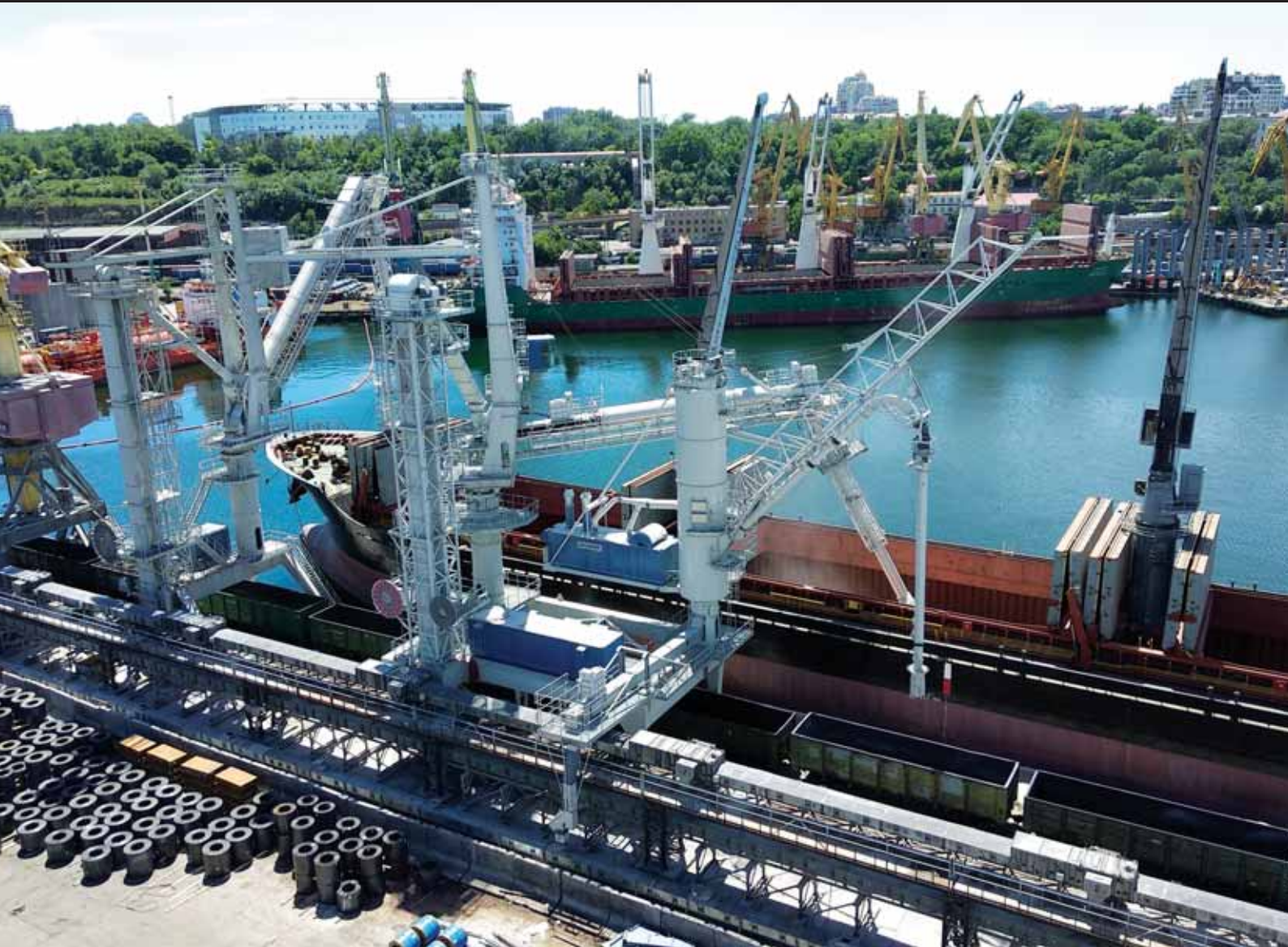




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ISSUE NO. 214 JUNE 2018



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JUNE 2018 issue

featuring...



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Steel industry raw materials offer support

An underlying trend of strengthening commodity import demand around the world still appears intact. Although the precise rate of growth is not easily estimated, and there is considerable uncertainty about the future performance of some large components, world seaborne dry bulk trade can be expected to remain in a positive mode.

Several major economies decelerated in this year's early months, potentially an adverse influence for consumption of many dry bulk commodities. However, signs suggest that the slowdown probably was a temporary blip, rather than indicating the start of a prolonged weakening. While awaiting further data, most forecasts continue to point to the global economy continuing to perform strongly through 2018.

IRON ORE

Steel production in the main raw materials importing countries started this year at a brisk pace. According to World Steel Association figures, China's crude steel output in the first four months of 2018 was 5% above the volume seen in the same period a year earlier, at 289mt (million tonnes). South Korea and India both achieved 4% growth, to 24mt and 35mt respectively, while the European Union's total was up by 2% to 58mt.

Assuming that a supportive background is broadly maintained, annual iron ore imports by a number of buyers could increase, as illustrated in table 1. Prospects for China's imports

also reflect expectations of extra impetus from steel mills' growing preference for higher-grade foreign ores, displacing lower-grade domestic supplies. Among other raw materials importers, healthy demand for steel in consuming industries, resulting in more steel production, is evident.

COAL

A positive view of global coal trade this year is reinforced by indications of a solid trend in coking coal movements. Although this sub-sector comprises only about one-fifth of the total, it may contribute much of the overall increment during 2018. Several forecasters estimate coking coal trade growing by at least 2-3% and possibly substantially faster.

Higher steel production volumes are a generally beneficial influence on coking coal consumption and trade. Two countries are monitored particularly closely, India and China. In India an upwards trend is clear, because rising steel output largely depends upon foreign supplies of superior grade coking coal. China's imports are much more difficult to predict because domestic mines remain the dominant supplier.

GRAIN & SOYA

During the next few months grain crops will be harvested in northern hemisphere countries which are also major importers. Estimates for these harvests are still very tentative because unpredictable weather in the final part of the season will greatly affect production quantity and quality. Hence

import demand forecasts are also mostly provisional.

Recent signs have not pointed to any severe crop shortfalls in these countries. Grain output in Europe, North Africa, the Middle East and China is currently expected to be similar to that seen twelve months earlier. Based on that perception, related additional import demand may be limited. Consequently, coupled with estimates for other importers, the latest International Grains Council forecast for global wheat and coarse grains trade in 2018/19 starting next month shows just a modest 2% rise, to 369mt.

MINOR BULKS

Global trade in forest products provides many bulk as well as non-bulk cargoes, including logs, sawnwoods, woodchips, pulp and other items. Seaborne movements apparently exceeded 360mt in 2017, one of the largest 'minor' bulk segments. Further expansion is envisaged this year as well, assisted by solid trends in construction and manufacturing in numerous countries.

BULK CARRIER FLEET

In the Handymax category of 40-65,000dwt-size vessels, comprising almost one-quarter of the world bulk carrier fleet, growth is likely to be noticeably slower during 2018 as a whole. As shown in table 2, much lower newbuilding deliveries are expected and, despite reduced scrapping also, the carrying-capacity expansion rate could be roughly halved.

TABLE 1: KEY IRON ORE IMPORTERS (MILLION TONNES)

	2013	2014	2015	2016	2017	2018*
China	820.3	933.1	953.4	1,024.7	1,075.4	1,100.0
Japan	135.8	136.4	131.0	130.0	126.6	128.0
EU-28	111.0	114.0	109.0	105.0	107.0	110.0
South Korea	63.4	73.5	73.3	71.7	72.5	74.0
Taiwan	20.5	21.3	23.8	23.5	23.7	24.0
Total of above	1,151.0	1,278.3	1,290.5	1,354.9	1,405.2	1,436.0

source: China Customs, AGDIIS, Bulk Shipping Analysis

*BSA forecast for 2018

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

	2013	2014	2015	2016	2017	2018*
Newbuilding deliveries	14.7	11.4	16.0	13.2	10.8	5.0
Scrapping (sales)	3.5	3.2	3.1	4.3	3.1	1.0
Losses	0.2	0.0	0.1	0.0	0.1	0.0
Plus/minus adjustments	-0.1	0.0	-0.1	0.0	0.0	0.0
Fleet at end of year	158.6	166.8	179.5	188.4	196.0	200.0
% change from previous year-end	+7.4	+5.2	+7.6	+4.9	+4.0	+2.0

source: Clarksons Research (historical data) & BSA 2018 forecasts

*forecast



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India now net wheat importer

In India, domestic wheat production is on course to fall by three million tonnes from an earlier estimate of 97 million tonnes. This may involve the country in importing 1.5mt (million tonnes) in 2018-19, according to a new report prepared for the US Department of Agriculture (USDA).

The report notes that, in 2016-2017, India imported 5.9mt, followed by 2mt a year later.

It continues by noting that, “Unfavourable late season weather conditions and consequent decline in the upcoming harvest may improve import prospects, while any further rise in import duty may push the forecast for imports lower”.

In November 2017, the government increased the import duty on wheat from 10% to 20% to discourage imports, since

local harvest projections were upbeat.

India has been a net importer of wheat since 2016-17 and this continued into 2017-18. However, most imports are of quality wheat for South India millers. Nevertheless, these sometimes find imports more economical than buying from the domestic market, since prices often rise after the marketing season is over in August.

Barry Cross

Australia's Metro Mining ships first consignment of bauxite to China

In early May, Australian company Metro Mining Ltd announced the departure of the first shipload of approximately 62,000 tonnes of ore to China from the Bauxite Hills Mine.

The Hong Kong flagged bulk cargo vessel *Spring Oasis* set sail for Shandong, China.

The Xinfu Group, one of China's largest integrated aluminium companies, will take delivery of the bauxite.

Xinfu has significant refining and smelting operations in Shandong, Shanxi, Guangxi and Xinjiang Provinces and Metro has a four-year binding off-take agreement to supply Xinfu with one million tonnes in the first year followed by 2mtpa (million tonnes per annum) for each of the next three years. Pricing under the agreement is linked to a well-established alumina price index.

Metro started mining at Bauxite Hills in April and experienced some commissioning issues due to a later than normal wet season and hydraulic system operability issues with the truck and haulage fleet.

Dry conditions since mid-April have led to much better mining conditions, the hydraulic system issues are being resolved and the production ramp up is progressing well.

Some commissioning problems also occurred with the screen and barge loading facilities. These were mostly related to material handling and exacerbated by the wetter than normal bauxite. These issues have now been resolved with minor plant modifications.

The project loaded bauxite from site to ship at an average rate over 7,000tpd (tonnes per day), and Metro Mining

expects to reach our 2018 target average of 10,000tpd by the end of June.

Conditions for the shiploading task were excellent, with gentle breezes from the east contributing to flat water and cool conditions generally. The marine transportation fleet performed well, and in line with expectations.

“Once again I wish to congratulate the entire Metro team. Whilst the first shipment is an extremely exciting event it is also very demanding and has been another job well done,” said Simon Finnis, CEO at Metro Mining Limited.

The Bauxite Hills Mine has an estimated ore reserve of 92.2mt (million tonnes) and a total resource of 144.8mt with an estimated 17-year mine life. The mine now becomes a globally significant bauxite mining operation and will feed the growing seaborne bauxite market.





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Coal exporters embrace a positive short-term outlook



Richard Scott, Bulk Shipping Analysis

Forecasting global coal trade has become progressively more difficult amid intense pressure in many countries to reduce coal consumption. A downwards trend in the longer term seems unavoidable. Yet short-term coal trade prospects are not necessarily especially bleak, and some analysts are still predicting, for 2018 as a whole, further modest growth in the total after an upwards trend resumed last year.

The outlook for import demand in a number of Asian countries suggests that higher volumes may be seen this year. Perhaps the additional quantities will be enough to more than offset reductions elsewhere, enabling the world coal trade total to increase by between 1% and 3%, as indicated by several recent forecasts. If

such a cautiously positive view proves accurate, a number of key suppliers to the international market probably will benefit, resulting in raised exports.

Various recent signs have indicated that the dominant coal exporters, Australia and Indonesia, could achieve increased foreign sales during 2018. These two countries each have around 30% shares of world seaborne coal trade.

Among the other largest suppliers, Russia's share is about 11% while Colombia and South Africa each have 7% shares. All three could see maintained or increased volumes exported during the current period. In the past year a similar 7% share was achieved by the USA's seaborne coal shipments as a result of a strong rebound,

but there is uncertainty about whether this recovery will persist.

ENERGY USAGE BACKGROUND

During the past twelve months the background of underlying influences affecting global energy consumption and coal usage has been generally favourable. According to most assessments prepared recently, the positive pattern could continue through 2018 and into next year, assuming that trade disputes do not severely disrupt import and export flows around the world.

Subject to that crucial proviso, the growth rate of global economic activity is widely expected to strengthen slightly after a brisk improvement last year. Despite a

predicted modest slowing of China's expansion, and a moderating trend in Japan, a number of other economies including the USA, eurozone and India may achieve higher growth rates. Several commodity and coal exporting countries such as Australia, Indonesia and Russia also may derive benefits.

The latest comprehensive analysis produced by the International Monetary Fund, published in April, predicted that world gross domestic product (GDP) would grow by 3.9% in 2018, a slight acceleration from the sharply improved 3.8% recorded in the previous twelve months. Advanced economies as a group (mainly comprising USA, Europe, Japan and South Korea) are expected to accelerate by 0.2 percentage points this year, to 2.5%. Emerging and developing economies as a group (including China) are expected to see a 0.1 percentage point improvement to 4.9%.

Prospects for several individual countries are especially significant from an energy consumption and coal importing viewpoint. Many economists foresee China's economy slowing, amid changes placing less emphasis on heavy industry and more emphasis on consumer services. The

IMF is predicting a limited slackening in China from the robust 6.9% GDP growth seen last year to 6.6% in the current period.

Among other coal importers, Japan's economic activity could slow from 1.7% last year, to 1.2% in 2018. The European Union could see a slight deceleration to 2.5% reflecting the slowing UK economy. Excluding the UK, eurozone GDP growth could improve marginally to 2.4%. In a large group of emerging and developing countries in Asia (a category which excludes Japan, South Korea and Taiwan) expansion is expected to be maintained at 6.5% despite the deterioration envisaged in China. This estimate reinforces expectations of continuing rapid advances within the Asian region, embracing many sizeable coal importing countries.

Implications for coal consumption and imports, arising from these predictions, vary. Energy use may rise but coal is not always affected proportionately. Other effects on imports result from changes in use of alternative energy sources and, in some countries, domestic production of coal. National environmental regulations designed to cut pollution or contribute to reducing greenhouse gas emissions often

have a substantial negative impact.

THE GLOBAL EXPORT MARKET

Differing opinions about the global coal export market in 2018 and further ahead are circulating, but a number of analysts predict a positive outcome, with a rising volume. Expectations of a strong expansion have not been prominent, but forecasts of modest growth within a one to three percent range reflect cautious optimism about several importers, mainly in Asia.

An example of an arguably cautious forecast was published in April by a reputable forecaster, the Australian Government Department of Industry, Innovation and Science (AGDIIS). The figures suggest that world coal trade (including land movements, but mostly seaborne) could be virtually flat in 2018, at 1,361mt (million tonnes), compared with an estimated 1,366mt last year. In 2019, the total is calculated at 1,358mt, another almost unchanged volume.

Within this overall view, contrasting developments in the two main parts are apparent. Thermal or steam coal trade is forecast to fall by over 1% this year to 1,046mt, followed by a further 1% reduction



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Due diligence in the coal supply chain

WHY BUSINESSES NEED TO BE RESPONSIBLE TO REMAIN COMPETITIVE

Coal buyers, especially in Europe, are under growing scrutiny from both civil society organizations and governments. They all want to be able to reassure consumers and end users that the coal being burned in their power plants, used to manufacture their steel or produce their cement comes from 'responsible' mines. In doing so, they want to know that the entire coal supply chain from producer to end user is sustainable.

Sustainable supply chains are not just crucial to the preservation of our environment and the respect of human rights, they are also good business. Mineral supply chains are complex, and mining is an industry often associated with environmental degradation, safety incidents, human right violations, etc. But mineral products are also vital to our societies. It is because they are so vital and present in everything we use that due diligence and responsible supply chain initiatives in mining are crucial.

Coal is still an essential part of our economies, not only used for power generation, but also for the manufacturing of steel, cement and several chemical products which can be produced from the by-products of coal. Coal is under even more scrutiny because of its direct link to Climate

Change. However, as long as coal remains important in our societies, we need to look beyond that aspect of the debate around coal, and producers and buyers alike need to focus their attention on the way coal is mined and transported to its end users.

Identifying and managing social and environmental risks in the supply chain is a business imperative and Bettercoal was created to deal with just that concern: ensuring that the coal purchased by Bettercoal Members comes from mines committed to a continuous improvement process of their operations. The enabling system created by Bettercoal insists on the principle of continuous improvement as opposed to simple compliance.

At the core of the initiative is the Bettercoal Code which covers ethical, social and environmental principles and provisions grouped into four critical areas: General Implementation Expectations (Legal Compliance, Policies and Systems); Business Ethics (Disclosure, Bribery and Facilitations Payments); Human Rights and Social Performance (Human Rights, Workers' Rights, Community Engagement; and the Environment (Environment, Pollution Prevention, Biodiversity).

Bettercoal assesses performance of coal suppliers against the ten principles

of the Bettercoal Code and jointly develops Continuous Improvement Plans, the summary results of which are shared with Bettercoal Members. All 13 Bettercoal Members then take into account the results of the assessments in their purchasing decisions and due diligence processes. By bringing buyers and producers together, Bettercoal is working towards a global responsible coal supply chain.

Bettercoal was established in 2012 and since then has been working with mines across the world: Colombia, Russia, the United States, South Africa, Poland, Indonesia, Kazakhstan and the United Kingdom. All these countries have mining companies which have undergone in total more than ten Bettercoal Site-Assessments. Bettercoal Members purchase coal from across the globe and therefore connect with mine operators in many different countries.

While the long-term goal of Bettercoal is to engage with all its Members' coal suppliers, the organization requires a pragmatic approach that allows the allocation of limited resources to Bettercoal's priorities. Therefore, the current priority focus for Bettercoal has been on the large coal exporting nations of Colombia, South Africa, Russia, Indonesia and the United States. Bettercoal is a growing organization and as coal consumption moves East, it is always looking for new Members and coal suppliers who want to support the improvement of the coal supply chain.

Coal will continue to be challenged as the world transitions to low carbon sources of energy. Producers and buyers should continue to work closer together to develop a shared understanding of the risks and build a system where demonstrating continuous improvement in practices will become a key purchasing decision factor, as important as price.

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



WORLD COAL TRADE — PRINCIPAL EXPORTERS (MILLION TONNES)

	2016	2017	2018*	2019*	2018 % change**
Australia	389	374	399	405	+7
Canada (coking)	21	21	23	21	+10
Colombia#	82	82	80	81	-2
Indonesia#	369	374	377	371	+1
Russia	156	166	169	172	+2
South Africa#	75	76	76	78	0
USA (exc to Canada)	52	81	82	76	+1

* forecast ** 2018 forecast compared with previous year #steam coal only

source: Australian Government Dept of Industry, Innovation and Science, 9 April 2018, and BSA calculations

in 2019 to 1,037mt. These declines could be offset by rising quantities in the metallurgical or coking coal sub-sector, up by 2% to 315mt in 2018 and by a similar 2% to 321mt next year, amid expected strengthening steel production in countries relying on imported coal for use in that industry.

Other pundits are more optimistic. Based on those calculations, growth in coking coal trade may be more vigorous than indicated in the above forecast, while steam coal movements may continue growing rather than seeing a sustained weakening. Of particular significance are varying expectations for two importers, China and India — jointly comprising over one-third of the global import market — which are especially hard to assess.

For commodity exporters, attempting to assess the usual range of commercial factors affecting consumption and import demand is a difficult enough exercise. To these aspects are added, in some countries more than others, especially in China and also India and elsewhere, government policy changes determining consumption patterns and foreign purchases. These affect not only the longer term trend of coal imports, but also short-term changes the duration of which often cannot be predicted accurately.

Within the main coal exporting countries numerous influences affect trends and associated prospects. Prominent among these are the scale and efficiency of mining activity and production, type of coal produced, and export availability. Production and transport costs have an impact on relative competitiveness and pricing in the international market. Government policy involvement is more visible in some countries than in others.

Contrasts among the principal suppliers and their significance within the broader picture are emphasized in the table, showing AGDIIS estimates for individual coal exporters in 2017 and forecasts for 2018 and next year. The 2019 predictions are inevitably tentative, surrounded by greater uncertainty. The volumes shown represent about 85% of all world trade in coal and are therefore a useful indication of likely changes.

INDIVIDUAL EXPORTER'S PROSPECTS

Australia's exports are fairly equally divided between steam coal and metallurgical coal (metcoal is a category which includes some thermal grades used in the steel industry). The 2017 total of 374mt shown is comprised of 202mt (54% of the overall volume) and 172mt (46%) respectively. These massive volumes provide Australia

with a large 30% share of the world market for sea-traded coal. In 2018 a robust 25mt or 7% expansion is forecast, entirely reflecting a recovery in metcoal shipments after the sharp downturn seen last year.

Steam coal exports from Australia are expected to grow only minimally from current levels over the next few years. The 2018 total may be almost the same as seen in the preceding twelve months. This subdued expectation is based on a flat outlook for consumption in many countries importing Australian coal for use by power stations and other industries. However, according to AGDIIS, Australian exporters "are likely to increase their share of a stagnant market, as countries such as China and South Korea consume higher amounts of high energy/low to medium ash coal to reduce air pollution and meet international climate commitments".

In the metcoal sector, exports from Australia this year are expected to rebound. Production and exports last year were weakened by unfavourable weather, industrial action and operational changes. An absence of weather-related outages in 2018 could boost recovery, especially if assisted by strong prices. Exports of this coal type are forecast to grow by 25mt or 15%, reaching 197mt, although rail and port maintenance has been highlighted as a feature likely to adversely affect the smooth flow and possibly restrain the upturn.

The international steam coal market, especially in Asia, will determine Indonesia's exports which mostly consist of steam grades. In 2017 these exports, including large quantities of low-grade lignite mainly used in China's power stations, rose marginally by one percent to reach 374mt. A further small rise is seen as a possibility for this year. But government policy changes related to the domestic coal market in Indonesia are an uncertainty, with effects potentially restraining export shipments.

Exports from Russia, predominantly steam coal, have been rising briskly and totalled 166mt in 2017 (including land



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movements, although mainly seaborne), a 10mt or 6% increase from the previous year. Metcoal exports of 15mt comprised under one-tenth of the total. Earlier currency depreciation improved competitiveness and assisted an upwards trend in foreign sales, which may continue this year with an estimated modest 2% exports rise to 169mt.

One especially remarkable change among suppliers last year was a surge in the USA's exports. The annual US total (excluding shipments to Canada) rose by 29mt or 56%, from 52mt in the preceding twelve months, to 81mt. Within this volume steam coal comprised 48mt, accompanied by metcoal shipments of 33mt. Both categories increased greatly, boosted by higher import demand in Europe and also by reduced Australian coking coal availability. However, there are some doubts about the sustainability of an upwards trend in US exports, reflecting increasing competition in the international steam coal market, and possibly higher metcoal consumption within the US domestic market.

South Africa's exports are shown in the table as almost flat last year at 76mt, although this total excludes metcoal. Other sources suggest that the overall coal volume exported rose by a brisk 8%, reaching 82mt. Analysts at AGDIIS comment that export capacity "is being

held back by a lack of investment in port infrastructure; the country's rail infrastructure also desperately needs improving". Given these circumstances, and absent investment in mining projects, only limited scope for foreign coal sales to expand is currently envisaged.

Exports from Colombia, consisting entirely of steam coal, were flat last year at 82mt according to the figures shown in the table, but alternative information sources indicate that there was a 1% decrease to 86mt. Potential for further growth here, as well, is seen as limited. European import demand, a key element of Colombia's customer base, is more likely to weaken than strengthen given rapidly diminishing support for coal consumption in Europe's power stations.

Elsewhere among coal suppliers, positive indications for Canada's metcoal exports (excluding shipments to USA) have been seen. These signs have resulted in predictions of growth this year, following last year's 21mt, as included in the tabulated data.

Another supplier, becoming more prominent, is Mozambique which apparently shipped about 12mt of steam and metcoal through the ports of Nacala and Beira mainly to Asian markets in 2017. Further growth in Mozambique's exports is foreseen amid improvements in rail connections to loading ports.

EVALUATING THE TREND

Based on the available evidence, a strengthening trend of global coal trade is quite likely to continue during 2018 as a whole, albeit possibly a deceleration compared with last year's growth rate. However, some influences are not easy to predict, even in the immediate future, and the outcome can only be guessed after making assumptions which are not always firmly supported. Consequently there is also a possibility of a flat or even reduced trade volume this year.

Moreover, the longer term view of prospects for global coal import demand still points to very limited potential for overall trade growth, and a greater risk of diminishing volumes. Although downwards pressures may not necessarily result in annual volumes declining rapidly, the future trend's direction seems fairly clear.

In some parts of the international market, such as Europe, weakening coal consumption and imports are foreseeable as a result of government energy policy. In the much larger Asian importing region, comprising about three quarters of world seaborne coal trade, there are a number of positive signs, particularly among smaller importing countries. But the outlook for major importers China, India and Japan is surrounded by considerable uncertainty with seemingly more potential for reductions than for higher volumes. **DCi**



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New offices in New York, Shanghai and Athens signal Newport Shipping expansion

On 4 June, Newport Shipping Group announced that it has opened new offices in New York City, Shanghai, and Athens as part of the company's "near customer, near market" efforts, expanding its presence in key shipowning and ship repair communities around the world.

The London-headquartered company has existing offices in Istanbul and Singapore.

A key aspect of the group's expansion is to ensure that shipowners with operations in all the major maritime hubs have easy access to Newport Shipping's unique ship repair and financing capabilities.

Speaking during Posidonia Athens 2018, Chief Executive Officer Erol Sarikaya said: "The shipping industry requires global capabilities and is dependent on personal relationships.

"Having offices in key maritime locations means we have local people, with local knowledge on the ground in daily contact with shipowners and shipyards. We have excellent teams in place in each market we serve."

The Athens, Istanbul, Shanghai, and Singapore offices are focused on customers' ship repair and technical needs

while New York and the London headquarters manage Newport's corporate and international operations.

Commenting on the ship repair market, Sarikaya said: "The industry is undergoing tremendous change. The introduction of mandatory requirements to reduce shipping's impact on the environment, in particular, will have a significant material impact on most shipowners.

"While the larger players are likely to have capital in place for retrofitting ballast water treatment systems, scrubbers and other compliant systems, or to invest in newbuilds, the reality is that shipowners with smaller, older fleets — those that make up the majority of the world fleet — will benefit greatly by minimizing working capital costs in an already capital-intensive industry.

"We can support these small to medium-sized operators by financing their retrofits, while they benefit further from the opportunities presented through our cooperation shipyards within the lower cost regions of the Pacific/Atlantic trading zones."

Sarikaya added: "With offices in strategic shipping locations around the world,

together with ship repair facilities in China, Turkey, Indonesia and Singapore, all shipowners, big or small, now have comprehensive servicing and financing options available to them for their drydocking and equipment retrofits. We cooperate with highly-skilled and cost-competitive shipyards that can serve owners globally."

Newport Shipping plans to open offices in other locations and announce new co-operation agreements in coming months.

Newport Shipping UK LLP, registered and headquartered in London, UK, began operations in 2013 providing comprehensive technical and commercial ship management services to the shipping industry. In 2016, Newport began focusing operations on providing comprehensive drydocking services ranging from shiprepair works, equipment purchases and the timely delivery of spare parts, paint supply, as well as specialized retrofits and equipment upgrades.

Newport operates a global strategic network of 13 drydocks capable of handling vessels of all sizes operating across the Atlantic and Pacific trading zones.

Ballast water treatment — how digital tank gauging can help

Ballast water is an essential component of ship operations, with larger vessels requiring thousands of cubic metres to maintain stability and manoeuvrability. The recently enforced 'International Convention for the Control and Management of Ships Ballast Water and Sediments' requires that an approved water treatment system is fitted to ships to prevent the spread of harmful aquatic organisms from one region to another and prevent damage to the marine environment by minimizing the uptake and subsequent discharge of sediments and organisms. Ships will also now be required to implement a ship specific ballast water management plan and to record and



report on all ballast treatment and exchanges.

The installation of a modern tank level gauging system — from a company

such as PSM Instrumentation — can help cut costs by real-time and accurate measurement of ballast water levels to ensure that the treatment is run for only as long as required. In addition, the system can provide an automatic output to comply with new recording and reporting standards, for the ballast water record book.

The new legislation presents an ideal opportunity to upgrade to the latest digital tank gauging systems. It is estimated that up to 40,000 existing ships will be affected and require ballast water management to be installed, and installing a high accuracy gauging system which can automate record keeping at the same time can be achieved very cost-effectively.

DELIVERING A HIGHER STANDARD



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Hartmann and CSL Join Forces on Newbuild Project

The CSL Group (CSL) and Hartmann Family announced on 25 May 2018, that they have formed a 50/50 joint venture to build and operate a 40,000dwt gravity self-unloading vessel to trade in Europe.

The new ship will be built at Chengxi Shipyard in China and is scheduled for

delivery in Germany in 2020. It will service Mibau Stema Group on a long-term charter.

The joint venture represents an expansion of existing activities in Europe for both Hartmann and CSL.

Hartmann Family is the owner of a fleet

of belt self-unloading ships that are chartered to Mibau Stema Group. Mibau Stema Group, a joint venture of Heidelberg Cement AG and Hartmann Family, is the leading supplier of exported aggregates for the construction building industry in Europe.

Cavotec inaugurates world-class manufacturing facility in Italy



Cavotec's hands-free mooring system — the MoorMaster™.

Global engineering group Cavotec has officially opened its new world-class production facility in Milan, which is set to maintain the high quality of the group's manufacturing and supply chain in the years ahead.

Some 150 guests attended the opening ceremony at the end of May, among them key customers, suppliers, partners, local officials and dignitaries, and members of the media. Cavotec board members and management team were also present.

Cavotec CEO, Mikael Norin, opened

the ceremony. Following a series of keynote addresses, guests were taken on a guided tour of the facility. The world-class production plant features the latest in sustainable building materials and technologies, including the capacity to generate 230kW of solar power. It is also equipped with geothermal heating, has 2,730m² of office space, and 12,264m² devoted to engineering and production.

"Not only are we opening a state-of-the-art production facility, we're opening a new chapter in the Cavotec story.

These premises will ensure that we build the manufacturing and supply chain excellence that will see Cavotec realize its full potential," Norin said.

