission of particulates to the air has led equipment companies to research new solutions. Recently TMSA developed the telescopic tube with dust suppression system, a speed reducer coupled in a flow centralizer device. Additionally, four emergency panels open in case of overload or plugging. This device was especially designed to retrofit existing shiploaders with load restrictions in the boom.

❖ **AGP shiploader — Aberdeen, USA:** TMSA supplied a 1,500tph soybean shiploader to a US customer, which has now been in service for the last 15 years operating under harsh environmental conditions, such as seismic zone, storm winds and heavy snow during the winter season.



*Travelling and luffing shiploader at Port of Grays Harbor, USA (TMSA, Brazil).*

The global population is growing fast, as is the demand for food and commodities, so the frequency of the ship voyages has increased significantly in the last years, as well as shorter loading times. This requires more from the shiploaders in terms of capacity, availability, durability and dust suppression.

TMSA offers different solutions for the conveying of bulk materials in general. Its wide technological portfolio also includes belt conveyors that can be conventionally covered or totally enclosed, with high capacities up to 20,000tph. TMSA has the knowledge and experience to propose an ideal design for the conveying facility, which will fit with the load restrictions, environmental requests, general needs and the budget of the customer.

# Bedeschi wins shiploading contract

Major bulk handling equipment supplier Bedeschi has been awarded a contract by Enviva to supply material handling and shiploading equipment for its new operating plant that is under construction in Pascagoula, Mississippi.

The supply includes a new A-frame type shiploader, very similar to the one installed at Voestalpine in Corpus Christi (Texas), as well as the conveying system for woodchips from the rail-unloading system to the port where the material feeds the shiploader through a conveyor and a tripper system.

The overall capacity of the system is for 1,600 tonnes per hour handling woodchips.



## Bedeschi for Cargill in Westwego Plant, LA

Bedeschi has been awarded the contract to supply a shiploading system for Cargill. This contract forms part of the refurbishment and upgrading of an existing facility operating on the Mississippi River. Bedeschi will engineer, manufacture, install and commission (through its US branch located in Deerfield Beach, Florida) a shuttle-type shiploading arm able to load grains and oilseeds at 80,000 bushels/h

(2,200 tonnes per hour) onto vessels of up to 120,000dwt.

The equipment will be preassembled in Italy and shipped to New Orleans area into three main parts in order to minimize the downtime during the erection. Bedeschi will carry out the project as well as mechanical and electrical works on a turnkey basis. In this project, Bedeschi will actively co-operate with Lanier & Associated, an engineering firm from New Orleans.

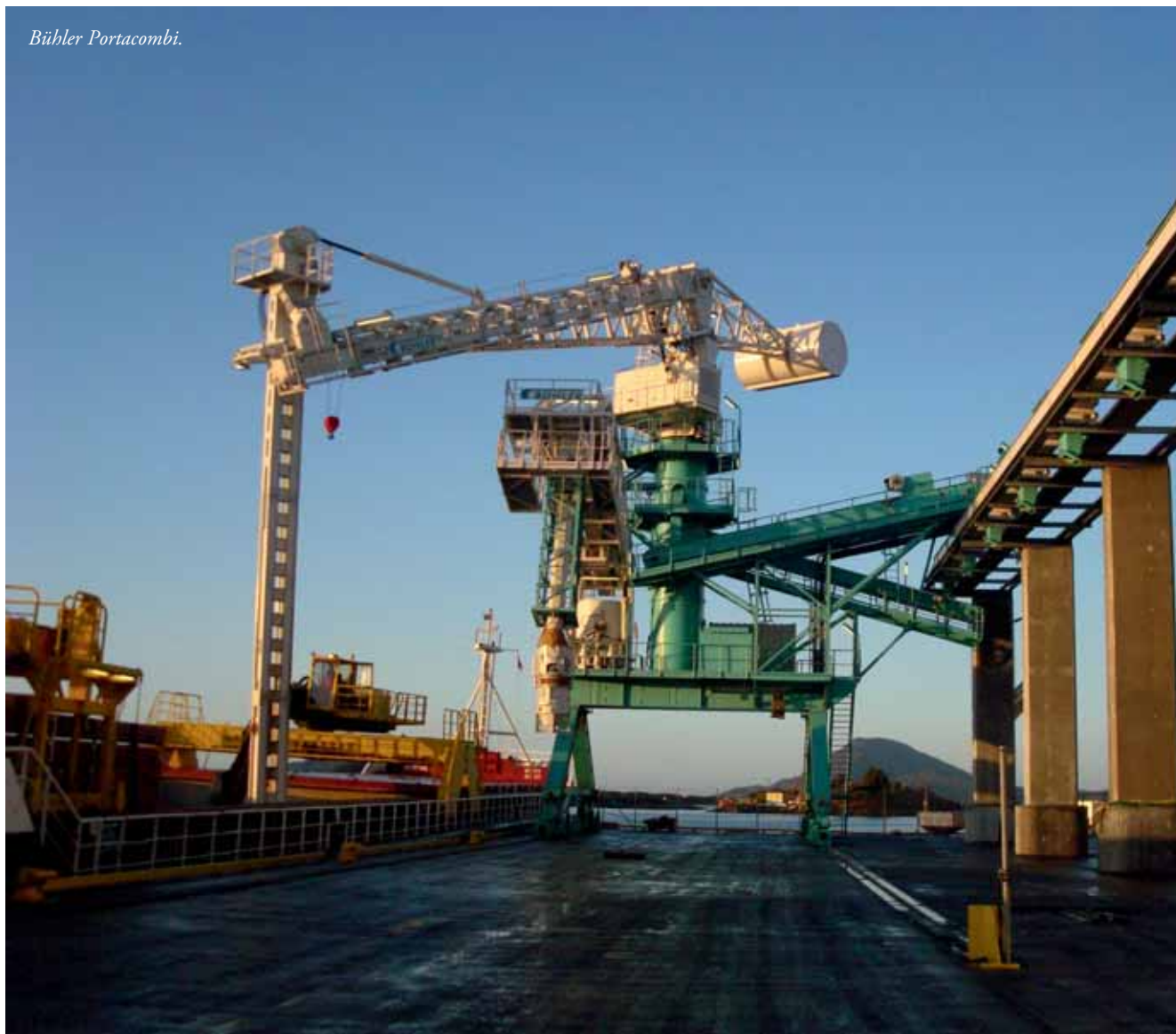
This machine features enclosed type belt conveyors and a Vortex type dust free telescopic chute. The overall features are very similar to the three-tower shuttle-type shiploader successfully installed in 2015 in CMT terminal in Convent, a few miles north from this new one.





## Shiploading solutions from Bühler

*Bühler Portacombi.*



Bühler shiploaders (and its unloaders) offer their operators great versatility in their applications: whether mobile or stationary, equipped with their own energy supply or supplied with electric power from the outside — they are sized to suit different needs and can be tailored to the local conditions.

The material is typically transferred to conveying systems which are permanently installed on the pier or directly to road or rail vehicles.

### PORTALOAD & PORTACOMBI SHIPLOADING SYSTEMS AND COMBINED SHIP-UNLOADERS/LOADERS

For decades, Bühler has been globally respected in the supply of systems for handling bulk materials such as cereal grains, oilseeds and derivatives. This includes mechanical and pneumatic ship-unloaders, shiploading systems, combined ship-unloaders and loaders and bulk storage facilities of all types of design.

State-of-the-art Bühler control systems guarantee efficient operation of these systems.

Bühler has accumulated vast experience in the field of shiploading systems, which has produced technically matured and reliable solutions especially in Bühler's activity in Argentina.

Customer requirements and project parameters vary to such a wide extent that decades of experience are needed for successfully designing and constructing such systems.

Bühler has demonstrated these capabilities in a wide variety of projects for a large number of customers around the world.

### MOBILE AND STATIONARY SHIPLOADING SYSTEMS

In the selection of the type of shiploaders, diverse parameters are crucial, for example:

- ❖ location of the system and type of material supply;

- ❖ loading throughput and ship sizes; and
- ❖ water levels of rivers or sea tides.

The selection of a mobile or stationary loading system will depend on the terrain, the infrastructure and the operating parameters. Loading terminals with piers are typically equipped with mobile shiploaders. Terminals without piers are provided usually with stationary loading towers with booms, which can be slewed, lifted and lowered. They are capable of loading one or simultaneously two holds with throughputs of 2,000tph (tonnes per hour) and more.

An example of such a facility is the Terminal of Santarém in Brazil, which has been in service since 2003. This stationary design has three loading towers and one loading line with a throughput of 1,500tph.

### PORTALOAD — STATIONARY SHIPLOADER EFFICIENT AND VERSATILE

The loading of sea-going vessels by stationary loaders has proven to be an

efficient and cost-effective solution. These units allow ship holds to be loaded individually or simultaneously by several loading lines. Their possible loading boom motions (lifting, lowering, and slewing) eliminate the need for time-consuming shifting of ships. If required, the loading booms can be equipped with a kick system to optimize loading of the ship holds.

Hydraulically powered deflection shovels attached to the end of the loading spouts increase the area that can be loaded. Often, low-dust loading systems are demanded in order to satisfy operating as well as environmental requirements.

Bühler loading installations with throughputs of 2,000tph of grain are based on vast experience and dependable engineering and have been successfully applied in numerous countries.

Exports from countries such as Argentina, Brazil, the US, China, Australia, etc. are carried out by such systems, which are capable of loading ships up to 120,000dwt (Capesize).

### PORTALOAD — MOBILE SHIPLoader

#### FLEXIBLE AND COST-EFFECTIVE

Mobile rail-mounted shiploaders are distinguished by their high flexibility. The combination of the shiploader's capability of travelling along the ship's side, the vertical boom motions and the kick-in/kick-

out technique of the loading spout allow an ideal loading of a wide variety of ship types and sizes.

Excellent examples of such loading terminals are the systems operated by Bunge Alimentos S.A. and Terlogs S.A. in San Francisco do Sul in Brazil. Each of the two loaders is capable of loading up to 2,000tph of soybeans or wheat or 1,500tph of soybean meal.

### PORTACOMBI — SHIP-UNLOADER AND LOADER

#### COMBINED MECHANICAL SHIP-UNLOADERS AND LOADERS

Combined ship-unloading and loading systems for cereal grains, oilseeds and derivatives are frequently applied in facilities with import and export activities. They may also be used after processes such as oil extraction from soybeans, where the extraction meals are sold to further processors. Combined ship-unloading and loading systems are available in a wide variety of design versions.

#### PORTACOMBI IN SAUDI ARABIA

The Portacombi is based on the best-known mechanical ship-unloader Portalink. An example of such a facility is the Arasco project in Dammam, Saudi Arabia. The Portacombi in this installation is applied as an efficient unit for unloading and loading

wheat, corn (maize), barley and soybean meal.

The unloading throughput for grain is 600tph and soybean meal can be unloaded with a throughput up to 360tph from ships with sizes up to 70,000dwt. Ships with sizes up to 20,000dwt are loaded at a throughput rate of 300tph.

The Portacombi is equipped with bogies, enabling it to travel on rails. The shuttling distance along the pier is 200 metres, which enables it to easily access all ship holds.

### PORTALOAD WITH DUST SUPPRESSOR: LOW DUST LOADING

#### MOBILE RAIL-MOUNTED SHIPLoader IN TALLINN

A substantial part of the grain from the countries of the former Soviet Union is exported through Estonian ports. As far back as in 1986, Bühler commissioned a grain handling facility in this Baltic country. The new shiploader in Tallinn is installed on a finger pier. The throughput of the installation is 1,200tph.

Increasingly stringent in-plant, sanitation and environmental requirements in terms of dust emissions are satisfied by the dust suppressor type RGLZ. It regulates the material throughput in such a manner that the material velocity at the outlet of the spout is only little and therefore no dust will be whirled at the spout outlet.

*The Portaload mobile shiploader offers a high level of flexibility.*







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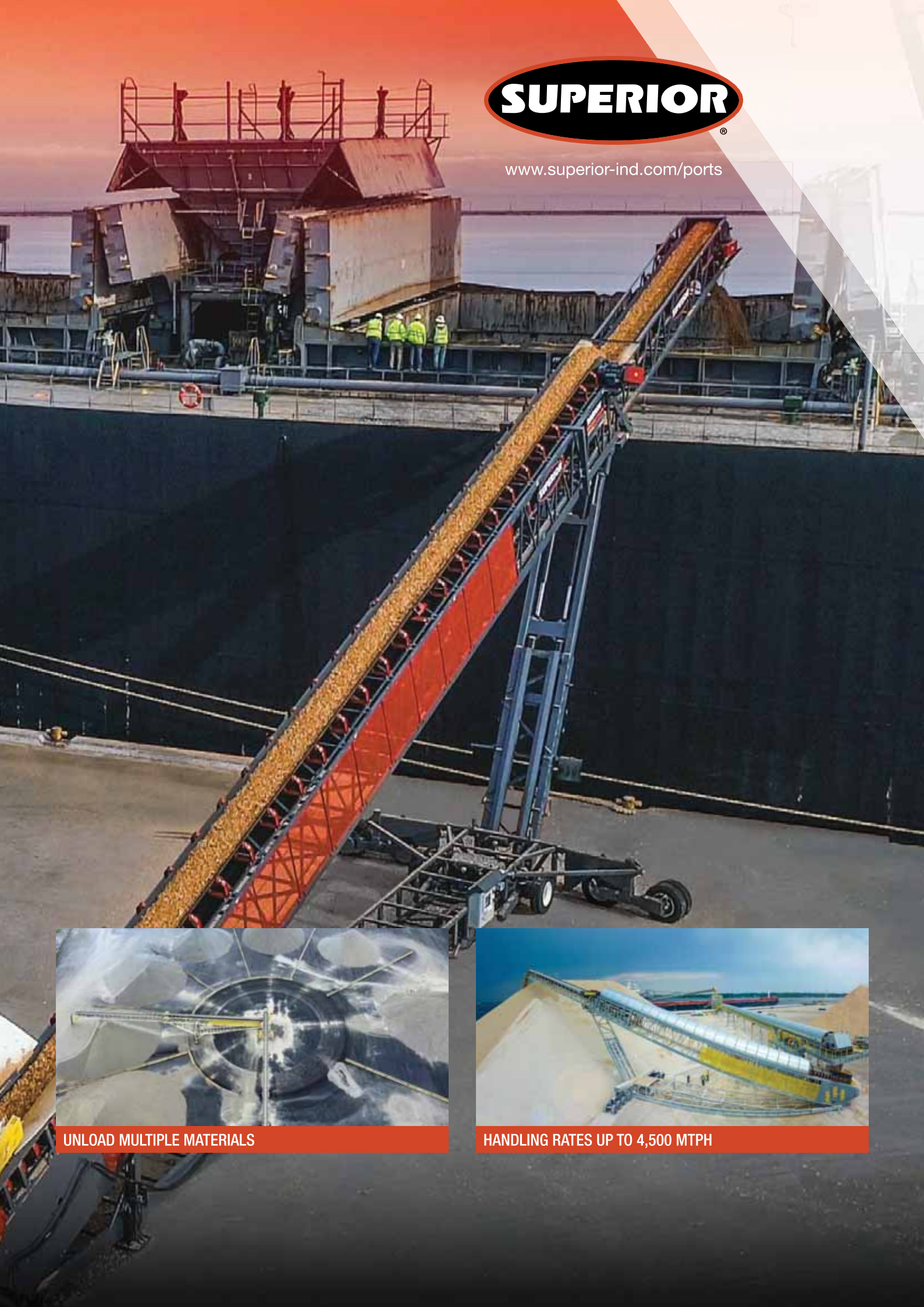


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HANDLING RATES UP TO 4,500 MTPH

## Golfetto Sangati's Transload offers low energy consumption and dust control

Golfetto Sangati develops, builds and installs turnkey plants for durum and wheat mills, maize mills and rice mills. It also provides a wide range of shiploading and unloading systems, and storage for raw materials and finished products.

The company has 90 years of experience in advanced technologies for the handling, cleaning, calibration, selection and storage of seeds and other free-flowing or not free-flowing commodities such as wheat, corn, barley, soybean, sunflower seeds, rapeseed, coffee, rice, soy meal and other similar products.

### SHIPLOADING TECHNOLOGY — TRANSLOAD

The Transload is a mechanical shiploader designed and manufactured in the Italian offices and factories of Golfetto Sangati. Each piece of equipment is customized in partnership with the client in order to comply with technical and operational requirements as well as specific site characteristics.

Transload can load vessels up to 120,000dwt and can be stationary or mobile on rails or wheels. The capacity ranges from 300tph (tonnes per hour) to

## Transload: statistics

The Transload mechanical shiploader from Golfetto Sangati is a modern, high-tech machine that offers a range of capabilities:

**MAIN FEATURES**

- ❖ for vessels up to 120,000dwt;
- ❖ fixed or mobile on rails or wheels
- ❖ handling capacity: 50–2,000tph;
- ❖ Golfetto Sangati in-house-designed self regulating dust suppressor system also for directing and distributing the product flow; and
- ❖ full remote control system.

**PERFORMANCE**

- ❖ very low energy consumption in operation;
- ❖ peak capacity 10% to 15% higher than rated capacity;
- ❖ extremely versatile during operations thanks to the wide range of movements allowed and to the equipment installed onboard.

2,000tph when handling cereals and a wide range of other free-flowing materials as well as meals, handled with chain conveyors or belt conveyors depending on the quay layout and customer requirements.

### RELEVANT FEATURES

- ❖ very low energy consumption in operation;
- ❖ peak capacity 10% to 15% higher than rated capacity;



*Golfetto Sangati Transload shiploader (photo: GEA).*



# DESIGNED, ENGINEERED AND BUILT WITH 90 YEARS OF EXPERIENCE AND EVOLUTION

Golfetto Sangati is an Italian company designing, building and installing turnkey equipment for grain handling and milling. This strong industrial reality is born from the merger of three historic Italian brands: Golfetto, Sangati and Berga. The company fulfills the market demand in a competitive way and with state-of-the-art technologies based on research, experience and in-depth technical knowledge.

Golfetto Sangati is a reference point for the design and construction of complete port systems for loading and unloading ships. The company designed and built more than 50 port systems all over the world and plays a primary role in technological advancement from the first pneumatic ship unloader to the more advanced mechanical loaders and unloaders.

The company supplies a large range of handling, processing and storage, loading and unloading systems on tires or rail with a capacity of 50 to 2,000 tons per hour implementing the best technical principles.

A COMPANY OF

*Golfetto Sangati dust suppressor system (photo: GEA).*



- ❖ extremely versatile during operations thanks to the wide range of movements allowed and to the equipment installed onboard; and
- ❖ advance loading regulation system that makes it possible to operate in the best conditions in terms of pollution (noise and dust).

#### KICK-IN KICK-OUT SYSTEM WITH SPECIAL DUST SUPPRESSOR

A slewing ring is driven by an electric geared motor on the upper part to rotate the dust suppressor to a maximum 180°, according to the loading angle.

The loader works as a braking box, to slow down the flow; when in kick-in or in kick-out, the spout is rotated downwards to push the product towards the sides of the hold.

The lower part of the suppressor is provided with an adjustable flap which automatically sets its opening according to the flow of product to form a plug of product at the extremity which stops the dust. Ceramic tiles are used as lining at the points that are more exposed to wear.

- ❖ reducing dust;
- ❖ environmentally friendly;
- ❖ efficient and fast shiploading performance; and
- ❖ reduction of total time to load the ship (15–20%).