Cavotec Italy is one of the group's seven Centres of Excellence worldwide. As part of the Ports & Maritime Division, Cavotec Italy focuses primarily on the development and manufacture of shore power solutions, MoorMaster™ automated mooring as well as crane electrification solutions such as cable reels.

CSL and SMT Shipping team up in Global Cement Shipping Joint Venture

On 8 May this year, SMT Shipping (SMT) and The CSL Group (CSL) announced that they have entered into an agreement for CSL to acquire 50% of Eureka Shipping Ltd. (Eureka), SMT's pneumatic cement vessel business.

The new joint venture will allow Eureka and CSL to combine expertise, resources and innovative technologies to expand services to customers in the seaborne cement powder and fly ash transportation markets around the world. CSL's Australian cement shipping business is not included in the joint venture.

"The joint venture represents an important step in CSL's strategy to increase its presence in the global construction material sector," said Louis Martel, President and CEO of The CSL Group. "We are confident that the synergies between CSL and the Eureka team, along with our common values and complementary skills will further strengthen our ability to provide significant value to our customers and an effective platform for growth."

"SMT Shipping is honored to partner with CSL in Eureka," said Mark Voorham, CEO of SMT Shipping.

"We feel the new joint venture will harness the strengths of both respected companies, which will work together seamlessly to serve our clients with the highest levels of service and professionalism."

"For Eureka Shipping, the partnership with CSL provides a strong, collaborative platform to further invest in innovative logistics solutions to the benefit of our customers in the cement and building materials industries," added Kai Grotterud, CEO, Eureka Shipping Ltd.

The partnership is a strong strategic fit, leveraging the companies' respective strengths in the shipping and handling of dry bulk cargoes. There will be no change in the day-to-day management and operation of vessels in the Eureka fleet. The transaction is subject to certain regulatory conditions and is expected to close by end of June.

Eureka Shipping Ltd. operates a fleet of self-unloading cement carriers in the Baltic Sea, the Atlantic Ocean, the Mediterranean Sea, the Caribbean and Asia.

The SMT Shipping Group has, over the past 30 years, built a fleet of about 45 vessels through a number of joint venture companies operating in various bulk commodities markets, focusing on highly efficient geared bulk carriers, floating storage/transshipment terminals and belt-unloaders.

Eureka Shipping's cement carrier Furuviik was built by Royal Bodewes.





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Marshall Islands aims to resolve safety concerns

The Republic of the Marshall Islands (RMI) has submitted a paper to the International Maritime Organization (IMO) Intersessional Working Group (ISWG) on the consistent implementation of the 2020 global fuel oil sulphur standard under MARPOL Annex VI.

The submission, which was co-sponsored by the Republic of Liberia, the Baltic and International Maritime Council (BIMCO), the International Chamber of Shipping (ICS), the International Association of Dry Cargo Shipowners (INTERCARGO), the International Association of Independent Tanker Owners (INTERTANKO), and the World Shipping Council (WSC), is intended to assist the ISWG in developing guidelines on the implementation of regulation 14.1.3 of MARPOL Annex VI.

The regulation limits sulphur in fuel oil to 0.50% when operating outside of designated Emission Control Areas (ECAs). It was decided at the 70th session of the IMO Marine Environment

Protection Committee (MEPC) to retain 01 January 2020 as the effective date for the shift to the 0.50% global fuel oil standard. The MEPC issued Resolution MEPC.280(70) to affirm this decision. Additionally, recognizing concerns expressed regarding the implementation of this fuel oil standard, MEPC 71 agreed to establish a new output on what additional measures may be developed to promote consistent implementation of the 0.50% global fuel oil standard.

The RMI's submission to the IMO provides technical information focusing on safety implications and challenges associated with using new fuel oil blends compliant with the new 0.50% sulphur fuel oil standard. The technical information, detailed in the Annex to the submission, aims to cover a wide range of safety aspects associated with the switch to 2020 fuels such as potential issues with blend components, stability, compatibility and other fuel oil parameters. All of these issues are

viewed as having the potential to negatively impact fuel and machinery systems. Accordingly, the technical information also touches upon operational and technical measures to address risks during fuel switching, tank cleaning and fuel system arrangements (heating capacities and tank segregation). The information is intended to facilitate informed decision making as the ISWG addresses preparatory and transitional issues.

The co-sponsors also recommend that any consequential regulatory amendments and/or guidelines necessary to address the safety issues raised in the submission are brought to the attention of the MEPC at its next session in October 2018.

Likewise, it is also proposed that any potential safety implications resulting from new blends or fuel types should be reported to the next session of the Marine Safety Committee (MSC) in December 2018.

Aqua-tools' B-QUA nominated for Seatrade Clean Shipping Award

Aqua-tools' B-QUA ballast water monitoring technique, which is based on an advanced Adenosine Tri-phosphates (ATP) testing methodology, has been nominated in the Clean Shipping category of this year's Seatrade Awards.

Marc Raymond, aqua-tools' founder and CEO, said: "We are thrilled to be nominated for this award. While aqua-tools has been supplying water and fuel microbiological expertise to industrial and maritime industries for some time, the ballast water treatment sector is relatively new to us.

"To be nominated for a Seatrade Award so early on is indicative of the important commercial and technical role the industry

believes effective, rapid water sampling and testing will have to play in meeting the Ballast Water Management Convention's requirements."

Earlier this year, the French company's B-QUA was approved for use by the Saudi and Canadian port state control authorities. B-QUA is said to be the only test kit on the market capable of providing microbiological measurement readings in under one hour and across all organism factions. The 10–50µm and >50µm ranges are analysed within 50 minutes, while results of bacteria analysis can be provided in 15 minutes.

"There is no other monitoring and

verification system that can test all three of these organism groups – 10 to 50µm and >50µm and bacteria — required by the D1 and D2 standards," said Raymond.

Those nominated for the Seatrade Clean Shipping Award must demonstrate a new or improved upon technology that supports the industry's objective of clean and sustainable shipping.

A panel of judges, which includes experts from leading industry associations BIMCO, CLIA, HELMEPA, IACS, ICS, INTERCARGO, INTERTANKO and OCIMF, will decide which of the six finalists takes home the award on the evening of the 29 June.

Union calls for 'real' increase in seafarer wage

The International Transport Workers' Federation (ITF) and Nautilus International, the maritime professionals trade union, will tell the International Labour Organization (ILO) that it is time for a significant rise in the global minimum wage for seafarers. In June,

Nautilus International general secretary Mark Dickinson will lead the seafarers' delegation on behalf of the ITF at talks within the Joint Maritime Commission, which is responsible for setting the global minimum wage for seafarers — currently the equivalent of approxi-

mately US\$614 per month. Dickinson believes this is scant reward: "Crewing the world's roughly 52,000 ships are approximately 1,647,000 seafarers, many of whom work dizzyingly long hours, in dangerous conditions, and for far too many, in return for a pittance."

Marine paints & coatings

profitability
is key

Fouling-free slow steaming

Over the last ten years the global fleet capacity of bulk ships has more than tripled, but cargo volumes while increasing, have not kept pace, writes *Henrik Dyrholm, Global Product Manager, Hempel A/S*. Added to which, the dry bulk freight rates which started to drop in 2008, hitting a record low in January 2016, are still below the pre-collapse levels despite the positive upturn last year.

Bunker costs have also risen and the implementation of the new Global Sulphur Cap in 2020 looks certain to increase operators' costs still further. As a result, profitability is key.

Whatever trade or vessel type, fragile market conditions mean that operational efficiencies are absolutely top of mind for all shipowners and operators.

One of the most basic factors affecting operational efficiency is the way a ship moves through the water. A hydrodynamic smooth hull cuts through the water with minimal resistance and drag, which is vital to fuel economy. But as soon as a ship enters the water it will attract biofouling, with warmer waters and slower speeds — a strategy adopted by many when faced with lower cargo volumes and plummeting freight rates — encouraging even faster growth.

At first, just single cell organisms create a bio-film or light slime, but over time this increases as larger organisms become established and grow. With no hull antifouling control, a vessel could have up

to 150kg of marine life per square metre attached to its hull, after just six months of active service.

Even light biofouling has a significant impact on a vessel's fuel consumption; it's been estimated that the roughness caused results in an increase in fuel consumption of between one to two per cent. The impact of larger, more established biofouling depends on the type and quantity but seaweed can increase fuel consumption by up to 10%, while shells, barnacles, oysters and mussels could cause a massive increase in fuel consumption by as much as a staggering 40%.

Unsurprisingly, over the years much money and research has been put into finding solutions to this perennial problem, as shipowners and operators search for hull coatings and cleaning solutions that deliver the greatest result reducing resistance and drag.

Hempel, the worldwide coatings manufacturer, launched the world's first antifouling coating for ships' hulls back in 1917, and has been driving modern science and technology forward in this area ever since.

Lasting antifouling protection is a key element of vessel efficiency and increasingly high-tech solutions now offer comprehensive protection with minimal environmental impact. The cost of applying an effective antifouling coating can effectively balance the significant return on investment achieved through reduced fuel consumption.

LATEST TECHNOLOGY

Hempel's Globic 9500 series of premium self-polishing antifouling coatings offers outstanding defence against fouling. Coatings from the series have been designed to offer customers a maximum speed loss of just 2.5% over five years, which equates to significant fuel savings and lower CO₂ emissions. The Globic range has been very well received in the market since its launch in 2005 and have already been applied to more than 5,000 vessels worldwide.

The latest Globic coatings — Globic 9500M and Globic 9500S — combine the strongest binder and biocide package using patented Nano acrylate technology. The result is a fine polishing mechanism which brings the biocides to the surface at a steady rate, while patented microfibres reinforce the binder producing a skeleton effect, which give best-in-class mechanical strength to prevent cracking and peeling.

Globic 9500M (M for maintenance) is designed to protect against slime, soft and hard fouling in all operating conditions, while Globic 9500S (S for static) is designed to protect against hard fouling even the type that can occur during extended outfitting periods and is as a result, ideal for newbuilds.

The Globic binder technology creates a product with a very low hull roughness which starts working as soon as the hull meets the water. The specially designed

Hempel: setting a new standard with new hull performance system SHAPE

Responding to shipping's continuing needs for sustainable solutions for increased efficiency, in January this year, Hempel launched its new digital analysing tool – Systems for Hull and Propeller Efficiency (SHAPE). Based on the ISO 19030 framework, SHAPE combines elements of efficiency optimization, delivering expert advice and solutions to every ship operator.

SHAPE is designed to maximize the quality of performance analysis and to offer expert analysis for efficient operations and a maximum return on investment through its transparent and thorough process. Fouling and mechanical damage to the hull can increase the engine power a vessel needs by up to 20%.

By utilizing SHAPE, in combination with its hull coatings, Hempel can provide ISO quality documented savings

in fuel and a programme of continuous improvement. Users of SHAPE are able to analyse the impact of dry docking, in service hull and propeller solutions and maintenance on performance, allowing for data driven decision making.

Andreas Glud, Group Segment Manager, Marine, Dry Dock, says: "Hull performance remains a crucial element in understanding fuel performance. At Hempel we started focusing on fuel performance over a decade ago when we launched the first fuel savings guarantees in the industry. Our new Hempel SHAPE system allows us to gather high quality data, provide expert analysis, deliver decisive advice and world class hull coatings irrespective of the type, age, size and the operating patterns of a vessel — making ship owners more efficient and competitive.

We are presenting our customers with something beyond performance monitoring, we are offering fuel efficiency intelligence."

SHAPE is based on the new standard in performance monitoring — ISO 19030 — a set of methodologies to measure changes in ship specific hull and propeller performance, and define a set of relevant performance indicators for hull and propeller maintenance and repair activities. SHAPE can monitor the long-term trends using in-service key performance indicators (KPIs) and also short-term trends through the maintenance trigger KPI. Only 15% of ships can currently meet the strict requirements of ISO 19030 part 2. Hempel SHAPE brings transparent performance monitoring and analysis to the global fleet.

water-activated Nano acrylate technology means that the seawater immediately starts to penetrate the hydrophobic outer shell of the Nano capsule. The hydrophilic inner core then chemically hydrolyses and expands to break through the outer shell, giving controlled polishing across the surface of the hull.

This continued self-polishing and the constant thin leach layer means that the vessel hull benefits from a consistent biocide release over the entire docking interval, while the Nano acrylate technology provides immediate antifouling protection without the need for water friction, which is unlike other antifouling technologies. The Globic technology delivers clear operational efficiencies for both slow steaming and long idle periods.

Hempel has designed both types of coatings to provide effective antifouling protection for docking intervals of more than 60 months, offering significant fuel savings which translates into improved operational efficiencies, lower CO₂ emissions and a higher return on investment.

Faced with ongoing over capacity in the market, shipowners' and operators' profit margins will remain tightly controlled for the foreseeable future and operational efficiencies will remain a vital factor in all vessel operations. Hempel's Globic series offers invaluable effective control over a naturally occurring hazard, but one that operators can ill afford to ignore in the current market conditions.



Selektope® antifouling gains popularity in the shipping market

TWO-YEAR SHIP TRIAL CONFIRMS SELEKTOPE® ANTIFOULING POWER

A twenty-four-month trial of a hull coating containing the bio-repellent active agent Selektope® on a 46,067dwt chemical and products carrier has confirmed the antifouling ingredient's hard fouling prevention power.

Selektope® is an organic, non-metal compound that works to prevent barnacle fouling by temporarily activating the swimming behaviour of barnacle cyprid larvae, making it impossible for them to settle on the hull. It is characterized by high efficacy at extremely low concentrations (0.1% w/w), is ultra-low leaching and offers paint manufacturers the flexibility to boost copper-based paint formulations or replace copper completely.

In 2015, the vertical sides and flat bottom of Laurin Maritime's vessel *Calypso* were fully coated with an antifouling coating containing Selektope® during its first five-year drydock. The vessel has spent two years in active operation across a wide range of trade routes, with more than 50% of operating time spent in biofouling hotspots with >25°C (up to 32°C) temperatures.

Independent hull and propeller performance analysis has verified that after twenty-four months *Calypso*'s increased total resistance was calculated to be 7%, compared with a benchmark new vessel that would see an increase in resistance of 10–20%. Over the period, speed losses experienced by *Calypso* amounted to a mere 2% when measured against sea trial performance. Data also confirmed that the development rate of added resistance for *Calypso* amounted to 0.1 % (0.5% to 1.5% is expected).

A recent underwater hull inspection established that *Calypso*'s hull is very clean, with divers finding no soft or hard fouling over the starboard and portside verticals, flat bottom and bilge areas.

Laurin Maritime's technical director Bertil Andersson says: "The vessel has now operated for two years since last dry dock, and we can conclude that the fouling of the hull (read added hull resistance) remains at a very low level and the trend continues

being flat." I-Tech is the Swedish biotechnology company behind the development of Selektope®. Its CEO Philip



Chaabane says: "This independent analysis of performance data and the underwater hull inspection provide convincing long-term performance results from a full-vessel application of a Selektope®-containing hull coating for a vessel with significant exposure to severe fouling conditions. The fact that the hull fouling trend continues to be flat means that our general outlook on the continuous performance of the Selektope®-containing coating is very positive.

This delivers the proof required that our unique antifouling ingredient can offer ship operators guaranteed hard fouling prevention performance for any vessel activity and trading patterns."

With multiple major coatings suppliers now turning to Selektope® to enhance their products, I-Tech AB is urging ship owners to check whether the ingredient is available in all antifouling being considered as part of the coatings selection process.

BIOFOULING DURING OUTFITTING AT SOUTH KOREAN SHIPYARDS DRIVES HIGH DEMAND FOR SELEKTOPE®

As global water temperatures increase, global 'biofouling hotspots' in subtropical/tropical areas are intensifying, exposing newbuildings at the world's major shipyards to greater risk of hard fouling during the outfitting process. The effects of intense hard fouling on idle newbuilds can have great impact on a newly applied hull coating and on a vessel's performance in sea trials.

In response to this problem, a new antifouling coating specifically targeting

hard biofouling prevention during the outfitting period was brought to market by Danish marine coatings specialist Hempel in late 2017. GLOBIC 9500S includes the unique antifouling ingredient Selektope® as part of its 'smart biocide package' that delivers boosted static performance against hard fouling for ships with extended idle periods.

Philip Chaabane, CEO I-TECH AB, says: "Our product is boosting the performance of sophisticated antifouling systems under harsh fouling conditions, such as those experienced during outfitting at shipyards in South Korea. Selektope®

is clearly adding value to the coatings products that the major coating manufacturers offer."

This first-of-its-kind antifouling technology caught the attention of coatings suppliers in the early stages of its research and development. To date, several products have been launched onto the market and the number of Selektope®-containing coatings being sold by different manufacturers is increasing year-on-year.

I-Tech AB recently responded to strong market demand for the antifouling ingredient in South Korea by appointing KhaiEL as Selektope's exclusive importer and agent. Under the new agreement, I-Tech will continue to manage sales of Selektope® in South Korea while KhaiEL will exclusively handle imports.

"We are delighted to be working with such a highly reputed company in KhaiEL to strengthen the supply of Selektope® to South Korea. This business relationship reflects the need to address increasing demand for our product in South Korea, particularly from the shipyards and many owners running risks of extended idling, whether during newbuilding or operations," says Chaabane.

"KhaiEL is very proud to partner with I-Tech to represent the highly innovative Selektope® technology in the Korean market," says Paul Cho, Marketing Director KhaiEL.

South Korea is a key market for I-Tech. The company believes that coatings containing Selektope® play a vital role for shipyards located in biofouling hotspots with its barnacle-repellent technology.

PPG and DNV GL collaborate to take hull performance beyond ISO 19030

PPG, a globally renowned provider of protective and marine coatings, and the global quality assurance and risk management company DNV GL, have signed a collaboration agreement focused on operational data analysis using DNV GL's next-generation hull analysis methodologies.

To tackle the challenge of poor hull and propeller performance, PPG and DNV GL will work together to collect data and apply DNV GL's methodologies to contribute to PPG's further development of innovative coating solutions.

According to data published by the IMO, about one tenth of the world fleet's fuel consumption can be attributed to poor hull and propeller performance. This costs owners an estimated US\$30 billion in additional fuel costs per year and contributes to 0.3% of all man-made carbon emissions. Released in 2017, the ISO 19030 standard defines a set of performance indicators for hull and propeller maintenance, repair and retrofit activities to improve operational performance.

"DNV GL and PPG have identified a market demand for methodologies that go beyond ISO 19030 and share a common vision to develop future requirements and solutions that enable optimum vessel performance" says Tom Molenda, PPG's Global Marine Director. "Our goal is to enhance hull efficiency for multiple operational profiles and optimize vessel

performance".

DNV GL Senior Research Engineer Jason Stefanatos explains that as more owners invest in more sophisticated sensors, tools and systems to collect operational data, performance can be measured more precisely over time.

"By applying DNV GL's expertise in hull degradation and operational data analysis tools, PPG will be better able to transparently demonstrate the impact of their coating solutions" Stefanatos says, noting that the methodologies and data analytics tools are also available on DNV GL's Fleet Performance Management Platform ECO Insight.

"The ECO Insight platform provides

information on the performance of voyage, vessel, hull, engine, fuel, weather, cargoes, among other variables," he explains. "And because we have access to real-time vessel performance data from more than 1,900 vessels, we are confident that our collaboration with PPG can be used by owners and operators to optimize hull performance."

ABOUT PPG

PPG works every day to develop and deliver the paints, coatings and materials that its customers have trusted for more than 130 years. Through dedication and creativity, it solves its customers' biggest challenges, collaborating closely to find the right path forward. With headquarters in Pittsburgh, PPG operates and innovates in more than 70 countries, with reported net sales of \$14.8 billion in 2017. PPG serves customers in construction, consumer products, industrial and transportation markets and aftermarkets.

ABOUT DNV GL

DNV GL is a global quality assurance and risk management company. Driven by its purpose of safeguarding life, property and the environment, it enables its customers to advance the safety and sustainability of their businesses. Operating in more than 100 countries, DNV GL's professionals are dedicated to helping customers in the maritime, oil & gas, power and renewables and other industries to make the world safer, smarter and greener.



DNV GL's George Dimopoulos, Head of R&D and advisory Greece and PPG's Tom Molenda, Global Director Marine Coatings sign the collaboration agreement.



(left to right) DNV GL: Jason Stefanatos, Senior Research Engineer, Braun Till, Market Development Manager and George Dimopoulos, Head of R&D and advisory Greece, PPG: Tom Molenda, Global Director Marine Coatings, Ariana Psomas, Global Segment Manager Dry Dock and New Build and Eirinaios Petoumenos, Business Development Manager Marine.

Oil-to-water conversion success for Great Lakes bulkers



A Thordon COMPAC installation.

Thordon Bearings shaft conversion enables drastic reduction in emissions

The oil-to-water lubricated tailshaft conversion Thordon Bearings carried out last year to the 26,260dwt Great Lakes Fleet-managed bulk carrier *John G. Munson* has successfully completed its first season as a diesel-powered ship.

The shaft conversion of the 1952-built self-unloader formed a key part of the mammoth 12-month power conversion project completed last year by Fincantieri's

Bay Shipbuilding yard, in Sturgeon Bay, Wisconsin, USA.

The vessel's steam propulsion plant was replaced with an energy efficient medium-speed diesel arrangement. Major works also included the removal and replacement of the vessels' tailshaft, stern tube, propeller and hub. Thordon Bearings' supplied its COMPAC water lubricated propeller shaft bearings, a Water Quality

Package, which conditions the lubricating water, and shaft protection system ThorShield.

Mechanical Supply Inc. and Belthor Systems, members of Thordon's Distributor Network, worked closely with Great Lakes Fleet on the detailed design, while Avalon Marine, another Thordon Distributor, was instrumental in working with classification society ABS to trial

COMPAC under its notation for extended shaft withdrawal.

John G. Munson became the first ABS-classed vessel with a water-lubricated propeller shaft arrangement to operate under its TCM (Tailshaft Condition Monitoring) notation.

Commenting on the success of the conversion, Thordon's Regional Manager – Americas, Scott Groves, said: "September 2017 sea trials confirmed the

John G. Munson is consuming considerably less fuel than it was as a steam ship, reducing emissions dramatically. The water-lubricated propeller shaft arrangement adds to these cost savings and further mitigates against any risk of tailshaft pollution."

As steam power plants can use 30% to 50% more fuel than comparable diesel engines, the shipowner's decision to convert the *John G. Munson* under the USEPA's Steamship Repower Incentive Program has paid dividends. As a motorship, the owner can now extend the life of this historic vessel for decades to come, without detriment to the environment in which it operates."

Thordon Bearings' Director of Marketing and Customer Services, Craig Carter, added: "There are a number of steam-driven bulk carriers that have been earmarked as potential candidates for power conversions, some of which, like the *John G. Munson*, have already been converted to more energy and

environmentally-efficient means of propulsion.

In early 2016, the Interlake Steamship Co converted its last steam-powered vessel, the 1959-built self-unloader *Herbert C. Jackson* to diesel and also specified the COMPAC water-lubricated bearing system.

"The conversion of both these vessels illustrates how well-maintained vessels can operate beyond the usual 25 years and be cost-effectively retrofitted to meet today's more stringent environmental requirements. A 2012 study by the US Maritime Administration found that repowering a laker can achieve 80% of the efficiencies of a new build at 20% the cost," said Carter.

Groves added: "The owners of these vessels are very pleased at how their water lubricated arrangement is performing. Both Interlake and Great Lakes have responded very quickly to the changes in the shipping industry and specified COMPAC to meet new US EPA environmental requirements."

He also intimated that Great Lakes Fleet is assessing the performance of COMPAC

installed on the *John G. Munson* with a view to converting more vessels in its fleet to water-lubrication.

Thordon Bearings is exhibiting at Posidonia 2018.

The *John G. Munson* was built more than 64 years ago by Manitowoc Shipbuilding and lengthened in 1976 by Fraser Shipyard as a Great Lakes steamer. It operated a steam plant base around two Foster Wheeler Type D boilers, two 7,000hp Westinghouse steam turbines, two 600kW GE SSTG and one 500kW Caterpillar SSDG generator for its stern thruster. Bay Shipbuilding replaced this with diesel arrangement based around an 8000hp 6M43 MaK Tier 2 medium-speed diesel and four 550kW Caterpillar C18 SSDG generators.

MaK engines also replaced the *Herbert C Jackson's* ageing steam turbine. A pair of MaK 6M 32E engines — the first of their kind to power a vessel on the Great Lakes — was installed in addition to a twin-input, single-output gear box with twin PTO shaft generators. The repowering is estimated to have reduced the ship's emissions of particulate matter by 35%, carbon dioxide by 57% and sulphur oxides (SO_x) by 63%.

ABOUT THORDON BEARINGS:

A global leader in seawater lubricated propeller shaft bearing systems, with over 35 years' experience in this technology, Thordon Bearings is renowned for supplying high performance, oil and grease-free bearing systems to the global marine, clean energy, pump and offshore markets. Thordon Bearings is the only manufacturer of propeller shaft bearings to guarantee its award-winning COMPAC system for a 15-year wear-life. Thordon systems and bearings are available worldwide through over 80 agents and distributors.

Great Lakes Fleet's John G Munson.



Interlake's Herbert C Jackson.



La Coop fédérée plans to build new grain terminal at the Port of Quebec

The Quebec Port Authority has announced a new project to construct a bulk grain terminal to boost the country's agricultural market.

The new terminal — to be built in four stages by La Coop fédérée at Anse au Foulon — will have a capacity of 1.3 million tonnes per year of grains, valued at C\$450 million.

It includes installation of grain storage and handling equipment near deep water

docks that can accommodate large vessels.

For the first phase of the project, two existing grain terminals at the port, each featuring a capacity of 37,500 tonnes, will be brought together — recovering the existing equipment for implementation at the new terminal.

In the second phase, six new silos will be constructed, two with the capacity of 15,000 tonnes of grain and four with 1,000-tonne capacity for residues. This phase will

also include construction of a grain cleaning tower, two electrical substations, civil works, conveyors and permanent installation of a station for boats.

The final phases include two additional 15,000-tonne silos, construction of the car reception station, connection with the new silos and with the yard and connection to the existing tower and receiving station.

Work is scheduled to be completed in four phases by 2021.

Ust-Luga's Yug-2 terminal upgrades

In Russia, the Yug-2 multi-purpose terminal at the port of Ust-Luga is to be rebuilt and extensively modernized. Work will take place between 2018 and 2020. The objective is to boost the terminal's annual capacity to 20mt (million tonnes).

News of the investment was initially released at the recent TransRussia exhibition in Moscow by Yevgeny Savkin, Director General of terminal operator, the Commercial Sea Port of Ust-Luga JSC. He put forward several new possibilities.

At its core, the upgrade will involve construction of three new installations capable of handling coal transshipment traffic of around 14mt per annum,

mineral fertilizer traffic amounting to three million tonnes per year and a further 3mt of general cargo.

The coal terminal will have a tandem-style rail wagon dumper, which will incorporate an axle-heating system to ensure frost does not halt movements. There will also be environmentally friendly covered warehousing for up to one million tonnes of coal, plus a 500-metre-long pier equipped with shiploaders.

The fertilizer transshipment facility will have an unloading station and an enclosed storage for up to 125,000 tonnes. The alongside berth will similarly incorporate shiploaders.

For general cargo handling, two

RMGs will deal with inbound rail consignments, moving cargo to open storage yards. Two Liebherr LHM420 mobile harbour cranes will load ships.

Each of the three facilities will have its own rail siding.

However, in addition to new facilities, the project also encompasses reconstruction of the existing berths, construction of a new pier and extensive dredging works to ensure that 14.5 metres of draught is available.

The Commercial Sea Port of Ust-Luga OJSC, which operates both the existing Yug-2 Multipurpose Terminal YUG-2 the Auto-Railway Ferry Terminal handled 3.8mt of cargo in 2017.

Barry Cross

The Port of Riga follows global trends and is ready to accept large ships

Increasingly large ships are used to move cargo by sea. This reduces costs for cargo owners, and is a trend that the Port of Riga is ready for. In 2017, the port handled almost three times more cargo than in 1997, while the total number of incoming merchant ships dropped from 4,029 in 1997 to 3,422 in 2017. "The trend is clear: the number of ships coming to the port is decreasing, but their capacity increases," A. Brokovskis, Captain of the Freeport of Riga, commented on the data. Challenges faced by the Port of Riga in handling these giants increase along with the size of ships.

The size of ships has been growing in the Port of Riga particularly rapidly over the past decade. In 2010 the Port of Riga accepted only 110 ships with the a capacity of more than 50,000dwt, while last year their number was 214. The number of large ships has doubled within this period. The main reason for the constant increase in

the size of ships is the desire by cargo carriers for cheaper shipments, whereas the recent rapid increase is related to the reconstruction of the Panama Canal. As a result of the reconstruction, the Canal has been widened, and while earlier it was capable of accepting approximately 32m-wide ships, subject to the Panamax standard, now the maximum width is 49m.

Increasingly large ships require deeper and wider navigation canals. Over 20 years, almost €90m has been invested in dredging at the Port of Riga. Moreover, investments must also be made in IT infrastructure, navigation systems and employee training. Managing larger ships also requires greater competence of port services and pilots in particular. "If the height of the captain's command bridge on a Panamax-type ship is located at least at the level of the seventh floor, determining the precise distances to the shore or pier is practically impossible.

Therefore, nowadays accurate digital tools and equipment are used more and more often. We are living in the 21st century, and centuries-old port professions are also experiencing rapid changes," the captain of the port highlighted.

The successful handling of large ships at the port does not depend on the depth and width of the navigation canal alone. It requires appropriate infrastructure on the shore as well. Hence, requirements for stevedoring companies operating in the port increase. Janis Kasalis, Deputy CEO of SIA Rigas universalais terminals: "In order to handle large ships quickly, we need greater railway and road transport capacity, as well as larger warehouses and modern handling technologies. Likewise, we have invested almost €10m in the extension of the pier to enable the terminal to accept larger ships and operate under new competitive conditions."

Agreement reached on future of Industrial Terminals facility with transfer of assets to Watco

Intermarine, LLC, a specialist in the transport of project, breakbulk and heavy lift cargo, and its affiliates, Industrial Maritime Carriers, LLC (IMC), and affiliate Industrial Terminals, Management, LLC, have transferred the leasehold ownership of their terminal assets to Watco Companies, LLC.

The parties have entered into a long-term agreement for continued and future use of the Industrial Terminals facility. Industrial Terminals is directly adjacent to Watco's Greens Port terminal on the Houston Ship Channel. Concurrently, Intermarine has entered into a long-term agreement with Watco for the provision of stevedoring and terminal services. Intermarine staff will remain located at Industrial Terminals. Combined, the two properties are comprised of 746 acres, seven berths and more than 5,000 feet of dock space.

"Our ocean carriage business has evolved with the changes in the market and the transaction with Watco will allow us to seamlessly and efficiently continue operations at Industrial Terminals, while focusing on our core liner and worldwide chartering services," said Michael Dumas,

President of Maritime Holdings, LLC and CFO of Intermarine, LLC. "Our partnership with Watco will allow Intermarine to expand its services to better accommodate our clients."

"We are very excited to add the Industrial Terminals assets to the Greens Port Industrial Park and enter into a long term agreement with IMC. The combined assets will allow us to expand the service offerings and provide unparalleled service to IMC and its customers. We are looking forward to expanding the partnership with IMC and growing this business," said Bill Kinzeler, Vice President of Network Strategy for Watco Terminal and Port Services.

ABOUT INTERMARINE, LLC

Intermarine is a global leader in the transport of project, breakbulk and heavy lift cargo. Founded in 1990, the company, through its subsidiaries and worldwide network of 20 offices, operates a flexible international fleet with lifting capacities up to 1,400 metric tonnes. Intermarine provides ocean transportation and marine logistics services with regular sailings in the Americas, West Africa,

Europe, Asia, and the Middle East, plus inducement voyages to Australia and other international ports. The company operates the largest US-flag heavy lift fleet and controls Industrial Terminals (Houston), the busiest project cargo terminal in the United States.

ABOUT WATCO COMPANIES, LLC

Watco Companies, LLC, is a Pittsburg, Kansas, based transportation company providing transportation, terminal and port, mechanical, and supply chain services for Customers throughout North America and Australia. Watco Companies, LLC is the owner of Watco Transportation Services, LLC, one of the largest short line railroad holding companies in the US with 36 US short line railroads and 34 industrial contract switching locations. Watco's Terminal and Port Services division operates 87 locations throughout the U.S. Watco Companies is a 50/50 joint venture partner with The Greenbrier Companies, Inc., in GBW Railcar Services, LLC. GBW repairs and refurbishes freight cars at 31 locations across North America. Watco's Supply Chain Services provides supply chain solutions globally.

On a roll: Port of Vancouver USA reports fourth consecutive record year

For the fourth year in a row, the Port of Vancouver USA has logged record-breaking cargo tonnage, with 2017 coming in at 7.5mt (million metric tonnes), up slightly from the 2016 record of 7.49mt.

"Our sustained growth is a testament to the investments we and our partners have made in world-class rail and marine services, access to efficient transportation and excellent customer service," said port CEO Julianna Marler. "I'm very proud of our continued success and the hard work of everyone who makes it happen, year after year."

The year 2017 was a great one for imports, which climbed to 1.24mt from 1.17mt in 2016 — a 6.5% increase overall. Steel and dry-bulk commodities continue to be the largest imports at the Port of Vancouver by volume, and in 2017 these cargoes increased 14.8% and 47%, respectively.

Some exports, such as wheat and soybeans, increased in 2017, but overall exports were down one percent over 2016.

Fluctuations in currency and the global economy had an impact in 2017, but the port's continued tonnage growth contributed to a slight increase in operating revenue from \$35.9 million to \$36 million.

Another good year is expected in 2018 for the Port of Vancouver USA. Cargoes like autos, steel, minerals, wind energy components and grain continue to bring in solid numbers, making the future look bright for the port and our community.

The Port of Vancouver USA is one of the major ports on the Pacific Coast, and its competitive strengths include available land, versatile cargo handling capabilities, vast transportation networks, a skilled labour force and an exceptional level of service to its customers and community.



Volvo helps Ukrainian port set new productivity record



Overview of the TIS coal terminal near the Yuzhny port area.

A fleet of Volvo L180 and L220 wheel loaders is helping TIS Group, Ukraine's largest stevedore and port operator, set new standards for productivity.

For Ukraine's TIS Group, business is booming. Since its foundation in 1994, the company has grown to become the country's largest stevedore and port operator, running five terminals close to the Yuzhny port area, 27km from Odessa. These terminals specialize in the re-handling of grain, mineral fertilizers, coal, iron ore and containers for both import and export.

In 2015, TIS terminals handled 26 million tonnes, representing 18% of all cargoes passing through Ukrainian ports. By the first half of 2017, this share grew to 21%. Meanwhile, in March 2017, the TIS coal terminal set a new productivity record, loading 115,000 tonnes of coal in just 24 hours.

"The key performance indicator for the port operator is the speed of rehandling the cargoes – and here the special handling equipment makes all the difference," says Oleg Sologub, chief engineer at TIS Group.

TIS employs a fleet of Volvo L180 and

L220 wheel loaders, spanning the E, F, G and H machine generations. Recently, TIS took delivery of a further four L220H models.

"The majority of loaders on the market are designed for quarry applications, while our crucial needs are high productivity, fast speeds, superior manoeuvrability, small overall size and highest possible bucket capacity. It seemed to us that Volvo loaders have a design that is suited best to our tasks. Not every machine can meet these requirements," Sologub says.

SUPERIOR BUCKET FILL

Volvo Construction Equipment (Volvo CE) offers customers a range of factory-fit options to best suit the needs of their application. For rehandling jobs, such as at the TIS terminals, Volvo CE offers a dedicated rehandling bucket, as well as a flat floor rehandling bucket, on the L110-L350 wheel loader models. The shape, balanced floor back ratio and countersunk holes on these application-specific buckets make them easier to fill in rehandling jobs, while the curved side plates minimize any spillage, allowing operators to move more material at a

faster rate. The reduction in cycle times also helps customers improve fuel efficiency by up to 20%, compared to when using standard wheel loader buckets.

COMFORTABLE CAB

Volvo wheel loaders also promote a productive work shift by providing a comfortable and spacious cab fitted with an ergonomic seat and controls. Attention to detail in the operator environment helps to significantly decrease fatigue.

"It's the best cab for the operator – very comfortable. You feel good after the shift is over," says Alexander Vykhvatnyuk, a former operator, now shift mechanic at TIS.

Lead operator Igor Kolyuzhnyi adds: "All the controls are very conveniently located and easy to access."

ULTIMATE UPTIME

The Volvo wheel loaders' high uptime has also proved crucial in the success of the TIS terminals' round-the-clock operations. These durable and reliable machines are designed to work hard for long hours with minimal wear and tear.

"The machines we purchased initially



Volvo wheel loaders approach the coal pile.

have been running for more than 40,000 hours and they are still working. For sure, we use them without mercy!" Sologub says.

Daily maintenance and service checks are quick and easy to carry out. The engine compartment is accessed via an electrically-activated, wide-opening hood and the whole cab can be tilted by 30° or 70° degrees. Grouped greasing points are controlled by optional automatic lubrication system. The sealed oscillation pins cradle keeps components greased for up to 8,000 hours, dramatically cutting down on service time.

OUTSTANDING DEALER SUPPORT

When further assistance is required, TIS counts on quality customer service from the local Volvo dealer.

"One of the strengths Volvo machines have here is the way Volvo is represented in Ukraine," says Aleksey Shlapakov, head of procurement at TIS. "We are pleased with the performance not only of the equipment manufacturer but also the local dealer. It is a very big advantage since our operation mode leaves us no room for long breakdown and delivery times for parts. The Volvo service depot performs well here and we feel confident and easy with these machines and their support."

"No one else can show results like we do — and these machines contribute not the least part in these achievements," Sologub concludes.

DC



A Volvo L220H demonstrates its superior bucket fill.



Electronic-opening hood on the L220H provides easy access to the engine compartment.

Van Beek uses 360° camera to ensure more efficient production process

Screw conveyors are customized. It is important for Van Beek's engineering team to clearly assess the location where the company's machine will stand. To improve this understanding, Van Beek has a new tool: the 360° camera.

As the name suggests, the camera produces a 360° image of the location. The virtual environment can be seen on a big computer screen and you can 'look round' with the mouse or touchscreen.

EXTENSION FOR ENGINEERING

The camera is an extension for Van Beek's engineering team. "It is a tool for avoiding errors or ignorance during the development process," says Joram van der Heijden, sales engineer at Van Beek. "We also see details that are important and we can think with our client."

PROBLEM SOLVING

Previously Van Beek mainly used the classic tape measure and static photos. "The

engineer works everything out and takes into account what he can see in the photos", says Van der Heijden. "Sometimes you overlook something. You may have missed a couple of angles or not know what is behind an obstacle. We do come up against this."

LESS LABOUR INTENSIVE

After the sale of a screw conveyor, various employees must get to work, from the engineer to the installer. Van der Heijden explains: "It is labour intensive to take several colleagues to site. It is therefore much more practical and efficient to all sit round a computer screen and take a virtual 'walk' through the environment."

ALTERNATIVES

An alternative to the 360° camera is to take a 3D scan. This is an expensive technique where you take a laser scan of the environment. The scan is finally converted into a 3D drawing. "This

method is very labour intensive, because it takes a long time to take the scan and convert it into a 3D drawing." According to Van der Heijden the costs may amount to thousands of Euros.

The 360° camera cannot take measurements. Previously Van Beek was looking for a technique in which dimensions could be determined from photos. "But these are too inaccurate for our purposes", says Van der Heijden.

USE OF CAMERA

Van Beek does not always use the camera. "We use the camera if the machine has been sold, the dimensions of the location are not known and we have to make a visit to measure up. This method is then part of the purchase package. The technology of the 360° camera is well known to many people, for example on Facebook and for holiday shots. But clients react with surprise and tell us that they have not seen the camera used before in this industry."

Siwertell unloader to give competitive edge to new agribulk terminal in Mexico

Siwertell, part of Bruks Siwertell Group, has secured an order from Mexico's Gramosa Agroalimentos SA for a high-capacity unloader to serve the company's new agri-bulk terminal located in the Gulf of Mexico port, Veracruz. The unloader was chosen after out-performing all competitor systems during a four-month selection process.

The totally-enclosed, rail-mounted, Siwertell ST 640-M unloader offers a rated capacity of 1,200tph (tonnes per hour) and will handle grain, corn, soya bean meal and dried distillers grains with solubles (DDGS).

In a statement from Gramosa Agroalimentos, the company said that: "The Siwertell system was selected after considering many factors and multiple equipment comparisons. Analysis included operating principles and mechanisms, investment costs, as well as operating costs.

"An important factor was cargo loss and damage. We will handle a number of different grains at the new terminal such as corn, rice, wheat, soya beans and canola seeds. The low conveying speed



of the Siwertell screw-type unloader means that the grain is not damaged during handling, which will give us added value and differentiate us from our competition.

"Although the selection analysis took four months, it was actually an extremely quick process," says Patrik Henryson, Siwertell sales manager. "Our first meeting with the customer, via a local

contact, was in November and the unloader was ordered by February this year. I think this speaks volumes about the performance of our equipment and the service that we offer as company."

The new unloader will be delivered fully-assembled from China and will then be tested and commissioned on site in Veracruz by Siwertell. It is expected to be operational in mid-2019.

Siwertell and Bruks — a strong new venture



From left: Olof Cato, Chief Operating Officer, JCE Invest; Per Karlsson, President, Siwertell; Peter Jonsson, CEO, Bruks Siwertell Group; Sofia Karlsson, Strategic Development Manager, JCE Invest.

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

"This joint venture supports Cargotec's strategy to focus on container ports, heavy industrial segment and logistics. Siwertell's business is outside these core focus areas, with different customers, customer locations and limited synergies with the rest of our businesses.

"By joining forces with JCE Group, we are able to create a company that will be a

significant player in the bulk material handling with a globally competitive and specialized product portfolio," says Antti Kaunonen, President, Kalmar.

"This is a true partnership between two strong brands, Siwertell and BRUKS, as they complement each other very well both in terms of product portfolio and market coverage. Siwertell will benefit from BRUKS's strong position in the US market whereas BRUKS will gain access to Siwertell's Asian network, knowledge and exposure.

"Together we will be a full line supplier for almost all types of bulk materials," says Per Karlsson, Managing Director, Siwertell.

"Together BRUKS and Siwertell will have a strong position in the dry bulk handling industry and attractive growth opportunities in new markets and customer segments including biomass, bioenergy and biofuels industries. This co-operation will add customers, competence, additional knowledge, capabilities and products to support the

future growth of the new company", says Peter Jonsson, Group CEO, BRUKS.

Siwertell is a world-renowned supplier of ship-unloaders, road-mobile unloaders, port-mobile unloaders, shiploaders, mechanical and pneumatic conveying systems, and bulk terminal solutions. Most equipment is customized according to individual bulk operating requirements, but the company also offers standardized products.

In 2017, Siwertell generated total revenues of SEK 582 million and it employs 114 people in Bjuv, Sweden.

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

Konecranes Gottwald floating cranes to be delivered to Guinea

Konecranes has won another order for two Konecranes Gottwald floating cranes. The order was placed by Winning Logistics Company Limited in the first quarter of 2018. With these new cranes, Winning has ordered eight such cranes in a short time.

The new order follows an order placed with Konecranes only last autumn. The floating cranes contribute to the continuing growth of Winning's bauxite handling activities off the coast of Guinea, Africa. They play a key role in the supply chain, transshipping bauxite from river barges to Capesize vessels on the open sea.

Wang Chuanyang, Vice President, Winning Logistics explains: "Our existing cranes have proven themselves to be particularly productive and reliable in the very rough open-sea environment. This is why we have opted time and again for floating cranes from Konecranes."

Giuseppe Di Lisa, Sales and Marketing Director, Mobile Harbor Cranes, Konecranes Port Solutions, says:

"Konecranes Gottwald Floating Cranes are derived from our mobile harbour crane technology and highlight our pioneering role in this field. The first floating cranes went into operation on the Mississippi River in 2004. Thereafter, they quickly found their way to the open sea. Winning's decision to continue to rely on Konecranes Gottwald floating cranes confirms Konecranes' leading role in

this segment."

Built for use on the open sea, the Model 8 floating cranes with a maximum outreach of 43m and a powerful 63-tonne grab curve are designed in accordance with Lloyd's Register Code for Lifting Appliances in a Marine Environment. This allows them to operate at wind speeds of up to 24m/s and at maximum wave heights of 2.5m.



ABOUT KONECRANES

Konecranes is a world-renowned group of Lifting Businesses™, serving a broad range of customers, including manufacturing and process industries, shipyards, ports and terminals. It provides productivity enhancing lifting solutions and well as services for lifting equipment of all makes. In 2017, group sales totalled €3,136 million.

HIGH QUALITY EQUIPMENT FOR DRY BULK CONVEYING

CIMBRIA CONVEYING EQUIPMENT

Cimbria develops and manufactures an entire range of conveying equipment for handling a vast variety of bulk materials, ranging from agricultural products to industrial commodities and raw materials.

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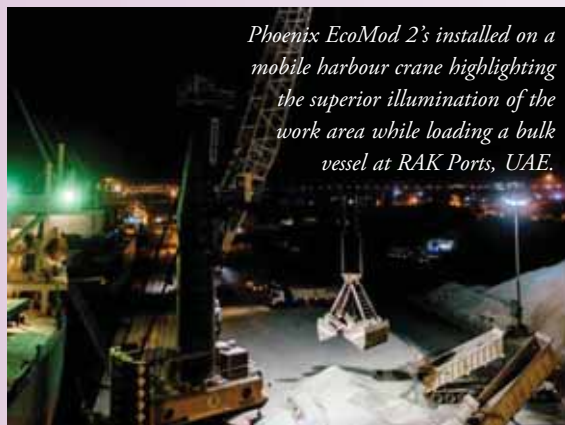


Phoenix Lighting retrofits mobile harbour cranes at RAK Ports in the UAE

Phoenix Lighting has been selected by RAK Ports to provide EcoMod 2 LED floodlights to retrofit both Liebherr and Konecranes Gottwald mobile harbour cranes.

RAK Ports, managed by Saqr Port Authority, is located in Ras Al Khaimah, UAE and is a key maritime gateway for import and export activities. Ras Al Khaimah is the number one source for rock, aggregate and cement products in the entire GCC and is a central contributor to the local economy.

At Saqr Port, RAK Ports loads and unloads bulk vessels with a fleet of 20 mobile harbour cranes supplied by Liebherr and Konecranes Gottwald. These cranes often operate 24 hours a day within the challenging, local ambient conditions. In order to improve safety of operations and reliability of crane floodlighting, RAK Ports approached Phoenix Lighting to design and supply a durable, LED lighting package. Phoenix provided customized EcoMod 2



Phoenix EcoMod 2's installed on a mobile harbour crane highlighting the superior illumination of the work area while loading a bulk vessel at RAK Ports, UAE.

420 and EcoMod 2 280 floodlights to replace existing boom and tower lighting on both Liebherr and Gottwald cranes.

RAK Port's decision to upgrade to Phoenix LED eliminated the rising concern that replacement lamps and other repair parts wouldn't be available in the near future for its traditional lights. RAK also recognized the benefit of energy savings with the LED floodlights and a reduction in maintenance costs, as the EcoMod 2 is

specifically designed to withstand the harsh, high temperature and corrosive conditions within a port.

Most notably, the Phoenix LEDs improved the safety of personnel working on the quay and in the vessel. Phoenix provided fixtures with superior illumination quality and a design that won't be compromised by the shock and vibration of the cranes. RAK Ports is happy with the safety and operational conditions that resulted from the upgrade and

plans to utilize LED for future equipment lighting

ABOUT PHOENIX LIGHTING

A privately held company founded in 1892, Phoenix has evolved alongside the city of Milwaukee and is still proud to call it home. Over 126 years later, Phoenix continues to be a leading lighting manufacturer of high quality, durable products that are built to withstand even the harshest of conditions.

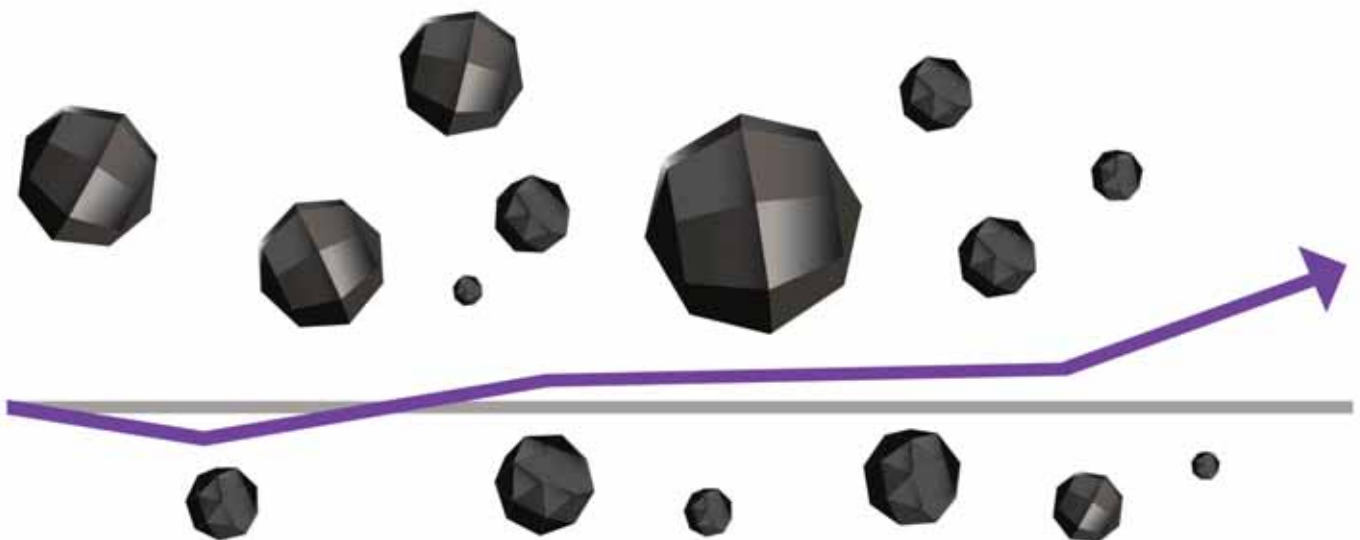
Image of Phoenix's EcoMod 2 LED floodlight.



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At the coal face

what's new in today's coal handling systems and technologies



Louise Dodds-Ely

Heyl & Patterson equipment keeps the coal industry moving

Heyl & Patterson has been engineering coal handling equipment since 1887. Much of the company's storied history runs in parallel with the coal industry. Heyl & Patterson was founded for the sole purpose of meeting the needs of the booming coal industry surrounding the company's Pittsburgh, USA office. As the coal industry grew, so did Heyl & Patterson's equipment offering. Serving power utility companies, mining operations, intermodal terminals and stockyards, H&P designs custom bulk material handling equipment to keep the coal industry moving forward.

RAIL

Railcar dumping systems are the most efficient way to unload a coal car. Currently, Heyl and Patterson railcar unloading systems can be found across the globe, with rotary dumpers serving power plants across Canada, the US and Mexico. Recent contracts include wagon tipplers in India, turnover dumpers in Argentina and H&P is currently overseeing the installation of two tandem rotary dumpers in Russia's Wrangel Bay.

Unloading systems are particular to their environment. Factors such as a high water table, space limitations and

downstream transportation systems all play a role in deciding the ideal type of unloading system for a particular facility.

UNLOADING SYSTEMS

❖ **Rotary Railcar Dumpers:** H&P's most frequently utilized design style is the rotary railcar dumper. The rotary is ideal for situations where unit trains need to be unloaded at a rapid rate. The benefit of a rotary railcar dumper, is the ability to unload an entire unit of trains without the time-consuming process of having to uncouple and re-couple the railcars. For extreme efficiency, the



quad-rotary dumper design allows for the simultaneous unloading of four railcars at a time.

- ❖ **Turnover Railcar Dumper:** for sites with shallow foundations and track level receiving hoppers, turnover dumpers provide moderate throughput rates with a lesser construction scope compared to a rotary.
- ❖ **C-Shaped:** C-shaped designed dumpers offer the flexibility of being able to unload random, rotary and non-rotary coupled cars.



H&P's hammermill breaks up frozen coal with a series of steel hammers on a rotating shaft.

Coal handling in cold weather climates can pose unique challenges to railcar unloading. Frozen coal can be a hassle, and dealing with oversized lumps of coal can greatly affect the speed on the unloading process. To accommodate coal handling in extreme cold, Heyl & Patterson's 'hammermill' breaks up frozen coal with a series of steel hammers on a rotating shaft, crushing frozen chunks of coal down to more easy transportable size that can easily fit within the grid of grizzly.

WATERWAY

For coal transportation on inland waterways, continuous bucket unloaders (CBU) can unload coal at a

free digging rate greater than 5,000tph (tonnes per hour). The CBU features a continuous bucket elevator traversing the barge's cargo hold from one end to the

other while reclaiming in the longitudinal direction of the barge. Once lifted by the bucket, the bulk material is transferred to a gathering belt conveyor, which in turn feeds a takeaway conveyor. To accommodate smaller-scale operations stationary or travelling grab bucket unloaders can be designed to empty barges at a 1,500tph unloading rate, with a cycle time of 36 seconds.

Transporting coal by barge has its own set of challenges as water levels can be volatile. To combat the changing water levels H&P has engineered a continuous barge unloader where water elevation adjustments are made by hoisting the counterweighted cantilever section, which supports the takeaway conveyor and fixed bucket boom. Currently, Heyl and Patterson is rebuilding a cantilevered CBU, originally installed by HP in 1970. Designed to accommodate volatile changes in water level, this unit unloads coal barges for an electric utility plant on the Ohio River. The project scope will include new drives and operating systems, a brand new boom structure and an equalized trolley assembly, to extend life of the machine for a further 48 years.



H&P's CBUs can unload coal at a free digging rate of more than 5,000tph.



NEGRINI
since 1967 S.R.L.



negrini



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.

VIA TORRICELLI 4 · CASTELFRANCO E. (MO) ITALY

www.negrini.org

Bedeschi stacker and reclaimer for coal stockyard

SEISMIC ANALYSIS AND STRUCTURAL VERIFICATION
WITH MATTEO SCHIVO PROJECT ENGINEER AT
BEDESCHI S.p.A., LIMENA (PADUA), ITALY

SUMMARY

Two Bedeschi machines have been assembled for a new outdoor coal stockyard which will feed the thermo-electric power plant in the Antofagasta region in Chile. All engineering, design and supply work has been carried out by Bedeschi S.p.A. of Limena (Padua) on behalf of Dimisa, a Mexican firm that was awarded the contract to supply the conveyors and machines in the coal stockyard.

The storage area has a capacity of about 200,000 tonnes; the pile size is $266 \times 63\text{m}$ and a height of 12m. The two machines supplied by Bedeschi are:

- ❖ a rotating stacker, with a capacity of 3,600tph (tonnes per hour), a total weight of approximately 450 tonnes, electric power installed of approximately 400kW; and
- ❖ a portal reclaimer, capacity 1,700tph, total weight approximately 530 tonnes, electric power installed approximately 700kW.

INTRODUCTION

Bedeschi S.p.A. is an industrial design and manufacturing company located in Padua; it was founded in 1908 and has been operating globally for several decades now. In addition to its original brick business unit, Bedeschi can now supply machinery and complete plants for bulk handling, marine, gas cleaning and container logistics.

In bulk handling and marine logistics, there is a progressive increase in the size of the machines required by the market. This means increased attention to structural aspects and cost containment related to the weight of structures, and therefore optimization in use of materials. In addition, there is a growing demand for expediting the process of design, testing and commissioning of new machines, but ensuring at the same time the required standards of reliability and robustness required for such type of machines.

In Bedeschi S.p.A. 2D and 3D drawing tools, FEM (Finite Elements Modelling) tools and other calculating tools for material trajectories and containment surfaces (DEM – Discrete Elements Modelling) have been used practically since their first appearance to improve design process.

BLUE DOLPHIN PROJECT

One of the latest Bedeschi projects, called

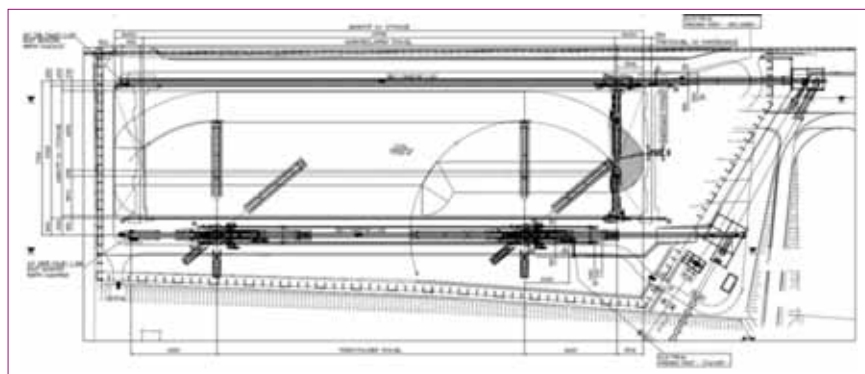


Figure 1: plant view of the stockyard with overall dimensions.

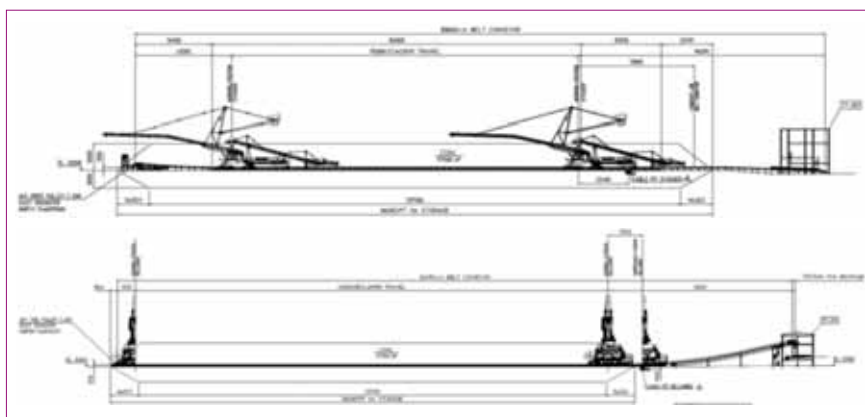


Figure 2: side views of the stockyard with overall dimensions.

'Blue Dolphin Project', involved the design and supply of two machines — a stacker and a reclaimer — for an outdoor coal stockyard to feed a thermoelectric power plant in the Antofagasta region of Chile. The stockyard can hold about 200,000 tonnes of coal and the pile footprint is $266 \times 63\text{m}$. Dimisa, a Mexican company specialized in conveyors, was awarded the contract to supply the conveyors and machines in the stockyard by the end user E-CL, the largest electric company in Chile which specializes in production and transport of electric power. The two Bedeschi machines were assembled; last year. Erection lasted for a few months, and the machines are now in successful operation.

In addition to the challenges posed by the huge size of the machines, during the engineering and design process it was necessary to factor in particularly severe seismic specifications, since the machines are installed in a zone with frequent earthquakes. By means of Straus7 software, static verifications were carried out for the main load conditions (own weight, operating loads, wind) as well as seismic calculations with modal analysis and response spectrum. Applying requirements written in seismic specifications, usually for buildings and not for machine structures, is

not always easy and in some cases is not possible, or not 'correctly' and fully possible... This paper, therefore, does not describe correct methods for seismic analysis, but reports only a case study of using Straus7 for dimensioning calculations of the machine's structures, general bearing loads and seismic loads.

STACKER AND RECLAIMER MAIN FEATURES

STACKER

The rotating stacker has a capacity of 3,600tph, the total weight is approximately 450 tonnes, and the installed power is approximately 400kW. The length of the boom is 55m and the width of the conveyor belt is 1,830mm (72"). Coal arrives on a conveyor belt after being unloaded from vessels. The conveyor belt goes up the tripper structure in order to reach the required height to be transferred to the stacker belt conveyor and to be stored on the ground. The stacker tows the tripper and can move along the rails throughout the stockyard. The stacker boom, 55m long, can rotate covering an angle of $\pm 135^\circ$, can tilt covering an angle of about 20° , in order to stake the coal at the bottom of the park and then rise during the formation of the pile, limiting the drop height of the material and the consequent formation of dust.