#### NEW TECHNOLOGY

In 2017, Golfetto Sangati developed a fixed loading system with multiple loading booms in two main versions. The first is dedicated to small-capacity installations like river ports (from 100–500tph for each boom); and the second is dedicated to very high capacity installations (from 1,500–3,000tph for each boom). The system is a cost-effective solution suitable for loading very small to very big ships.

#### TRANSLOAD RECENT REFERENCES

- ❖ The project in the **Port of Yuzhny** (Ukraine) includes the design, manufacture, delivery and start-up of a new shiploading terminal. It includes

one Transload mobile shiploader rated at 2,000tph with kick-in kick-out system, with conveying route inside the machine composed of belt conveyors (width of 1,800 mm). Start-up of the facilities is planned for the fourth quarter of 2018.

- ❖ **Barcelona Port Project (Spain):** supply of one Transmec ship-unloader (600tph) for soya beans; it includes also a shiploading boom for soya meal (200tph). Start-up of the project is expected to take place by the first quarter of 2019.

#### GOLFETTO SANGATI EXPERTISE

Golfetto Sangati can offer its clients extensive expertise in the design and engineering of integrated technologies lines for grains and grain based food.

This expertise, together with decades of experience in grain handling and milling, is fundamental in enabling the company to propose the most suitable solution in terms of best technology and of optimized investment profitability, considering the input and the output required by the client for the construction of loading/unloading plants and full grain handling terminals.

Golfetto Sangati can supply the shiploader with all the related equipment needed on the quay like trolley, enclosed or open belt conveyor and the steel supporting structure.



*Golfetto Sangati Transload 2,000tph (picture: GEA).*



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# iSAM advanced anti-collision system with optional autonomous operation



Overlay of real-world scene and 3D scan data acquired by ship model system.

### THE INDUSTRY

Bulk export and import terminals typically have extreme levels of equipment utilization. At most locations, the equipment is utilized 24/7, as minutes of downtime create a considerable impact on the profit margin. One of the major business risks is the breakdown of critical equipment. A common, worst-case scenario is mechanical damage to a shiploader caused by a collision, e.g. with the superstructure of a ship. The protection of those valuable assets is therefore a top priority, second only to the safe operation of the terminal.

### THE TASK

In general, most shiploaders are equipped with simple sensor systems such as microwave barriers or pull-cords along the boom to prevent collisions between the boom structure and a possible obstruction in the work area of the machine. These systems are designed to stop critical movements but not to predict collisions or

to alarm an operator before a collision happens. For both the manual operation and specifically for a fully automated operation of a shiploader, it is crucial for the automation system to “see” in advance a collision hazard and to be able to calculate future machine movements to prevent collisions. Therefore, sensor and evaluation systems must be implemented that:

- ❖ work reliably in an industrial 24/7 all-weather production environment;
- ❖ provide the required accuracy to detect typical obstructions such as light towers, radar masts etc.;
- ❖ require minimal maintenance;
- ❖ are suitable for ship sizes ranging from small barges to Chinamax vessels, including ships with deck cranes and butterfly hatches;
- ❖ seamlessly integrate into existing machine control systems;
- ❖ visualize ship-model and collision information in the operator cabin or at a remote control centre; and

- ❖ support the operator in perception of environmental elements increasing his situational awareness.

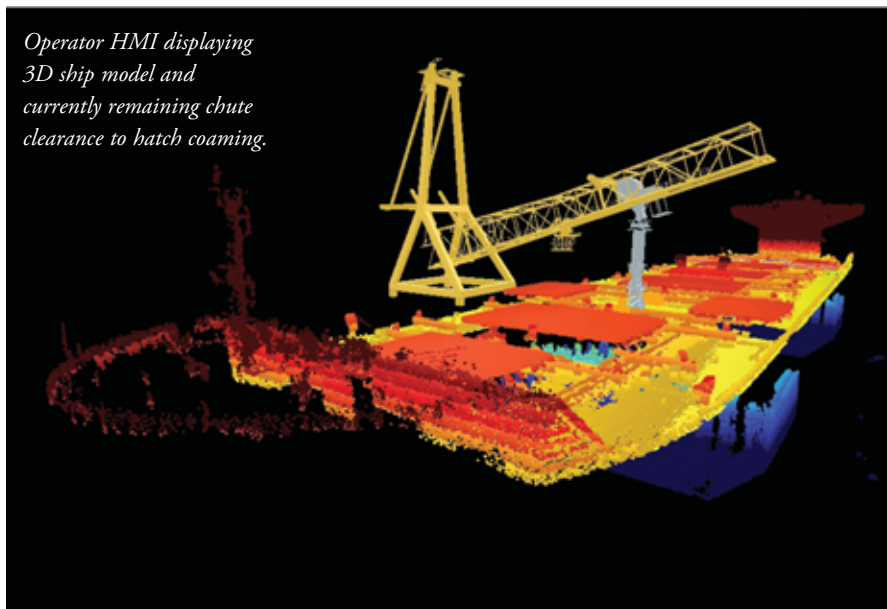
### THE SOLUTION

iSAM has developed and implemented a sensor and evaluation system which enables a shiploader control system to obtain complete information about its own position and also of all other objects in the vicinity.

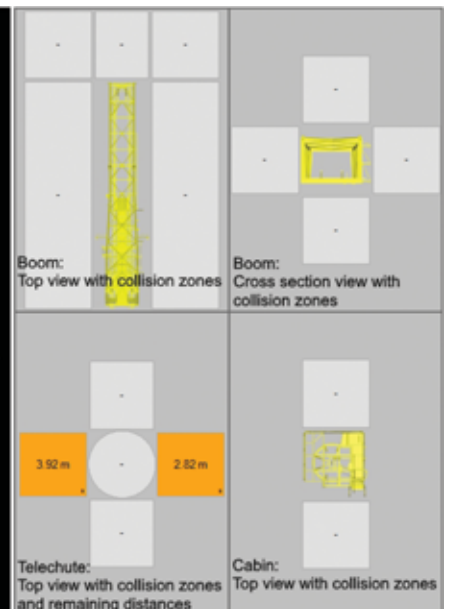
For the first time, this allows for an effective protection of the shiploader boom in manual mode. It also creates the foundation for remote or an even fully automated operation. To do so, the system integrates data from two main sensor components:

- ❖ 3D laser scanning system for building a virtual model of the machine’s environment; and
- ❖ RTK-GPS system for machine positioning.

The system continuously builds and



Operator HMI displaying 3D ship model and currently remaining chute clearance to hatch coaming.





updates a three-dimensional ship model which is calculated from laser scan data and georeferenced by RTK-GPS position measurement. It allows configuring additional zones for either protecting the boom or individually moving structures such as an operator cabin or a telescopic chute. Should the machine be equipped with a shuttle, the related zones are automatically adjusted to match the actual boom length.

On the basis of the acquired 3D ship model, the system reliably detects deck obstructions such as cranes, light poles, the ship's bridge or open butterfly hatches posing a collision hazard to the operator cabin, boom or telescopic chute.

The system uses defined slow-down and final-stop zones around these structures for object detection. For each zone, it provides the distance to the closest detected collision hazard as well as a stop signal in case the obstruction violates the defined final-stop zone to the machine PLC.

The system provides all necessary data to the machine control system to ensure a safe stop of the shiploader before a collision occurs.

A standard industrial PC is used to display the 3D model in the operator cabin or a remote control room. The iSAM visualization client provides the following main views:

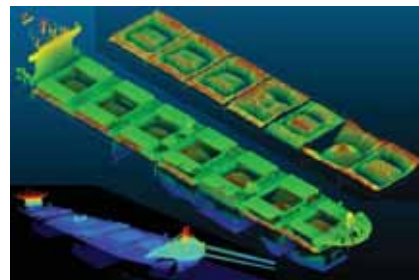
- ❖ 3D ship model in a pan/tilt/zoom view;

- ❖ overlay with machine 3D CAD model;
- ❖ virtual cameras providing dedicated views;
- ❖ precise position of hatches;
- ❖ highlighting of collision hazards based on current data;
- ❖ material distribution within a hatch; and
- ❖ distance and direction of nearest collision hazard.

The iSAM advanced anti-collision system can be upgraded to facilitate fully automated shiploading. This system utilizes the 3D ship model data and hence makes it possible not only to control the entire loading process from a remote location but also provides an unprecedented level of automation, enabling one operator to easily control several shiploaders from a central control room.

#### THE BENEFIT

The system provides a comprehensive protection of the complete boom structure by providing collision hazard information to the machine control system as well as to the operator. Optionally, it can be used to fully automate a shiploader, running several shiploaders from a central control station at a remote location. The technology is already operational and field-proven over many years in numerous bulk — mainly coal and iron ore — export and transshipment terminals in Australia and Europe.

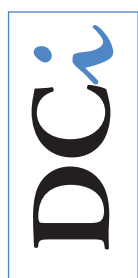


*View of combined vessel scan data and simulated product distribution for optimization prior to loading.*

#### ABOUT THE COMPANY

iSAM AG, Gesellschaft fuer angewandte Kybernetik, located in Muelheim an der Ruhr, Germany, develops and implements automation solutions that enable industry, commerce and service suppliers to increase their performance. iSAM's team includes specialists from the engineering, computer science and physics sectors as well as business economics, focusing on increasing customer value.

The company's customers can be found all over the world and in almost every industry, such as mining, bulk handling, transport and logistics, steel and metal manufacturing and processing, tube welding and pipeline construction, mechanical engineering and plant building, electronics and aerospace.



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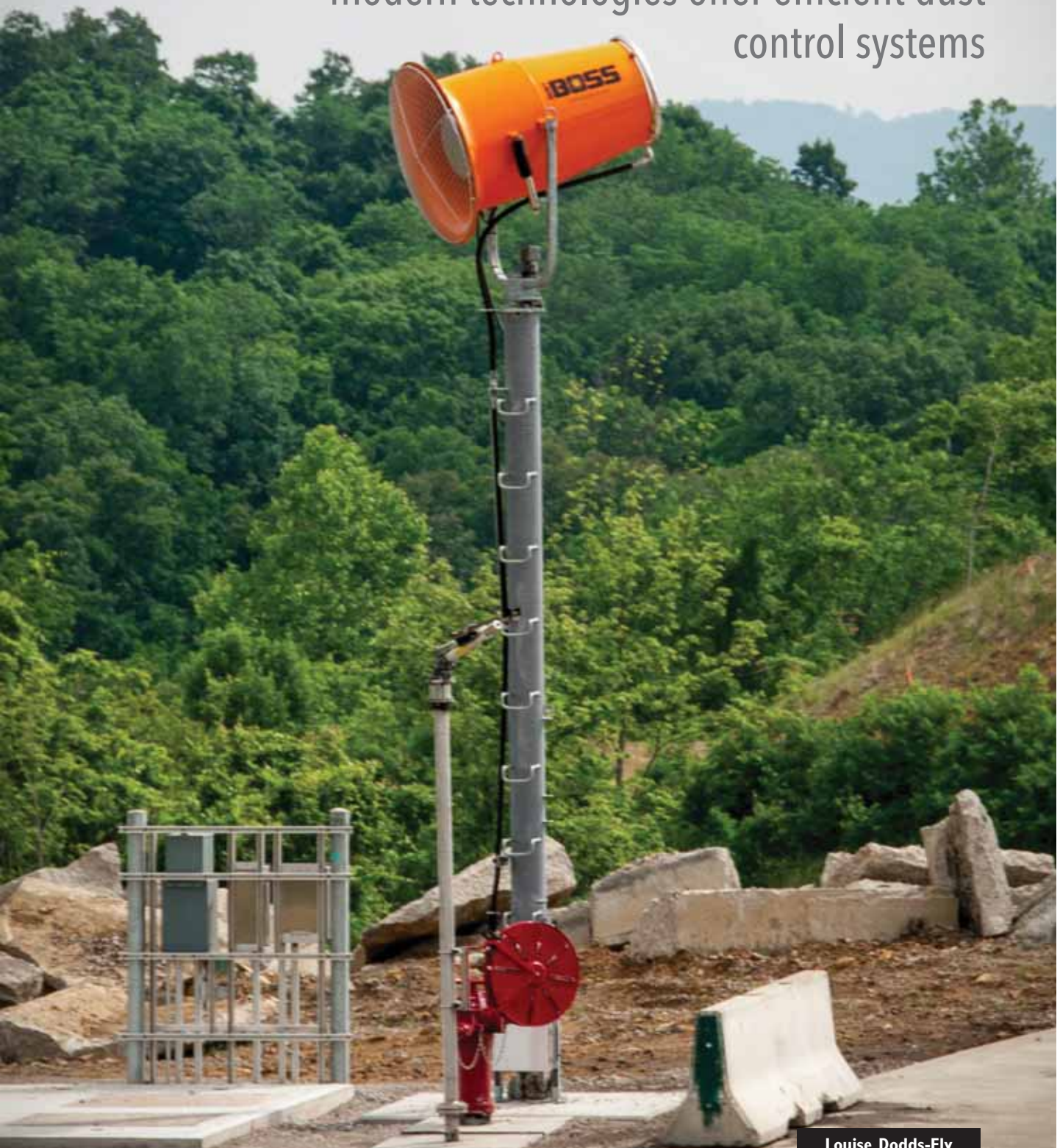
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*The tower mounts can deliver a focused mist right to the areas where dust is created.*

# Targeting dust

modern technologies offer efficient dust control systems



Louise Dodds-Ely

## Tower-mounted dust control extends reach, improves aiming

A global innovator in open area dust control has introduced a new addition to its family of tower-mounted units, a massive suppressor that can project an engineered

mist over a distance of more than 100 metres (328 feet), dramatically extending droplet hang time and range, while delivering more precise aiming.

Complementing a product line that already includes two existing tower-mounted units, the new DustBoss® DB-100 Tower produces millions of 50–200 micron



# DUST FREE LOADING



**Leading the way with innovative dust free loading solutions for rail, ship, and barge loading of bulk materials at terminals and port facilities throughout the world.**



**DUST CONTROL AND LOADING SYSTEMS, INC.**

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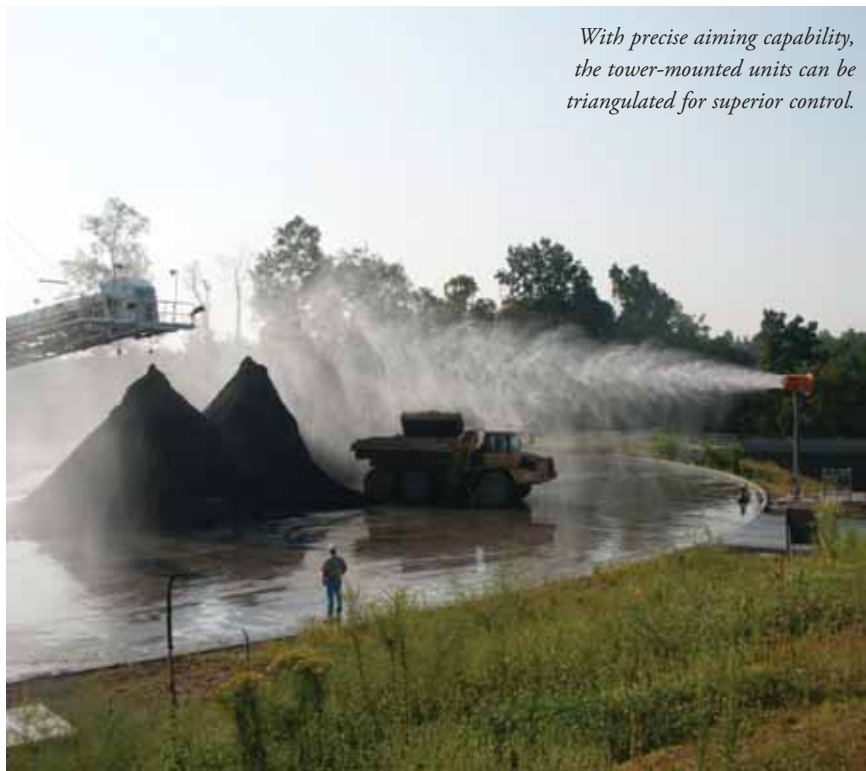


droplets per minute — which can be targeted directly at dust-generating activities — helping large commercial operations achieve superior control and prevent particles from migrating off-site. The huge atomized misting cannon can be specified on a tower as tall as 30 feet (9.1 metres) for a proven turnkey dust suppression solution, with a fraction of the water usage of hoses and sprinklers.

BossTek™ developed the line-up of tower designs to address operations that can benefit from the ability to target specific dust-generating activities, as well as large facilities needing even greater range and coverage areas. They are well suited for port facilities, slag handling, aggregate processing, recycling operations and coal handling.

“The tower mounts can deliver a focused mist right to the areas where dust is created, suppressing airborne and ground-level particles before they have a chance to migrate,” commented BossTek Sales Manager Mike Lewis. “This allows the DustBoss units to concentrate virtually their entire output directly on the source of the problem.” Designed to withstand wind loads of at least 100mph, the towers are constructed of carbon steel pipe, with hot-dip galvanizing to resist corrosion.

Once installed, users have two options for raising and lowering the tower. The manual jack has a long rotating handle attached, allowing operators to change the height from the ground. When fitted with the optional electric jack, changes can be made via the control panel or remote control unit. With motion limits set by the software, the operator simply activates the jack until it reaches the desired position, allowing quick and easy adjustments to



*With precise aiming capability, the tower-mounted units can be triangulated for superior control.*

accommodate weather changes or specific work activities.

The heavy-duty DB-100 design features flange-mounted towers, which can be secured directly into concrete. The large diameter allows hoses and power cords to be routed inside for protection and a ‘cleaner’ appearance. Climbing rungs, work platforms, booster pumps and additive metering systems are all available as options.

#### A FAMILY OF THREE

The DB-100 Tower joins two other designs that have already proven successful in a wide range of applications. The DustBoss DB-60 was BossTek’s flagship model for

over a decade, until engineers perfected the larger design. The DB-60 is based on the same atomized mist technology, with an industrial-strength 25HP motor that generates 30,000cfm (nearly 850 cubic metres per minute) of air flow. A 10HP (7.5KW) booster pump elevates water pressure in the DB-60 as high as 200 psi for outstanding particle suppression. Like the rest of the tower-mount family, it can be outfitted with a dosing pump to accurately meter in dust/odour-control additives.

For smaller operations, the DustBoss DB-30 Tower outperforms its size, capturing dust particles more effectively than many larger machines. Like its bigger cousins, it features a ring of 30 specially-designed nozzles that atomize the water supply to droplets between 50 and 200 microns in size for maximum particle attraction.

On all three models, the ducted fan design has an adjustable throw angle from 0–50° elevation and standard oscillation up to 359°. With a range of more than 30 metres (~100 feet), it delivers exceptional coverage from a standard 5/8” garden hose.

Because of its compact size, the DB-30 can be an extremely effective solution for indoor locations or confined spaces. The machines come with a pre-filter featuring quick cam release for easy access, and they can be set up to run potable or non-potable water.

*The designs can be secured in concrete or mounted on shipping containers, platforms or existing structures.*



## Vortex expands markets into Czech Republic & Slovakia

Vortex Global Limited, a solids and bulk handling components company — which has great expertise in the control of dust emissions — has announced the appointment of MillTech CZ sro as its representative agent in Czech Republic and Slovakia.

This partnership allows Vortex to formally extend its products and services to reach new markets, as the

company has not previously held representation in Czech Republic and Slovakia.