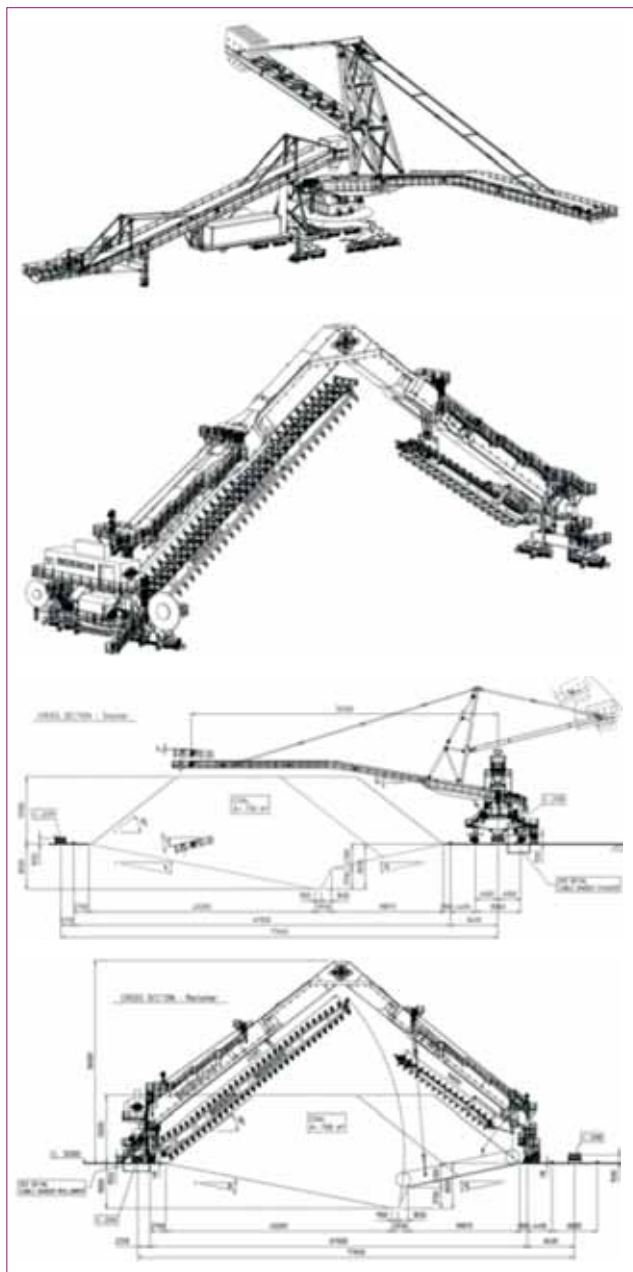


Figure 3: stacker and reclaimer 3D models and side views.

RECLAIMER

The portal reclaimer has a capacity of 1,700tph, the total weight is approximately 530 tonnes, the installed power is approximately 700kW. The main structure is a 67m span portal frame, that crosses the coal pile and supports the two booms, the main boom (reclaiming side) and auxiliary boom (feeding side), by means of two lifting winches. The purpose is to continuously dig the coal with reclaim blades (2,600mm wide for the feeding boom and 3,500mm for the main boom) and convey it to the conveyor belt on the side of the stockyard, which then transports it to the power plant. The blades of the feeding boom push the coal towards the main boom, whose blades instead drag the coal into a hopper feeding the reclaim conveyor.

FEM MODELS WITH STRAUSS7

The main structures of the two machines have been modelled with Strauss7. The beam elements models have been considered for global and seismic analysis; plate elements models have been considered to analyse stress concentrations and detail design. In particular, stress concentrations (hot spots) in these types of machines are subject to vibrations and could generate premature



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weld cracks. Some components, such as the booms, are well-known, as they have been already put in service for other similar machines. So the beam models have been simplified as simple rigid elements, with only mass properties.

LOADS

GENERAL LOADS

The following general loads have been considered: dead loads, operation loads (coal on the conveyor belt for the stacker, digging loads for the reclaimer, taken from FEM II e ISO 5049, "Mobile equipment for continuous handling of bulk materials"), loads on walkways (live loads), operation wind (for this project and normally 20m/s = 72km/h), out of service wind (33.3m/s = 120km/h, as required from Chilean local standard Nch432-2010, "Diseño estructural – Cargas de Viento").

EARTHQUAKE LOADS

The seismic loads have been evaluated considering customer specification (PIEM-02000-C-DC-SKH-45-002, "Seismic design basis"). Main data are:

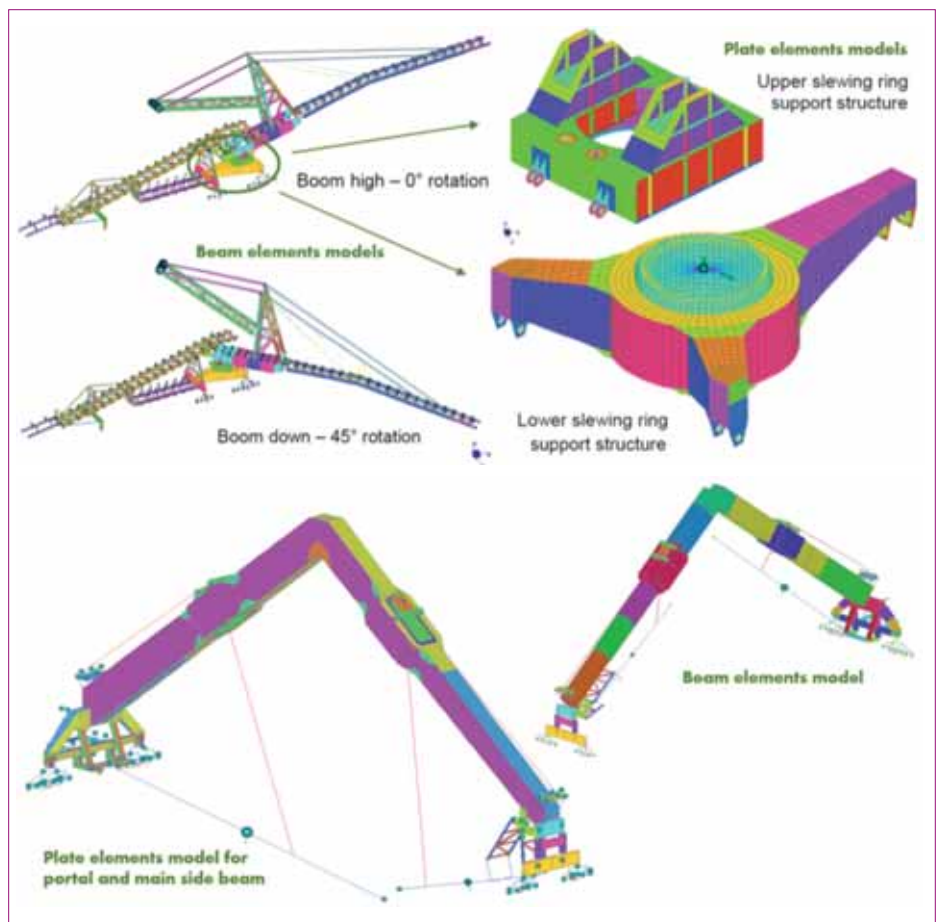


Figure 4: stacker and reclaimer Straus7 models.

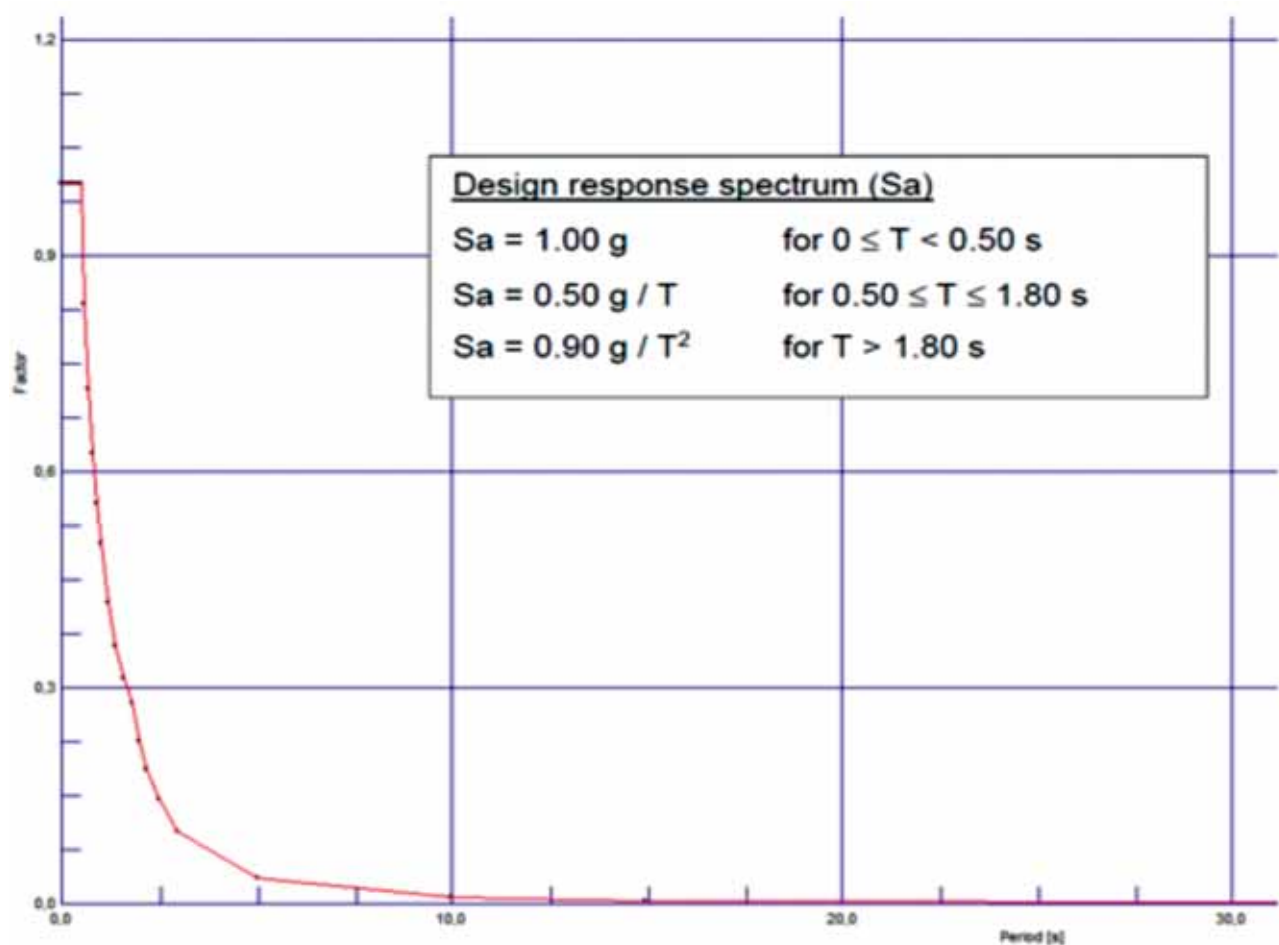


Figure 5: elastic response spectrum for modal analysis.



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NATURAL FREQUENCIES

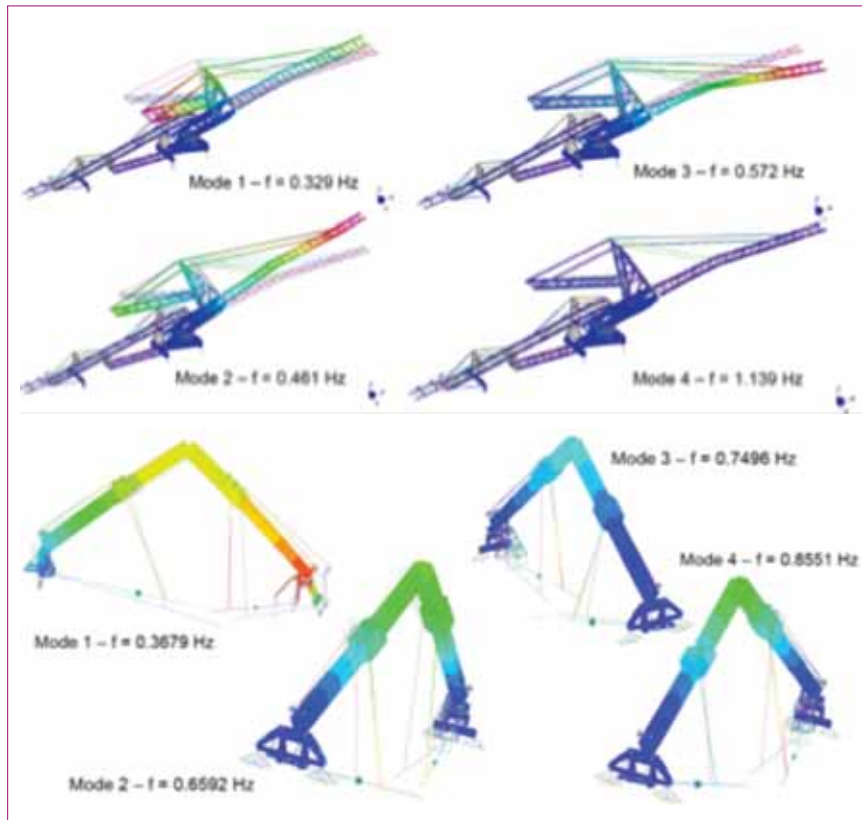


Figure 6: first four modes and natural frequencies for stacker and reclaimer.

STRESSES

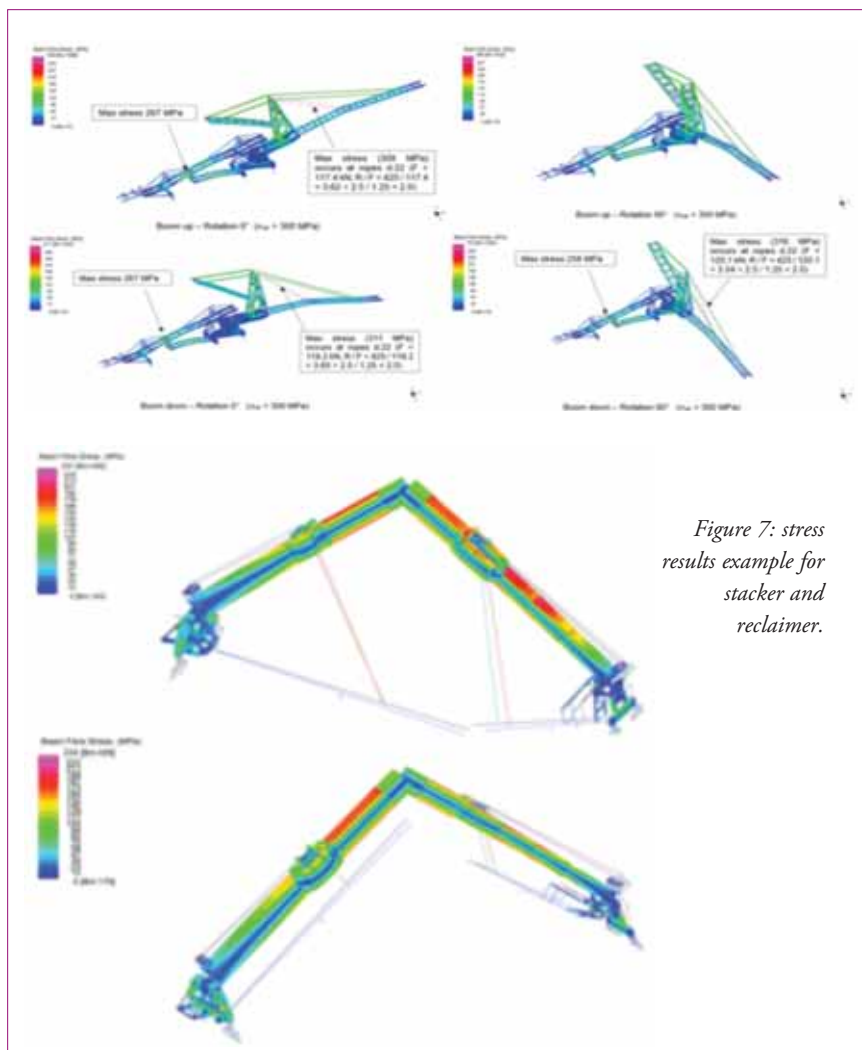


Figure 7: stress results example for stacker and reclaimer.

design spectral accelerations $SDS = 1.00 \text{ g}$ / $SDI = 0.50 \text{ g}$, importance factor = 1.25, reduction factor $R = 3.0$, overstrength factor $\Omega_0 = 2.0$ (used in joints calculations) and $C_d = 2.5$ (used in displacements assessment). Participating mass of 95% is required for modal analysis.

SEISMIC LOAD CASES COMBINATIONS

The seismic loads combinations have been evaluated according to the above specification, which refers also to American Standard ASCE 7-10. Several combinations have been considered for seismic cases, in particular two sets: one for structural resistance and one for overall stability of machine verifications. For the structural resistance, the allowable stress design method (ASD) has been considered, with reference to FEM II e ISO 5049, that define standards for these type of machinery.

Combinations for structural resistance are:

$$1.0 D + 1.0 L \pm 0.7 E_x \pm 0.2 I E_z \pm 0.7 E_y$$

$$1.0 D + 1.0 L \pm 0.2 I E_x \pm 0.7 E_z \pm 0.7 E_y$$

Combinations for overall stability are:

$$0.6 D + 0.6 L \pm 0.7 \Omega_0 E_x \pm 0.2 \Omega_0 E_z \pm 0.7 E_y$$

$$0.6 D + 0.6 L \pm 0.2 \Omega_0 E_x \pm 0.7 \Omega_0 E_z \pm 0.7 E_y$$

where: D = dead loads, L = material loads, E = seismic loads. The seismic loads derived from modal analysis have been combined with CQC method (Complete Quadratic Combination).

RESULTS

The first step to perform seismic assessment was to obtain natural frequencies and vibrating modes (about 400, in order to reach 95% of participating mass) for the two machines. Then stresses and displacements have been calculated and analysed. Some examples of the obtained results are illustrated.

OVERALL STABILITY VERIFICATIONS

In order to ensure global stability of the machines, safety coefficients were provided from the Customer seismic specification, see previous paragraph "Seismic load cases combinations". For the reclaimer structure, for both geometrical configurations analysed (booms up and booms down), no problem for overall stability was found, because all minimum wheel corner loads were positive (always compression on wheels).

For the stacker anti-lifting devices (clamps) have been considered, see figure 10, because negative values for wheel corner loads were found. Clamps are attached to the machine's bogies, during the machine travelling they do not work;

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DISPLACEMENTS

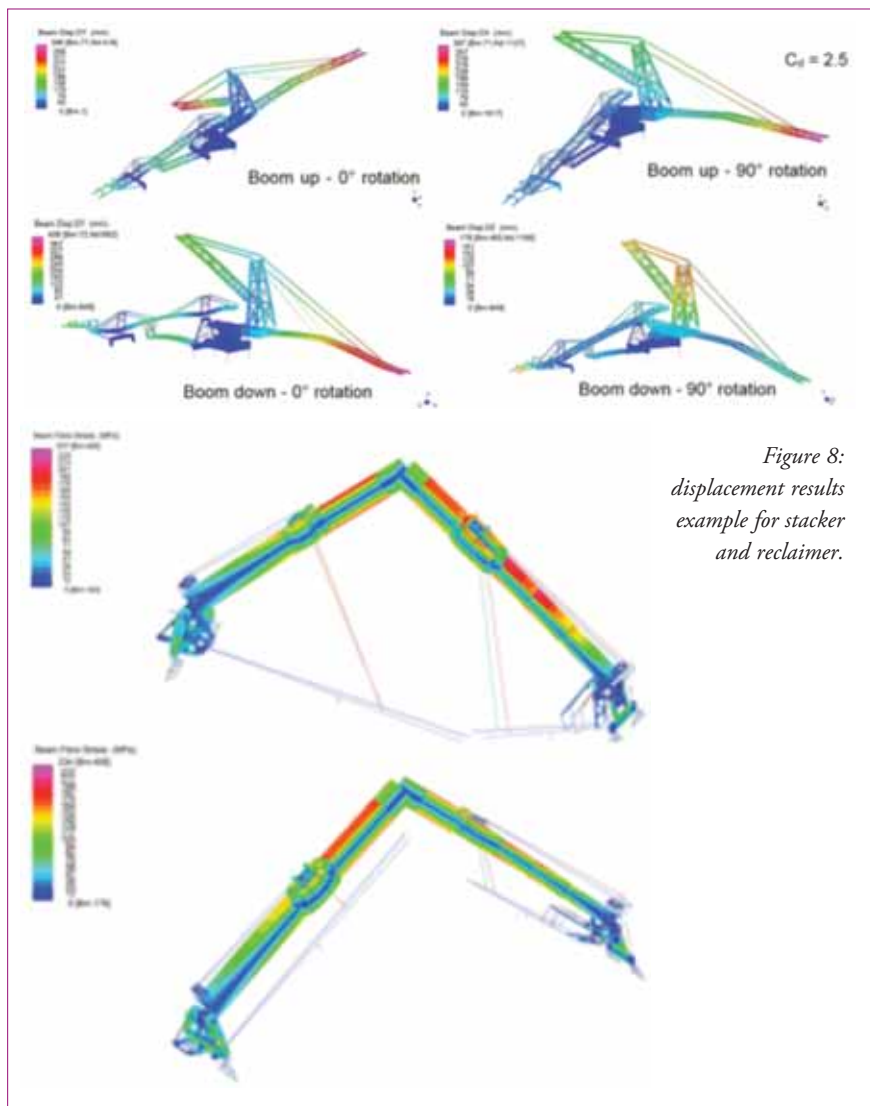


Figure 8:
displacement results
example for stacker
and reclaimer.

instead, in case of wheel lifting, they act on the rail and permit the transfer to the foundation traction loads by means of the connection between rail and foundation. Rail is connected to the foundation by means of welded clips, with a regulation bolt. A simple beam element model has been used to determine the maximum load on the clip, due to clamp action taking into account the rail stiffness contribution (see figure 9). Then a brick FEM model of the clip has been considered to verify it in the condition of maximum tensile load. Non-linear analysis, representing the curve stress-elongation for the spheroidal cast iron, has been considered.

RESULTS ON PLATE FEM MODELS

The design of the machine structures has been completed in detail using the results of the plate FEM models, see figure 10. In particular, for the stacker the most important load cases have been extrapolated from the global model in terms of loads applied to cylinders and slewing ring, then re-applied to the plate models. The full structure of the portal reclaimer has been modelled for weight optimization and buckling verifications. The static scheme of the portal is basically a reverse V-structure, hinged at one side and simply supported at the other, therefore the whole structure is affected by high horizontal deflection due to its own weight. One very important design parameter is the value of horizontal displacement due to

Picture from site of the
portal reclaimer.



Figure 9: determination of maximum load on the clip (percentage on a total load of 100 N).

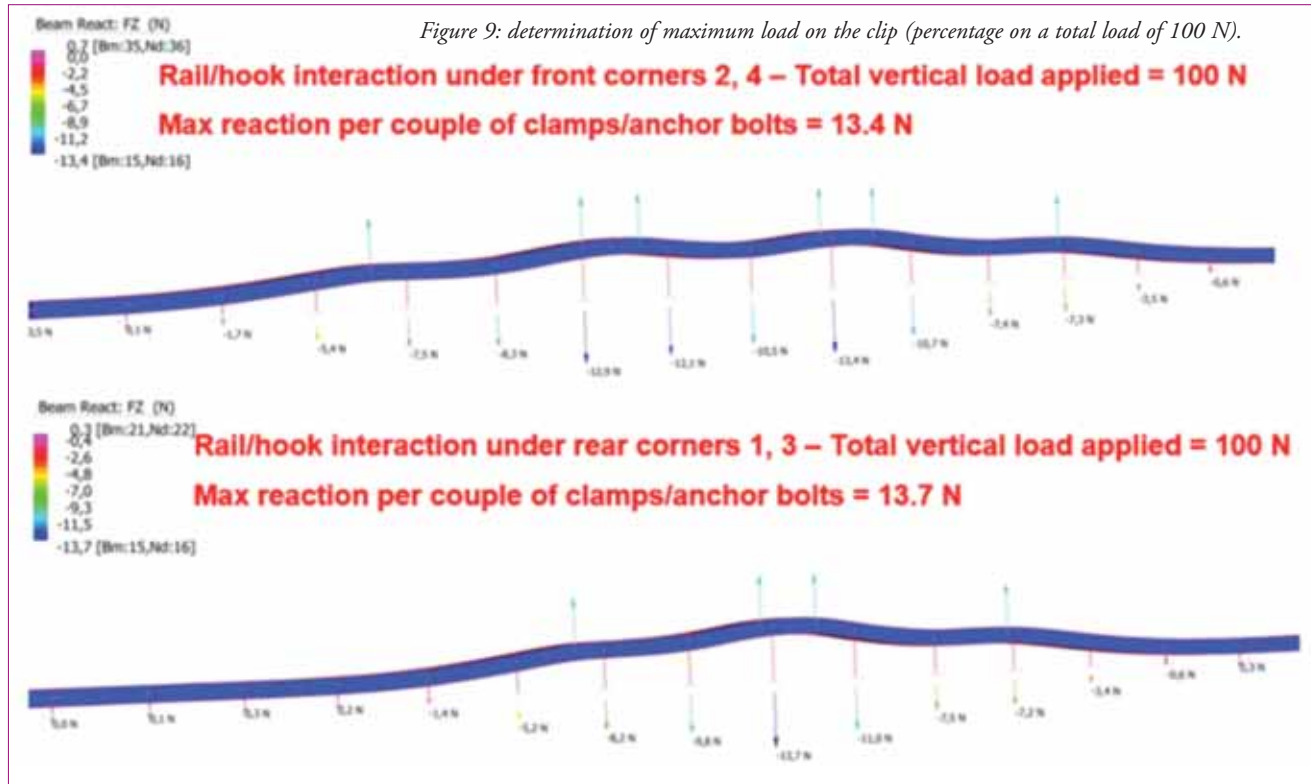


Plate Stress:VM Mid plane (MPa)

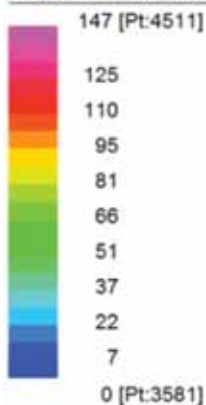


Plate Stress:VM Mid plane (MPa)

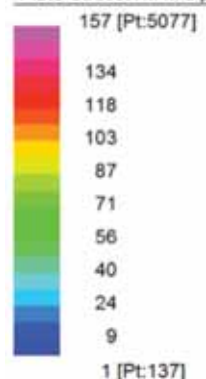


Plate Stress:VM Mid plane (MPa)

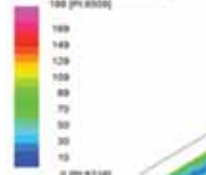


Figure 10: examples of detailed analysis with plate models.

its own weight, in order to manufacture the portal structure with a shorter span (camber). Once the portal will be erected, it will reach the correct span .

CONCLUSIONS

One of the latest Bedeschi projects, called 'Blue Dolphin Project', involved the design and supply of two machines, stacker and reclaimer, for an outdoor coal stockyard for feeding a thermoelectric power plant in the Antofagasta region of Chile. In addition to the challenges posed by the huge size of the machines, during the engineering and design process it was necessary to factor in particularly severe seismic specifications, since the machines are installed in a zone with frequent earthquakes. By means of Straus7 software, static verifications were carried out for the main load conditions (own weight, operating loads, wind) as well as seismic calculations with modal analysis and response spectrum. Besides, machines calculations have been completed with overall stability verifications and local stress-strain analysis of the rails clips.

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- [1] PIEM-21200-C-CA-BED-45-001 C07401.W004.M07887 Verification report of structural strength and deflection of main stacker structures
- [2] PIEM-21200-C-CA-BED-45-002 C07401.W003.M07888 Verification report of structural strength and deflection of main portal structure
- [3] C07401.W005 Elasto-plastic analysis of rail clip.

Transmax™: solution to draught restrictions when transshipping coal

TRANSMAX™: INNOVATION IS THE KEY TO SUCCESS AROUND THE WORLD AND HAS NOW ARRIVED IN INDONESIA

In 2016 Marco Lucido, the Managing Director of National Port Corporation, travelled to Europe on a mission to find the right industrial partner. After sourcing various material handling companies he selected thyssenkrupp. thyssenkrupp is a globally renowned designer and supplier of bulk materials handling, mining and processing equipment.

National Ports Corporation, in partnership with thyssenkrupp, has developed the Transmax™, a self-propelled, self-discharging super shallow draught bulk carrier. With its revolutionary design and unique ground-breaking technology, the Transmax™ is the solution to solving draught restrictions in ports around the world.

Alberto Simeone is an Indonesia-based executive who transformed Coeclerici into the market leader in the Indonesian transshipment sector. He immediately recognized the Transmax™ solution as the only viable innovation for offshore logistics and transshipment of bulk material. In early 2018 Simeone joined with National Ports Corporation to expand into the Indonesian Market.

A laden Transmax™ is able to navigate the Indonesian rivers with 38,000dwt of coal on a 5.5m draught, which is five times the current capacity of a standard 300ft barge limited to 8,000dwt. The Transmax™ can be loaded from any existing berth with a traditional shore conveyor (without warping or shifting the vessel), reducing both operational and CAPEX cost while increasing throughput.

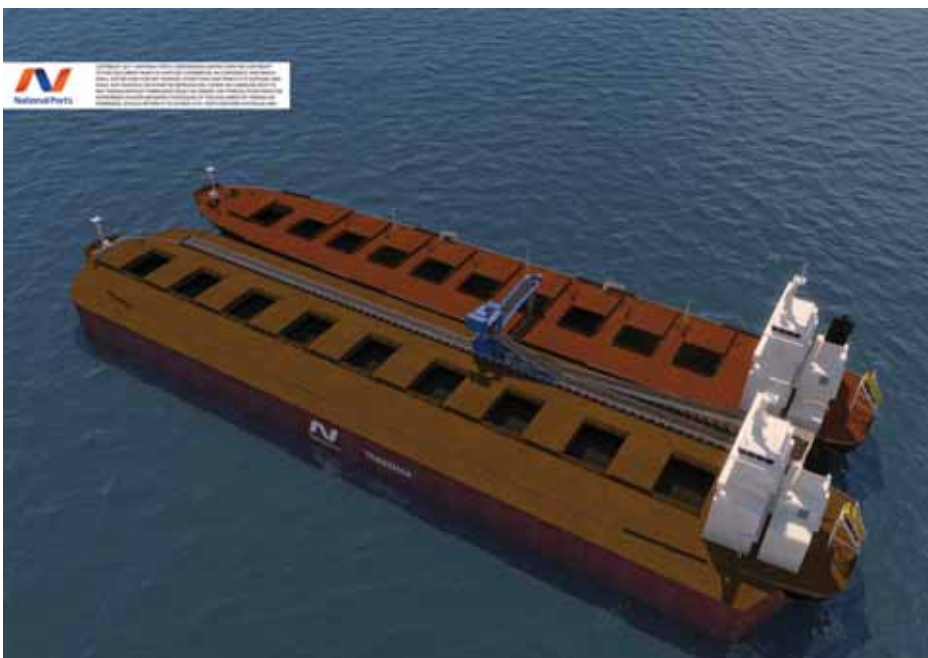
The self-propelled Transmax™ opens the draught-limited river ports/ivers in Indonesia to far greater tonnages with no dredging, no capital expenditure, nor change to materials handling process or equipment.

The Transmax™ can self-discharge at the rate of up to 10,000tph (tonnes per hour) into any size of oceangoing vessel (OGV) or at the port of destination.

The Transmax™ can deliver a homogeneous blend of coal as required by the client.

THE MAIN BENEFITS OF THE TRANSMAX™ IN INDONESIA

- ❖ direct transhipment from the loading



berth to the OGV; will reduce multiple handling, making the entire operation far more efficient and economical;

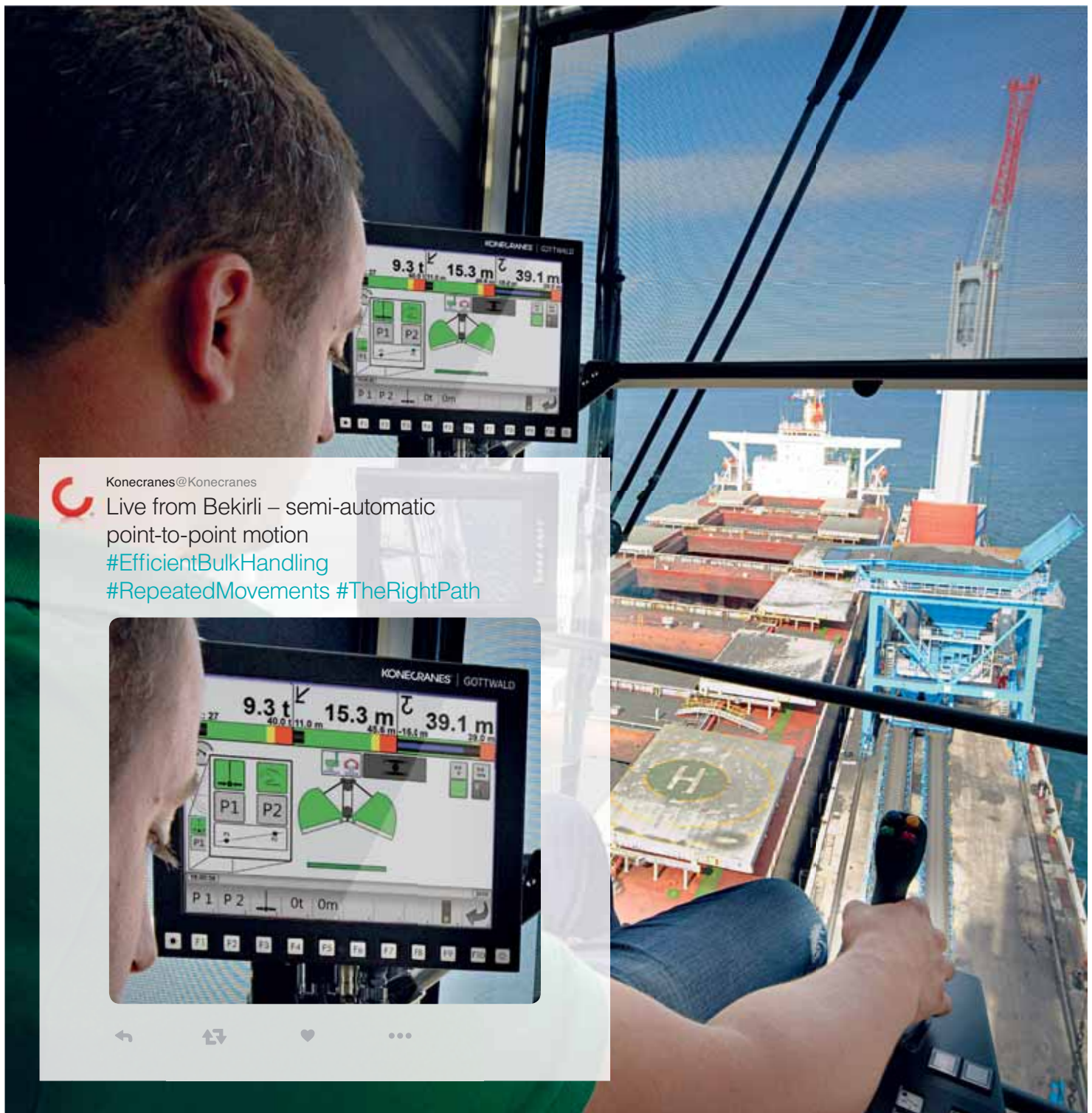
- ❖ direct transhipment from the loading berth to the port of destination; capturing the growth of domestic and Southeast Asian markets; and
- ❖ unlocking the potential of Central Kalimantan; significant reduction in shipping and logistic costs.

"The Transmax™ innovative technology addresses shallow water port/river restriction and fast self-unloading. The result is that the client will be able to increase the throughput at a significantly reduced cost. The Transmax™ is the answer to the transshipment industry in Indonesia," Simeone said.

INDONESIA OPERATIONAL COST SAVINGS:

- ❖ reduction of demurrage cost;
- ❖ blending cost will be removed. This operation can be carryout on board with five different types of materials;
- ❖ faster, efficient and environmentally friendly, all transshipment operations are under cover; and
- ❖ the Transmax™ can receive 38,000 tonnes of coal directly from the mine site avoiding the need to double handle the material and stock pile, effectively removing the associated cost.

The result is that the client is able to increase the throughput at a reduced cost.



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Live from Bekirli – semi-automatic
point-to-point motion

#EfficientBulkHandling

#RepeatedMovements #TheRightPath



THE RIGHT PATH FOR BULK

Efficient coal handling in Bekirli, Turkey is the key for supplying the nearby power plant. To ensure continuous supply, terminal operator İçdaş relies on its Konecranes Gottwald Portal Harbor Cranes. Equipped with semi-automatic point-to-point motion, a smart crane feature, the cranes discharge coal from the vessel's holds to hoppers. This feature for repeated crane movements between these two positions ensures that the right path for bulk is taken, assisting the crane operator with productivity and safety.

Find out more about portal harbor cranes at [konecranes.com](https://www.konecranes.com)

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Replacing rope cranes at Balikpapan Coal Terminal with E-Cranes

A few years ago the first E-Crane was installed in Desa Muara Kaman, Kota Bangun in Indonesia (situated where the Kedang Kepala and Mahakam River meet). Fast forward to May 2018, and another E-Crane installation is under way near Balikpapan on the Indonesian island of Kalimantan.

In late May, E-Crane dedicated a week to the meticulous preparation of the different components for the erection process. Shipping brackets were removed, hoses connected, pins installed and all major components were loaded onto the crane barge used for the installation. By working this way, the major lifts can be completed in quick succession. All of this was done in order to reduce the impact to the fully operational coal terminal, a true balancing act for all involved but a task everyone is up to.



ABOUT BALIKPAPAN COAL TERMINAL

Balikpapan Coal Terminal (BCT) is one the largest coal terminals in Indonesia located in Balikpapan, East Kalimantan. BCT is managed by PT Dermaga Perkasa Pratama, the subsidiary of PT Bayan Resources Tbk, and equipped with shiploading and unloading berths. BCT has a handling throughput capacity of 15 million tonnes per annum and a stockpiling capacity of approximately one million tonnes across 16 stockpiles.

It is able to serve Handy, Panamax and Capesize vessels. BCT also has a loading facility with capacity of 4,000tph, enabling it to load a Panamax-size vessel in one day. Other than that, BCT also has and unloading facility with 5,000tph capacity and is able to unload coal from two barges simultaneously. BCT is equipped to mix coals from four stockpiles using a computerized system to meet customer specifications

After a successful kick-off meeting at BCT the first major item (column) of a 2000 Series E-Crane with 32 metres outreach was lifted in place by E-Crane's erection crew, in close co-operation with the client's team. In the following days the chassis, power module, cab and walkways will be installed after which all electrical and hydraulic connections can be completed. Once this is done, the boom, arm and counterweight can be installed.

Just after the first E-Crane installation has been completed, one of the existing rope cranes will be torn down, and the process will begin again. The second identical E-Crane can be installed to replace it, repeating the balancing act to quickly and successfully install the new E-Crane while minimizing any disruption to the coal terminal. Each of the new cranes

will have a design unloading capacity of 1,500tph (tonnes per hour) and can unload deck barges up to 12,000dwt into two dedicated hoppers each.



Transporting coal with equipment from Gambarotta Gschwendt

Gambarotta Gschwendt Srl is a major manufacturer of equipment for the bulk handling industry.

Gambarotta Gschwendt's products include:

- ❖ heavy duty apron feeders/apron weigh feeders;
- ❖ high capacity bucket elevators up to 3,000tph (tonnes per hour);
- ❖ bucket elevators for large-size material;
- ❖ drag chain conveyors/armoured chain feeders;
- ❖ screw conveyors/mass flow screw feeders; and
- ❖ self cleaning cell feeders.

The company also offers a wide range of services, which include:

- ❖ spare parts supply, both for its own brand conveyors and for those manufactured by other companies;
- ❖ upgrades/refurbishment of its own conveyors and those of other brands, keeping existing structure/casings and replacing internal parts such as chains, sprockets etc.;
- ❖ measurements of existing site dimensions/layout (civil and steel works), 3D creation and proposal of customized new conveyors/feeders;
- ❖ periodic inspection of conveyors with reporting and evaluation of each component's life expectancy; and
- ❖ maintenance supervision and assistance when replacing spare parts.

In many areas of industry, there has been a recent return to using coal as primary energy source — this is partly for economic reasons and partly because of the security of supply that coal can guarantee.

In certain specific situations however, the handling and transportation of coal can represent a danger of explosion. This depends on various factors: the type of coal involved, its granulometry, the humidity and the presence of certain volatile substances.

In order to be in the position to offer its clients transport systems which really are secure, Gambarotta Gschwendt Srl has drawn up a series of internal recommendations which deal specifically with the danger of explosion in the lifting and transport of coal.

Its recommendations were prepared on the basis of detailed research and with consultants who have considerable experience in this field.

The recommendations take into consideration the particular conditions a machine is operating in, vibration, friction,

turbulence, complex internal geometry, etc.

Gambarotta Gschwendt is thus in a position to supply reliable equipment, that is completely tested against the risk of explosion.

Among the products offered for the handling of coal are:

- ❖ screw conveyors;
- ❖ drag chain conveyors;
- ❖ bucket elevators;
- ❖ cell feeders; and
- ❖ extractor conveyors.

Below are some details on Gambarotta Gschwendt's screw conveyors, drag chain conveyors and bucket elevators.

SCREW CONVEYORS

Screw conveyors are one of the oldest conveying technologies — dating back to the time of Leonardo da Vinci (1452–1519), who designed a machine along the same principles. His design was certainly a very simple one, but the basic principle has not changed. At the time, the idea was developed in order to irrigate and convey water by mechanical means, and thus avoid manual labour. Today, the use of screw conveyors has been widely extended, and

they are now considered irreplaceable in their field. They are used in the coal industry, as well as in the cement, chemical, food, sugar and steel industries, as well as in purification plants and silos.

Gambarotta Gschwendt's screw conveyors can be used to transport both powdery and granulated materials, at speeds of up to 350m³/hour. They are up to a maximum length of 40m and a diameter of 1,000mm. They are all standardized, which means:

- ❖ easy adaptation to existing plants;
- ❖ save time and money; and
- ❖ rapid substitution of worn and damaged parts.

These conveyors therefore have a favourable influence on economical operations, as all 'dead' periods are cut to a minimum.

Because of the varying requirements of the industry, Gambarotta Gschwendt has found it useful to use different qualities of steel in its screw conveyors. These options are all available:

- ❖ carbon steel;
- ❖ manganese steel; and
- ❖ stainless steel for special uses.



Gambarotta Gschwendt has extensive experience in screw conveyor technology, which has enabled it to continuously enlarge its product range. Its range of screw conveyors includes:

- ❖ standard version;
- ❖ ducted version;
- ❖ hopper version;
- ❖ double version;
- ❖ belt version;
- ❖ blade version; and
- ❖ cooled version.

Using screw conveyors offers many advantages. They are relatively compact, and particularly suited for the transport of materials at any inclination, with the added bonus that space is utilized in the best possible way.

The completely enclosed screw can be watertight, and thus avoids environmental pollution. Another possibility offered by this means of transport is that the material can be transported with the same screw to different points without influencing the dimensioning of the screw. Further, the reversibility of rotation allows the material to be transported in both directions.

VERTICAL SCREW CONVEYORS

This type of screw conveyor can be an

alternative to other machines, with remarkable advantages in terms of sizing. Construction in section elements allows re-use or modifications if plants are renovated. Above all, Gambarotta Gschwendt's standardization offers the possibility of lengthening or shortening.

The operational simplicity, combined with low maintenance, ensures maximum

reliability. Due to their compact size, these conveyors are highly recommended for use in plants with a limited work space. The main advantages of vertical screw conveyors are summarized as:

- ❖ great lifting heights;
- ❖ maximum transport capacity with minimum overall size;
- ❖ tightly sealed against dust;



SURFACE FEEDER



- ❖ no lubrication of intermediate supports;
- ❖ unified sectional elements; and
- ❖ lack of reduction gears.

DRAG CHAIN CONVEYORS

Gambarotta Gschwendt's 'TRS' chain conveyors are used for horizontal, inclined or vertical conveying of countless types of

bulk materials. Their operation is based on the continuous movement of a chain placed in a rectangular-section steel trough with airtight cover, coupled to a drive gear and an idle wheel.

The chain, driven by the gear in the drive head, drags the material — the upper layer of which can be in excess of the height of

the scrapers. In fact, the lower layer of material — pushed directly by the scrapers — supports and conveys the upper layers, forming a single mass which moves at a constant speed.

The materials may be fed in from the top or side, at one or at several inlet points on the machine body. Material run-off may be at the end of the conveyor or at several intermediate discharge points.

The material is usually dragged along the bottom of the trough by the lower branch of the chain; it is also possible to convey material in the upper part by installing a false bottom between the two branches of the chain.

The main advantages of these conveyors are:

- ❖ reduced cross width compared with other conveyors;
- ❖ easy insertion into existing systems;
- ❖ machine is closed and dedusted, in compliance with the most rigorous standards, safeguarding the environment from the effects of pollution;
- ❖ possibility of conveying materials at very high temperatures; and
- ❖ reduced number of support points, thanks to the self-carrying trough.

The drag chain conveyors constructed



GAMBAROTTA®
S.R.L. G.M.B.H.
GSCHWENDT
Advanced Conveyor Technology

SURFACE FEEDER

Receives various type of bulk materials at yard level, following rapid flow discharge to convey them onto a hauling and processing plant with controlled and adjustable flow rate, **minimizing the installation costs.**

Combines the strenght of a metallic plate extractor with the retaining quality of the rubber belt that seals off any potential escape points **for even the finest materials.**



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by Gambarotta Gschwendt are built using high-quality components; construction is sturdy, safe and simple, to reduce maintenance to a minimum and to increase reliability. All parts subject to wear are easily replaceable.

TRS HORIZONTAL CONVEYORS

These include:

- ❖ **standard linear conveyor:** with chain tensioning system on drive head;
- ❖ **standard linear conveyor with curve;**
- ❖ **conveyor with extraction** from a single hopper. Material conveyed in the lower branch and tensioning system on idle head;
- ❖ **extraction conveyor** with extraction from several inlets;
- ❖ **extraction conveyor** with a single hopper. Material conveyed in the lower branch and tensioning system on drive head.

TRS VERTICAL CONVEYORS

These include:

- ❖ **standard inclined linear conveyor;**
- ❖ **double-curve conveyor** with steeply inclined conveying and loading on the horizontal section;
- ❖ **single-curve conveyor** with steeply inclined conveying and loading on the horizontal section; and
- ❖ **double-curve conveyor** with vertical section end with discharge at intermediate point and at end.

TYPES OF TRS CONVEYORS

Each conveyor comprises:

- ❖ **the external body** — divided into drive head; intermediate body; and idle head;
- ❖ **the mechanical organs** — including conveyor chain; drive and idle gears/wheels; and shafts, supports and bearings; and
- ❖ **the drive unit.**

The shape of the body depends on conveyor function (extraction, conveying), on the type of installation (horizontal, vertical, inclined) and on the characteristics of the material to be conveyed (flowability, tendency to bridge, abrasiveness, temperature, granulometry, moisture).

DRIVE HEADS

The drive head forms the front part of the machine. It consists of an electro-welded casing structure equipped with an inspection and cleaning door. It houses the gear which drives the conveyor chain. This gear is mounted on the shaft, supported by rolling-contact bearings and connected to the drive unit. The head may have different shapes, depending on the type of conveyor.



It may also be equipped with a chain tensioning system.

INTERMEDIATE BODY

The intermediate body is the part which connects the drive head and the idle head. It comprises a series of flanged troughs, having a standard length, formed by a channel element plus cover, with one of more inlets for loading the material to be conveyed.

The trough is airtight, equipped with flanges having adequate seals. Runners in wear-resistant low-noise materials are available for the areas which come into contact with the chain and with the material being transported. Special pieces permit formation of inclined or vertical conveyors with curves. On request, the conveyors can be supplied with a lowered body or built in special materials or with special linings.

IDLE HEADS

The idle head is at the end of the machine. It consists of an electro-welded casing structure equipped with an inspection and cleaning door. It houses the idle conveyor-chain wheel. This wheel is mounted on a shaft with rolling contact bearing and supports. It is equipped with a chain tensioning system when this system is not installed on the drive head.

DRIVE UNITS

The conveyor chain is driven by the drive unit mounted on the drive head. Conveyors are equipped with various drive units.

CHAINS

The fundamental part of the conveyor is the chain.

- ❖ **links:** press-forged in case-hardened

alloy steel for high resistance to abrasion. Hardened to 0.8–1.5mm. Three different standard pitches are available for these machines: 102, 142 and 260mm. The holes for the coupling pins may be equipped with interchangeable bushes in wear-resistant steel.

- ❖ **coupling pins:** act as the coupling hinge of the chain links. Made of heat-treated steel with hardening depth of 0.6–2mm., depending on the type of material. Special check rings prevent accidental withdrawal of the pins as the machine is running.
- ❖ **drag scrapers:** welded to the links; the shape, size and type of scrapers depends on the material being conveyed. Five types of scrapers are available.

GEAR WHEELS

The drive gears are made of highly wear-resistant steel, and equipped with induction-hardened discs in the area which comes into contact with the chains.

They can be supplied with a welded hub or a bolted hub, for replacing worn rings without disassembling the drive head shaft.

The idle wheel, normally not toothed, is supplied with ring and hub incorporated in a single piece.

The ring is made of wear-resistant steel, induction hardened at edges. For easy replacement, the wheels are fitted onto the shafts using expansion fittings.

BUCKET ELEVATORS

In several industrial sectors, the need to lift bulk material of any size can be met by Gambarotta Gschwendt's bucket elevators. The company offers three different categories:



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- ❖ **high-speed bucket elevators:** generally used for powdered or small-sized materials (<40mm);
- ❖ **medium-speed bucket elevators:** for medium-sized materials (40–80mm) or for special applications such as fertilizers or granulated materials that must be stored intact;
- ❖ **low-speed bucket elevators:** suitable for large-sized materials — up to 300mm or more. This article will focus on these elevators, as they are the most suitable for handling coal.

ELD — BUCKET ELEVATOR WITH CHAINS AND SHACKLES

ELD — DIN-type low-speed bucket elevator with chain strands on the sides of the buckets to ensure central discharge aligned with the elevator. The main features of the elevator include the following:

- ❖ standard dimensions (i.e. bucket width) of the same series as for high-speed elevators, starting from 315mm;
- ❖ sturdy buckets, suitable for dredging on the reinforced outer side and discharging on the opposite internal side. The sides are fitted with two perforated brackets for connection to the shackles;
- ❖ drive wheels with hub and smooth rings for driving the chains through friction;
- ❖ return wheels of the same type as the drive wheels;
- ❖ chain strands manufactured according to DIN 764 specifications (or, alternatively, DIN 766 type strands with shorter links);
- ❖ DIN 745 type shackles for connecting the buckets to the chains (Gambarotta uses reinforced DIN 5699 shackles that are interchangeable with DIN 745 shackles);
- ❖ tangential feed inlet on idle station;
- ❖ central discharge outlet under drive station; and
- ❖ standard counterweight tensioning system with load equivalent to roughly

80% of the weight of the material contained in the up run.

Type of discharge: central gravity.

ELR — BUCKET ELEVATOR WITH CONTINUOUS ROUND CHAINS

ELR — low-speed bucket elevator with round link chains. Type of bucket elevator with two continuous drive chains and toothed wheels. The chains are anchored to the sides of the buckets to ensure central discharge aligned with the elevator.

ELM — BUCKET ELEVATOR WITH LINK CHAINS WITH PINS AND BUSHES

ELM — low-speed bucket elevator with toothed drive wheels and double chains connected to the bucket sides. Similar to ELR elevators but mounting roller chains with pins and bushings fixed to the bucket sides, to ensure central discharge aligned with the elevator.

ETR — BUCKET ELEVATOR WITH CONTINUOUS ROUND CHAINS (FOR LARGE GRAIN SIZE)

ETR — non-dredging low-speed bucket elevator for lifting large-sized material. Elevator with two round link continuous chains and toothed wheels. The chains are anchored to the sides of the buckets to ensure central discharge aligned with the bucket elevator.

ESP — MEDIUM-SPEED CONTINUOUS BUCKET ELEVATOR, WITH DOUBLE CHAINS CONNECTING THE REAR OF BUCKETS

ESP — the mild centrifugal force due to the low speed causes part of the material to flow off the back of the preceding bucket. Type of bucket elevator with chains that are driven by toothed wheels.

- ❖ acceptable material grain size (mm): 0–100;
- ❖ recommended speed (m/sec): 0.40–0.95; and
- ❖ acceptable centre-to-centre distance (m): 80.

Construction specifications:

- ❖ continuous buckets with extended sides in the area where material flows off to be discharged;
- ❖ drive wheels with interchangeable toothed segments for driving the chains;
- ❖ toothed return wheels for improved chain guidance;
- ❖ link chains with side plates, pins and fixed bushings, with attachments for connecting the buckets;
- ❖ tangential feed inlet on idle station;
- ❖ tangential discharge outlet on drive station;
- ❖ standard parallel tensioning system with counterweight. Hydraulic tensioning



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Opening diameter without dedusting filters or with spraying	7m	9.5m
Opening diameter with dedusting filters	5.5m	8m



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■ 100 m³

■ Without dedusting
■ Dedusting filters
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■ Clamshell
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system also available; and

- ❖ type of discharge: tangential, partly centrifugal and partly gravity discharge.

ESPC — HIGH-SPEED BUCKET ELEVATOR WITH SINGLE CENTRAL CHAIN

ESPC — bucket elevators with a single chain connecting the buckets and driven by a toothed wheel.

- ❖ acceptable material grain size (mm): 0–50;
- ❖ recommended speed (m/sec): 0.90–1.60; and
- ❖ acceptable centre-to-centre distance (m): 80.

Construction specifications:

- ❖ buckets of suitable capacity and size with holes on rear end for connection to the chain;
- ❖ drive wheel with interchangeable toothed segments to drive the chain;
- ❖ toothed return wheel;
- ❖ link chain with side plates, pins and fixed bushings, with attachments for connecting the buckets;
- ❖ tangential feed inlet on idle station;
- ❖ tangential discharge outlet on drive station;
- ❖ standard tensioning system with contrast springs, pair of threaded bars and adjustment nuts. Alternatively, a hydraulic tensioning system is used; and
- ❖ type of discharge: tangential — centrifugal.

ESPLV — HIGH-SPEED CONTINUOUS BUCKET ELEVATOR, WITH DOUBLE CHAINS CONNECTING THE SIDES OF BUCKETS

ESPLV — suitable for handling very large capacities (up to 1,500m³/h or more). Can also be used at medium speeds similarly to those used on ESP bucket elevators; part of the material is discharged by flowing onto the back of the preceding bucket. When used at medium speed, medium-sized materials can be lifted (70–80mm). Elevator with chains connecting buckets that are driven by toothed wheels.

- ❖ acceptable material grain size (mm): 0–60;
- ❖ recommended speed (m/s): 0.90–1.60; and
- ❖ acceptable centre-to-centre distance (m): 80.

Construction specifications:

- ❖ high-capacity continuous buckets, with extended sides in the area where material is expected to flow off;
- ❖ drive wheels with interchangeable toothed segments for driving the

chains;

- ❖ toothed return wheels for improved chain guidance;
- ❖ link chains with side plates, pins and fixed bushings, with attachments for connecting the buckets;
- ❖ tangential feed inlet on idle station;
- ❖ tangential discharge outlet on drive station;
- ❖ standard parallel tensioning system with counterweight. Hydraulic tensioning system also available; and
- ❖ type of discharge: tangential — centrifugal (partly also gravity discharge when medium speeds are used).

EVN — BUCKET ELEVATOR WITH RUBBER BELT

EVN — high-speed belt bucket elevator, with rubber belt to which buckets are connected.





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Clean conveyor belts with secondary scrapers from Schulte Strathaus



One of the biggest mobile machines in the world: the AFB F60/34 conveyor bridge in the German open-cast lignite mine Jänschwalde near Berlin.

HIGH BELT SPEEDS: A CHALLENGE FOR SCRAPERS

High belt speeds represent a challenge for scrapers. Cleaning results are often less than satisfactory. But that is not always the case, as is clear at the open-cast lignite coal

mine in Jänschwalde, Germany.

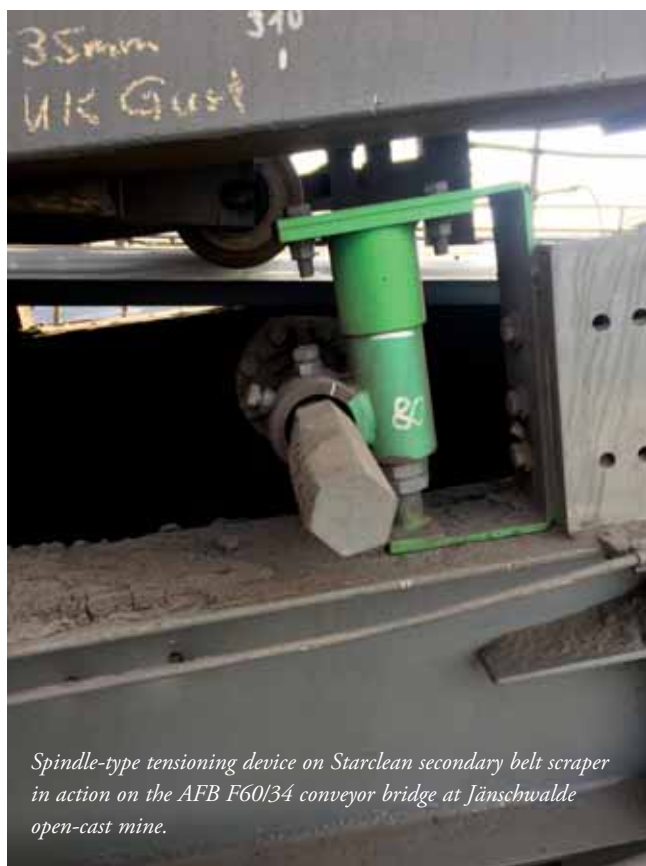
The four F 60 series conveyor bridges still operating in Germany, built by the former GDR company TAKRAF Lauchhammer, are some of the biggest mobile machines in the world. They are approxi-

mately 200 metres wide, 500 to 600 metres long, up to 80 metres high and weigh several thousand tonnes. Their job is to transport and dump overburden from the mining area in the Lausitz lignite mines.

The maximum hourly load is a



Starclean secondary belt scrapers with carbide segments are also suitable for very high belt speeds.



Spindle-type tensioning device on Starclean secondary belt scraper in action on the AFB F60/34 conveyor bridge at Jänschwalde open-cast mine.

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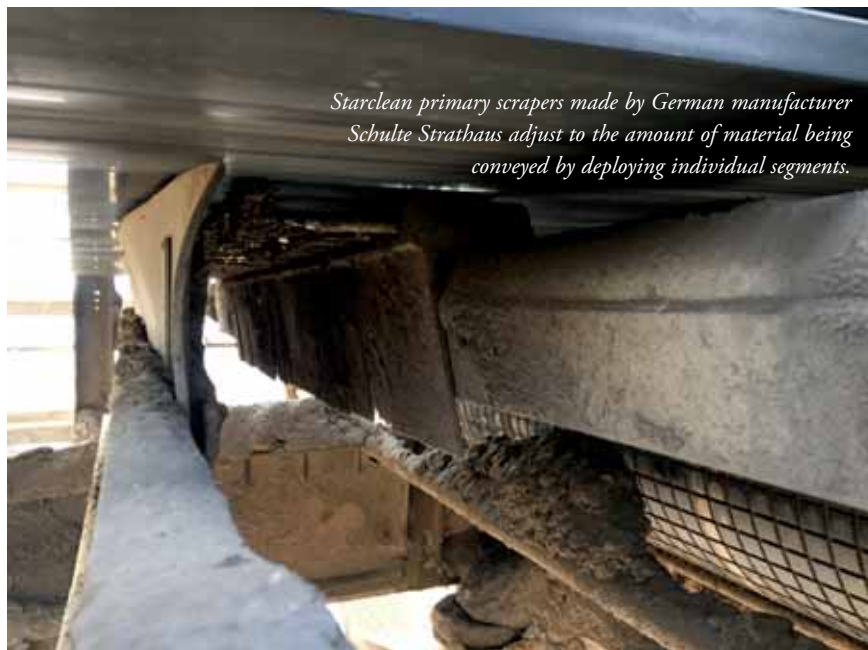
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prodigious 34,000m³, according to Peter Hobracht. The 57-year old is responsible for heavy machinery maintenance at the Jänschwalde opencast mine near Cottbus, south of Berlin. He also has to look after the AFB F60/34, one of the conveyor bridges. Once a year, "all bridges stop running", he says. The time is used for major maintenance and repair work. This time, primary and secondary belt scrapers also had to be renewed or replaced. Since the belts are not only hundreds of metres long and up to three metres wide but also run at very high speeds of up to ten metres per second, the demand for cleaning efficiency, ease of servicing and durability were high.

As Hobracht knows, high speeds are "extremely challenging for scrapers". The main No. 5 conveyor belt alone reaches a speed of nine metres per second. Cleaning efficiency is often visibly reduced at such speeds and scraper wear and tear greatly increased.

"With Schulte Strathaus and their Starclean scrapers we have found another manufacturer who can supply our particular needs," says Hobracht. Both cleaning efficiency and ease of servicing were considered "exemplary in practice".