MillTech CZ sro is active in many industries, including food, chemicals, pharmaceuticals, and crystalline substances, among others. MillTech CZ sro seeks to establish strong relationships with Vortex customers through outstanding after-sales service

and technical support.

“Our team is very happy to begin working with Lukáš and Tomáš in the Czech and Slovakian markets,” explained Laurence Millington, managing director at Vortex Global Limited. “We look forward to longstanding and fruitful collaboration as we grow Vortex sales presence in two countries filled with untapped potential.”

To further customize a dust solution for individual customer sites and conditions, any of the fan-driven units can be modified to address specific particle sizes or service environments. “In some applications such as slag handling, the dust particles can be so small that they are more effectively managed with smaller droplets,” Lewis observed. “In other situations, reduced flow may be preferred to protect moisture-sensitive materials.”

To maximize dust capture, the company can apply its Variable Particle Sizing (VPS) technology to match the droplets and water delivery to the dust particle size. “The most effective suppression takes place when the dust particles and droplets are roughly the same size,” he reminded.

The ability to network multiple machines and/or automate the on-off cycles can also be a big advantage to large operations. “Automated units can be operated from a single hand-held remote

to conserve resources and avoid oversaturation, with the units running only during dust-generating activity,” Lewis explained. The radio-powered remote control allows rapid start-up or adjustment of the machines by a single operator, without any manual contact.

In fully-automated systems, the network can even be equipped with sensors that track wind and weather details, with customized software and programmable logic control. Driven by proprietary software, the resulting ‘intelligent’ systems can be programmed to manage start/stop cycles based on dust monitor readings, motion sensors or weather input. The technology allows users of DustBoss equipment to automatically adjust elevation, oscillation range and other features on any number of machines to improve suppression efficiency and free up manpower for other tasks.

The tower units provide a versatile,


customizable dust control solution. Spraying the worksite from above, they help prevent nuisance particles from entering the air stream, greatly reducing the possibility of fugitive dust. With the number of tower sizes and available options, the systems can be customized to suit the needs of specific applications and locations.

BossTek is globally recognized and respect in dust- and odour-management solutions for ports & shipping, mining, rock and aggregates, demolition, recycling, food processing and other applications. The company’s DustBoss and OdorBoss® product lines help reduce labor costs vs. manual sprays, freeing up manpower for more important tasks. The automated units also use less water than hoses and sprinklers, with some customers realizing payback in less than six months and netting an annual cost savings of more than \$50,000.

*The new DustBoss® DB-100 Tower produces millions of 50–200 micron droplets per minute.*







« SHIP & BARGE LOADING FOR THE »

# GRAIN INDUSTRY



"The most critical features of ship loading equipment are reliability and environmental safety. Nowadays, ports worldwide consider pollution prevention a primary objective – paying special mind to reducing dust emissions and preventing cargo overflow or spillage. To address these concerns, it is critical to incorporate sophisticated engineering controls and dust control measures capable of fulfilling the highest environmental standards."

– Mark Schaberg P.E., Chief Engineer, Vortex

## FAST & EFFICIENT LOADING.

When loading dry materials into bulk carriers, travel distance, product dispersion and loadout speed are of primary concern. The Vortex Ship Loading Spout is specifically designed for loading efficiency. Capable of load rates over 113,510 bushels | 141,260 ft<sup>3</sup> | 4,000 m<sup>3</sup> of grain per hour, which averages 1 ton per second, the Vortex Ship Loading Spout is among the world's fastest loading solutions. It is also designed to capture fugitive dusts and reintroduce them back into the load, to reduce product loss and waste. This improves profitability.

Learn more about Vortex Loading Solutions at

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





## Dustcruster®: keeping coal under control

Den Bakker Dustcrusting technology b.v., (dbd global) specializes in dust control and prevention. The company originally started in 1948 and is now successfully active with Dustcruster® technology on many a site and all over the world. It is very popular at coal handling installations, but is also suitable for use with other commodities, such as petcoke, iron ore and similar products.

Den Bakker Dustcrusting technology b.v. specializes in the control of dust, not only by cleaning areas that are already dusty, but also, and most importantly, by preventing dust from becoming a problem in the first place.

Being heavily involved in this matter as a contractor for some 30 years, the company has developed several solutions to help with dust control and prevention, including a range of specially designed spraying vehicles, each having particular capacities and performances to suit the needs of a specific site or condition.

The constant desire to improve led to the development of a very effective method to control dust, far better than continuously spraying — and wasting — pure water: the Dustcruster® technology.

### SOLUTION

DBD global has a solution for tackling dust problems commonly connected to storage and handling of large stockpiles of coal.

The product is called Dustcruster dry® and consists of a selected blend of several types of cellulose fibres pressed into pellets. The advantage of using pellets instead of ready-mixing product is that it can easily and cost effectively be transported and stored as dry bulk or in FIBCs (big bags) to the actual site where it is needed.

Once on site, Dustcruster dry® can then be dissolved into the sprayable product and transforms into Dustcruster liquid® by adding water and using dbd global's special mixing installation.

The next step is to spray Dustcruster liquid® employing purpose made spraying trucks to cover the coal stockpiles, hence creating a tough and long-lasting and clearly visible white crust which will last for a long time, even in tough atmospheric conditions.

One FIBC contains approximately 800kg of Dustcruster dry® which, once blended with the required amount of water, translates into 3,200 litres of Dustcruster liquid®. The maximum effective solution is three litres of



*Picture after very heavy rainfall (more than 100mm in one night).*

Dustcruster liquid® per m<sup>2</sup> for crusting petcoke, but for crusting less dusty materials the company recommends only two litres per m<sup>2</sup>.

As mentioned, the purpose built spraying trucks are required to successfully cover the coal stockpiles creating a tough and long-lasting and visible crust.

Dustcruster® is an inexpensive and environmentally friendly and natural product, not requiring special precautions to store or use and not affecting fauna or flora. Normal rain does not affect its effectiveness whatsoever. Even with very heavy rainfall (that is more than 100mm in one night) there is still a tough and long lasting crust of Dustcruster®.

Only after digging or disrupting the stockpiles is it necessary to repair the crust by spraying on a new layer at the clearly visible disrupted area.

Dustcruster liquid® is also used in near zero temperature conditions. In these circumstances, electric heaters are installed in the mixing tank to allow the spraying process to be performed in winter conditions. The company sells and rents the mixing containers, depending on geographical location and need.

For the spraying of Dustcruster liquid®



*The DBD global Demo team is always ready to perform a live demo.*

the purpose made spraying trucks are required, mostly agri-tractor towed.

### IT IS CLEARLY VISIBLE

A major feature of Dustcruster® is the fact that it is clearly visible. It is white so it can be seen miles away. Environmental Inspectors are able to easily judge the efforts a terminal has undertaken.

### DBD GLOBAL DUSTCRUSTING DEMO TEAM

DBD global has a team, always at the ready to come over to prospective customers' sites, with everything required to perform a live demo on the stacks of their choice.

For this purpose dbd global has two options and will select either the fully autonomous system, which it brings on its



*Not the Swiss Alps in winter time, but a major bulk terminal in a seaport in Western Europe in the summer time.*



Wagoncruster



semi-trailer lowloader, or, for overseas destinations, the company can despatch its containerized kit. In both cases the demo is performed by its specialized team.

### WAGONCRUSTER®: CONTROLLING DUST COAL TRAINS

Dust creation during transport of coal and similar products by train is also a matter of concern. Using Dustcruster® at the loading station solves this problem. The crust safeguards the dust particles from being lifted by the wind during transport. This automatic system which is called Wagoncruster® was developed as far back as 2007 and is still successfully used to full satisfaction of the customers, without interference of the filling process.

### CONTROLLING DUST WITH FOAM DBD FO 312®

With some dust-prone products, it is not



With foam dbd FO 312

appropriate to use water as this may affect the product quality or hurt the further processing. For such applications, dbd FO 312® was created.

In a special foam generator, with 2 litres of dbd FO 312® and 98 litres of water a staggering 5,000 litres of foam is created.

Foam, having a larger surface will envelop around the dust particles more easily and keep the area free of dust.

Depending on the actual activities performed the foam can last anything from three to 12 days.

An additional benefit is that huge savings on water is achieved.

### COMPETITIVE PRODUCTS

Typical products proposed by other companies are polymer based, but most of The customers of DBD Global, after first having tried the polymer products and then trying Dustcruster® are sufficiently satisfied to continue using Dustcruster®



Without foam dbd FO 312

exclusively. Several comparative tests have shown that Dustcruster® contains the dust, is long-lasting, clearly visible, environmentally friendly and price worthy.

### EXTENSIVE EXPERIENCE

Den Bakker Dustcrusting technology b.v. has gained vast experience in the control of outdoor dust. The company uses very advanced systems, stationary as well as mobile, which can operate under the most severe conditions. Frost and strong winds present no problems for the company's equipment.

Den Bakker Dustcrusting technology knows that each environmental problem needs its own approach and solution, and it enjoys the challenge of developing appropriate solutions for its customers, round the clock, seven days a week.

This commitment is fuelled by the company's belief that there is a solution to each and every dust problem.

# DUST!

The headache of each terminal operator!

We have the solution:

# Dustcruster®!

For more details, contact:



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The Netherlands  
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Fax: +31 (0)181-399634  
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Mobile: +32 475 69 68 73  
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## Cleveland Cascades: mass flow principle minimizes dust and degradation



*Cleveland Cascade chute,  
loading alumina at  
1,200tph.*

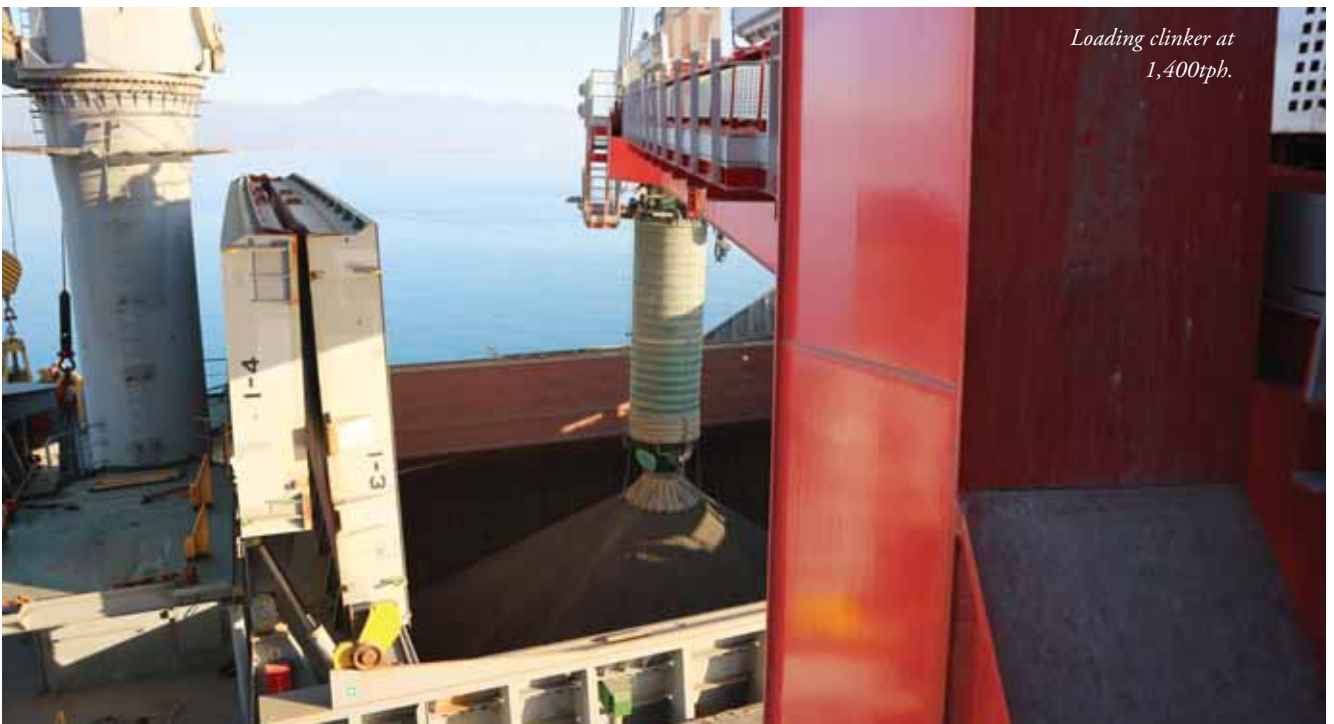
Cleveland Cascades Ltd. of the UK has refined and improved its Cascade chute system over a period of almost three decades now. But the original principle of material control in mass flow to minimize dust emissions remains the same.

The Cascade chute is arguably the world's foremost loading chute when it

comes to dust emissions performance, and this performance is generated by loading bulk materials — ranging from fine powders such as alumina and phosphate, to granular materials such as urea, sulphur and potash, up to large lump materials such as clinker, limestone, coke and coal — all with a principle of mass flow. Mass flow is the

transfer; flow of a material as a single mass, and occurs by gently flowing material in high volume, but low velocity through a controlled and supported pathway.

Loading bulk materials in this way, prevents the particles from separating and becoming air liberated as dust. It also minimizes acceleration, and thus impacting

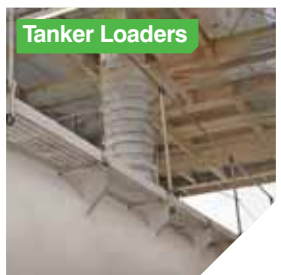
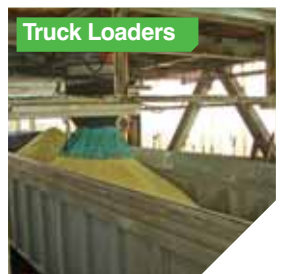
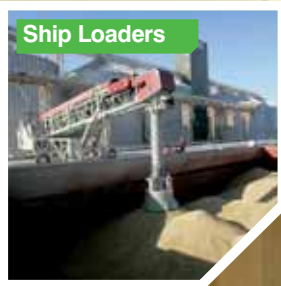


*Loading clinker at  
1,400tph.*



# Cleveland Cascades Ltd

Global leader in bespoke dry bulk loading chutes



## Cleveland Cascades are Specialists in the design and manufacture of bespoke dry bulk loading chutes.

Our bespoke solutions are designed to meet each customer's specific requirements from a tool kit of proven components, utilising the expertise of a team of specialist in house design engineers.

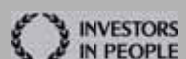
We lead the loading chute industry & set the standard for dust emissions and environmental pollution control in dry bulk handling.

Our worldwide reputation is built on high quality, well-engineered, robust, high performance chutes, backed up by excellent customer service and global lifetime product support.

### Contact Cleveland Cascades Ltd

Unit 22, Dukesway, Teesside Industrial Estate, Thornaby, Stockton-on-Tees, Cleveland, TS17 9LT, United Kingdom Tel: +44 1642 753260 | Fax: +44 1642 753270

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forces as the material flows within the chute, and then upon exiting the chute to a forming pile. This means as well as minimized dust emissions, product degradation is also minimized and internal chute wear is controlled.

Cleveland Cascades Ltd has created a range of Cascade chute sizes, each with a different volume loading rate range for which it can be effectively applied. The Cascade chutes are now offered for handling bulk materials in volume loading rates ranging from 50 cubic meters per hour, up to 7,000 cubic meters per hour, and Cleveland Cascades Ltd. uses 15 different chute sizes to cover this vast

range of rates. In addition to a large range of loading rates, Cleveland Cascades has also developed its system to cover a large range of extended lengths, with the longest Cascade chutes now being over 40 metres in extended length.

Since its initial development and use in 1992, Cleveland Cascades Limited has delivered almost 800 systems around the world for loading a variety of bulk materials in a number of different applications. The Cascade chutes are used for open wagon & railcar loading, open stockpiling and storage building/silo loading — however the primary application is open vessel loading, shiploading. Due the outdoor application,



*Loading biomass, wood pellets at 1,500tph.*



*Loading grains at 2,000tph.*

and typical coastal locations with high winds, open vessel loading with shiploaders can be troublesome in terms of keeping emissions levels down. The Cascade chute offers the cleanest possible method for open shiploading, and essentially a totally clean loading process.

For any given loading application, regardless of bulk material handled, environment or climate, Cleveland Cascades has the appropriate experience to deliver the best possible solution.

Cleveland Cascades supports each of its chutes supplied with original spares parts through a dedicated after-sales department, as well as continuous technical support and on site services using highly trained engineers.



*Loading soda ash, with the shroud cover down, clearly showing the mass flow principle.*



## ADS™ Dry Fog for controlling dust at coal handling facilities



For coal-fired power plants, one of the most challenging things is to control fugitive dust at the point of receipt, writes *Gonzalo Campos Canessa, CEO of the Raring Corporation*.

Over the past 35 years, the Raring Corp have been designing, manufacturing, commissioning and maintaining dust suppression systems all over the world. The company has been applying this experience controlling dust at coal facilities through ADS™ Dry Fog and passive dust control systems in truck dumps to load-outs. It has also broadly applied fog and passive technology into coal-fired power plants' transfer points, reclaim feeders, crushers, and bunker rooms and displacing traditional dust extraction.

The Raring Corporation has been involved in many rotary rail dumps, barge unloading applications and both truck and train belly dumps, in the United States, where it has addressed the containment issues, operation in sub-freezing weather and automated control.

The most recent rotary dump

application incorporates its latest thinking in containment design and control. Located in an upper Midwest power plant burning PRB coal, it is an older link belt dumper with cable drive and four cable-driven clamps. It is situated inside an unheated building fitted with a dust extraction system without modern airflow containment features. The Raring Corporation has also worked together with its licensee in India (FHarley), designing a successful belly rail dump in the state of Odisha. Working conditions were extremely hazardous and visibility was obstructed by dust, both causing maintenance problems and operational delays.

After an initial evaluation, Raring Corporation has the capabilities to create graphic 3-D models of the applications and the containment requirements, which help it and its clients to better understand how to approach the dust problems. Afterwards the company was able work together with the client on a containment design that was both functional and user friendly.

After walking these facilities, having ADS™ Dry Fog systems on the dumpers and material handling equipment, the dust and maintenance problems have been notably reduced, and the working conditions improved.

Most of the rotary rail dumps that have been fitted with the Raring Corp's ADS™ Dry Fog systems had existing dust extraction/baghouse systems. ADS™ Dry Fog can replace bag houses either to improve dust control or to reduce operational costs.

Operating horsepower can drop from the several hundred horsepower of the dust extraction system to approximately 30 equivalent horsepower of compressed air taken from the plant air source. Routine maintenance is now limited to occasional nozzle cleaning and replacement, small valve repair and changing filters. The major maintenance associated with a baghouse is gone.

ADS™ Dry Fog dust control is a proven and cost-effective option for rail, truck and barge unloading facilities using coal.

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## Great things grow from small beginnings

### DSH OFFERS INCREASED CAPACITY UNITS TO MARKETPLACE

After many years successfully supplying high-quality dust control systems, DSH Systems Ltd has added to its mainstay markets of truck, train and storage shed loading, by moving into very high capacity shiplading units.

With its global reputation being built around the 200 to 500tph (tonnes per hour) range and having globally supplied hundreds of these units into a variety of industries loading numerous types of products, DSH Systems Ltd was asked to supply a much larger unit for the sugar industry in South America.

Designing upward from its existing range of models, the company manufactured and installed a DSH7 unit capable of loading sugar at 1,500tph. Based on the overwhelming operational results and dust reduction achieved compared to conventional loading spouts, the same end-user has now installed a DSH8 and DSH9 unit. This takes their loading capacity up to an impressive 2,500 and 3,000tph respectively.

Further projects have been supplied for loading large volume wood pellet applications for both shiplading and storage shed applications.

These units follow on from equipment supplied into the European market for barge loading. DSH Dust suppression hoppers are already loading on a daily basis, products as diverse as fertilizer, soda and palm kernel extract. The DSH units have been installed to a variety of existing shiplading units ranging from smaller mobile belt loading systems, up to major systems with long drops via telescopic spout units.

The company has not forgotten its roots and still supplies a growing number of units into the small to mid-range capacity market, but the addition of these latest high capacity systems adds another weapon to its already strong stock of dust reduction solutions.



*Dust-free loading of wood pellets.*



*For loading phosphate.*



*DSH 7 unit in movement.*



*Loading sugar.*





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At the loading point, the DSH System concentrates the discharge of dry goods as a solid column through free air into any target repository including trucks, rail wagons, storage containers, bags, ships, barges or stockpiles.

The DSH Dust Suppression System uses no utilities and has no internal moving parts.

Winner (joint) of the Inaugural Innovative Technology Award at BulkEx 2006.

Winner of the Dust Control Technology "Application or Practice" at BulkEx 2007.

The DSH System gives you:

- Cleaner, safer working environments
- Dust explosion risk mitigation
- Reduced maintenance, cleaning and dust handling
- Faster, continuous, cleaner loading of trucks and rail wagons
- Enables operation in closer proximity to urban areas
- Reduced product shrinkage.
- Reduced environmental agency concerns

Clients include companies handling fertilizers, grains, stock-foods, salt, sugar, sand, etc in Australasia, USA, Canada, South Africa, South America, and Europe (East and West).



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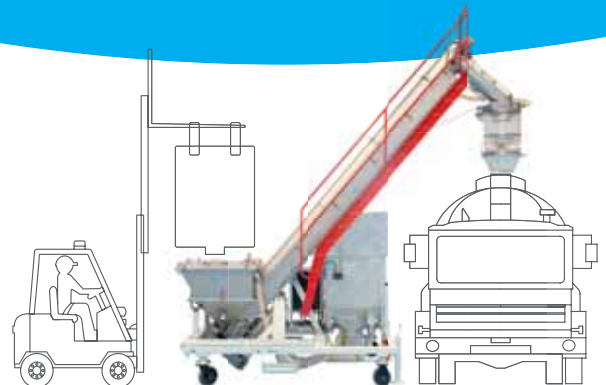
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THE STANDARD IN SCREW CONVEYING

## Clean cement and clinker handling with SAMSON's dust-controlled solutions

SAMSON Materials Handling Limited (part of the AUMUND Group) has been providing equipment for handling and storage of dry bulk materials for over 50 years.

The company has extensive experience in designing solutions for the cement industry particularly in the handling and storage of fuels and raw materials for cement plants including clinker. SAMSON strives to provide solutions that not only deliver high performance but also focuses on minimizing the spread of fugitive dust and the associated risks to the environment. Handling of clinker is a very dusty process; however by employing cleaner technologies, such as the SAMSON Eco Hopper, port operators can reduce environmental damage.

SAMSON mobile equipment is a cost-effective way to equip ports and terminals. It requires a smaller capital outlay than fixed equipment and provides greater flexibility as equipment can be employed at multiple locations, with limited (or normally no third party) approvals and can be moved off the berth when not in use, therefore freeing up space for other activities. As international supply and demand for clinker varies the need for effective and flexible handling and storage options becomes more important. SAMSON mobile equipment is therefore well suited to variable markets as it allows producers to adapt to changes in volume and operate from multi-purpose berths.

### EQUIPMENT PORTFOLIO

SAMSON equipment is employed at multiple points throughout the clinker handling and storage process.

#### SAMSON® FEEDERS (TRUCK UNLOADERS)



Samson® Feeders are an effective method to receive limestone and other minerals for processing into clinker at the beginning of the cement production process. They are also often used to receive clinker for further transportation such as ship loading or as a truck reception unit at a cement



mill. These versatile units can either be stand-alone or connected to onward conveyors or other auxiliary equipment. For enhanced dust control Samson® Feeders are housed in rigid or canvas enclosures and accessed through the entry curtain. Additional dust containment and reduction measures are employed at each transfer point where required.

#### SAMSON SHIPLoadERS

SAMSON shiploaders can be used alone, in conjunction with other SAMSON equipment (mobile feeder/truck unloader or STORMAJOR®) or as part of a comprehensive shiploading system with integrated truck unloading units.

The port configuration and feed system

will determine whether the shiploader is based on a standard, raised or narrow quay chassis design. Cascade-type telescopic trimming chutes are generally chosen for clinker shiploading as they provide a contained fall of material into the vessel's hold. A simple skirting device at the end of the chute reduces any dust generation and helps in the placement of product. If enhanced dust control is required at loading points integrated Samson® feeders including steel enclosures provide full dust filtration on the feeders, transfer points and enclosure to the boom.

#### SAMSON Eco HOPPERS

SAMSON Eco Hoppers (ecological hoppers) are predominantly used for clinker imports as they provide an effective and efficient means of importing dusty materials at scale and with reduced environmental impact. Vessel-mounted or shore based crane grabs deliver the clinker from the vessel into the ecological hopper. As the grab is released integrated filter units located at three sides of the hopper are activated to capture and contain any dust. Dust retained by the filter unit is returned to the material stream by





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PROCESSING STORAGE MIXING FILLING PACKING PALLETIZING LOADING AUTOMATION



high-pressure jets of compressed air. As the clinker passes through flex flaps into the hopper the upward movement of displaced air closes the flaps and contains the dust within.

Using an Eco Hopper for importing clinker helps keep costs down. The high performance filtration unit reduces air consumption and therefore reduces OPEX costs. The filtration units are easy to maintain and by decreasing the chance of clogging, maintenance time and costs can

Eco Hoppers can discharge the clinker to waiting trucks (or onward conveyors) for transport to storage and/or processing. Eco Hoppers provide peak rate discharge via a telescopic loading chute to trucks from 600tph or up to 1,500tph to an auxiliary conveyor.

#### MAJOR CLIENTS

SAMSON Materials Handling has been providing equipment to the cement industry for many years. Clients include

be kept to a minimum.

Eco Hoppers are a viable option for smaller or irregular shaped berths. A compact filter design allows for a smaller hopper size that increases flexibility in location. They can be wheel or rail mounted allowing for easy removal from the berth when not required.

Eco Hoppers are of a robust design with a reinforced tubular shroud and inlet grille to reduce damage from crane grabs. An integrated shroud minimizes the effects of cross winds during grab discharge. The steep angle of the hopper reduces the risk of blocking and wear resistant liners extend the durability of the equipment. Access walkways surround the hopper for easy maintenance.

LafargeHolcim, Irish Cement, Cemex, Southern Province Cement Company, Saudi Cement, Cong Thanh Cement, Cement Industries (SABAH) Sdn Bhd and many more.

#### How SAMSON STAYS COMPETITIVE IN THE MARKET

SAMSON benefits from being part of the AUMUND Group with Subsidiaries and Agents worldwide. With a dedicated research team located in Group Head Office and engineers and service centres around the globe the company keeps up-to-date with the latest opportunities and threats in order to provide the best solutions to clients in the cement industry.

#### RECENT CONTRACTS

There is considerable interest in SAMSON Eco Hopper technology to support clean ports and reduce environmental impact. Recent contracts include an Eco Hopper for the SEA-Invest development of the new bulk terminal at the Port of Abidjan in the Ivory Coast and four SAMSON Eco Hoppers for the Kenya Port Authority in Mombasa.

#### RECENT TECHNOLOGICAL DEVELOPMENTS

Across the entire SAMSON range of products emphasis is given to researching and developing equipment that reduces operating costs and increases efficiency with advanced dust reduction systems. Modularized design and transportation of the new ranges will help the company work towards these goals.



## Sealed and delivered: external skirting mitigates dust, spillage and downtime

Although skirtboard sealing systems have been around for decades and are standard for any efficient conveying system, that doesn't necessarily mean the designs currently in use by most bulk handlers are well engineered, function adequately and promote a safe working environment, writes *Dave Mueller, Product Manager, Martin Engineering*. Maintaining a safe workplace requires installing equipment that consistently keeps walkways clear from fugitive material, prevents dust emissions and allows maintenance to be performed safely without hazards such as confined space entry.

The importance of skirting should be self-evident. Most bulk handling operations have a conveyor belt with vertical loading or a transfer chute, often containing little more than a rock box to slow material on its descent. When tonnes of bulk material hit a moving belt, three things happen: fines scatter in a random direction, cargo shifts as it settles to the center of the belt and dust becomes airborne. A properly designed enclosure can manage bulk solids, but cannot contain all of the dust. Inside a settling zone enclosure, the impact can create turbulent air that seeks the easiest escape from any gap it can find, carrying dust and fines with it. These gaps generally appear on the sides of the enclosure between the chute wall and the belt. Skirting systems address the challenge of containing fugitive dust.

### BELT SEALING REGULATIONS AND HAZARDS

The Occupational Safety & Health Administration (OSHA) in the United States, as well as other government regulatory organizations around the world, put workplace safety rules in place to protect workers from the hazards of dust and spillage. OSHA 1917.48(h) specifically states, "The area around conveyor loading and unloading points shall be kept clear of obstructions during conveyor operations." [1] Airborne dust can also be considered a visual obstruction.

Extensive studies of both underground mines and open-air bulk handling operations indicate long-term exposure to airborne dust can cause chronic lung diseases. Invisible fugitive particulates small enough to penetrate deep into the lungs can also travel long distances and may be able to leave the site line, another violation in most regulated environments.

Even if workers are required to wear respirators in dust-filled locations, outside of the immediate area where it may seem



Figure 1 — scalloping.

safe to remove the equipment, exposure is still possible. Containing fugitive dust within the conveyor enclosure not only protects workers, it prevents gritty particulates from getting into rolling components such as idlers and pulleys, which can cause undue wear and potential seizure, as well as dangerous frictional heating.

As for spillage, OSHA closely monitors the number of conveyor-related injuries that occur during routine maintenance and cleanup, concluding that controlling fugitive material should be viewed as one of the primary elements in reducing hazards and preventing injuries. Spillage can block walkways, inhibit inspection and maintenance, create a tripping hazard and require regular cleanup that diverts vital man-hours. And while cleaning under or around a moving belt is considered to be a serious hazard, it remains a common practice.

In addition, material piling in the loading area can quickly encapsulate the belt and tail pulley. Spillage of just 4 grams (0.14 oz) per hour will result in an accumulation of 680 g (1.5 lbs) by the end of a week. If the rate of escape is 4.5 g per minute, the buildup will approach  $\approx 45$  kg (100 lbs) per week, exceeding 1.8mtpy [million tonnes per year] (2tpy) [tons per year]. With spillage of just one shovelful per hour, the total could reach 227kg (500 lbs) of material every day. That kind of volume can cause equipment breakdowns, foul the pulley face and promote belt alignment issues.

Installation and service of skirtboard systems can also be hazardous, with some designs welded to the inside of the chute

structure, involving confined space entry with a grinder or blow torch to perform maintenance, repair or replacement. According to OSHA, "permit-requiring confined spaces" allow only an "authorized entrant" to perform the work inside the chute, assisted by an "attendant" monitoring the safety of the entrant from the outside and supporting the removal of material from the chute.[2] In some cases, a supervisor must also be present to oversee the project. Explosive dust is another serious hazard, easily ignited by sparks from metal tools and must be thoroughly washed from chute walls to avoid potential disaster.

Aside from the value of the lost cargo, these maintenance requirements demand extended periods of downtime, negatively impacting productivity and labour costs. Properly sealing the chute using modern skirting designs can help avoid equipment breakdowns, improve workplace safety and prevent excessive downtime due to dust and spillage.

### ANATOMY OF A SEALED CHUTE

The components of a well-designed and sealed loading zone will likely consist of a combination of components, including an enclosed loading chute, a heavy-duty belt support system, closely spaced idlers to avoid belt sag, adjustable skirting to contain fine particles, easily serviced wear liners, dust curtains to control air flow, a sealed tail box to protect the tail pulley and exit curtains to prevent release of fugitive dust. The trough angle will change throughout the settling zone, so proper skirt design for adequate sealing is important.

Usually made from natural or SBR

rubber (or specialty formulations for specific applications such as underground mining, food, etc.), the skirting extends down the entire length of the transition enclosure, and is generally tapered at the bottom to match the trough angle of the belt. It is intended to ride the inside edges of the belt to maintain a seal on the enclosure and help trap any fine particles and dust that is not contained by the wear liners and chute wall. Without a wear liner to protect the skirt and chute wall from serious damage by bouncing and shifting cargo, both will degrade and fail quickly.

**SKIRTING ISSUES**

As the skirt edge loses its seal due to wear or belt sag, gaps are created, which can allow material to become entrapped in a ‘pinch point’, causing abrasion that gouges or chafes the surface of the belt down its



Figure 2 — grooves.

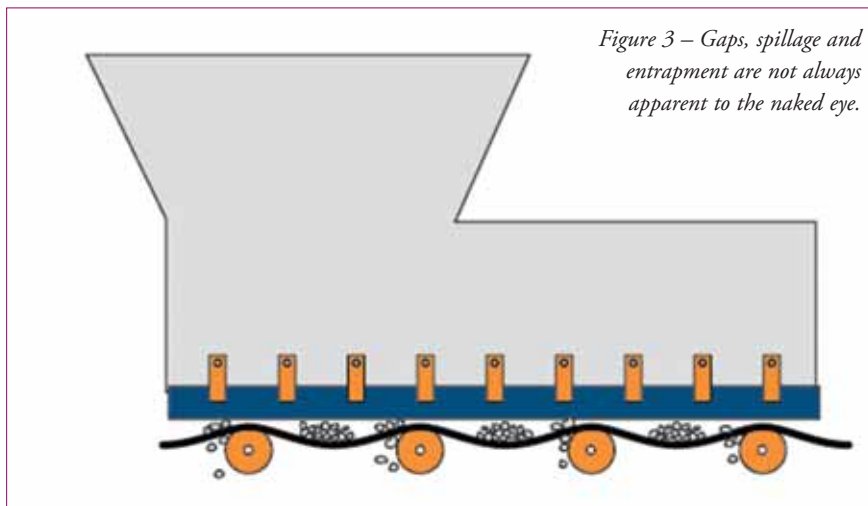


Figure 3 – Gaps, spillage and entrapment are not always apparent to the naked eye.

entire length. Often blamed on pressure from the skirt, extensive study has shown pinch points occur most often when there is inadequate belt support or loading is done before the belt is fully troughed.[3] Some of the major issues that result from entrapment are:

- ❖ scalloping occurs when trapped material forms a high-pressure area between the roller and the skirt, causing excessive wear on the sealing system. [Fig. 1 on pxx]; and
- ❖ grooves can be created along the entire length of the belt under the skirt. [Fig. 2 above].

Regardless of the belt tension provided by the takeup pulley, small amounts of belt sag will occur between the skirt and belt, creating a space for fugitive dust to escape or material to become entrapped. [Fig. 3] This is avoided by using impact cradles or edge support rather than rollers in the loading zone for a more consistent belt plane through the settling zone. By creating

a consistent plane, the straight edge of the skirt is able to retain a tight seal.

**SKIRTING TYPES**

The main skirt sealing configurations are vertical sealing systems; internal wear liner

and skirting; internal wear liner with external skirting; and external wear liner and skirting. There are also some alternative approaches using segmented sealing modules. Each of these come with their unique benefits and issues.

Segmented vertical sealing systems use a series of interlocking sealing blocks installed outside the skirtboard on special mounting plates. [Fig. 4] The interlocking blocks can be manually moved downward, but resist upward movement. However, since some wear disproportionately to others, they are difficult to adjust accurately (leading to scalloping) and are easily over-adjusted (causing premature wear to the seals and belt). Gaps caused by material being forced between the blocks make them prone to material entrapment and leakage of dust and fines.

Internal wear liner and skirt configurations are not usually adjustable

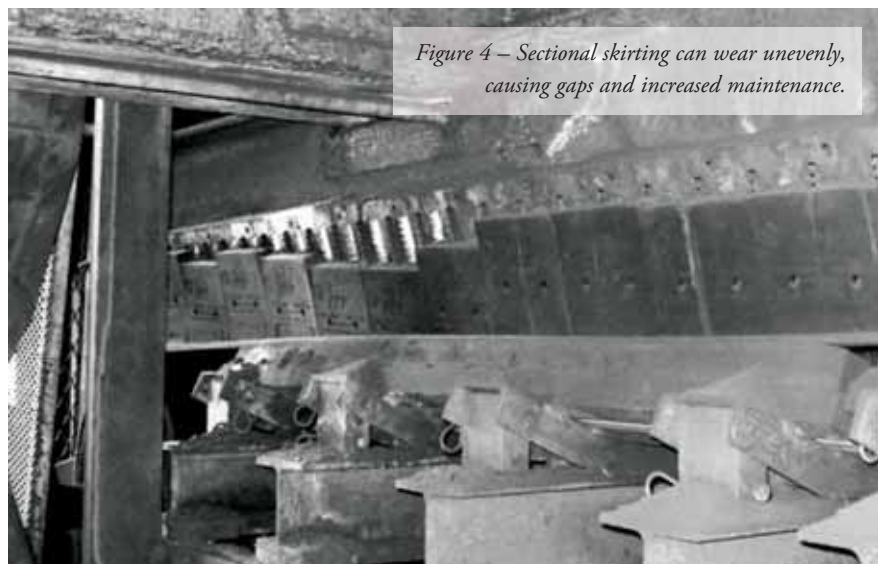
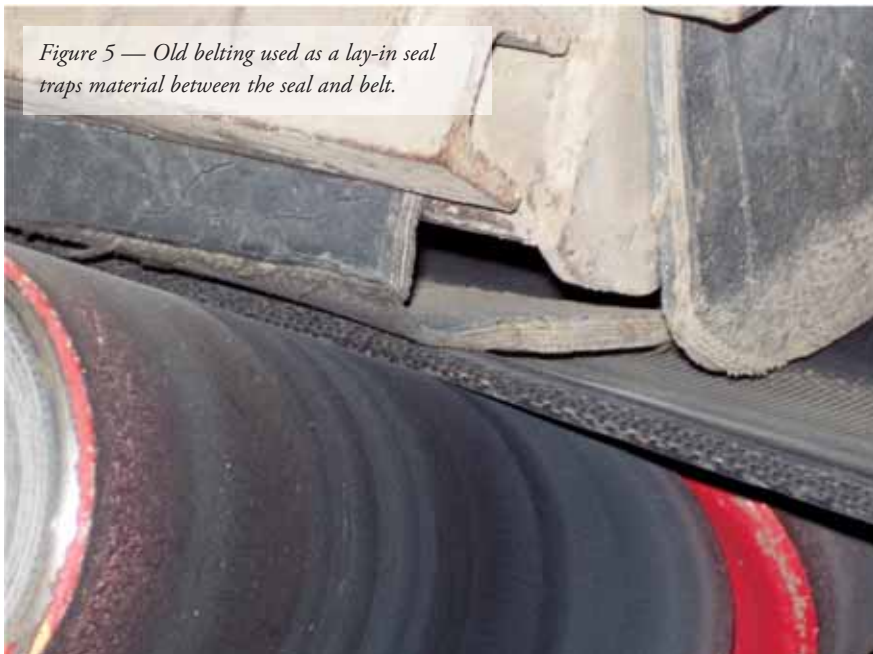


Figure 4 – Sectional skirting can wear unevenly, causing gaps and increased maintenance.