As Franz Hering, in charge of



Starclean primary scrapers made by German manufacturer Schulte Strathaus adjust to the amount of material being conveyed by deploying individual segments.

distribution in East Germany for Schulte Strathaus, explained, thanks to the use of individual blades the scrapers automatically adapt to the conveyed material and the belt. The automatic torsion tensioning device ensures that the segments always operate with the correct tension. Manual adjustment is unnecessary. The same principle applies to the secondary belt scrapers. Here too the individual carbide

segments with polyurethane snap-on feet adapt to the belt in optimal fashion.

In addition, their position ensures belt cleaning with reduced wear. Installation and maintenance are relatively simple thanks to the snap-on system. As Hering says, "the replacement of worn-out parts in a different scraper system with bolted-on elements would be considerably more complicated."



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Grabbing a piece of the coal market: Calim Grab Industry's units in use worldwide

Calim Grab Industry, based in Istanbul in Turkey, is a company engaged primarily in the developing, manufacturing and reconditioning of hydraulic and wire rope grabs. Over 3,000 grabs have been supplied by the company to more than 20 countries worldwide — many of which are in use handling coal cargoes.

Calim was founded in 1970 as an engineering office and consulting company, specializing in the construction of grabs (main business) as well as nearly all kinds of bulk handling equipment. The company founded its own workshop in 1973, and since then, it has been known as Calim Manufacturing.

Calim uses 3-D solid modelling and FEA (finite element analysis) in the design of its grabs. This means that customer-specific requirements can be implemented in the



and requiring few spare parts. Calim's product range is suitable for much more than just coal, and includes:

- ❖ mechanical rope grabs (single rope, two-rope, three-rope, four-rope systems);
- ❖ electro-hydraulic grabs;
- ❖ remote-controlled hydraulic grabs;
- ❖ wood grabs (for wood bundles or logs);
- ❖ dredger grabs;
- ❖ salvage grabs;
- ❖ crane equipment for operating electrohydraulic grabs;
- ❖ c hooks; and
- ❖ minimum 20m³ and maximum 100m³-capacity sea port hoppers

Calim Grabs delivers parts and grabs internationally.

design and production process.

Calim's grabs are ideal for a wide range of dry bulk products, including coal. The company's main customers are shipping companies, where the grabs need to withstand the rough conditions on seagoing vessels, loading and unloading the vessel in every corner of the world.

The company has a wide range of standard type grabs. These grabs are readily available.

Each bulk material has its own specific properties and this requires a specially designed grab. The optimal grab for coal, can have great difficulties with iron ore. Calim has developed a full range of grab models, especially designed for common bulk materials like coal, iron ore, agribulk,

fertilizer, phosphates, etc. Besides grabs for above materials, Calim offers special solutions available for other bulk materials with specific properties. Calim grabs are used among many brands and types of available cranes; some examples include E-Crane, Sennebogen, Hitachi, Liebherr, Volvo, Fuchs and more.

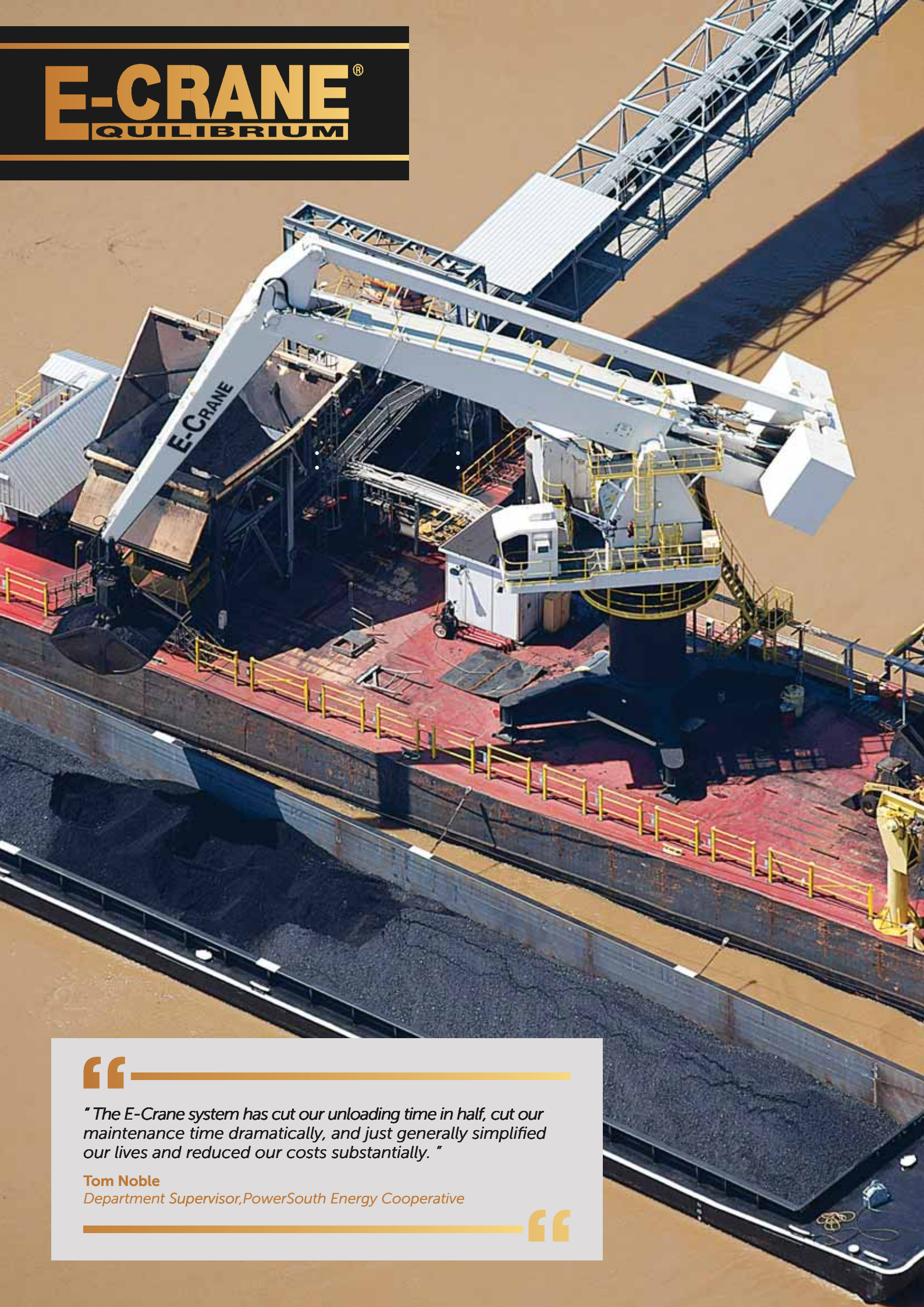
Calim also regularly carries out repairs on grabs made by other manufacturers.

In terms of lifetime costs, grabs from Calim are extremely economical and, due to their high quality, are well worth the price of investment. They have proven to be reliable, efficient, able to handle a high payload, powerful



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The combination of using stacked containers as a wind-break, and HKD Blue's water cannon, has solved the problem of fugitive dust while handling manganese at a Chicago port.

Done and dusted?

dust control systems & technologies

Louise Dodds-Ely

HKD Blue's 'wall of water' makes manganese handling operations safe

Dry bulk handling in Chicago is among the most sensitive in the USA. Whipping winds from Lake Michigan create difficult conditions for port operators during the loading and unloading of bulk materials such as iron ore and manganese.

In effort to mitigate the hazards posed by fugitive dust emissions from certain materials, the City of Chicago has introduced some of the strictest regulations for bulk material handling of any city in the nation. Part of this regulation requires port operators to take comprehensive action to mitigate the environmental impact of bulk handling activities and protect workers and the environment from fugitive dust emissions and particulate matter (PM) exposure. A Fugitive Dust Control Plan must be designed and produced ahead of any operation involving hazardous dry bulk materials.

Manganese is a naturally occurring element primarily used in the production of steel. Although very small amounts are found naturally in the soil, inhaling large of

amount of manganese — which can also be flammable — is extremely hazardous. Any time this material is handled at a Chicago port, site managers must combine several different measures to formulate and implement a site-specific plan.

A recent discharge of manganese was especially challenging for one local port company which contracted 5R Enterprises to operate HKD Blue equipment for its dust suppression. A half dozen 20' shipping containers were stacked perpendicular to the vessel holding the manganese. The man-made wind barrier would help reduce windblown manganese emissions, but this was only part of the solution. The team ultimately relied on an HKD Blue V-500 GT unit to create a 'wall of water' downwind of the natural man made barrier.

Any manganese dust not trapped by the barrier was immediately captured by the atomized mist projected from the V-500GT, and site workers were able to unload the material safely and on schedule.

HKD Blue's Variable Flow Geyser Nozzle is different than typical water

atomizing cannons because it can control the water flow to reduce run-off. The unit can be controlled remotely by site managers, and mobile units like the V-500T can be positioned for specific discharge operations. Fixed equipment, like the 20' V-500FX, can be installed as part of permanent fugitive dust control solution for a terminal location. Water throw trajectory, angle, and particle size are all controlled remotely and multiple fan towers can be networked to provide a dynamic layer of emissions control in unison.

Local regulations and conditions require a unique solution for any port terminal and traditional water based dust control strategies are often ineffective and waste valuable site resources. HKD Blue's industrial grade dust control machines are trusted by dry bulk handlers and demolition teams across the United States and Canada. HKD Blue works with its partners to identify site specific challenges and design custom dust control plans to ensure safe and efficient operations.



Sealing conveyor belts using LIFTUBE® prevents fugitive dust

Standard Industrie International, founded in 1978 in the North of France, specializes in the design and manufacture of equipment facilitating the handling of bulk powdery products.

Evolving and innovating continuously for 40 years in more than 60 different sectors of activity, Standard Industrie International uses its extensive expertise to solve customers' problems.

The company has designed an innovative system that optimizes the sealing of any conveyor belt: the LIFTUBE®. It is easy to install, and makes it possible to cover the conveyor belt with hoods. This solution significantly reduces dust emissions during material conveying, whilst optimizing the operator's safety. In this way, the LIFTUBE® reduces product losses and the need for cleaning during the transport of products such as sand, limestone, clinker, aggregates, grain, flour, etc.

This solution is also perfectly suitable for recycling or wood treatment factories. Around the world, many Standard Industrie International customers using this patented system are fully satisfied with the results: optimizing productivity, reducing maintenance time and costs.

CUSTOMERS FOR LIFTUBE® INCLUDE:

- ❖ cement plants;

There is considerable fugitive dust on this system before installing the LIFTUBE®.



- ❖ steel industry;
- ❖ foundries;
- ❖ thermal power plants;
- ❖ cleaning companies;
- ❖ glass factories;
- ❖ mines and quarries;
- ❖ limeworks;
- ❖ coke works;
- ❖ incineration plants;
- ❖ mills;
- ❖ food industry;
- ❖ petrochemicals; and
- ❖ chemical industry.

LIFTUBE® ADVANTAGES INCLUDE:

- ❖ sealing (reduction of dust emissions);
- ❖ staff safety;
- ❖ fast return on investment;
- ❖ removal of material overflow; and
- ❖ easy and minimal maintenance.

The LIFTUBE® is also available with a range of options:

- ❖ can be used at high temperatures;
- ❖ ATEX zone 21;
- ❖ food industry; and
- ❖ auto-extinguishing.

The difference is clear: after installing the LIFTUBE®.



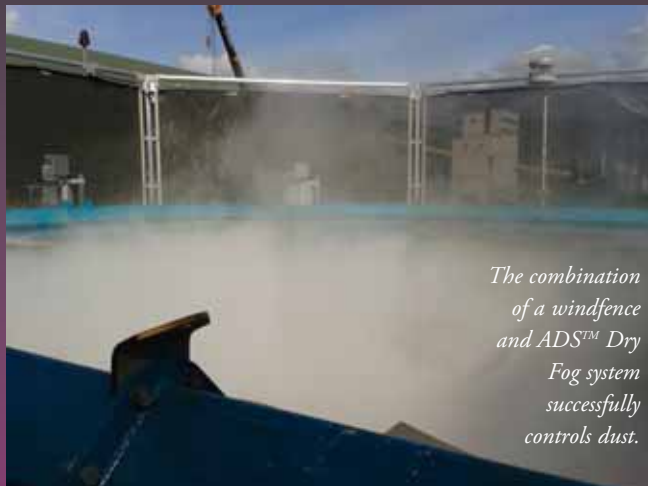
The Raring Corp and Weathersolve join forces to defeat dust

Working closely with dust-control specialist Weathersolve, the Raring Corporation has implemented a new approach that combines technologies from the two companies.

The windfences are supplied by Weathersolve, and these work in combination with the ADS™ Dry Fog system from the Raring Corp. This integration has been used successfully in many applications and in different industries.

The most important requirement for ADS™ Dry Fog, to successfully work controlling the dust, is the need of containment. Using a Weathersolve windfence is a good way to add the containment feature to the dust control system, maintaining the fog and dust on the controlled boundaries which help give the fog the retention time needed for doing its job. Specifically in ports, the Raring Corporation recommends that its clients consider both ADS™ dry fog and windfences on the unloading hoppers. It has used this combination in several ports in different parts of the world, and it has successfully controlled dust in challenging and difficult applications.

Hoppers are continuously exposed to wind gusts from different directions and the logistics of some operations limit the amount of windfence that can be installed. Nevertheless, the integration of these two technologies has been a good fit for clients of the Raring Corporation. For more information on the Raring Corporation, please see 'ADS™ Dry Fog on shiploaders: cost-effective solution from the Raring Corporation' on p88 of this issue.



The combination of a windfence and ADS™ Dry Fog system successfully controls dust.

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Vlint supplies dust suppression hoppers to ICL



A DSH hopper handling phosphate for ICL Fertilizers.

Phosphate ore — a raw material base for fertilizer — is a very dusty product. This is why dust reduction and dedusting are very important for Netherlands-based ICL Fertilizers.

This fertilizer factory trusts the specialist company Vlint to reduce dust and emissions in its factory. Vlint also installed a special dust reduction system for loading to the storage facilities.

This factory can trace its history back to 1906, says Gerard Oudshoorn, business co-ordinator at ICL Fertilizers Amsterdam. “To get a dry fertilizer granulate, for years we have been mixing shiploads of phosphate with all kinds of acid and minerals.”

The ships that moor at ICL Fertilizer are loading a powder phosphate ore into a funnel on a belt conveyor. In the past, the product was loaded into the storage facilities from 9m high, using a chute.

To avoid producing too much dust, it was only possible to load at 30% of maximum capacity — and even at this speed, some dust did escape.

DSH HOPPER

Product specialists from Vlint recommended the use of a DSH hopper. A DSH hopper can be installed below a loading point like a belt conveyor, chain conveyor or silo. The DSH hoppers work

ICL Fertilizers has been manufacturing chemical fertilizers for over 100 years.



based on gravity.

The DSH hopper is installed onto a frame with springs and inside there is a plug that closes the outlet from the hopper. The hopper is filled to about 70% and will go down in the springs so the product can flow around the plug to the outlet and make a strong column with product where dust does not get the chance to escape.

In practice, there are situations where the DSH hopper can reach 95% dust reduction, depending on the product.

FASTER LOADING

ICL Fertilizers decided to do some testing with the DSH hopper in a smaller size to see the result on 30% loading capacity, according to Oudshoorn. After some small changes and adjustments, this was a great success.

During loading operations, there is much less dust and emissions from the storage facility are a thing of the past. After the testing, ICL Fertilizers decided to buy a couple of DSH hoppers in a bigger size so they with capacities exceeding 60% without any dust problems. Another big advantage is that the ships can be unloaded much faster and can leave much quicker. ICL



Gerard Oudshoorn, business co-ordinator at ICL Fertilizers Amsterdam.

Fertilizers' dust problems in the storage areas are history.

GROWING POPULARITY

Ger den Heijer, product specialist at Vlint says that the use of DSH hoppers is growing very fast in Europe.

For hygroscopic products, Vlint can supply a PE hopper, for food a stainless steel hopper, and for other products like corn and wheat — but also sand and grit —

Vlint uses Corten steel or Hardox DSH hoppers.

The DSH hopper is not only very good for dust reduction but also makes a very strong and fixed column which make the loading process more efficient. Other advantages are that you do not need any electronics and in most cases there is also no need for dedusting systems. Using the DSH hopper also saves in terms of maintenance costs.



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Solve the world-wide industrial material handling problem – dust fallout while transferring dry, granular goods. 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).



Dust collection: the key to cement production from beginning to end

Large flows of abrasive dust are typical in all cement-related applications. Without effective dust control, equipment and process are put to risk. As a global expert in filtration solutions, Donaldson experts present step-by-step the dust collection challenges and solutions that arise during cement production.

EXTRACTION AND CRUSHER

Cement minerals contain four essential elements: calcium, silicon, aluminium and iron. The most important raw materials for making cement are limestone, clay and marl. These are extracted from quarries by blasting or by ripping with the use of heavy machinery. Wheel loaders and dumper trucks transport the raw materials to the crushing installations. Based on data from installations, it's been estimated that as much as 1% of mining throughput can be lost to the surrounding environment. For a 700tph (tonnes per hour) quarry, that's about seven tonnes per hour lost from conveyors, crushers and screens, and that does not include losses from stockpiles. Good dust control is essential in meeting both environmental and occupational types of requirements.

CHALLENGE

- ❖ wide range of airflows, from small to very big;
- ❖ different types of trucks and machinery with diverse filtration needs; and
- ❖ maintaining stable pressure drop is challenging due to low temperatures and large particles.

SOLUTION

- ❖ local extraction systems that work on the spot versus centralized systems with fixed ducting;
- ❖ flexible product range covering from small to very big airflows;
- ❖ high-flow filtration media with the lowest possible restriction for optimal efficiency and stable pressure drop; and
- ❖ with over a century of experience and a global customer base of OEMs and end users, Donaldson technology and product range covers the entire spectrum of filtration needs for cement applications.

Donaldson's silo venting unit.



PROPORTIONING AND BLENDING

The crushed material is transported into the raw material storage of the cement plant by conveyor belts, cableways or railways and in exceptional cases with trucks. Once there, it is stored in blending



Large flows of abrasive dust are typical in all cement-related applications.



beds and homogenized.

The raw materials are now analysed in the plant laboratory, blended in the proper proportion and then ground even finer. After grinding, the material is now ready for the kiln or preheater, depending on plant type.

CHALLENGE

- ❖ collection of large amounts of dust without impacting optimal product flow; and
- ❖ control high level of emissions released into the atmosphere.

SOLUTION

- ❖ selection of optimal filter media to handle large amounts of airborne dust – i.e. suited ePTFE membrane;
- ❖ the Downflo® Evolution (DFE) dust collector reduces the number of required filters by up to 40% compared with a typical cartridge collector; and
- ❖ DFE's innovative design positions more filtration media in beneficial locations. As a result, this collector cuts filter replacement costs, opens up valuable manufacturing floor space in a facility and delivers the lowest cost of ownership.

BURNING

The burning of the raw meal at approx. 1,450°C is carried out in preheater kilns that work by varying methods, the main difference being in the preparation and preheating of the kiln feed. By chemical conversion, a process known as sintering, a new product is formed: clinker.

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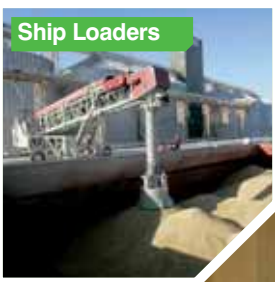
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Cleveland Cascades Ltd

Global leader in bespoke dry bulk loading chutes



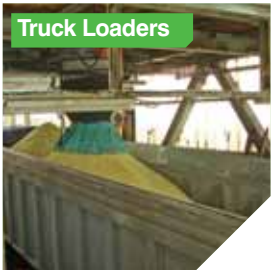
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Silo Loaders



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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

E-mail: enquiries@clevelandcascades.co.uk | Website: www.clevelandcascades.co.uk



CHALLENGE

- ❖ high temperature (up to 260°C);
- ❖ large gas volumes; and
- ❖ critical to process, environmental pressures, alternative fuels.

SOLUTION

- ❖ near zero emissions;
- ❖ reduced cleaning regime;
- ❖ higher airflow; and
- ❖ Tetratex® Ultra High Efficiency ePTFE membrane laminated to woven glass fabric.

CEMENT GRINDING

After burning, the clinker tumbles onto a grate cooled by forced air and stored in clinker silos. From there the clinker is conveyed to horizontal steel pipes filled with steel globules called ball mills or roller presses.

CHALLENGE

- ❖ extreme abrasive, corrosive and aggressive dust;
- ❖ very fine particles;
- ❖ high dust loads; and
- ❖ risk of production blockages, equipment abrasion, secondary dust emissions, and

higher costs for maintenance and materials handling.

SOLUTION

- ❖ PowerCore® CP Series dust collectors with PowerCore filter packs solve the industry's need for better filtration, reduced operational cost, a smaller footprint and easier maintenance;
- ❖ surface filtration for high efficiency and low pressure drop; and
- ❖ consideration of incoming air velocity, dust distribution, and air patterns within the collector. Tailored filter media selection.

LOADING

From the grinding mills, the cement is conveyed to silos where it awaits shipment, depending on type and strength class. From there it is mainly loaded in bulk form from terminals onto rail or road vehicles as well as onto ships.

CHALLENGE

- ❖ specific requirements for different filter housings and pressure relief systems;
- ❖ complex maintenance put the silo at risk of leakage and over-pressurization;

and

- ❖ worker safety and convenience for long heights operation.

SOLUTION

- ❖ filter must be sized to accommodate peak dust loads and peak air volumes;
- ❖ increased efficiency and performance with PowerCore® technology: by fitting more filter media in less space, the silo venting unit is 54% smaller than conventional units, freeing up valuable extra space for more security and efficiency; and
- ❖ fewer filters, better cleaning and safer maintenance result in major cost savings over the life of the collector.

EXPERT TIP

Two basic strategies exist for applying dust control to mines and quarries. i) Source collection, in which the dust collector is put at the source of the dust emission so collected dust can be deposited directly back into the process stream and ii) centralized collection where the collector is put in a central location and dusty air is ducted and discharged as a separate process stream.

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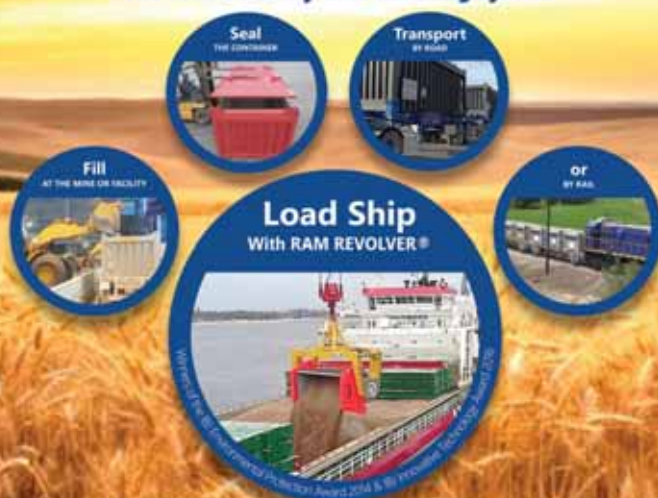
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Scrap Metals | Logged Materials | Iron Ore | Copper Concentrate



Performance Through Innovation

Blue Water Misting helps Semaphore to reduce dust in bulk handling

The bumper grain harvest in South Australia has led to record throughput for Semaphore Containers in South Australia. With more loading activities there is more dust being generated.

Being a proactive company, Semaphore engaged Blue Water Misting to reduce dust in their operations.

Blue Water Misting (BWM) analysed the site in consultation with customer identifying the sources of dust. Then it purpose-designed a system to help reduce dust in the following areas:

❖ truck receivals from the farm to silo;

"We engaged BWM to install dry fog dust suppression at several points in our operation. The result has been a significant reduction in dust emissions"

**Michael Raidis Manager
Semaphore Containers**

❖ truck load out to the ship loader;
❖ container stuffing; and
❖ hopper loading.

SOLUTIONS FOR DUST — NOT ADDED MOISTURE

Blue Water Misting worked with the client to determine the sources of dust and prepare a solution for the fugitive dust emissions. BWM placed a large power pack centrally on site then used specialist nozzles to produce a dry fog that adds less than 0.25% moisture to product.

Solution 1: truck receival

The existing tipping receival pit to offload trucks to fill silos resulted in dust emissions to the air and local pollution. BWM engineers built a two pronged solution to the problem firstly a physical screen around the inlet and secondly dry fog bars mounted to the screen



Solution 2: truck loading

Once a vessel is alongside the grain needs to be transported to the quay for loading on a ship. Previously grain was discharged from silos and storage by belt conveyor into trailers creating dust. BWM engineers identified the source of the dust and fitted dry fog lances on a spray ring to the spout.



Solution 3: hopper loading

When feeding material from storage the client used a front end loader to fill a hopper which generates a lot of dust. BWM fitted its dry fog spray bars to the hopper inlet reducing dust from operation to zero.



Solution 4: container stuffing

An important part of the client's operation is container stuffing of grain for export in containers. This is done using a belt conveyor into the container with one door closed and the other blocked with a plywood $\frac{3}{4}$ false wall. This resulted in dust emissions as can be seen below.

BWM fitted dry fog spray bars to the loading station at an angle to best impact the dust particles and significantly reduce the dust emissions from the operation.



Dust control systems from Buttimer Engineering

Buttimer Engineering was first established in 1978 by Edward Buttimer and, in the intervening decades, has experienced significant growth. It has grown from its base in Cahir, Co. Tipperary to serve clients internationally and has even resulted in subsidiaries in Birmingham, UK and Warsaw, Poland.

Despite the company's broad range of clients and sectors, the core expertise remains high quality steel fabrication and most notably the mechanical handling of dry bulk materials. This expertise in bulk material handling led to the development of its own material handling brand, DOCKSOLID, launched in 2014. Since then, Buttimer Engineering has been striving to provide innovative and practical solutions to bulk handling problems. Arguably the most pertinent problem regarding the material handling process is the topic of fugitive dust, which is becoming more and more relevant in a contemporary setting where an emphasis on health, safety and environmental awareness is increasingly prevalent. With this in mind, Buttimer has developed patented dust control systems which provides customers with peace of mind and no compromise in performance.

As stated, handling of many dry bulk materials can generate airborne dust. This can pose a health threat to port workers, an environmental hazard, as well as a fire safety and explosion risk. Excessive dust emissions also represent a loss of product during the handling process. The DOCKSOLID hopper has a number of dust and environmental control techniques that can be incorporated into a hopper's design. These features offer state-of-the-art dust prevention and suppression; we can work with clients to include some, all or none of them as necessary, given the location,



climate, product characteristics and performance requirements that the hopper is designed to meet.

DUST THIMBLE

The dust thimble is an extension of the

hopper walls above the grid area, in order to create a sheltered space in which the loading grab can be opened. The dust thimble prevents exposure of the product to the wind or external influences while it is being dropped into the hopper. It also



prevents the lateral spread of dust when the product is dropped through the thrash grid. As a simple and effective measure to prevent dust spreading during grab unloading, including a dust thimble is recommended in most circumstances, unless there are restrictive height limits.

FLEX-FLAP SYSTEM

The flex-flap mechanism is a one-way non-return valve system positioned beneath the thrash grid. Made from steel and flexible rubber, the flex-flap allows the product that has passed through the thrash grid to fall freely into the hopper, but prevents dust rising upon impact with the hopper wall or other product. Simply, the flex-flap system allows product into the hopper but prevents dust escaping. Where a dusty product is being handled, this is an effective method of reducing dust emitted and product lost.

DUST EXTRACTION FILTERS

Dust extraction filters can be positioned along the underneath the hopper's thimble. These extractor filters remove air from the hopper and thimble at a rate required to create significant negative air pressure, keeping the product subdued inside the hopper structure, while removing the dust from the air being extracted. The reverse-jet filter system collects dust from the extracted air in reusable filter bags, then periodically pulses compressed air through the filters to return collected dust to the product. The rate of air extraction and the filter cleaning pulse can be adjusted to economize on power and compressed air. The reverse-jet filter can even be set with a 'Delta(P)' controller, to vary the rate of filter emptying in accordance with the level of dust present in the extracted air. The extraction filter system is used alongside the dust thimble and flex-flap options, and effectively minimizes dust from the loading process. When the grab is correctly positioned and opened by the operator, the loading process can be carried out with almost no dust and product loss.

CLIENTS

In recent years, as Buttimer has developed dust control systems along with other innovative design techniques, its client base



has steadily risen and now boasts a number of well-known customers. Because most hoppers are located at large ports and terminals, it tends to be clients from this sector that have the opportunity to experience first-hand the ground-breaking dust control systems that Buttimer has introduced. Clients include, but are not limited to:

- ❖ Port of Cork;
- ❖ Frontier Coal Colombia;
- ❖ Bunge Ltd.;
- ❖ Port of Gdynia;

- ❖ Dublin Port; and
- ❖ Associated British Ports (ABP).

To those unacquainted with dust control systems, it may seem like a minor obstacle and certainly not a major deciding factor when handling bulk materials. However, recent years has shown that this is far from accurate, and in general a large part of Buttimer's growth can be attributed to its tireless efforts to produce the most environmentally friendly, efficient and practical equipment possible.

Dust control cannon manufacturer introduces industry's longest parts warranty

A pioneer in atomized mist technology for dust suppression has announced an industry-leading upgrade to the company's product warranty. Having previously set the industry standard with three-year/3,000-hour coverage, the company has increased the term to a five-year or 5,000-hour replacement warranty on the direct drive fan motor of its entire product lineup. For over a decade, BossTek® (formerly Dust Control Technology) has built the DustBoss® line of atomized mist cannons, widely considered to be extremely reliable. Many of the early units sold by the company are still in service, delivering excellent surface and airborne particle control. As industrial dust emissions become more heavily regulated, the improved warranty offers customers peace of mind and reflects BossTek's commitment to superior durability and return on investment from its products.

"When we follow up with past customers, more often than not, instead of replacing their DustBoss, they're adding to their fleet as they expand," said BossTek CEO Edwin Peterson. "With so many of our oldest units still in the field cranking out wide area dust suppression, extending the warranty was an easy decision. Our product quality hasn't changed from day one."

The demand for atomized mist dust suppression technology has increased since air quality inspectors now test for smaller, non-visible fugitive particle sizes (<10 microns in diameter or roughly the size of pollen). These particulates can leave the site line and expose the surrounding community to potentially hazardous respiratory issues. Previously, industries like demolition contractors, bulk product storage (coal, ash, scrap metal, etc.) and ports have controlled dust by applying surface suppression using water sprayed from hoses, which create droplets from 200–1,000 microns in size. But over time, operators have discovered that in order to control dust emissions, droplet sizes must roughly match the size of airborne



The industrial fan and misting ring work in tandem to offer wide area coverage.

particulates, which hoses cannot accomplish.