Figure 5 — Old belting used as a lay-in seal traps material between the seal and belt.



standard for decades. It offers a safer and more adjustable solution for skirting, as it is typically held tightly against the skirtboard using an adjustable clamp system that can be accessed from outside the chute. However, the internal design [Fig. 6] can allow some material buildup in the gap between the wear liner and the skirtboard, depending on the size of the aggregate.

External wear liner and skirting configurations place both pieces of equipment outside the chute wall. [Fig. 7] If not originally supplied, this may require some restructuring of the chute, extending installation time. Placing the skirt seal and wear liner outside of the chute makes it easier for workers to perform adjustments more frequently and safely, resulting in a better seal on the belt and less material entrapment, while eliminating the need for confined space entry. Without confined

and require significant downtime and labour to repair, maintain and replace. These activities are generally accompanied by workplace safety issues such as confined space entry and potential exposure to explosive dust. Since internal equipment operates under punishing conditions, wear is rapid and may result in short equipment life compared to other configurations.

A self-adjusting interior skirt features an L-shaped system with an outside assembly — similar to the self-adjusting skirt — with an inward 1.5 inch (38mm) extension under the wear liner that rides on the belt closer to the cargo to increase the range of tolerance for belt mistracking. Old belting should never be used for sealing, as the fabric will trap abrasive fines and wear grooves in the belt. [Fig.5] Even with a deflector style wear liner, cargo will get between the seal and belt, and the pressure of the load will create wear unless the bulk

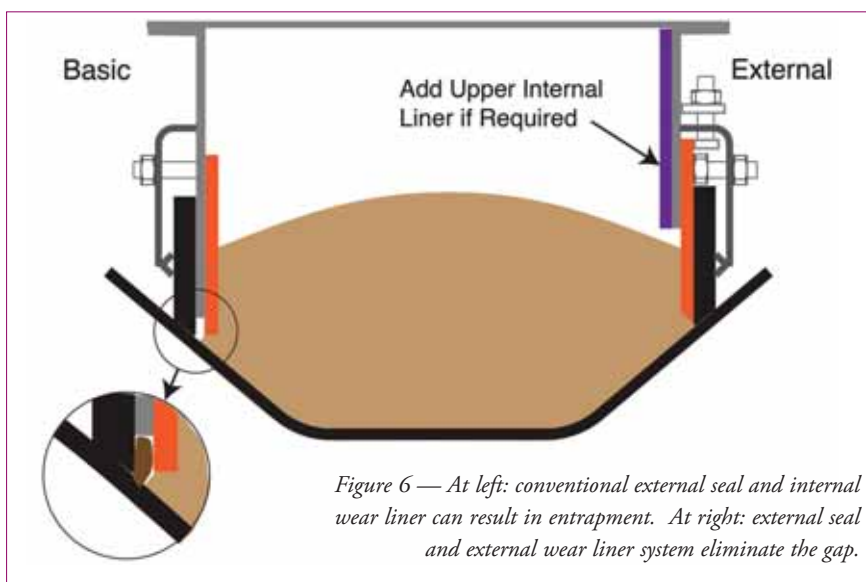


Figure 6 — At left: conventional external seal and internal wear liner can result in entrapment. At right: external seal and external wear liner system eliminate the gap.

material is totally non-abrasive.

The internal wear liner and external skirt configuration has been the industry

space entry, the external design requires minimal tools to inspect, adjust or replace, and in most cases these tasks can be performed by a single worker.

The low profile of the skirt seal assembly needs only a few inches of clearance, allowing installation and maintenance in space-restricted areas. The design of the components drastically reduces scheduled downtime and the potential workplace hazards associated with replacement and adjustment.

**SEALING BY THE NUMBERS**

Innovative skirt designs apply practical engineering for safer and more effective sealing for trough angles from 0° to 45°. They are often made from improved materials to deliver chemical resistance and low abrasion index characteristics for reduced friction on the belt and splice.

Many dusty applications may need skirts

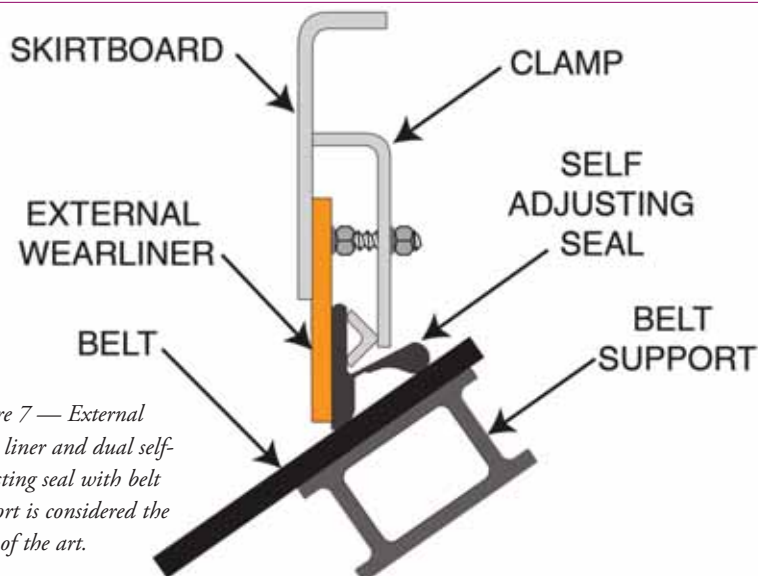


Figure 7 — External wear liner and dual self-adjusting seal with belt support is considered the state of the art.

featuring a secondary “dual seal” that rides further up on the belt angle behind the primary seal to offer an added layer of protection. If possible, experts recommend installing these in continuous lengths with no splices or possible gaps to avoid entrapment. Once the edge is worn, some designs allow the strip to be flipped over, effectively doubling the service life.

Self-adjusting skirting maintains a seal automatically as belt path fluctuates due to its design, without the need for adjustment and only periodic inspection. The use of self-adjusting skirting is also excellent for tight spaces where maintenance may be difficult. A low-profile skirting assembly should need only 6 in. (152mm) of clearance for installation and maintenance in small spaces. For safer and faster maintenance, the clamps securing the skirt may be held in place with linchpins, making it an easy no-tool operation.

**SKIRTING BEST PRACTICES**

The skirt should be considered a safety device first and foremost, protecting the



*Dust will seek out any gap from which to escape.*

work environment from fugitive dust and spillage and therefore reducing the time exposed to hazards while cleaning, with the added benefit of increased efficiency. With this in mind, any manager contemplating a

capital investment in a skirting and wear liner system should consider:

- ❖ Hiring an outside engineer to design the best system for the application.
- ❖ Installing equipment that features external maintenance.
- ❖ Utilizing a skirting strip that extends the entire length of the chute to avoid seams.
- ❖ Choosing skirting material that is free of fabrics, with a lower abrasion resistance than the belt.
- ❖ Installing a self-adjusting system.
- ❖ Choosing the option with the least worker exposure to equipment hazards.

Since skirts are wear parts, it is important that they are easily installed, adjusted, maintained and replaced to avoid dust and spillage, mitigate downtime, improve workplace safety and reduce the cost of operation.

**CASE STUDY**

A port terminal in Indiana handling petroleum coke (petcoke) was experiencing excessive spillage, tail pulley fouling and belt tracking issues on a transfer point from a stacker/reclaimer boom leading from a cargo ship to a conveyor system. [Fig.8] When hitting the belt, the light, chalky substance spilled out the sides of the chute and piled onto the floor, creating a walkway hazard. This required workers to be reassigned from other duties several times per month to clean, increasing labour costs.

Moreover, the spillage was getting onto the return side of the belt and fouling the tail pulley, causing tracking issues. The company attempted to remedy the situation by having a new transfer chute



*Figure 8 - Cluttered stairs and walkways created a workplace hazard.*



built. However, once installed, operators realized that the problem was not with the vertical chute, but the loading zone and settling zone equipment.

Managers invited Martin Engineering to examine the issue and offer solutions. After thorough inspection, technicians installed wear liners, double skirting, and upper/lower belt trackers. [Fig. 9] The wear liner protects the wall, while the double skirting forms a seal that rides lightly on the belt, keeping fines from escaping. The wear liner and skirts are externally mounted for safe and easy maintenance. To maintain a true belt path, technicians installed upper and lower tracking technology and closely spaced 35° idlers for belt support that slide out for easy one-person maintenance. To protect the tail pulley, a plow was installed on the inside of the belt return to deflect fugitive material.

Three Martin technicians and six contractors completed the project over two shifts of 12 and 14 hours. The chute was tested numerous times and adjusted until the optimum trough angle and belt seal were achieved. After several boat loads of material, the customer reported “not a single pellet has hit the deck.” Along with a near-complete elimination of spillage, operators said that the tracking issues were also resolved, and the tail pulley has had no incidents of fouling from return side debris. Moreover, the cutback in labour for cleaning has reduced worker exposure not only to the hazards of cleaning but the trip hazard of pellets on the walkways. The savings in cleanup more than paid for the installation.

## CONCLUSION

For most bulk handling operations, dust and spillage at the loading zone is an ongoing maintenance and cleanup issue. Not only can fugitive material become a safety, regulatory compliance and air quality



*Figure 9 – The external configuration redesigns the chute for more effective sealing.*

issue, equipment life is also affected. Abrasive dust and fines can foul mechanical components, requiring premature replacement. Along with increased labour for cleanup and maintenance, unscheduled downtime can raise the cost of operation.

By installing modern skirtboards that prevent fugitive material from leaving the loading chute, operators can reduce worker exposure to hazards, minimize labour for maintenance and cleanup, improve equipment and belt life and achieve better compliance. The savings on labour and operating costs alone provide a sound return on investment, but the improvement to workplace safety should be the only motivation needed.

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## ABOUT MARTIN ENGINEERING

Martin Engineering is a global innovator in the bulk material handling industry, developing new solutions to common problems and participating in industry organizations to improve safety and productivity. The company’s series of *Foundations* books is an internationally-recognized resource for safety, maintenance and operations training—with more than 20,000 print copies in circulation around the world. The entire 500+ page volumes can also be downloaded as free PDFs from the Martin web site.

Martin employees take an active part in ASME, SME, VDI, CMA and CEMA, and the firm played a pivotal role in writing and producing the 7th edition of the CEMA reference book, *Belt Conveyors for Bulk Materials*. Martin Engineering products, sales, service and training are available from 18 Martin facilities, including factory-owned business units in Australia, Brazil, China, Colombia, France, Germany, India, Indonesia, Italy, Mexico, Peru, Russia, Spain, South Africa, Turkey, the USA and UK. 



*Spillage of fines can foul rolling components, causing them to seize.*



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# Coal handling equipment in focus

*TEHNOROS's Neva shiploader in operation.*



Louise Dodds-Ely

## Coal handling made easy with equipment from TEHNOROS

Russia is one of the world leaders in coal mining. Every year, the region produces more than 350mt (million tonnes) of this high-value resource, about 330mt of which are exported abroad. This makes the country the third-largest exporter in the world market. The remaining amount goes to domestic consumption in heat power industry, metallurgy, other industrial enterprises and households.

The organization of an effective coal transportation and storage system calls for complex equipment, which quite often requires the use of specialized technological complexes. One of Russia's foremost materials handling equipment suppliers is the production company TEHNOROS, based in St. Petersburg. The company has been in business since 1991 and has solid experience in designing bridge and gantry cranes, shiploaders, wagon tippers and storage conveying

equipment used in coal handling.

In Russia, railway transport is most often used for coal transportation. Coal is transported in open railroad freight cars. For the most effective unloading of open cars, special equipment is required: the wagon tippler. The operating principle of this equipment is quite simple; it rotates the car around its axis at an angle of 175°, at which point the coal falls onto the receiving hopper grid. TEHNOROS offers car dumpers with gross capacity up to 140 tonnes.

From the receiving hopper, the coal falls into the feeder and is transported to the consolidation warehouse by means of belt conveyors. For high-performance mechanization of open coal warehouses stacker-reclaimers are used.

The stacker-reclaimer serves for both the stacking of coal, and also for taking cargo from the coal pile for onward

transportation of the coal.

Sometimes special grab bridge, gantry or portal cranes are used for handling coal in coal warehouses. The capacity of such cranes in the grab mode is up to 32 tonnes.

The rising unit costs of coal transportation and processing and for slag removal has increased the importance of the 'quality of coal' factor (determined by the percentage of moisture, sulphur and other impurities). The quality of the coal can be stabilized by its homogenizing before combustion. A special homogenization stockpile is used for this purpose, where coal with different physical or chemical properties is stacked layer by layer with the help of a stacker. Stacking is performed by using either a chevron or roller method. TEHNOROS offers special equipment for homogenization and disassembly of coal pile at closed warehouses.





*The scraper reclaimer is used for continuous download flow onto a stockyard conveyor.*

In rare cases, especially near populated areas, and in order to improve the environmental friendliness of storage, coal is stored in closed backbone warehouses. To move cargo from these warehouses, TEHNOROS recommends the use of a

scraper reclaimer with various modifications, depending on the design of the warehouse: cantilever, portal and semi-portal.

For coal exports maritime transport is mainly used. Using shiploaders from

TEHNOROS is a very efficient way to load into the holds of vessels.

Recently, TEHNOROS supplied its 2,000tph (tonnes per hour) Pechora shiploader, with a telescopic boom, for transshipment of coal to the port of



*TECHNOROS's wagon tippler rotates the railcar around its axis at an angle of 175°, at which point the coal falls onto the receiving hopper grid.*



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*The 2,500tph Pechora shiploader.*



Shakhtersk (with further modernization up to 2,300tph). Such shiploaders are perfectly suited for loading small cargo capacity vessels (up to 15,000dwt), and are excellent, economically viable, high-performance replacements for grab cranes.

Also, TEHNOROS's Neva shiploader, with luffing boom and shuttle on the

conveyor was put into operation in 2017. Such shiploaders make it possible to ship coal at capacities of up to 3,500tph on to vessels of up to 120,000dwt.

In recent years TEHNOROS has been rapidly expanding sales of its equipment to foreign markets. Equipment from TEHNOROS is used in the CIS and South-

East Asia countries. Macrocontracts with countries from Eastern Europe are now coming fruition. TEHNOROS is ready to design and manufacture equipment that perfectly meets the specific requirements of its customer, the peculiarities of its business and the infrastructure conditions of the enterprise.

*TEHNOROS's Neva shiploader offers capacities of up to 3,500tph.*







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Negrini company, established in 1967, specializes in engineering and manufacturing a comprehensive range of grabs and buckets for rope machines and crawler mounted cranes; they are employed to do many jobs. Negrini buckets and grabs are very well-known for quality as well as for the very accurate and skilful engineering work; in fact Negrini supports their clients by analyzing the job to be done and, if needed, by adjusting the standard design of grabs and buckets to enhance their performance once in operation.

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## E-Cranes remain popular for coal handling operations worldwide



With multiple successful operations throughout the world, E-Crane has proven to be a trusted, all-in-one solution for the coal handling industry. E-Crane has been an ideal solution at many ports and terminals for barge loading and unloading, shiploading and unloading, and stockpiling. While each project is different, the modular and flexible design of the E-Crane makes it ideal for any coal handling operation.

### USA OPERATIONS

The history of E-Cranes in the coal handling industry began in Ruhr area in Germany around 30 years ago, but really took off in the United States market. The E-Crane product was brought to the USA in the late 1990s. Since then, the majority of the E-Cranes installed in the USA were utilized for bulk material handling operations along the inland waterways with coal as the primary commodity to be unloaded.

The US inland waterways are one of the most populated areas for E-Cranes, as there are many different ports and

stevedoring facilities that require a high production, reliable machine. Within the US bulk handling market, many of E-Crane's major clients are within the power

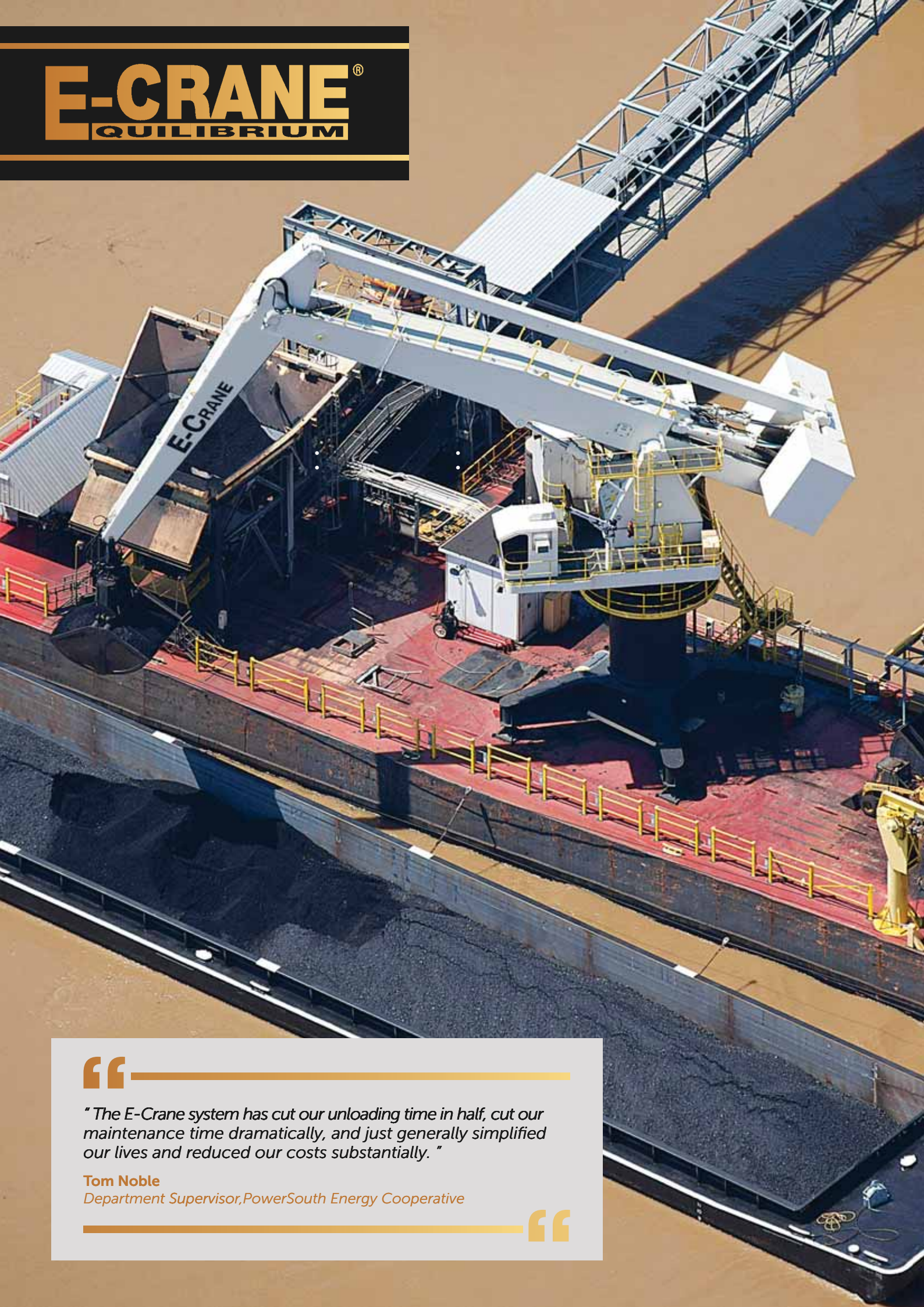
generating sector. E-Crane is an ideal solution for power plants because of the versatility to handle both the fuel for the plant as well as the other materials needed





# E-CRANE<sup>®</sup>

QUILIBRIUM



“

*“The E-Crane system has cut our unloading time in half, cut our maintenance time dramatically, and just generally simplified our lives and reduced our costs substantially.”*

**Tom Noble**  
Department Supervisor, PowerSouth Energy Cooperative

”



# TTS's coal handling experience includes large and small projects

## COAL HANDLING WITH TTS

Since TTS was first established, back in 1993, the company dealt with the design and production of equipment for the transshipment of different bulk commodities. In the past 26 years, engineers from TTS have created many machines, from regular belt conveyors, to sophisticated systems covering the functioning of the entire sea port terminal.

In the last ten years, TTS has completed many projects involving equipment for coal handling. The biggest projects are detailed below.

TTS's coal handling projects started with the supply of conveyors for numerous power stations and coal mines around the globe. The company delivered many kilometres of conveyors, getting the necessary experience and putting important references into the company's project folder.

The company's next step was into mobile coal handling equipment, when TTS designed and supplied two mobile coal stackers for the Port of Vysotsk in Russia. Equipment performance was highly acknowledged by port authorities, which triggered the order of additional machines resulting in a total, to date, of eight units. The stacker has a 25m-long, hydraulically adjusted boom and has a productivity of 600tph (tonnes per hour).

When Riga Central Terminal was faced with the issue of moving to another area in Riga Port, TTS was called



upon to offer a coal handling system that was effective both in terms of performance and price. The company created a fully portable handling system which allowed for the usage of the existing loading/unloading equipment, and ensured the needed capacity of 1,000tph.

At present, the workshops of TTS are running at full capacity to maintain the schedule of production of a 9.5km belt conveyor system for a coal handling terminal in Russia. This will handle 18mt (million tonnes) of coal per year using conveyors with a guaranteed capacity of 4,500tph. The terminal will be the most modern one in the northwest Russia.

The experience and expertise that

TTS has gained over the years has allowed it to offer another product in the field of coal handling — the development of coal terminal projects. Potential clients that have some land and the intention of handling material on this land can now talk to TTS about potential solutions, including the possibility of equipment production delivery and installation.

Many years of work, completing small and big projects, have enabled TTS to become not only a standard equipment producer, but also a material handling process developer, which can be complex or simple, but which every time meets its customer's requirements 100%.

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for the quality control process. One of the largest customers in the power industry is American Electric Power. AEP owns several cranes which operate along the Ohio river at its plants.

Along with power generation, terminal management firms like Kinder Morgan have also realized the advantages of E-Crane. Two E-Cranes currently operate at Kinder Morgan IMT in Port Sulphur, LA, USA, cleaning coal barges along the Mississippi River. Beelman River Terminals also utilizes an E-Crane to unload and clean coal barges at their facility near St. Louis, MO.

E-Crane continues to be successful with many bulk unloading projects along the US inland waterways and beyond.



a dedicated coal terminal. In the final step of the process, a floating E-Crane is used to load coal into Capesize vessels. On the receiving side, multiple E-Cranes are used in cement plants in SEA to unload coal.

### ABOUT THE E-CRANE

E-Cranes provide longer outreach ranges than typical material handlers, up to 47.8m (156'). This outreach allows for unloading any type of barge or ship with minimum cleanup. E-Crane duty cycle capacity ranges from 6 to 50 metric tonnes (6.6 to 55 US tons). Although E-Cranes are compatible with any type of grab, E-Crane's clamshell buckets are designed with a powerful closing force affording maximum fill and eliminating spills and carry-back. E-Crane cabs are equipped with a state-of-the-art control system for easy machine operation which builds operator confidence, reduces, cycle times, and maximizes productivity.

### SUCCESSES IN THE ASIAN MARKET

Recently, E-Crane has been a part of several coal handling projects in the Asia, particularly in Indonesia and Vietnam, where E-Cranes are successfully used in all stages of the coal supply chain.

Close to the coal mine in Central Kalimantan, Indonesia E-Crane has supplied a floating transfer station which unloads coal from smaller barges and transfers it into 300ft coal barges.

In the next step of the supply chain E-Cranes are used to unload these same barges into hoppers for storage and blending at



# Containerized coal movements made easy with Container Rotation Systems

*Rotainer Eurospec 38 in final assembly in the CRS workshop. This unit will be shipped to Ust Luga, to unload coal from CRS's Coaltainers®.*



The idea of moving bulk product in containers is growing in popularity, and the cargoes being transported in this way include coal.

This relatively new initiative brings with it its own challenges, including getting the right handling equipment in place to empty containers that are full of loose/free-flowing product.

Container Rotation Systems (CRS), based in Sydney, Australia, has developed a range of container rotation systems, that are in use around the world.

Among the products CRS offers is the Coaltainer®. This heavy-duty coal container is designed to be extra strong for high duty cycle application. It is designed to be used with a rotator, such as CRS's Eurospec, making it possible to unload bulk coal from containers.

The Coaltainer® is certified for rotation through 360° or 180°. It has a gross weight capacity of 38,400kg, which includes a 34,720kg load capacity and a tare weight of 3,680kg.

The Coaltainer® is available with an optional hard lid or rear discharge door. It

is fully compatible with the Rotainer Eurospec 38 and Tiltainer 35.



The Coaltainer® has clean inside walls for smooth discharge and dust minimization as it avoids hang-ups. Its curved inside wall contributes to a clean pour of the load, not a quick dump, which has less impact on the cranes.

The Coaltainer® has a certified standard patent, and registered designs. It has heavy-duty, specially designed

replaceable twistlocks.

A fleet of Coaltainers® will soon be delivered to the Ust Luga port in Russia, where they will be used with CRS's newly released Rotainer Eurospec 38 rotator, working under a Kone STS crane.

## TURNING TO YOUR ADVANTAGE

CRS, based in Sydney, Australia, developed its container-emptying system to offer an efficient solution to the problem of unloading bulk from containers. This is a concept that is gaining in popularity worldwide. CRS has recently delivered its first Eurospec rotator to Canadian stevedore and terminal manager QSL to empty its alumina cargoes. More

Eurospecs have also been ordered from CRS — two Eurospec 38s are for Ust Luga port (as above), and another order has also been placed by PLP St. Petersburg, and will be for extra heavy duty models that will be used for a scrap metal application.



# South Africa: SCHADE bridge reclaimer with Active Harrow to homogenize coal mix

The Australian mining company South32 has awarded SCHADE Lagertechnik GmbH an engineering order for a harrow modification, which became necessary after the alteration of the coal specification at the DMO (Douglas-Middelburg Optimization) coal mine in South Africa.

DMO operates a coal mine in the Province of Middelburg, around 160km east of Johannesburg, to supply a neighbouring power plant. As the coal is getting more and more difficult to blend, the bridge reclaimer in the stockpile will be equipped with a specialized SCHADE Active Harrow, to ensure homogenization of the coal. In addition, the capacity of the bridge reclaimer will be greatly expanded by 1,800tph (tonnes per hour), to 2,400tph.

The order, which will be completed next year, comprises the design and engineering of the Active Harrow, a new reclaimer chain system including drive



*SCHADE Active Harrow (example).*

units, and an upgrade to the electrical components.

## ABOUT THE AUMUND GROUP

The AUMUND Group is active worldwide. The conveying and storage specialist has special expertise at its disposal when dealing with bulk materials. With their high degree of individuality, both its technically sophisticated as well as innovative products have contributed to the AUMUND Group today being a market leader in many areas of conveying and storage technology. The manufacturing

companies AUMUND Fördertechnik GmbH (Rheinberg, Germany), SCHADE Lagertechnik GmbH (Gelsenkirchen, Germany), SAMSON Materials Handling Ltd. (Ely, England), as well as AUMUND Group Field Service GmbH and AUMUND Logistic GmbH (Rheinberg, Germany) are consolidated under the umbrella of the AUMUND Group. The global conveying and storage technology business is spearheaded through a total of 15 locations in Asia, Europe, North and South America and a total of five warehouses in Germany, USA, Brazil, Hong Kong and Saudi Arabia.



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## KRÖGER grabs for coal handling

### ENVIRONMENTALLY FRIENDLY GRABS ARE GAINING IN IMPORTANCE

The grabs from KRÖGER have been established for a long time in almost all ports and harbours in Germany, regardless of whether they are at international ports, e.g. in Hamburg, Brunsbüttel and Bremen, or inland harbours such as Duisburg, Düsseldorf, Cologne, Andernach and Ludwigshafen. Thanks to their technical benefits, KRÖGER grabs are spreading out throughout Europe and worldwide as recent orders from Asia and South America show.

Weight-optimized configuration, achieved by special materials and an innovative design provide an improved payload capacity of the grab in coal handling which enhances productivity. With the optional KRÖGER ZERO-maintenance bearing system, time consuming and annoying lubrication procedures become obsolete which again enhances the efficiency of overall transshipment operation.

For environmental reasons and in view of legal requirements, it is becoming increasingly important for port companies working in the coal handling sector to reduce emissions. Many handling companies are located in the vicinity of residential areas. As a result, it's more and more essential to avoid environmental impacts such as dust formation and ground water pollution.

Rainer Buessing, Director of Sales and Marketing at Kröger Greifertechnik with many years of experience in loading and shipping practices, provides an overview of the necessary requirements on future-oriented, ecologically responsible coal loading grabs. "Open the grab jaws. Grab the bulk goods. Transship. Things are no longer that simple in harbours and ports", says Büssing. "Today it implies: Grab the bulk goods. Do not lose any of it. Protect the environment."

What applies to free-flowing bulk goods is required more and more in coal handling, too. In view of eco-friendliness, three parts of the grab are essential: the specially raised grab jaws, the grab edges and the hinge bearings.

Let's start with the eco-friendly grab jaws. While it used to be absolutely common to have open grabs, coal companies are nowadays compelled to protect their conical coal piles against material loss caused by winds getting up over the water and in the harbour. Therefore the grab jaws are raised above the angle of repose which results in an enclosed configuration of the shells. It's the perfect solution to prevent coal dust from being blown off.

In the second place, matters become more complicated during the tight closing of the grab edges as it requires higher effort in terms of structure and design so that the grab jaws are able to operate tightly even under extreme loads and continuous, long-term usage.

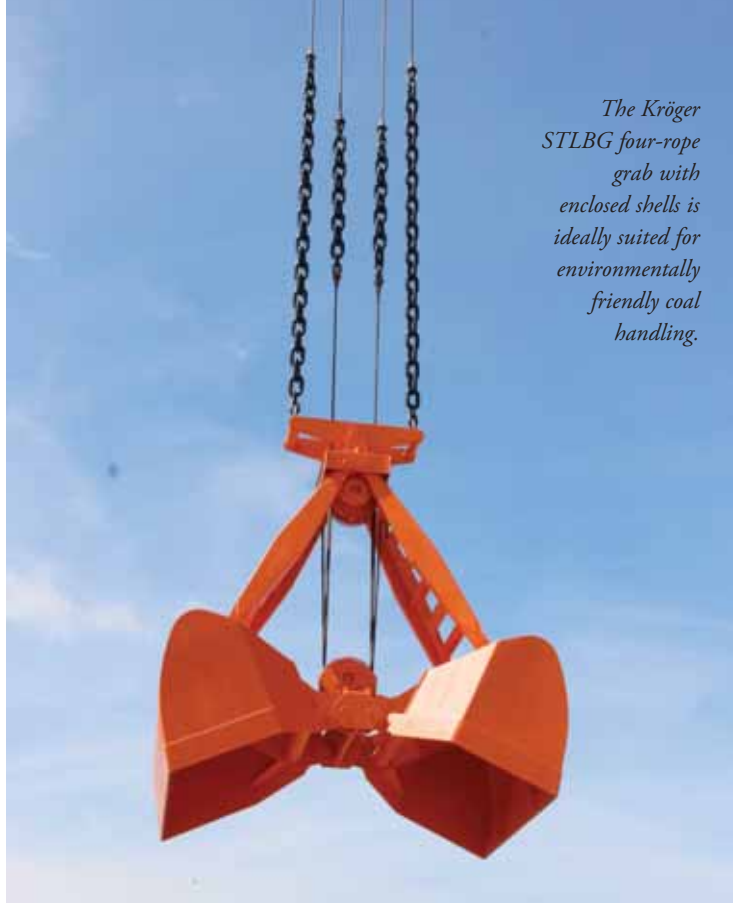
For 90 % of cargoes — such as coal — tight closing of the grab shells can be achieved by using double Pantanax round-bar steels, both on the bottom scrapers and on lateral blades. The jaws close tightly thanks to the embedded round-bar steel so that a watertight closure is achieved and a loss of material is avoided.

In the third place, the protection of the environment from oils, greases and lubricants which might escape from the hinge bearings and get in touch with the ground or water is becoming increasingly important. This issue can be totally avoided by the use of the above mentioned KRÖGER ZERO-maintenance technology. Hence, undesirable follow-up costs are eliminated.

"So," Buessing sums up, "KRÖGER shows that grabs can meet both, economic and ecological requirements in coal handling operation".

Kröger Greifertechnik GmbH & Co. KG is a manufacturer of grabs located in Sonsbeck/Lower Rhine Area in Germany. Its core products include rope, motor-hydraulics and hydraulic grabs. The target markets are, in particular, customers in the sectors of sand and gravel extraction, ports and general bulk handling as well as waste incinerator plants. End-users and distributors at home and abroad are among their customers.

*The Kröger STLBG four-rope grab with enclosed shells is ideally suited for environmentally friendly coal handling.*



*Kröger STLBG enclosed grab for dust-free coal handling is attached to crane.*





# Earning their (Stars &) Stripes

US  
manufacturers  
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equipment



Jay Venter

## New grain vacuum from Christianson Systems

### INTRODUCING THE HANDLAIR 404

Towards the end of April 2019, Christianson Systems, Inc. introduced a new addition to its Handlair line of pneumatic equipment. The Handlair 404, was designed to easily manoeuvre those hard to reach places, while still providing the power needed to complete the job. Intended for smaller jobs, the Model 404 provides both vacuum and pressure for filling totes, short transfers, railcar spills, or any cleanup job.

### SELF-CONTAINED HYDRAULIC SYSTEM

Self-contained with a 37HP Kohler engine, the 404 will transfer dry bulk material up to 1,200bu/hr.

Instead of using a chain to run the airlock, which can be troublesome to recalibrate correctly, the 404 utilizes an hydraulic system. Using this system allows the airlock to move both forward and in reverse should anything get lodged in the blades.

The inspection door on the machine

shows the product moving through the system and allows access to the airlock should a foreign object become lodged between the tips and housing.

### PATENTED AIR FILTRATION SYSTEM

The 404 is equipped with Christianson's patented air filtration system that prevents dust from entering the blower, which helps prolong the life of the machine and its components.

The heavy-duty cast airlock is self



cleaning with adjustable tips and vented endplates. When the airlock blades show signs of wear, rather than replace them you can simply adjust or reverse the tips.

**MOBILITY**

The forklift frame may be moved easily, fitting in the back of most pickups for effortless transfer to and from the jobsite. The optional truck loading out kit may be

added for filling totes or discharging directly into trucks or bulk containers.

**ABOUT CHRISTIANSON SYSTEMS**

Christianson Systems manufactures ship-unloaders and pneumatic conveying systems for a wide range of bulk materials including feed and cereal grains, plastics and chemicals. The company's equipment operates in agriculture, commercial bulk

handling, and marine port industries worldwide. The company's products are marketed directly from Blomkest, Minnesota and through a network of independent agents and resellers.

Corporate offices and manufacturing facilities cover about 85,000ft<sup>2</sup> (7,897m<sup>2</sup>). Large ship-unloaders are assembled and tested year-round inside one of the tallest (80ft) manufacturing buildings in Minnesota.

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## Johnson Crushers International launches new Kodiak® Plus Cone Crusher Model



Johnson Crushers International's K350+ cone crusher on display at AGG1.

In February 2019, Johnson Crushers International Inc. announced that it has expanded its Kodiak® Plus cone crusher series with the new K350+. This mid-range model offers higher production with a smaller footprint.

In comparison to the K300+, the K350+ features increases in drive train, stroke, horsepower, weight, head diameter and hold-down force, resulting in an up to 10% capacity increase.

With the same bolt pattern, the new cone can be mounted in most current K300+ applications.

"We have been testing the K350+ for a few years, especially on portable plants, and it has far surpassed our expectations. We are excited to release the K350+ to the market," said Ian Pendergrass, product manager for Johnson Crushers International.

Like other cones in the Kodiak® Plus cone crusher series, the K350+ will feature an industry-leading tramp iron relief system, fully-protected internal counter-

weights, precision roller bearing design, patented liner retention system and 360° thread locking ring for consistent product quality.

### ABOUT KPI-JCI AND ASTEC MOBILE SCREENS

Located in the upper Midwest and Pacific Northwest, the three manufacturing companies that make up KPI-JCI and Astec Mobile Screens' team of experts draws upon nearly a century of experience designing, building and manufacturing innovative equipment.

Its wide range of product lines, including crushing, screening, material handling, washing and classifying, track-mounted, stationary and portable equipment, offers comprehensive solutions for a variety of markets. With an authorized dealer network that spans around the globe, KPI-JCI and Astec Mobile Screens deliver an unwavering commitment to meeting the needs of its customers.

KPI-JCI and Astec Mobile Screens is part of Astec Industries' Aggregate and Mining Group. The Astec Industries family of companies is a manufacturer of equipment for asphalt road building, aggregate processing, pipeline and utility trenching and wood processing.

#### KOLBERG-PIONEER PRODUCTS:

Washing and classifying, conveying, jaw and impact crushing, screening, and portable, stationary and track-mounted plants.

#### JOHNSON CRUSHERS INTERNATIONAL PRODUCTS:

Roller bearing cone crushers, horizontal and incline vibrating screens and portable, stationary and track-mounted crushing and screening plants.

#### ASTEC MOBILE SCREENS PRODUCTS:

Screening products, including track-mounted screening plants, portable and stationary screen structures and high frequency screens.



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# White Paper: regenerative blower-driven vacuum conveyors fill niche for efficient, small-footprint pneumatic conveying

*Typical regenerative blower vacuum conveying system.*



	Regenerative Blower	Positive Displacement Vane or Rotary Lobe	Air Compressor
Capital Cost	Low	High	Very High
Operating Cost	Low	Low	Very High
Maintenance	None	Very High	Very High
Footprint	Small	Relatively Small	Very Large
Weight	Light	Heavy	Very Heavy
Noise	Low	High	Very High
Oil-Free Output	All	None	Some
Application Notes	Best for smaller systems conveying lighter materials over shorter distances. Lowest capital costs, highest operating efficiency. Very easy to install and maintain. Many applications in food, chemical and pharmaceutical industries.	Produce high vacuum rates; good for long-distance conveying at high rates. Can move heavier materials like aggregates. Relatively high maintenance, but offer long operating life.	Produce high vacuum rates; good for long-distance conveying. Good choice for hazardous duty areas, where electricity is not available or where operating envelope must be kept small.

*Table 1: Comparing Vacuum Generation Technologies for pneumatic conveying.*

Pneumatic conveying systems are frequently an excellent choice for moving large quantities of powdered, granulated or pelletized material, writes Steve Grant, Product Specialist, Hapman.