Available in four sizes depending on the needs of the application, a single DustBoss® unit can cover up to five American football fields with billions of mist droplets approximately 50 to 200 microns in diameter. Using a powerful industrial fan in the back of the cannon, engineered droplets are shot from a misting ring on the front in a cone-shaped pattern, reaching up to 100 metres. The huge coverage area is achieved by using the vertical adjustment and optional 359° oscillator. The tiniest droplets are small enough to travel with dust emissions, collide with particles too small to see and drag them to the ground. The larger droplets deliver surface suppression, without excessive pooling or saturation of material.

Hoses can pump out >100 GPM of high-pressure water and need to be controlled manually. At that volume, without extra steps taken to control pooling and runoff, operations can face workplace and environmental violations. DustBoss units are a one-touch operation, allowing workers to turn them on and walk away. The water pressure emitted from the mist nozzles is harmless, the maximum amount of water used is 39GPM (average around

17GPM) and the fans are guarded against reach-in injury, creating a safe and cost-effective operation.

The cannons can be mounted on a tower, steel skid or wheeled frame. They can also be purchased as Fusion™ units that feature an enclosed tank and gen set on a roadworthy trailer for applications that lack easy access to water and power or require exceptional portability. Able to be heat traced and insulated for cold climates, the Fusion line has quickly become a popular choice in many industries. The direct drive motor in those designs is also covered under the new parts warranty.

"This warranty demonstrates commitment to our customers," Peterson concluded. "When they revisit their dust control plans in the face of changing regulations, we want them to be confident that they are getting the highest quality product on the market, with the best return on investment."

BossTek is an innovator in dust suppression, with a wide range of equipment and accessories that enable atomized mist technology to control fugitive particles for applications in demolition, construction, bulk material handling, waste and scrap processing, recycling and landfills. Recently the company has extended its expertise to odour management solutions using similar technology, which distributes safe and environmentally friendly topical and airborne deodorizers. Headquartered in Peoria, IL (USA), the company's dust and odor control units are designed and manufactured in the USA and delivered to customers around the world, with its equipment sold to users in 40 different countries to date.



Tower-mounted DustBoss units offer extended coverage for fixed storage and transfer areas.

Lowering the risk of spontaneous combustion of coal by innovative dust control

The storage, handling and transshipment of dry bulk raw materials is a craft in its own right that should not be underestimated. Many tonnes of material have to be moved as efficiently as possible and with a minimum of transport movements. Special precautions have to be made to prevent cross contamination of raw materials, the liberation of dust and to minimize the

PARAMETERS THAT INFLUENCE THE CHANCE OF SPONTANEOUS COMBUSTION

Factors inherent to coal	Extrinsic conditions
Size of the coal particles and surface area	Degree of compaction
Moisture content	Oxygen concentration
Coal composition, quality and rank of coal	Dimensions and shape of stockpile
Heat conductivity of the particles	Moisture content
	Temperature



therefore have to be treated only once. The coatings also produce a water repellent layer that minimizes the penetration of rain into the bulk pile. Both features of the products will result in a lower moisture content of the coal pile, which is the fourth extrinsic condition that can be positively influenced.

The C-Force® dust control products do not negatively affect the physical properties of the coal and are also very well suited for use on other moisture

amount of noise and other nuisances.

Instral B.V. is developer, producer and supplier of a wide range of innovative additives to suppress and control the liberation of dust. The additives can be easily applied with standard and existing spraying systems like nozzle installations, spray cannons and even fog cannons. By using C-Force® dust control products it is possible to treat the surface of bulk piles, roads and open stockyards, raw materials on conveyor belts and open train wagons.

The tendency of coal to spontaneously combust is a characteristic property that needs special attention. This spontaneous ignition of coal stockpiles is a serious economic and safety problem, but careful handling and stacking of the coal can minimize the risk of this phenomenon.

There are a number of factors that

contribute to the process of spontaneous combustion of coal. The most important parameters involved in the process of spontaneous combustion of coal are shown in the table above.

The factors inherent to coal can of course not be altered when the bulk coal arrives at the bulk terminal. The extrinsic conditions can, however, be manipulated such that the risk of spontaneous combustion will be minimized.

The innovative dust depressing products of Instral B.V. are weather proof and will last for at least 90 days up to six months. The coal piles will

sensitive bulk materials as iron ore and iron ore pellets.

Instral's newest innovation consists of a full series of food-grade dust suppression products for all kinds of soft commodities like animalfeed etc.



C-FORCE® COATINGS IN COMPARISON WITH CURRENTLY USED PRODUCTS

	C-FORCE® INDUSTRY	WATER	LATEX	PAPER PULP
Dust reduction	✓✓✓	✓	✓	✓
Long-term effect	✓✓✓		✓	✓
Environmentally friendly	✓✓	✓	✓	✓
Easily to apply with conventional sprayers	✓✓	✓✓	✓	
Efficiency after rainfall	✓✓✓			
Applicable with fog cannon	✓✓✓			
Multi-purpose deployable	✓✓✓			

Equipment manufacturers stress compliance with OSHA's silica dust deadline



Isolating the cargo stream with a misting ring, particles are contained within the flow.

In a move to help silica dust-producing operations comply with impending rule changes, a pioneer of industrial dust control is reminding companies that the Occupational Safety and Health Administration (OSHA) respirable crystalline silica (RCS) dust emissions Final Rule [OSHA §1910.1000 Respirable crystalline silica] compliance deadline is 23 June 2018. BossTek (formerly Dust Control Technology) helps operators safeguard the health of individuals by emphasizing the use of field-proven atomized misting systems to minimize dust particles, forced downtime and potential fines.

Serving applications from concrete cutting to slag handling to demolition and recycling, workplace safety has always been a priority for BossTek. “We believe that dust control doesn’t need to come at the expense of production or profits but should support operations and deliver a return on investment,” explained CEO Edwin Peterson. “Although added regulations are always a strain on any business, compliance is an opportunity to assess current dust control efforts and improve effectiveness.”

WHY THE REGULATION?

Due to the small size, RCS of PM_{10} (particulate matter ≤ 10 microns [μm]) can penetrate the body’s natural defences (mucus membranes, cilia, etc.), reaching deep into the lungs. Invisible to the naked eye and able to travel long distances on ambient air currents, workers are often unaware of the lingering RCS and take off

protective masks, risking exposure and potentially contracting silicosis over time.

Silicosis is a chronic and incurable disease that affects millions of workers in a wide variety of industries. Without proper protection, workers with extensive exposure can experience a buildup of RCS deep in the lungs, restricting lung capacity. Silicosis can potentially lead to more



The Fusion can designs include a genset and water tank for improved mobility.

harmful and life-threatening lung ailments such as pneumonia, pulmonary tuberculosis and lung cancer.

With this in mind, not only does the OSHA Final Rule require regular monitoring by the employer, but it also sets personal exposure limits (PEL) and suggests engineering controls and particulate isolation rather than putting the entire onus of wearing uncomfortable respirators on the employees. By doing this, regulators also limit fugitive dust emissions from leaving the site line and exposing the wider public.

"The RCS regulations are touching a wide range of industries," said Peterson. "Some operations can implement a single solution, whereas others create dust throughout the entire processes and require unique solutions at each stage."

COMPLIANCE

Using a personal dust monitor worn by a trained employee continually monitors the amount of RCS to ensure the exposure is under the average "action level" of $25\mu\text{g}/\text{m}^3$ (micrograms of RCS per cubic metre of air). Plants must protect workers if they have an amount of RCS dust above the PEL of $50\mu\text{g}/\text{m}^3$, averaged over an eight-hour day. To control these levels, OSHA gives very general instructions regarding methods of compliance, advising companies to:

- ❖ **use engineering controls:** isolate dust in sealed chute systems and dust collectors, and/or using water-based atomized suppression systems;
- ❖ **provide respirators:** compliance cannot be achieved by respirators alone, but should be used in areas where engineering controls cannot adequately limit exposure;
- ❖ **limit worker access to high exposure areas:** vary staff assignments throughout the day;
- ❖ **develop a written exposure control plan:** have it available along with monitoring results;

Concrete cutting, demolition and recycling will be among the industries affected by the new OSHA rule.



- ❖ **offer medical exams to highly exposed workers:** review the regulation for compliance details; and
- ❖ **train workers on silica risks and how to limit exposures:** workers should be able to identify to OSHA inspectors the dust control supervisor and the compliance details when asked.

Non-compliance could result in fines, process disruptions and legal action by federal or state agencies or workers. If PEL readings are at or above the permissible exposure level, plants must take action with isolation or engineered controls. And fines — even for first offences — can be steep. For example, following the construction industry deadline of 23 June 2017, some general contractors and developers could face fines of \$40–70K.

ENGINEERING CONTROLS AND ISOLATION

Engineering controls include equipment that reduces or eliminates worker exposure to RCS. To address outdoor dust emissions from a wide range of activities — including storage pile management, cutting, demolition and recycling activities, the DustBoss® line of atomized mist cannons uses high-pressure water driven to a circular manifold at the end of a specialized cylindrical barrel with an industrial fan in

back. As the unit oscillates, the fan directs air through the cone-shaped cannon and propels millions of tiny droplets approximately the same size as the dust particles in a long cone covering an area of up to five football fields in size.

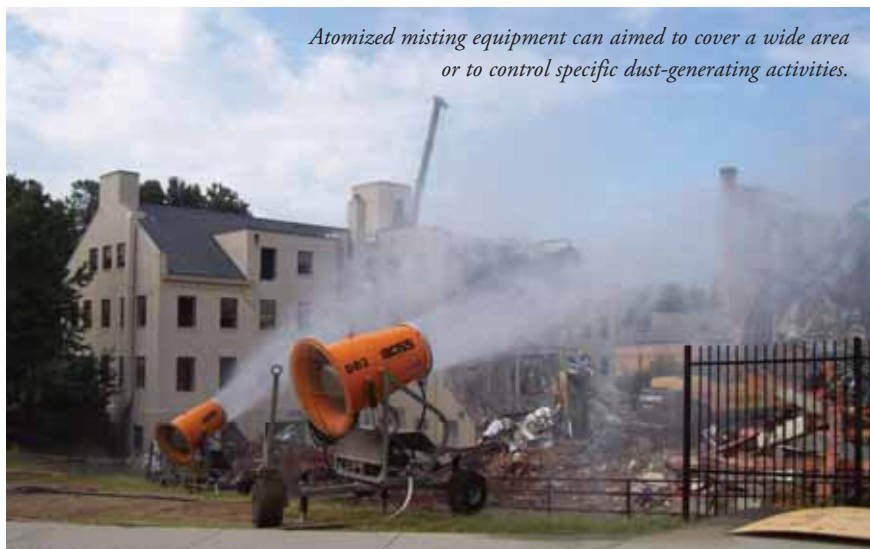
Outdoor isolation of particle emissions for stackout conveyors and chutes where the cargo stream is exposed to open air currents can be accomplished using point source suppression such as non-mechanical misting rings and spray bars. A misting ring encloses the stream in a curtain of atomized mist, preventing dust from migrating. Open air discharge resulting in dusty blowback from impact — e.g. when vehicles load into a hopper or from a conveyor discharging into a transfer chute — can be suppressed by combining rings and spray bars to create a dust barrier.

For hydrophobic materials like coal, dosing pumps attached to both the mechanical and non-mechanical units can apply dust-suppressing surfactants and crusting agents. The sprayed surfactant agents reduce the surface tension of water, improving its ability to wet surfaces and form fine droplets that reduce dust emissions.

"Compliance not only protects workers, but also protects the bottom line from downtime, fines and lawsuits," said Peterson. "Investing in long-lasting and field-proven equipment translates to a sensible ROI and peace of mind over the long term."

BossTek™ is a globally renowned for its solutions for dust suppression. A recognized innovator in atomized mist technology, the company's DustBoss® line of cannons is the most trusted and well-known in the industry. The firm's high-quality, industrial strength equipment carries a no-excuses guarantee of customer satisfaction, backed by a five-year/5,000-hour warranty.

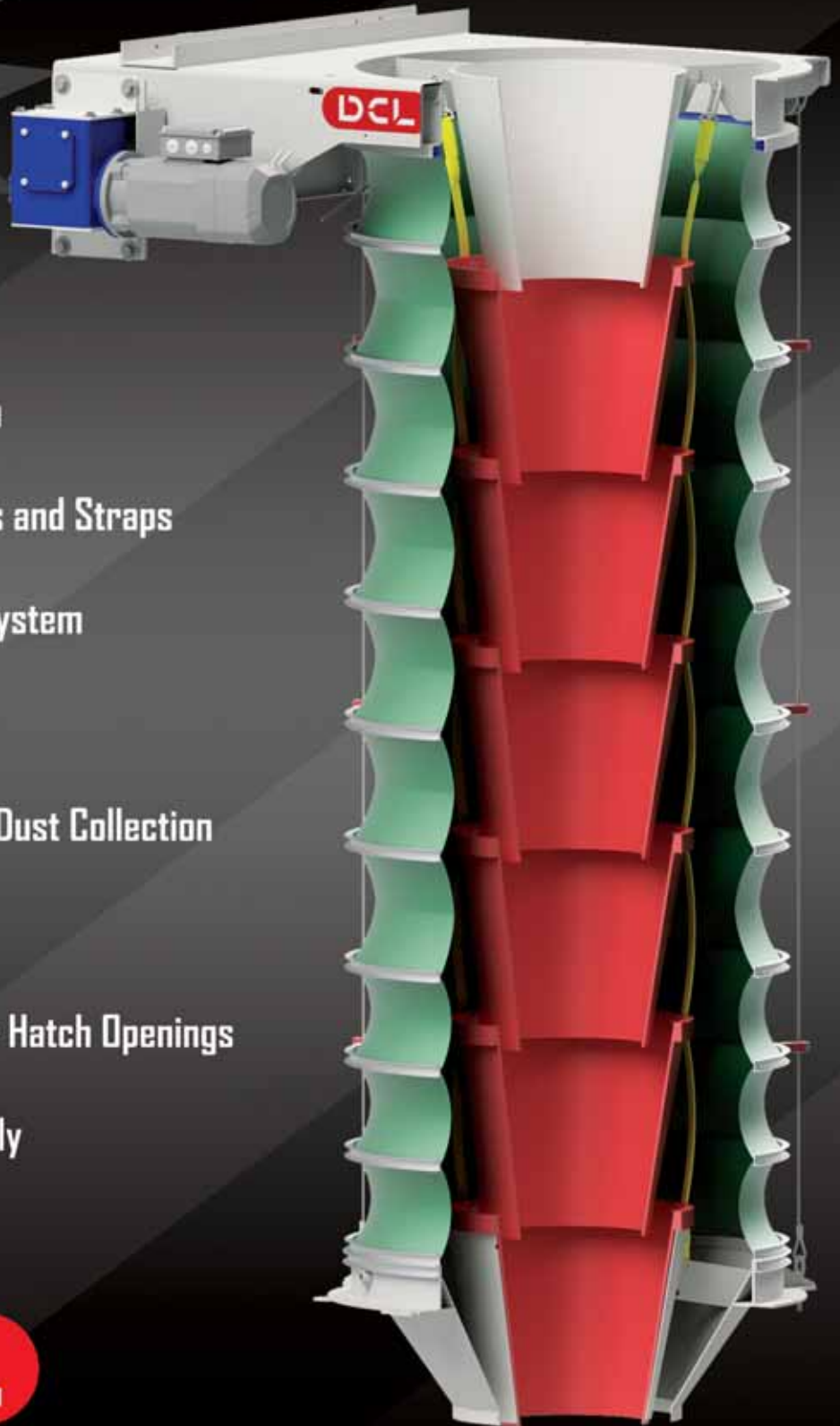
Atomized misting equipment can aimed to cover a wide area or to control specific dust-generating activities.



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Louise Dodds-Ely

Ease of operation is key to success of loaders from Bühler

Bühler has over 150 years of experience in processing and handling food products and has developed in-depth expertise in the loading of ships. It is more than 100 years since the first mechanical loader was

designed and installed by Bühler, and continuing product improvements have shaped the company's loading portfolio to their current form.

Key in the design and product

improvements is always setting new industry standards to, for example, significantly reduce energy usage, product breakage, and to ensure lower overall operating costs. Moreover, a clear



customer advantage is guaranteed by increased efficiency due to easy operating which can be supported by additional operating functionalities.

Through its long term and intensive market experience, Bühler has a broad and extensive product portfolio, including the Portalink product range. This versatile

portfolio meets the requirements of its customers for fast, optimal, and efficient loading of ships.

For example, its stationary and mobile loaders have been developed to load seagoing ships up to 125,000dwt, and can achieve loading capacities ranging from 800tph (tonnes per hour) to 3,000tph.

FOCUS ON FREE-FLOWING AND MEALY FOOD CARGOES

All Bühler's equipment — whether related to storage, conveying, or mobile and stationary loaders — handles free-flowing and mealy products food products. Its mechanical loaders and unloaders can efficiently handle the delicate product



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characteristics. They offer a clear customer advantage in terms of lower operating costs and increased efficiency due to easy and auto sink-in for the unloaders and lower-out function for the

loaders, decreasing the burden for the operators significantly. Actively adapting the product portfolios and setting new standards by introducing new technology, Bühler is able to maintain its strong position in the industry.

The world-wide network of experts working for Bühler guarantee that customer problems are solved with greatest care and specified for each problem.

WIDE CUSTOMER BASE

Major customers for Bühler's shiploading equipment are naturally the large trading and exporting facilities demanding reliable, high capacity, efficient loading equipment that offer low operating costs. Trusted customers also include direct end-users such as millers, brewers, feed plants, and so forth.

One of Bühler's major customers is Zen-Noh Grain Corporation (Zen-Noh), located near New Orleans in Louisiana, USA. Zen-Noh is the largest grain exporter in the world, loading an astonishing 15mt (million tonnes) of assorted grains per year. To boost the export capacity and to comply with increasing environmental regulations Zen-Noh has invested in four new shiploading booms from Bühler. These have increased the loading capacity from 1,600tph to 2,200tph, and have a total combined loading capacity of 5,000tph. Bühler's technology greatly reduces dust emissions with a dust suppressor.

Aerial view of shiploading operations at Zen-Noh Grain Corporation.*



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KEEPING COMPETITIVE AND LOOKING AHEAD

Bühler is always looking for new developments and product improvements, as well as trying new materials. The latest development is the complete revision of the mobile loader combining market and customer feedback and internal expert knowledge.

For example, the mobile loader has been designed focused on the main functions of loading product as efficiently as possible and ensuring ease of operation. With this in mind, Bühler has created the Mobile Portaload, removing complex equipment where possible and increasing the ease of operation. Less complexity and fewer parts results directly in higher availability!

Another benefit is the low weight and power usage of the Mobile Portaload. The low power consumption is setting a new standard in the market, where the lower weight reduced the requirements of current pier installations.

RECENT CONTRACTS

- ❖ Bühler has installed four stationary loading booms at Zen-Noh;
- ❖ Bühler has won a contract for a loading facility in North America; and
- ❖ Bühler is currently installing 12 loading booms in South America at four different sites.

ABOUT BÜHLER

Every day, billions of people come into contact with Bühler technologies to cover their basic needs for food and mobility. The company strives for innovations for a better world, with a special focus on



Dust suppressor in action.

healthy, safe, and sustainable solutions. It contributes significantly to feeding the world's population, while setting the focus on food security and safety. Its solutions and technologies enable efficient and clean mobility.

As a major technology group, Bühler invests up to 5% of its turnover every year in research and development. In 2017, around 11,000 employees in over 140 countries generated a turnover of CHF 2.7 billion. As a globally active Swiss family-

owned company, Bühler is particularly committed to sustainability.

Bühler wants its customers to be successful. It wants every human being to have access to healthy food. It wants to protect the climate with energy-efficient cars, buildings, and machinery.

**The use of these photographs does not constitute endorsement by Zen-Noh Grain Corporation or its affiliates.*



The four stationary 2,200tph shiploaders supplied by Bühler to Zen-Noh Grain Corporation.

ADS™ Dry Fog on shiploaders: cost-effective solution from the Raring Corporation

ADS™ dry fog dust collection systems from the Raring Corporation are highly efficient, patented, *in situ*, fine particulate scrubbers that use very little water, no chemicals, and do not increase the overall moisture content of the flowing material by more than a few hundredths of a percent. Dust emissions during shiploading operations can be highly problematic, so an effective dust-control/prevention system is essential.

ADS™ Dry Fog technology applies to crushing, screening, conveying, loading, and unloading of dry bulk materials. When done properly, it is as effective as dust extraction with bag houses and much less expensive to implement, operate, and maintain.

ADS™ Dry Fog dust control systems use special acoustic nozzles to fracture water into a cloud of extremely small droplets that are in the same size range as the airborne respirable dust. Acting in the same way that clouds cleanse the atmosphere of dust, the water droplets agglomerate with (attach to) the dust particles, become heavier, and settle back to their source. If the water and dust particles are very much different in size, the slipstream created by the larger one carries the smaller one around it and impact is prevented. When they are about the same size, the slip stream effect is too small to prevent collision.

Successful application of dry fog technology to industrial dust control



requires four design elements: containment, an adequate quantity of fog, retention time, and collection surface. Of the four, containment is the most important. Transfer enclosures need to be a little larger than the norm, truck and rail dumps require features to contain the displaced air by rolling it back into the hopper, and bins need protection from wind (like Weather Solve windfences — for an example of this, please see 'The Raring Corp and Weathersolve join forces to defeat dust' on p67 of this issue) and other outside

influences.

Calculating the quantity of fog required begins with an estimation of the quantity of dust that is airborne, applying a scrubbing ratio (water mass flow divided by dust mass flow), and making adjustments for other factors such as retention time and collection surface within the containment. The Raring Corporation uses US EPA data and experience to estimate the dust and it uses scrubbing ratios ranging from three to ten depending on the application. For a typical dry mineral ore transfer point, the water flow rate will range from 0.1 to 0.3gpm/1,000st/hr (.04 to 1.1 lpm/1,000mt/hr).

Key to the reliable delivery of fog into the system is the Raring Corporation's design of its FP series acoustic nozzles. These devices use compressed air to create high frequency sound waves that shatter water into the fog-sized droplets needed while retaining adequate kinetic energy to project the fog where it's needed

and penetrate through opposing air flows. The nozzles incorporate relatively large liquid ports which act along with the acoustic nature of the nozzles to resist plugging. Nozzles are available in three sizes with air capacities ranging from 1 to 8cfm (1.7 to 13.6nm³/hr). A typical transfer point will require between six and 20 nozzles depending on belt size and speed, flow rate, chute height, material nature, and other factors.

There are many ways to control dust in dry bulk material handling applications and all have their place. Dry fog is particularly well suited to most containable dust sources — it is sometimes the only choice that has a chance of success, and it sometimes cannot be used. In most plants, a well thought-out combination of technologies is the best solution. Virtually all mines use dry fog for some or all of their dust control applications and even those that choose to apply dust extraction with fabric filters have a need for dry fog at the point where the dust is returned from the collector to the conveyor.

THE CHALLENGE OF SHIPLOADING

Shiploaders are a bit more difficult and each one presents its own challenge. Containment becomes more difficult and most of the time an operational modification is needed to help minimize the amount of dust generated.



What happens when a ship is being loaded with bulk material is that the material falls free down into the ship bunker and, when it hits the bottom, the dust starts coming out from the sides of the pile that is being built. The wind does not help at all and it can get into the ship hold, blowing the dust out of it.

For this specific application, the Raring Corporation highly recommends considering a PEBCO telescopic

chute integrated with a TRC ADS™ Dry Fog spray ring, on the bottom end of the chute, providing the dust control system, the containment required and the active dust control system (Fog).

The telescopic chute will help to load the bunker from the top of the pile, all the time, and the spray ring will generate enough fog to fill the bunker with a dense cloud of fog to keep the dust inside of the ship bunker. When dust is generated, and the spray ring is fogging, dust gets together with fog, the dust particles become heavier and they settle down into the bunker.

Right now, the Raring Corporation is working together with PEBCO on integrating one of its telescopic chutes with Raring's ADS™ Dry Fog Spray rings for a frac sand loader application.

(Ful)filling efficiency with VIGAN shiploaders

700tph VIGAN shiploader installed at CAVAC (Sables d'Olonnes – France) in 2017.



Recently, there has been a flurry of activity in terms of shiploading projects in the European region, mainly in France and Eastern Europe, where grain export rates are very high.

Through its increasing expertise, VIGAN — the Belgian supplier of pneumatic and mechanical ship loaders and unloaders — is getting a share of the pie, with several shiploading systems installed recently, mainly high capacity equipment designed for the loading of ever bigger vessels.

Continuous shiploaders are used for the smooth handling and transport of bulk product.

The loading is carried out mechanically: the cargo is transported through the loading boom by an integrated belt or chain conveyor and discharged by gravity into the ship holds thanks to a telescopic loading chute. The loading boom is usually mounted on a slewing ring that can reach up to 40 metres to ensure optimal hatch coverage. The combination of telescopic and rotating movements allows continuous and uniform loading operations of the ship holds.

VIGAN shiploaders are designed for almost any kind of products in bulk (with

density from 0.2 to 1.8t/m³), and are suitable for all size of barges or oceangoing vessels.

Most shiploaders are mounted on a self-propelled gantry on rails, usually with cable reels. In some cases, shiploaders are mounted on a self-propelled gantry on rubber wheels with its diesel generator; in some cases, they are set on a fixed structure.

VIGAN shiploading machines offer capacities of up to 2,000tph (tonnes per hour).

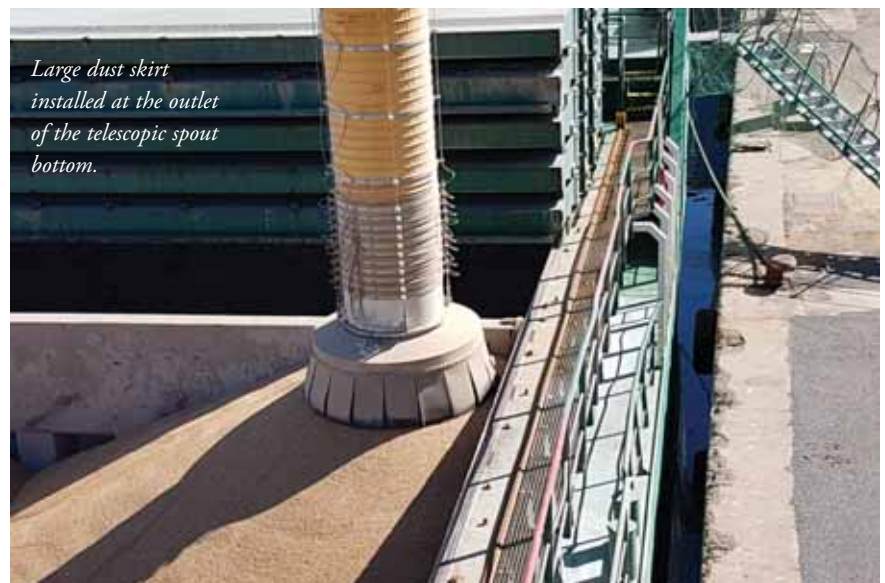
CONTROLLING DUST WITH VIGAN SHIPLOADERS

In most ports, dust emissions are a major concern and need to be reduced to a minimum.

Operators therefore need a good balance between capacity/efficiency and dust control.

VIGAN is reducing dust emissions in line with local site regulation.

VIGAN shiploaders meet all dust control requirements, thanks to a range of alternative solutions, without compromising on efficiency and reliability:



Large dust skirt installed at the outlet of the telescopic spout bottom.

1,000tph VIGAN shiploader at Port-La-Nouvelle in France in 2017.



- ❖ a fully retractable cover on the telescopic conveyor boom;
- ❖ automatic self-cleaning filters mounted on the top of the integrated belt conveyors;
- ❖ a dust-free loading head which can be installed at the end of the telescopic loading pipe.

For instance, the bottom of the telescopic spout can be equipped with a large dust skirt at outlet.

A level sensor controls the automatic luffing of the skirt at the bottom of the loading pipe during the loading process. The dust skirt always remains in contact with the pile of grain in order to control the emanation of dust. The luffing generally occurs by automatic steps of 20cm.

This is the case at CAVAC in France (Sables d'Olonne) where in 2017 VIGAN installed a 700tph shiploader, designed to load cereals into vessels of around 4,000dwt.

A single continuous loading station replaces two old stations of 200tph each, which had to be interrupted at each change of position. In terms of quality, the new continuous shiploading system enables a more homogeneous filling of the cargo. There is no longer any noise from the chain

conveyor, as a rubber belt gently conveys grain to the vessels. This equipment is significantly less noisy, and limits dust emissions on site, especially when loading corn.



PLC S7 Program: communication with the terminal to ensure interlocks and exchange of data and control signals.

The machine offers a performance gain in every way: speed, noise, working conditions, cleanness, quality, and so forth.

REPEAT ORDER FROM AXEREA

The same year, VIGAN also delivered a ship loader to SILOS DU SUD (Axereal group) in Port-La-Nouvelle, France. Between 600,000 to 800,000 tonnes of grains are shipped from Port-La-Nouvelle every year, including durum wheat, soft wheat and barley. These are delivered all around the Mediterranean rim (Italy, Algeria, Greece, Cyprus, etc.).

The VIGAN shiploader is designed to load cereals into 15,000dwt vessels at a capacity of 1,000tph.

This is a repeat order from Axereal group, as in 2011 VIGAN already delivered a 800tph shiploader and a 400tph pneumatic ship unloader to Sète (France).

OPTIONAL DEVICES

Several optional devices are available to adapt the loader to customer requirements and to specific working conditions, including: 360° slewing, static thrower, dust skirt (as mentioned above), operator's control cabin, continuous weighing system, PLC programme, and so forth.

VIGAN mechanical loaders are suitable for many applications.

VIGAN offers custom-design solutions, and can design its equipment according to the specific requirements of its customers.

Adder Snake: low-angle to high-angle with no transfers

BACKGROUND

Sandwich belt conveyor technology has been implemented in a variety of roles throughout the past 40 years, including plants, mines, and marine applications, writes Marcus J. dos Santos, *Dos Santos International, LLC, Marietta, GA*. As these have typically been custom applications, the layout of the system was usually tailored to work with incoming and outgoing equipment, leaving the sandwich conveyor itself as an isolated solution to the requirement of a high-lift, short-footprint system, often fed by, or discharging onto, low angle conventional equipment. The primary advantage of the sandwich conveyor in these cases is therefore the ability to eliminate long, low-angle elevating conveyors with their heavy, expensive elevated structure.