And among the many different approaches to pneumatic conveying, regenerative blower-driven vacuum systems can provide ideal cost efficiencies, compactness and simplicity where vacuum requirements and transfer distances are modest.

Many other types of pneumatic conveying systems like pressure-driven systems are designed for moving heavier materials over longer distances; they require fairly robust pressure, large capital equipment investments, more operating energy and higher maintenance costs. Downscaling this kind of pressure-driven technology to meet the needs of smaller-volume, shorter-distance transfer isn't always a practical or economical approach. Fortunately, regenerative blower-driven vacuum systems like those produced by Hapman give processors the right combination of design and operating characteristics for excellent economics in lighter-duty situations.

## OPERATING PRINCIPLES OF VACUUM CONVEYING SYSTEMS

Vacuum conveyors are relatively simple systems that include a pick-up inlet, a conveying tubing line, a receiver and a vacuum generator, which is the power source.

The vacuum generator creates the required negative pressure to pull the material through the conveying line and into the receiver. Internal filters separate the material from the air to remove any

dust and protect the vacuum generator. A number of different gating systems may be used for removal of product from the receiver, including simple sliding valves, pneumatically-operated dump gates or air lock rotary valves.

Power source options for vacuum systems include regenerative blowers, compressed air driven eductor (venturi) units, plant central vacuum using liquid ring vacuum pumps or low-pressure blowers or positive displacement vacuum pumps. With the exception of regenerative blowers, all of these vacuum power sources are external to the conveying equipment itself.

Vacuum systems are preferred for transporting materials that tend to pack or plug in a pressure system. And they are excellent choices where space is at a premium. With many lightweight materials, their conveying velocities can be quite high, between 3,600 and 5,000 feet per minute. One notable limitation is reach; they're not typically used for conveying distances above 200 feet, or where vertical distances are above about 50 feet.

## INTEGRAL VACUUM GENERATOR

Unlike almost any other pneumatic conveying technology, regenerative blower equipped conveying systems like Hapman's are unique in that the vacuum generator is integral to the system; no external plant air or vacuum is required.

The regenerative blowers that power these systems are very simple and reliable. They have few parts, just an electric motor with sealed bearings, an impeller and a housing with a cover. There are no other moving parts or wear parts that require lubrication or maintenance.

## INNER WORKINGS OF A REGENERATIVE BLOWER

Regenerative blowers work on a vortex air flow principle. Air is effectively moved between vanes as a single-stage impeller rotates in a casing. The spinning impeller and air flow create a vortex flow pattern which boosts velocity incrementally as the air moves from vane to vane inside the housing. The flow of air on the output side is very steady and smooth. Product lines like Hapman's include blowers from 1.5 to 15hp, which can supply sufficient vacuum for material conveying capacities up to 18,000 lb/hour.

## ADVANTAGES OF STAND-ALONE REGENERATIVE BLOWER VACUUM CONVEYING SYSTEMS

**Lower initial costs** — regenerative blower vacuum conveying systems are self-contained, requiring only an electric power hookup. There's no requirement for air or vacuum supply runs, or for internal studies of available capacity utilization. For facilities without plant air or vacuum supply already in place, operators avoid the expense of planning, installing and maintaining these external vacuum power systems.

**Lower operating costs** — Compared to externally powered pneumatic conveying systems, onboard regenerative blower systems offer considerably higher energy efficiency, typically twice that of conventional air compressor-driven systems. Maintenance costs are also much lower, especially when compared to external air compressors or positive displacement (PD) blowers, where ongoing maintenance items include lubrication and replacement or maintenance of filters, belts, regulators, coolers, mufflers and plant air lines.



**No competition for plant air or vacuum** — these self-contained systems place no additional demand on plant air systems. It's an advantage in terms of overall capacity planning and swing capacity availability for other users in the facility during peak demand periods.

**Easy to install** — regenerative blower vacuum systems weigh less and take up less space than other pneumatic conveying systems. They're easier to transport into manufacturing environments, and they're simpler to install.

**Easy to clean** — for routine filter cleaning, regenerative blower systems like Hapman's are designed for easy filter element access without tools. Where there's a need for overall system cleaning, regenerative blower systems are available with provisions for central unit and tubing washdowns.

**Oil-free air** — regenerative blowers don't require internal lubrication, so they produce oil-free air.

**Low noise** — noise levels for these systems are very low compared to other air or vacuum supply systems.

### COMPARISONS TO OTHER AIR/VACUUM SUPPLY TECHNOLOGIES

Table I provides a useful comparison of regenerative systems to two alternatives, positive displacement and air compressor technologies, that are sometimes used in similar applications.

### CASE STUDIES: REAL-WORLD SOLUTIONS TO PRODUCTION CHALLENGES

#### AUTOMATING MATERIAL HANDLING SYSTEM IMPROVES WORKER SAFETY, ECONOMICS AND PRODUCTION RATES

Werner G. Smith, an Ohio-based chemical manufacturer, was awarded a long-term contract for a new customer to blend a granular powder with an aqueous chemical solution. Werner was able to dedicate a large reactor to the contract manufacturing process, but the building housing the reactor presented serious logistics issues. There was no loading dock, and to get the operation up and running quickly, Werner initially relied on a team of five employees to manually carry 55 lb bags of material into the building and up one story where an operator would manually dump material into the reactor. In the course of a week's production the team had to handle over 800 55 lb bags of material.

Said Jennifer Bugbee, Vice President of Operations at Werner G. Smith, "This was

an enormous waste of time and manpower, and we needed to streamline the process, reduce powder hazards and reduce strain on the workforce." Through a local industrial equipment supplier, Werner connected with Hapman.

Hapman designed a material handling system that included a Loss-in-Weight Bulk Bag Unloader that feeds a Hapman Vacuum Conveying System that delivers material to process. The vacuum conveyor system includes an integral regenerative vacuum blower, integral filtration, a reverse pulse filter cleaning mechanism and automated batch controls.

The returns for Werner G. Smith were almost immediate. Production time improved by several hours per batch, and facility housekeeping improved dramatically. The system also eliminated the need for a third-party vendor to break down and repackage material into 55 lb bags so Werner employees could manually handle them. The five employees were assigned to duties more directly related to production.

#### VACUUM CONVEYING SYSTEM ELIMINATES CROSS-CONTAMINATION FOR PHARMACEUTICAL COMPANY

A major pharmaceutical company came to Hapman with a need for a vacuum conveyor system to take their finished product from a dryer and discharge it into a mobile bulk material handling system, which was scale mounted for precision metering and batching. The challenge was to incorporate an efficient cleaning system to eliminate any possibility of cross-contamination with product change overs.

Hapman engineered a pneumatic vacuum conveying system with individually controlled spray wash ports placed throughout the interior of this material handling conveyor. This self-contained design allowed the customer the ability to reliably clean and sanitize the conveyor's interior without the need for time-consuming external procedures. Further time saving enhancements included a side access door for quick filter cartridge change outs, and a clean-in-place rotary valve which allowed disassembly, cleaning and reassembly within minutes. The entire sanitary finish assembly was 304 stainless steel with sealed motors and controls

*Maintain filter efficiency with optional reverse pulse filter cleaning system.*

*The integral regenerative blower conveys material without using plant air or a separate compressor.*

*Change filters quickly with an easy-to-access side door. No tools needed.*



rated for explosive atmosphere and wash down applications.

The completed system delivered on all design goals. Efficiency and processing rates were subsequently increased.

### CONCLUSION: THE IDEAL CHOICE FOR MODEST PRODUCTION REQUIREMENTS

Regenerative blower-driven vacuum conveying systems certainly aren't for every application. They aren't a viable alternative to the more powerful systems needed for longer transfer distances and heavier materials. But as described here, they deliver an outstanding suite of advantages for smaller, shorter-run conveying systems that operate at lower vacuum or air consumption rates. Their efficiency, simplicity of operation, small footprint and low maintenance requirements mean they can deliver a unique combination of economics and practicality.

#### ADVANTAGES OF PNEUMATIC CONVEYING

Whether pressure- or vacuum-powered, pneumatic conveying systems offer processors many advantages, including:

- ❖ simple; essentially tubing, receiver and vacuum source;
- ❖ fully enclosed, no dusting, contamination, ignition spark generation;
- ❖ no large, heavy conveyors with numerous wear parts and maintenance;
- ❖ good-to-excellent energy-efficiency;
- ❖ can run horizontally and vertically; and
- ❖ quiet.

## New shiploading spout from Vortex



Earlier this year, Vortex announced the release of its new Grain Ship Loading Spout. Capable of load rates over 120,000 bushels/150,000ft<sup>3</sup>/4,248m<sup>3</sup> of grain per hour, the Vortex Grain Ship Loading Spout is among the world's fastest and most efficient loading solutions.

When properly applied using proprietary engineering controls (headchute, spout, dust collection, etc.), the Vortex Grain Ship Loading Spout is specifically designed for dust-free grain loading, thereby protecting the port's nearby neighbourhoods, waterways and other surrounding ecosystems from grain dust emissions into the atmosphere.

### DISCHARGE FILTRATION SYSTEM

The Vortex Grain Ship Loading Spout is equipped with a Discharge Filtration System for improved dust management at the point of discharge. It is specifically designed to (1) Displace dust-laden air from its source; (2) Separate dusts from the air; (3) Exhaust the cleaned air into the atmosphere; and (4) Re-entrain the filtered dusts back down into the load.

Vortex Filtration Systems are "active units," meaning air withdrawal forcibly pulls displaced air and dusts through the filter cartridges, in order to perform a filtration process.

The Vortex Discharge Filtration System is rated at efficiencies of:

- 99.98% @ 1/3 micron
- 99.99% @ 1/2 micron
- 100% @ 1 micron


### OTHER CONSIDERATIONS:

Vortex Grain Ship Loading Spouts are made-to-order to fulfill each client's application requirements. This includes spout overall size to meet load rate capacity requirements, vertical travel distance requirements, and other considerations for application parameters.

Vortex Grain Ship Loading Spouts are constructed from telescoping tubes which slide into one another as the spout retracts. In doing so, the spout's overall height is condensed to allow bulk carriers safe entry and exit at the port.

The spout's telescoping tubes are constructed from durable metal materials. Doing so protects the spout from the elements of its surrounding environment, addresses wear and abrasion from the grain(s) handled, and provides stability in spouts with especially long vertical travel distances.

The Vortex Grain Ship Loading Spout utilizes a two cable, dual-drum, two-part reeving hoist drive system. Redundant features are included to limit travel at both the upper and lower limits, as well as over- and under-speed conditions and cable tension monitoring. The winch system is designed at 5:1 service factor.

"The most critical features of ship loading equipment are reliability and environmental safety," explained Mark Schaberg P.E., chief engineer, Vortex. "Nowadays, ports worldwide consider pollution prevention a primary objective —paying special mind to reducing dust emissions and preventing cargo overflow or spillage. To address these concerns, it is critical to incorporate sophisticated engineering controls and dust control measures to provide the best available technology to our customers." 





# High quality from the Low Countries

why the Netherlands remains a big cheese in the bulk handling world



*Dunlop's new Ultra X belt is a game changer.*

Jay Venter

## Compromising on quality not an option for Dunlop Conveyor Belting

The year 2019 certainly seems to be an exciting one for Drachten-based Dunlop Conveyor Belting. Its order book is at its highest level for some considerable time. In fact business is positively booming. In the present economic climate, it is hard to imagine any company in any industry that can say that sales are up by over 50% compared to the same quarter last year and that production capacity and production staffing levels have been increased by more than 50% in order to cope with demand.

Perhaps what makes this exceptional level of success even more noteworthy is that European conveyor belt manufacturers like Dunlop are facing the growing challenge of 'market saturation' tactics that are being employed by belt manufacturers in East Asia, primarily China.



*Selling quality and much longer belt life is a winning strategy.*

Imports of belting priced way below market rates are arriving in Europe on an unprecedented scale and are posing a substantial risk to the very future of European belt manufacturing, which should concern all but the most foolhardy of end-users.

### RESPONDING TO THE THREAT

Dunlop's response to this threat has been to focus even harder on their traditional market approach. This has always been to sell on quality, performance and offering their customers superior economy by supplying belts that provide a working life that exceeds cheap Chinese import belt many times over. "There is no point trying to compete on price because, quite simply, it is impossible to manufacture belts that meet even the most basic European standards, let alone be safe to handle, at the kind of prices that the Chinese are offering" says sales & marketing director Andries Smilda. "All of our customers, without exception, could buy belts from China at a much lower price than we could ever achieve. The fact that our order books are so fantastically healthy proves beyond doubt that the price reflects the quality and the value for money. That's why they buy from us".

### MAJOR NEW INNOVATION

Although this strategy is clearly serving them well, at least part of this surge in popularity and demand stems from the development and introduction during the past year of a brand-new, super-tough, high quality belt that is totally unique to Dunlop. In Europe they have branded their discovery Ultra X.

Ultra X is a single-ply construction that is designed to replace EP315/2, 400/3, EP500/3, 500/4, 630/3 and 630/4 ply belts. Despite being single-ply, Dunlop claims that primarily thanks to its totally unique specially woven carcass Ultra X is considerably more durable and tougher than conventional ply belting. Most surprisingly of all, despite its physical advantages, Ultra X is also designed to compete at the economy end of the



*The BAUMA exhibition was a huge success for Dunlop.*

market. This market strategy seems to fly in the face of their claims to compete on quality rather than price but Smilda disagrees. "We are not trying to compete at what we call the 'crazy price' end of the market because those belts cannot remotely compare with ours in terms of performance and operational lifetime economy. What the price levels of Ultra X gives to end-users is the best of both worlds; sensible pricing and far superior performance and longevity".

So, how are they able to offer prices that are at least comparable (and often lower than) multi-ply belting? Dr. Michiel Eijpe, Dunlop's development director in the Netherlands, explains: "We have not," he says, "and of course never would, compromise on quality for the sake of a lower price offering. That is simply not our culture. Actually there are several reasons why we can price Ultra X so competitively." "Firstly, the single-ply carcass is made from a unique design of fabric that we manufacture in-house. That's a big advantage both quality and cost-wise. Having a single-ply construction also allows for maximum efficiency of production because there are fewer calender runs. And having no rubber skim between the

plies not only results in a thinner, stronger carcass, it also keeps the cost down".

### ON THE ATTACK

Perhaps it's also no coincidence that all this success comes at a time when the company's image and profile are also clearly in the ascendancy thanks to an extremely high level of marketing activity. New, cleverly designed and highly informative technical information documents; new technical and promotional films; an unprecedented level of media activity underpinned by a brand new and highly impressive 'user-friendly' website are just some of the components. The marketing efforts have been supported by significantly enhanced levels of customer contact based more on providing technical advice and guidance to customers rather than a 'hard sell' approach.

### EXHIBITION SUCCESS

The Bauma exhibition, held in Munich every three years is one of the biggest exhibitions of its kind and for Dunlop Conveyor Belting the 2019 event was a huge success, with a record number of visitors to their very impressive stand. "It was not simply the level of interest shown in us but also the extremely positive comments being made by visitors," explains Smilda. "Large numbers of people were telling us that the profile and image and sheer level of our marketing activity was leaving our rivals behind. I cannot begin to tell you how good that makes us feel. A lot of people have been putting in a lot of hard work behind the scenes. Now those efforts are beginning to pay dividends."

### ON A ROLL

Dunlop Conveyor Belting is, if you will excuse the pun, on a roll but they clearly have no intention of allowing success to go to their heads. "We have a lot of exciting things going on and there is plenty more to come," says Smilda enthusiastically. "As we say in the Netherlands, the best time to fix the roof is when the sun is shining. But we do not just want to fix the roof — we want to make that roof even higher!"



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## The Port of Cork and Port of Amsterdam sign collaboration agreement

On 14 June this year, Port of Cork and Port of Amsterdam International, in the presence of His Majesty Willem-Alexander and Her Majesty Máxima, as well as Minister Sigríð Kaag, signed a collaboration agreement in Cork. Both ports will research in what areas they can strengthen and support each other.

Ireland is an important trading partner for the Netherlands. In 2017, the country exported over €5.5 billion of goods to the Netherlands.

This makes the Netherlands the sixth biggest export destination for Irish goods. In the same year, Ireland imported over €3.5 billion worth of goods from the Netherlands. This chiefly consisted of pharmaceuticals, machines, and transport equipment.

The Port of Cork as well as Port of Amsterdam wish to share their expertise and experience in a number of areas in order to promote trade between their ports. Themes under consideration are port development, stakeholder management, cruise development, ports logistics and mitigation of the impact of Brexit, which is expected to have a significant impact on Ireland. The definitive themes are to be determined in the upcoming months. The agreement is part of the ambition of Port of Amsterdam to strengthen its position in the short sea segment.

Even though it is as of yet not clear which Brexit scenario will come to fruition, the expectation is that the logistics



of trade through the United Kingdom will be more expensive and complex. This makes direct (shipping) connections to the European mainland more viable. The expectation is therefore that this will be accompanied by a shift from use of the land bridge to use of direct shipping connections with the Netherlands.

Gert-Jan Nieuwenhuizen, Managing Director of Port of Amsterdam International, “We see many opportunities to work together with Port of Cork, the second largest port of Ireland. With an eye on developing partnerships, we look for ports that wish to exchange knowledge and that we can support in successful port development. We research scenarios, look at opportunities and seek to jointly

capitalize on these opportunities.”

Chairman of the Port of Cork John Mullins said, “Our historical bond with the Netherlands makes that we know each other well, and our joint goals ensure a smooth collaboration. Port of Cork is making significant investments to keep developing the port and we have grand ambitions for our commercial position. We look forward to what this collaboration will bring to both ports.”

The collaboration agreement was signed as part of the trade mission port development/maritime infrastructure, headed by the Minister of Foreign Trade and Development Cooperation, Sigríð Kaag. The royal couple were in Ireland for a parallel state visit.

## Vertom and Idea Maroc join forces to create the CAMABE LINE

On 15 April this year, it was announced that two strong players in the international sea shipping industry have decided to join forces. Idea Maroc, specializing in the maritime transport of conventional goods, and the Dutch Shipping Company, Vertom Shipping & Trading, have given the go-ahead for a partnership that will operate under the name CAMABE LINE.

This partnership is based on the two companies' mutual ambition to operate a new Regular Short Sea Service, which will connect the Belgian Port of Antwerp to the Port of Casablanca and other ports of the Kingdom of Morocco. CAMABE LINE will operate a comprehensive fleet, including regular

departures of vessels in the 3,500dwt size category, or bigger if required. In short, this Short Sea Service will enable the partners to provide customers with regular sailings by conventional vessels whose size varies between 3,000 and 6,000 tonnes and even more deadweight.

### TAILOR-MADE MARITIME SOLUTIONS

These vessels are operational to load all types of goods: from wood, metallurgical products, project cargo — including heavy parcels and bulky packages — up to public works and railway equipment, chemicals, fertilizers and other miscellaneous goods. As a result, the CAMABE LINE is able to offer customers tailor-made logistics solutions

for their specific requirements and for all their imports and exports. In addition, Vertom & Idea Maroc can offer ships for (partly) homogeneous cargoes from Antwerp or any other European port of the North Sea, Channel or Atlantic to Moroccan ports.

### ACCURATE FOLLOW-UP OF ALL SHIPMENTS

As a result of this partnership, customers will also get access to an EXW service, which is synonym for a very accurate follow-up of all shipments: from the departure of goods from the factory until the unloading of cargo at the port of Casablanca and their exit of the port on time.



## Van Beek: the standard in screw conveying



From conveying to dosing, elevating to buffering and heating to cooling, Van Beek can offer all these skills. The company from the Netherlands designs and manufactures custom-built screw conveyor systems geared to the requirements laid down in the different industries. Whether in the food, pharmaceutical, chemical, recycling or heavy industry, Van Beek has made every combination in screw conveying possible since its foundation in 1939.

Every day, a committed team of around 50 staff focuses on designing, manufacturing and selling screw conveyors. For many years, Van Beek has paid considerable attention to offering total solutions, high quality and first class service. Partly because of this, in recent months the company has invested heavily in its test centre 'The Blue Zone' in the field of equipment, technology and know-how. Top quality can only be delivered by making the best possible use of all business assets, as well as structural further training for all employees. Investment in its knowledge centre gives Van Beek the opportunity from now on to answer even more complex questions.

### COMPUTERIZED AND TRADITIONAL CRAFTSMANSHIP

The chemical, pharmaceutical, environmental and food industries have for many years benefitted from the broad expertise of Van Beek. The company's reliability has

for example led to 80% of its production now being operational abroad. In addition, Van Beek is not only a pioneer in the technological and organizational field, it also regards automation very highly. From office work to production and sales to engineering; wherever possible the process is automated at Van Beek. Where innovative techniques cannot yet produce the desired result, Van Beek uses traditional craftsmanship.

### EXTENSIVE DOCUMENTATION AND CE MARK

All of Van Beek's machines come with a CE mark, installation instructions, drawings and additional documentation, both digital and printed and these are made available immediately upon delivery. Supplemented by spare parts lists, exploded views, maintenance and cleaning instructions. If applicable FDA and EHEDG guidelines, materials certificates and ATEX conformity declarations. For ATEX category I, Van

Beek has received a type approval from notified body TÜV Rheinland, which means that there is no need for an inspector to visit to inspect the machine.

### INSTALLATION AND MAINTENANCE

Van Beek's industrial projects include maintenance and services. Its mechanics come and measure the machines themselves and only leave once the installation is running to the satisfaction of the customer. Maintenance can be on call or guaranteed in a maintenance contract.

### DINO BULK TRUCK LOADER

In addition to its screw conveyors, Van Beek has a separate machine line for bulk truck loading machines, known by the brand name Dino. The mobile bulk truck loader loads bulk goods efficiently and safely, packaged for example in big bags or in tankers. Decades of experience also make the Dino the solution for dust development during loading.



## Hazardous materials – The other 2020 regulation

Corporate Social Responsibility is increasingly a focus in shipping company boardrooms. Despite that, the European Union Ship Recycling Regulations (EUSRR) have largely gone under the radar; until recently that is.

The EUSRR dictates that new EU-flagged vessels (contracted after 31 December 2018), of 500 GT and over, are required to carry an Inventory of Hazardous Materials (IHM). Existing EU-flagged vessels as well as vessels with non-EU flags when calling at EU ports, will also be required to carry an IHM identifying all the hazardous materials on board along with a Certificate/Statement of Compliance, by 31 December 2020 the latest. EU-flagged vessels must, in addition, be scrapped in an approved ship-recycling facility. The investment these regulations will necessitate of the industry, is estimated to be in the region of \$340m by the end of 2020; much less of a burden than that of the ballast water or 2020 sulphur regulations.

Obtaining an IHM SoC necessitates a hazardous materials expert company audit the vessel and take around 100 samples based on the vessel specific Visual Sampling Check Plan (VSCP). This is to ensure that the sampling accurately reflects the potential hazardous material present on board the ship.

The Netherlands has, along with Australia, the most stringent regulations when it comes to asbestos and hazardous materials. The Dutch Port State Control (PSC) has already found several vessels in non-compliance through spot sampling and rapid analysis while the vessel was still in port.

It therefore is very important that the vessel's IHM is carried out by a expert company that has the credentials to stand behind their work. This is particularly important, as there are many operators with limited credentials and no internal laboratory facilities.

Centre Testing International (CTI) is at the very top of the IHM providers and the only one that has an in-house lab that is accredited for all the 15 elements required by the EUSRR. As one would expect from service providers, CTI has virtually all the Class approvals for IHM, as well as accreditation for its labs and all relevant ISO certifications. CTI is also accredited by the governments of The Netherlands and Australia for work related to asbestos.

It should therefore be no surprise that CTI has come successfully through several



A CTI technician collecting asbestos (above) and hazardous material (below) samples.



rounds of open eliminations to be a provider of choice by major companies such as Maersk Line, CMA CGM and Maersk Tankers.

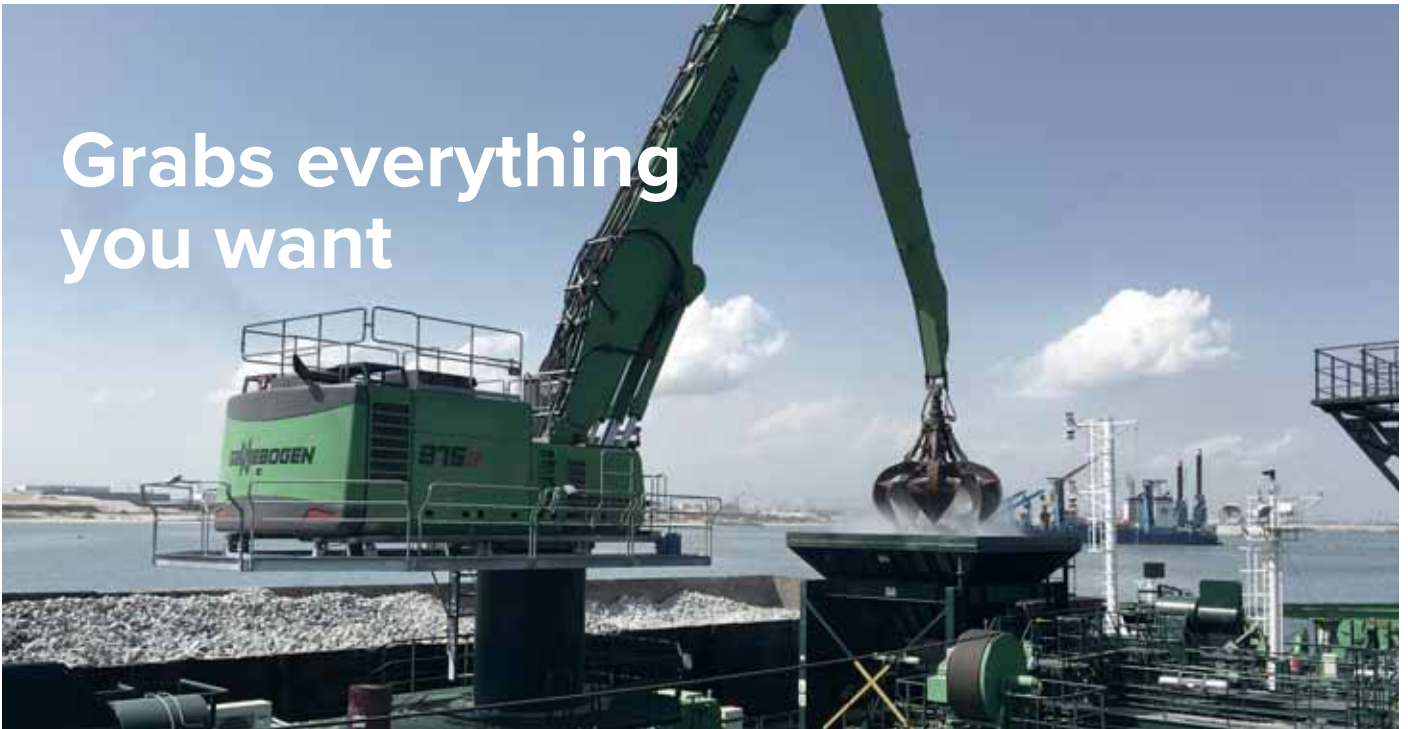
CTI's Western Europe hub is in The Netherlands. Clients' global needs are amply served through CTI resources in Singapore, Hong Kong, Malaysia, China, Turkey, India, United Arab Emirates, South Africa and the USA.



CTI has an in-house lab that is accredited for all the 15 elements required by the EUSRR.



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## Heavy lift jack-up 'Apollo' completes refit at Damen Shiprepair Dunkerque



*Apollo is now in Scotland for a wind farm installation project.*

DEME Offshore's newest heavy-lift jack-up Apollo has recently completed a one-month conversion project at Damen Shiprepair Dunkerque (DSDu). This complex contract involved the installation of a moon pool on the main deck. The technical demands combined with the limited time available required highly precise planning together with working around the clock to complete on time.

The moonpool installation was a major undertaking that involved creating an opening right through the centre of the vessel, from the main deck down through the engine stores and finally through the hull. To achieve this without compromising the structural integrity of the 87.5-metre Apollo the work was done in a strict sequence based on strength calculations of the ship's structure so as to manage the weight distribution.

Before the works could begin, the vessel had to be manoeuvred alongside the quay and then jacked up. This allowed the work to be conducted from a pontoon positioned directly beneath the hull.

"We performed the complete scope of work with the vessel jacked-up alongside the quay," said Fabien Guillemot, commercial manager at DSDu. "For our customers this demonstrates that for vessels of this type we do not always need to incur the added cost and time of drydocking for projects or mobilizations that require works below the waterline. The location of our shipyard in the east port of Dunkerque has a constant water level thanks to the locks that separate us from the open sea. That greatly simplifies operations like this."

DEME, the parent of DEME Offshore, is a longstanding client of DSDu based on the yard's ability to meet the requirements of its world-leading dredging fleet as well as



its offshore capabilities. DSDu's strategic location ensures minimum downtime for offshore operators active in the region. In June 2018, the 147-metre DEME Offshore heavy-lift jack-up *Sea Installer* spent eight days at DSDu for the fitting of new spud cans and other works.

### DAMEN SHIPYARDS GROUP

Damen Shipyards Group operates 36 shipbuilding and repair yards, employing 12,000 people worldwide. Damen has delivered more than 6,500 vessels in more than 100 countries and delivers around 175 vessels annually to customers worldwide. Based on its unique, standardized ship-design concept Damen is able to guarantee consistent quality.

Damen's focus on standardization, modular construction and keeping vessels in stock leads to short delivery times, low 'total cost of ownership', high resale values and reliable performance. Furthermore, Damen vessels are based on thorough R&D and proven technology.

Damen offers a wide range of products, including tugs, workboats, naval and patrol

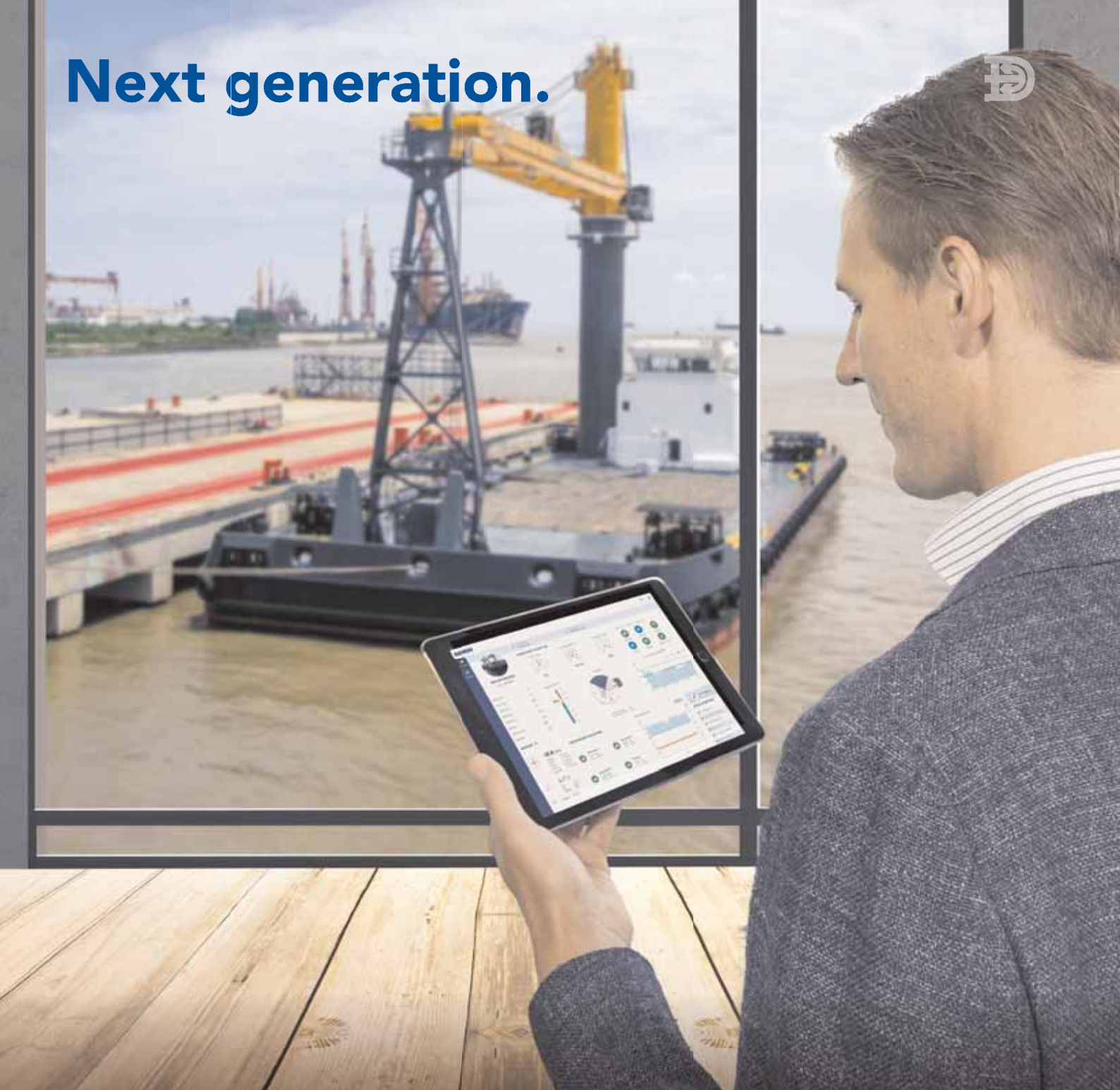
vessels, high speed craft, cargo vessels, dredgers, vessels for the offshore industry, ferries, pontoons and superyachts.

For nearly all vessel types Damen offers a broad range of services, including maintenance, spare parts delivery, training and the transfer of (shipbuilding) know-how. Damen also offers a variety of marine components, such as nozzles, rudders, winches, anchors, anchor chains and steel works.

Damen Shiprepair & Conversion (DSC) has a worldwide network of 18 repair and conversion yards of which twelve are located in North West Europe. Facilities at the yards include more than 50 floating (and covered) drydocks, including the longest, 420 x 80 metres, and the widest, 405 x 90 metres, as well as slopes, ship lifts and indoor halls. Projects range from the smallest simple repairs through Class maintenance to complex refits and the complete conversion of large offshore structures. DSC completes around 1,300 repair and maintenance jobs annually, both at yards as well as in ports and during voyage.



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## Gans Cargo Operations: adding value globally

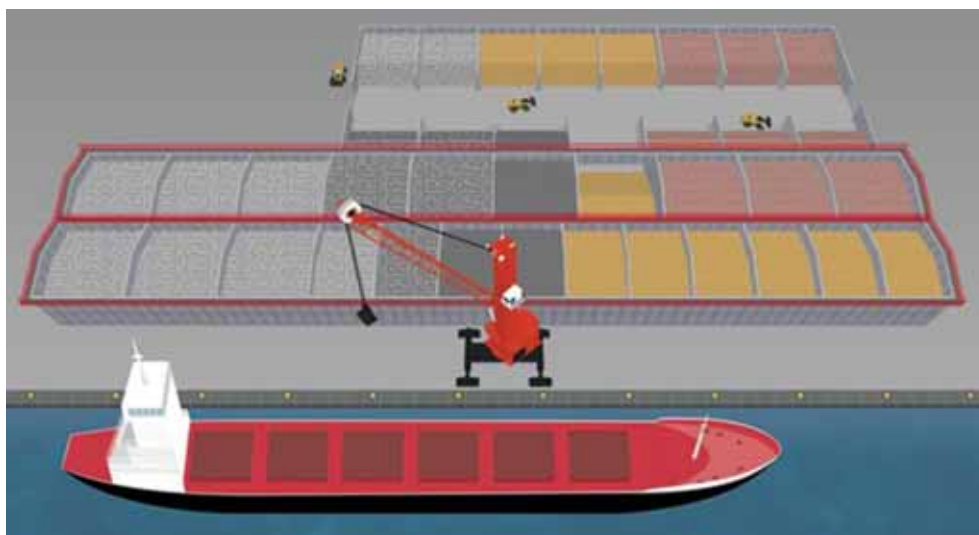
Gans Cargo Operations has a long history in the supply chain logistics of dry bulk products, such as petroleum coke, coal, agri, fertilizer and biomass.

With a highly skilled and motivated team, Gans can offer tailor-made solutions for the transport of customers' products on a door-to-door basis. The company's aim is to optimize its customers' logistics in such way that they can sit back and relax.

Gans offers the full scope of dry bulk product handling and transportation, including intermediate storage of weather sensitive products in well covered warehouses, as well as open pit storage for products, which are less sensitive to weather conditions.

"Already for a number of years, we have noticed an increasing demand for covered storage on a worldwide scale," says Hans Lagendijk, Managing Director of Gans Cargo Operations Netherlands. "That has been the reason to grow our international network by finding joint ventures with reliable and well-reputed local partners at a number of strategic locations. Together with our partners, we continuously try to develop value adding services for our customers on a worldwide basis."

The company's first joint venture outside Europe was established in Egypt early 2015, which was based on market intelligence that the Egyptian cement industry intended to shift from traditional



*Gans' most recently acquired asset is a 120,000m<sup>3</sup> new build warehouse in the port of Rotterdam for the covered storage of dry bulk directly under grab reach.*

fuels such as oil and gas, towards solid fuels such as petroleum coke and coal. To add value to its customers, Gans has bought 4x16m<sup>3</sup> bulk grabs, which it rents out against competitive rates to discharge dry bulk cargoes in all Egyptian seaports. "Nowadays we are serving approximately 20 agency calls per month, whereby also our grabs are rented in a significant number of occasions." adds Lagendijk.

In the meantime the company has established joint ventures in UAE (covering MENA countries, India and Africa), Turkey, Poland and the United Kingdom all offering the full range of supply chain logistics, including but not limited to covered and non-covered storage.

Gans' most recently acquired asset is a 120,000m<sup>3</sup> new build warehouse in the

port of Rotterdam for the covered storage of dry bulk directly under grab reach. The warehouse consists of 10 x 3,500m<sup>3</sup> compartments, 14 x 5,000m<sup>3</sup> compartments, both with sliding rooftops, combined with a connected 140 x 60m warehouse with moveable walls inside. The warehouse is located directly at the quay with an available draft of 10.65m NAP. Both terminal and warehouse are operating 24/7 between Monday 07:30 and Saturday 15:30.

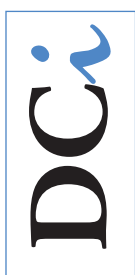
Gans is a member of the Hudig & Veder Group, a traditional, family owned company founded in 1795, operating all their business units with a very entrepreneurial vision, always willing and able to make quick decisions on interesting market opportunities.

DCi



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