Past writings have calculated the crossover point at which a 15° conventional conveyor becomes more expensive than the small-footprint sandwich belt conveyor for the same capacity. A premise of this comparison is that the loading point of the sandwich conveyor can be much closer to the

economical solution for a high lift requirement which could run at grade until close to the end point.

Various applications through the years have required arrangements such as that described above, and the determination had to be made regarding the most economical of three choices: 1) A shallow-angle elevating conventional conveyor; 2) A sandwich conveyor combined with a conventional conveyor along grade; or 3) A

sandwich conveyor with its wider bottom belt extended back to the start point. A very high lift would eliminate the first choice, as the elevated structure would quickly become exceedingly expensive. The choice then becomes whether to extend the wider sandwich belt or to employ a transfer between a conventional conveyor along grade and a high angle elevating conveyor.

The options above offered sufficient flexibility for a number of applications through the years. However, in August 2014, a unique requirement demanded development of a better solution. In a raw sugar and grain application, the abrupt upturn at the head/discharge end of underground collecting conveyors that reclaimed by multiple inline feeding points from the above dome storage silos was considered (See Figure 1 and Figure 2). Eight such conveyors came together to feed onto three outgoing conveyors, five

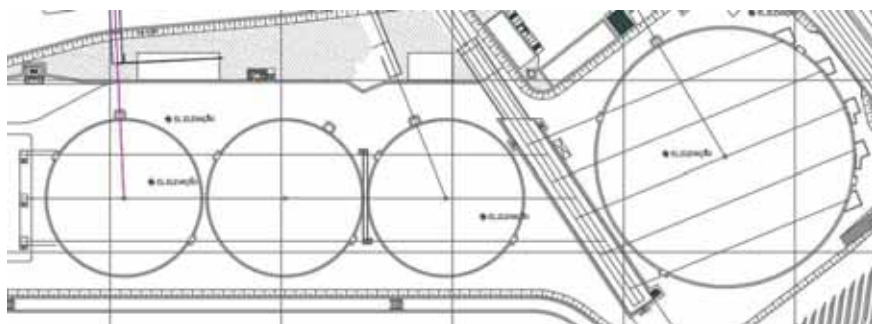


Figure 1: Plan view of dome unloading conveyors.

discharge point (horizontally) than that of the conventional conveyor, allowing for considerably less structure on a high lift sandwich conveyor. When the start point and end point are fixed, however, the economics change. There is still a crossover where it is advantageous to use the sandwich conveyor in conjunction with a conventional conveyor running along grade, rather than slowly elevating over the entire length. Historically, this combination of equipment would be the most

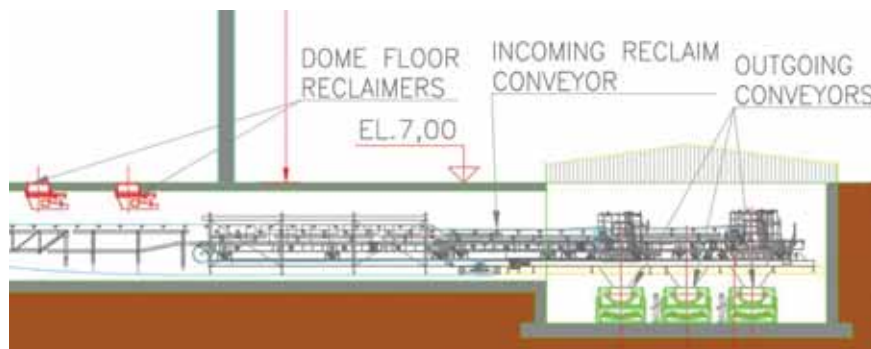
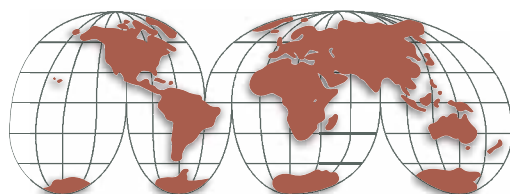


Figure 2: Subsurface solution for outgoing conveyors loaded by dome storage reclaim conveyors.



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from one side and three from the other. These outgoing conveyors took the collected material to ship loading. Because of the tight space between the domes and the outgoing conveyors, without an abrupt upturn the outgoing conveyors had to be underground, in a concrete vault. This was at significant expense and vulnerability to water as the water table was near the surface. Further, the material flow had to be routed to any one of the three outgoing conveyors, requiring a shuttling head in the initial subsurface arrangement developed by a third-party consulting firm.

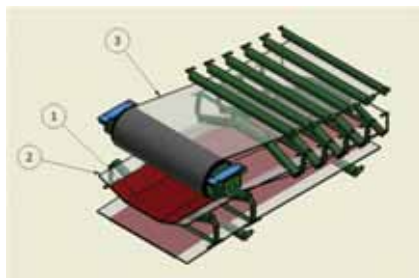


Figure 4: Adder Snake generalized sandwich entrance – conventional belt in red; sandwich belts semi-transparent.

The historical solutions for this problem were the first instinct, but these came at a cost. The sandwich belt high angle conveyor technology with its tight convex curves could be used to accomplish the needed abrupt upturn, bringing the discharge points to above the three surface conveyors. However, this would require extending the wide bottom belt tail to act as the collecting conveyor. Subject to the reduced cross-sectional filling of the sandwich belt, the extended collecting bottom belt would have to be wider along its entire length (around 320m), driving up the cost of the conveyor and the tunnels beneath the domes. Alternately, the narrow conventional collecting belt could discharge onto the sandwich conveyor shortly before the upturn. However, there was very limited space available to accommodate a transfer between the two conveyors, and the end user did not like the idea of this underground transfer with its maintenance implications.

During a brainstorming session, the idea occurred to the writer to combine the economics of the narrower conventional

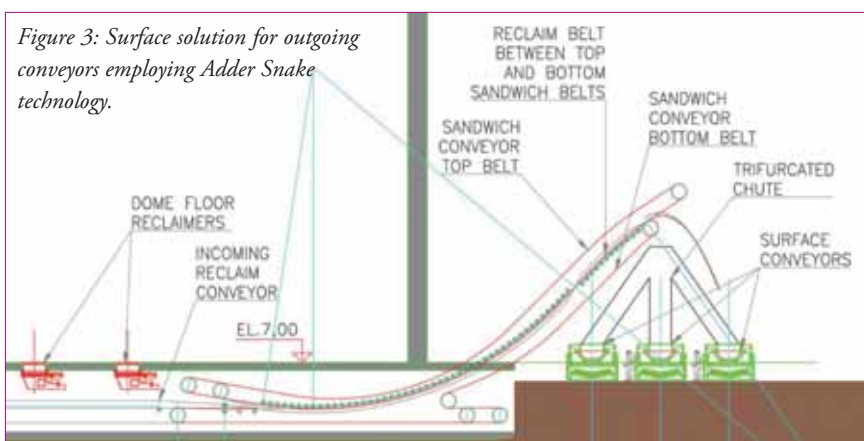


Figure 3: Surface solution for outgoing conveyors employing Adder Snake technology.

conveyor and the advantage of the abrupt upturns of the sandwich belt, while eliminating the transfer. Limiting the high angle conveying to a short upturn and discharge, each conventional collecting conveyor could continue directly into the sandwich, be carried through the upturn, and the material could then be discharged well above ground.

The resulting arrangement not only allowed the subsurface outgoing conveyors to be elevated to grade, but also provided ample space for a trifurcated chute to distribute the collected material to the appropriate surface conveyor, eliminating the complication and added expense of a shuttling head end. (See Figure 3)

A patent for the Adder Snake design was applied for in December 2015, and awarded on 14 November 2017.

DEVELOPMENT, APPLICATIONS

The conception of the Adder Snake system was spurred by a specific application. The tunnel gathering arrangement which was subsequently developed is certainly a very good application of the Adder design. However, the use of this technology extends to a wide variety of other applications, many of which are likely yet unrealized.

The primary advantage of the Adder Snake in the tunnel gathering project that was its motivation was to eliminate a potentially messy transfer, while not penalizing the overall conveying path with a wider belt than necessary.

In further developing the concept for use and for patent protection, a wide

variety of applications were considered and disclosed. Two of these are discussed further below.

MARINE TERMINALS, DOCKS AND SHIPLOADING

Dock length (structure) is very expensive in any marine terminal. As larger ships become more commonplace, shiploaders must increase their height. In turn, this requires the conveyors that feed these shiploaders to elevate the bulk material higher. A simple geometric calculation, based on the low incline angle alone, indicates that for every metre of additional lift, the standard tripper design used at many docks will require more than three and a half metres of length. This does not include the substantial additional length of the conventional empty belt uplift curve from tangency at the dock belt structure to tangency at the tripper incline.

Sandwich belt systems have already been employed at shiploading applications to mitigate this problem, though these were executed before the Adder Snake design was conceived. A historical method was therefore used, discharging from a dock conveyor at grade onto the sandwich conveyor tail via a short tripper and transfer station. While successful, such installations could have benefited from the Adder Snake arrangement.

Dos Santos International has been offering the Adder Snake for a variety of shiploading applications. Figure 6 and Figure 7 show views of one such offering, in which a 20-metre lift is required to reach the outgoing shiploader.

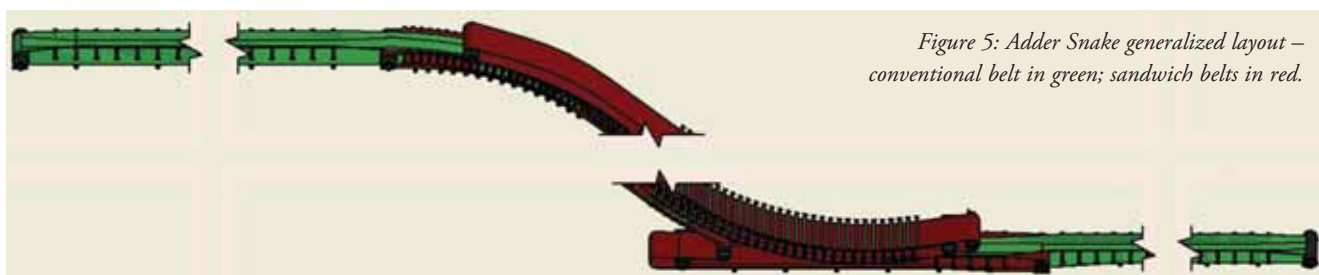


Figure 5: Adder Snake generalized layout – conventional belt in green; sandwich belts in red.



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In the overall view (Figure 6), a phantom profile is included for the conventional arrangement that would be required to accomplish the same lift as the Adder Snake. The Adder design in this function consumes just under 40m of horizontal space from the uplift of the belt to the head end. By contrast, the conventional solution extends nearly 135m back from the head end. It is worth noting that, because the elevated material is wood

terminal equipment that accompanies an additional complete conveyor. The Adder Snake technology can better handle such a scenario by swallowing the conventional

this capacity have been arranged as a separate piece of equipment, each receiving material from a dock conveyor mounted along the surface with a travelling tripper.

By employing the Adder Snake design, the low cost conventional conveyor can remain in place, and need only be lengthened to accommodate its path through the sandwich conveyor.

In mining, a major application of the Adder design will be in overland systems. Any scenario in which the conveyor path must take a large and abrupt upturn or downturn will benefit from employing an Adder Snake rather than the alternatives of rerouting the conveyor, excavating a low angle path, or using extensive elevated structure.

The reduction of the conventional belt tension in this case is available as a byproduct of the primary Adder Snake function. Depending on the requirement, boosting (or braking) of the belt may prove advantageous. This benefit is available to use either way.

Yet another application will be to apply the Adder technology to yard belts feeding the stacking equipment. In a design analogous to the shiploading dock conveyor, a yard conveyor can be outfitted with an Adder system to feed the stacker. This can reduce the length of the yard conveyor (and therefore land usage) needed for the storage requirements, or alternately, increase the stacker travel length and storage within the available yard.

CLOSING

Though the Adder Snake concept, using belts of varying width, was conceived only a few years ago, it has a very solid basis in the sandwich belt technology that is approaching 70 years of existence, and the expanded conveyor technology that is nearly 40 years old. This writing does not begin to cover all important points and capabilities of the technology. Such will continue to be discovered as the system is applied to the various projects that may benefit from it. This makes for a bright and exciting future for the Adder Snake — a significant expansion of the conveyor technology.

Figure 6:
Comparative view
of Adder Snake and
conventional dock
conveyor design.

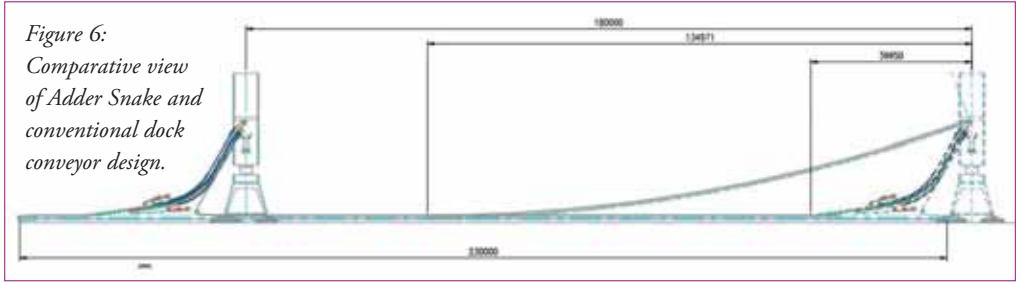
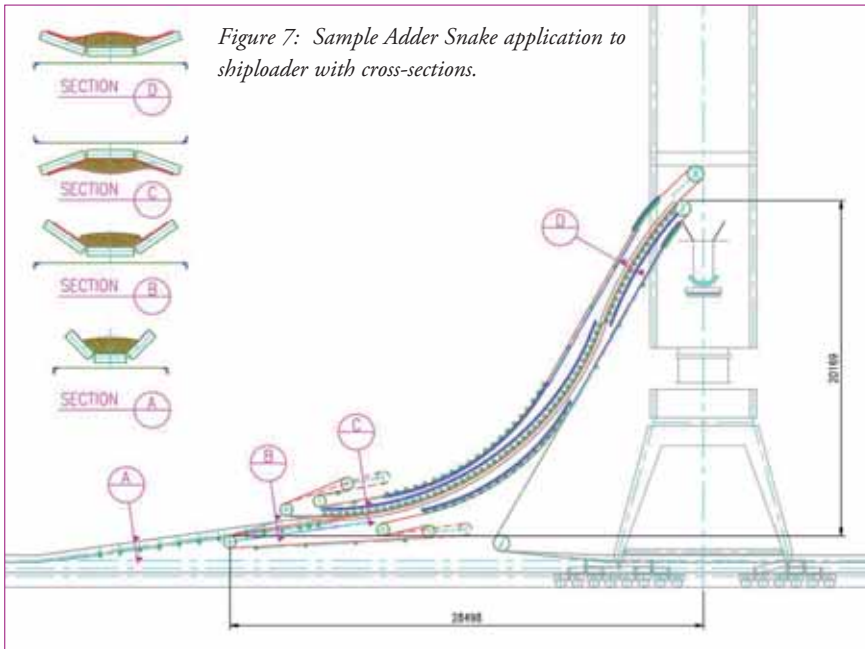


Figure 7: Sample Adder Snake application to
shiploader with cross-sections.



chips in a tropical environment this conventional arrangement is given the benefit of conveying at an incline up to 20°. Many designers will not allow conveying angles beyond 15–18°, which would further amplify the benefit of the Adder Snake.

OVERLAND SYSTEMS

There are many applications in which a long conventional conveyor encounters significant steep terrain in its path, both elevating and lowering, in order to negotiate a relatively modest net lift. In other cases, a conveyor or its path is modified to avoid an abrupt elevation change.

This may be accomplished by cut-and-fill, additional superstructure, adding transfers and conveyor flights, or by introducing complexities to the conveyor that would not otherwise be needed.

A sandwich conveyor can be arranged to receive material from one flight of overland conveyor and deliver it to a receiving flight at a higher or lower elevation, but this will require two additional transfers, along with all the

overland belt into a sandwich conveyor that exists only at the steep grade. The overland conveyor can therefore negotiate a previously unachievable path, with no disruption.

As an added benefit, the sandwich conveyor that envelops the conventional belt can double in function as a belt-on-belt type booster drive for the overland conveyor. The sandwich conveyor drives can be sized and controlled to handle the local elevating requirements without increasing the tension of the overland belt, allowing for a reduction in the belt strength, and therefore, in the cost of the overall system.

OTHER APPLICATIONS

As described above, very good applications of the Adder Snake will be at ports and terminals in shiploading applications. While the projects described thus far referred to new projects, upgrades of existing port facilities will also benefit greatly, particularly as shiploaders must increase their reach as they are elevated to accommodate larger vessels. Historically, sandwich conveyors in

Cereals loading and unloading technology from Golfetto Sangati



Golfetto Sangati Transload shiploader (photo: GEA).

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.

In November 2017 engineering group GEA, one the largest suppliers for the food processing industry and for a wide range of other industries, acquired Golfetto Sangati offering ideal growth opportunities as a globally established system provider thanks to its extensive sales and service network, around the world.

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 2,000tph when handling cereals and a wide

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



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



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;
- ❖ 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.

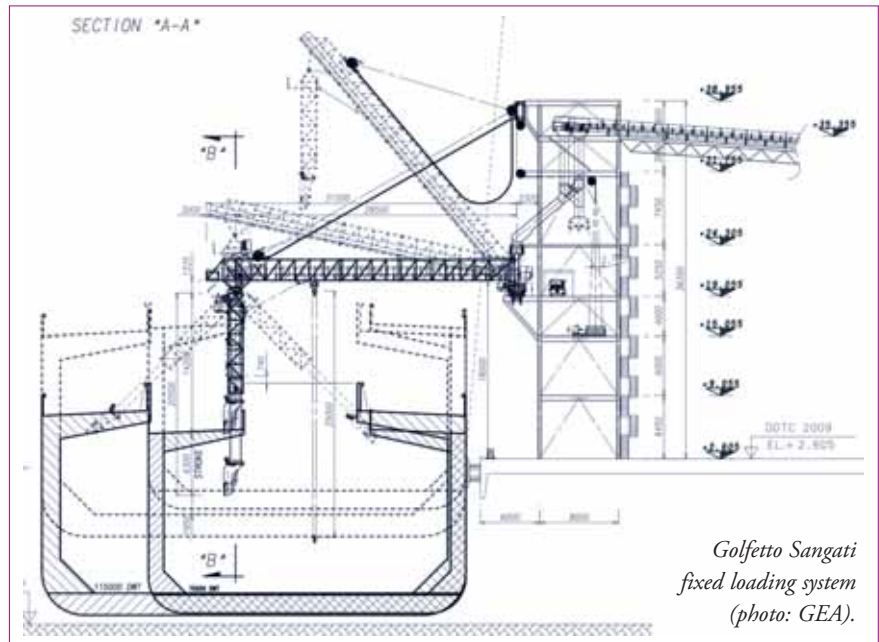
The loader works as a braking box, to slow down the flow; when in kick-in or in kick-out, the spout is rotated downwards to push the product towards the sides of the hold.

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



*Golfetto Sangati
fixed loading system
(photo: GEA).*

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
equipment on the
quayside (photo: GEA).*

Loading commodities into ship and warehouses

Loading chute with tilting mechanism.



During the course of 2017 Cimbria Unigrain received a record number of orders for loading chutes for discharging goods into ships and warehouses. These orders include loading chutes of various size and models designed for a wide range of products, including titanium, lead and zinc concentrates, fertilizer, sulphate, cement clinker, fly ash, coal, wood pellets, maize and grain. The vast majority of loading chutes are constructed using standard components, but are of course adapted to the conditions at each plant. Furthermore, they are designed to meet the specific application, in addition to a solution — drawn up in consultation with Cimbria — that meets the specific needs of the customer concerned. The loading chutes are sold both directly to end-users and via a number of distributors and dealers.

V400FF/29 TO TIZIR, TYSSDAL, NORWAY

Tizir in Norway contacted Cimbria Unigrain with an enquiry for a loading chute for discharging titanium. Due to the fact that there was insufficient built-in height on the existing belt, the loading chute was required to be pulled up under the belt when it was extended over the side of the ship. The capacity was specified as 800tph (tonnes per hour), the length of the loading chute was approximately 20m and it had to have a built-in filter. The solution to this task was a V400 with filter outlet which, following some development

work, was provided with a tilting mechanism such that it could be pulled up under the belt, after which it could be run out to the ship.

Since titanium is a very abrasive material, all parts coming into contact with titanium are executed in Hardox steel. The loading chute is also equipped with a universal joint, in such way that it always hangs vertically when the derrick is raised and lowered. In conjunction with installation and subsequent commissioning, Cimbria Unigrain had a supervisor present at the customer's premises.

V650FF/29 TO BOLIDAN, RÖNSKÄR, SWEDEN

From Bolidan in Skelleftehamn, Sweden, Cimbria Unigrain received an enquiry for a loading chute for loading lead and zinc concentrates onto ships. The capacity was stated at 1,000–1,500tph, in addition to which the material was very fine and dusty. The required length of the loading chute was 15–20 m and there was a need for an integrated filter.

The main challenge was that the solution had to be able to cope with ambient temperatures as low as -35°C . The chosen solution was a V650 with filter outlet in which all the electrical components are designated to be able to cope with an ambient temperature of -40°C . In addition, the loading chute is equipped with an extended inlet and chutes in Hardox, as the material is abrasive. The loading chute was delivered in August 2017

while the total price included a supervisor from Cimbria Unigrain and a service visit one year after commissioning.

A500FF/10 TO TELESTACK, NORTHERN IRELAND, END-USER NIBULON, UKRAINE



Loading chute executed as OEM unit fitted on mobile shiploader.

From Telestack, a Northern Irish manufacturer of mobile shiploaders, Cimbria Unigrain received an enquiry in December 2016 concerning a solution for the loading of grain at a rate of 500tph. The solution had to include an integrated filter, as well as two loading chutes. Cimbria and Nibulon arrived at a solution featuring a V500FF10 model and intake for Telestack's mobile shiploader. The loading chutes are produced as an OEM project, delivered in colours that match Telestack's. Finally, the order was for six units, delivered in three stages. In conjunction with the first delivery, Cimbria Unigrain carried out a test of the loading chute fitted to the shiploader at Telestack's factory in Northern Ireland.

The final two loading chutes were delivered in November 2017.

**V300F/39 TBMA EUROPE BV,
NETHERLANDS, END-USER EUROCHEM,
KAZAKHSTAN**

From Cimbria's dealer TBMA Europe in the Netherlands, Cimbria Unigrain received an enquiry for four loading chutes for stockpiling. The end-user, Eurochem, needed a plant for the discharge of phosphate under special temperature conditions (product temperature ranging from -30°C to $+80^{\circ}\text{C}$, with ambient temperature down to -38°C).

The chosen solution was four V300F/39s with all electrical components designated to cope with ambient temperatures as low as -40°C . The control units were supplied with a heating element, whilst the skirt on the outlets was specially produced in silicone rubber. All parts in the loading chutes that will be in contact with the material are fabricated in Hardox 400 due to the fact that phosphate is very abrasive. As the loading chutes are relatively long, they are equipped with a 4m-long inlet pipe in order to be able to better concentrate the product in the centre of the chute.

**A650X/25 WITH
TRIMMER, FIRMA LUICIJAIN
COLLABORATION WITH
RIMO, MUUGA
TERMINAL, TALLINN, ESTONIA**

Cimbria Unigrain's dealer in the Baltic, Firma Luicija, received an enquiry from RIMO. RIMO was looking for a loading chute with trimmer for a newly developed shiploader which the dealer was charged with drawing up for the MUUGA terminal at the Port of Tallinn, where wood pellets were due to be unloaded. After one or two preliminary proposals, RIMO and Cimbria Unigrain agreed on a newly developed trimmer with slewing bearing in

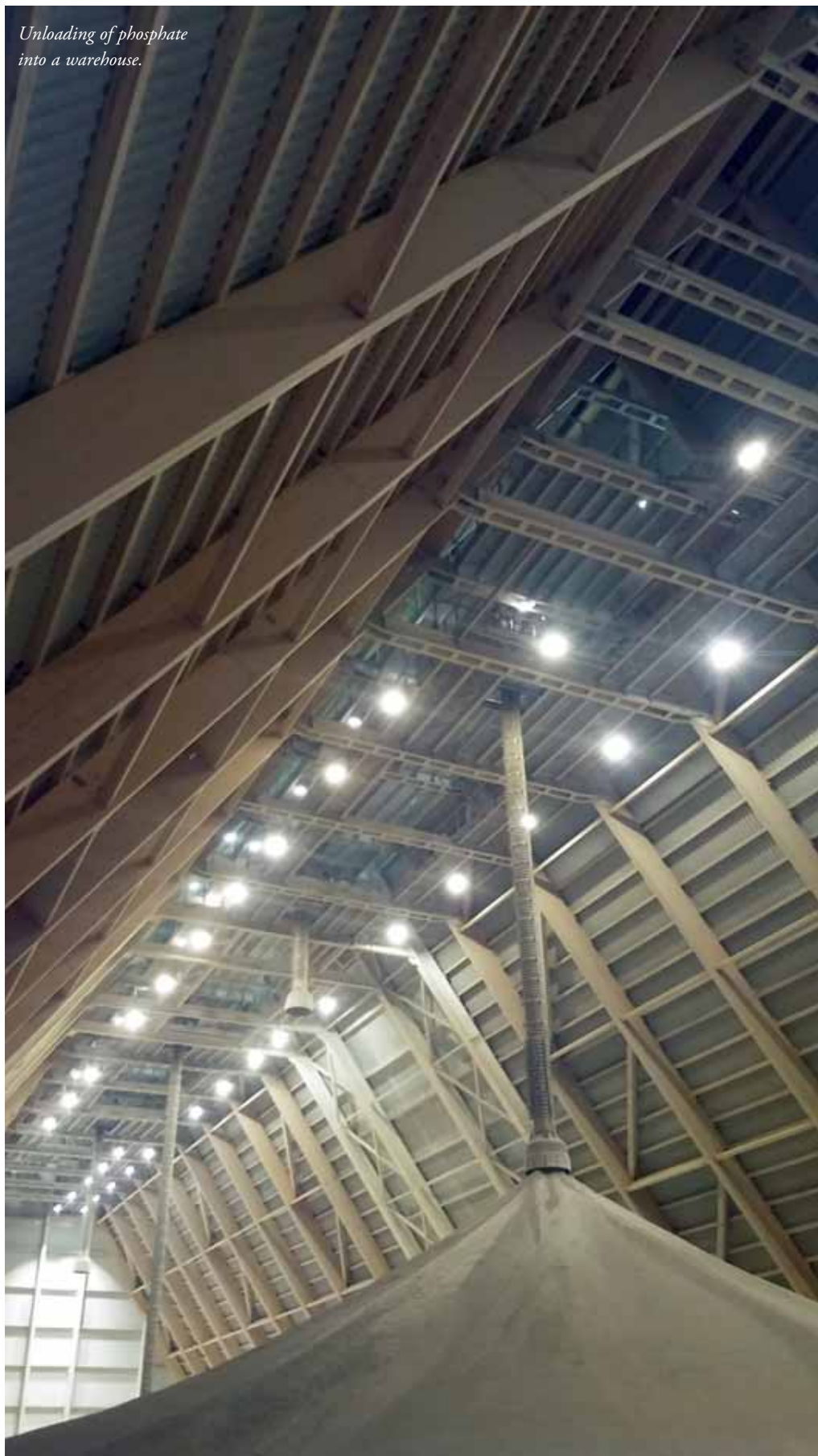
stainless steel. The purpose of the shiploader is that it is 'fed' by trucks with a tipper.

The wood pellets are conveyed via a belt up to the loading chute, after which they can be distributed over a larger radius than normal due to the rotating trimmer at the outlet.

Cimbria Moduflex, a member company

of the Cimbria Group of Companies, supplies dust-free loading chute systems through a network of agents in over 30 countries around the world. Cimbria was established in 1947 and is today an international organization with 900 employees in 30 companies throughout the world. Since 2016, Cimbria has been a part of AGCO corporation.

*Unloading of phosphate
into a warehouse.*



Having its finger on the pulse of industry: modern shiploading systems from FAM Magdeburg

Figure 1: FAM shiploader SL3000.39SX, to handle hard coal at a rate of 3,000tph, Latvia.



In recent decades, technical developments have taken a giant leap forward in terms of quality, safety, and efficiency of machinery and processes. As a successful provider of durable mining and conveying systems, a few years ago FAM faced the challenging task of expanding the existing fields of business by designing new equipment and services, increasing compatibility, and differentiating its own reliable products, and thus also the company, from competitors on the world market.

Increasing globalization has rapidly accelerated most of the information management, transport and communication processes. Manufacturers and customers around the globe have become flexible to a degree that distances, time zones, and languages have hardly any impact on work activities and operational procedures. A typical example is handling of bulk materials using customized shiploading systems that FAM provides for customers and projects around the world.

When selecting and designing a shiploader, the quality and properties of the bulk material, local conditions, performance parameters, and environmental requirements play a decisive role. With these aspects in mind, FAM engineers determine the most effective and cost-efficient handling method while minimizing operational and maintenance requirements. The loading system must fit in the port infrastructure and match current and

future vessel sizes.

That's why FAM has developed a variety of different loading systems in addition to standard mobile shiploaders mounted on rails.

Figure 1 shows a mobile shiploader type SL3000.39SX for loading hard coal with a conveying capacity of 3,000tph (tonnes per hour) that can travel along the jetty on rails in a seaport of Latvia. Its slewable, liftable and lowerable boom with a telescopic chute enables the machine to continuously

load vessels up to 40m long with a tonnage of 120,000dwt.

Radially travelling shiploaders, also referred to as radial quadrant shiploaders, have a different design. They are used in seaports with a water depth that does not allow to accommodate ships with a large draught. These shiploaders are secured offshore and connected to the mainland via conveyor bridges. They have an anchor point around which they can pivot. At the same time, the boom, which can be raised

Figure 2: FAM shiploader SLRQ6600.56/27 OX, which handles coal at 6,600tph, Colombia.



and lowered, and its loading system, e.g., a telescopic chute, can also be moved. This flexibility allows the tip of the boom to reach all loading hatches of the vessel without having to shift it. FAM delivered and installed two shiploaders of this type (Figure 2) for a loading system in Colombia. With a capacity of 6,600tph, they can load coal onto vessels with a tonnage of up to 180,000dwt.

Especially in cases when infrastructural conditions do not allow for the use of rail-bound shiploaders travelling along the jetty or radially travelling systems, new concepts must be developed. One of such solutions, which FAM has already implemented

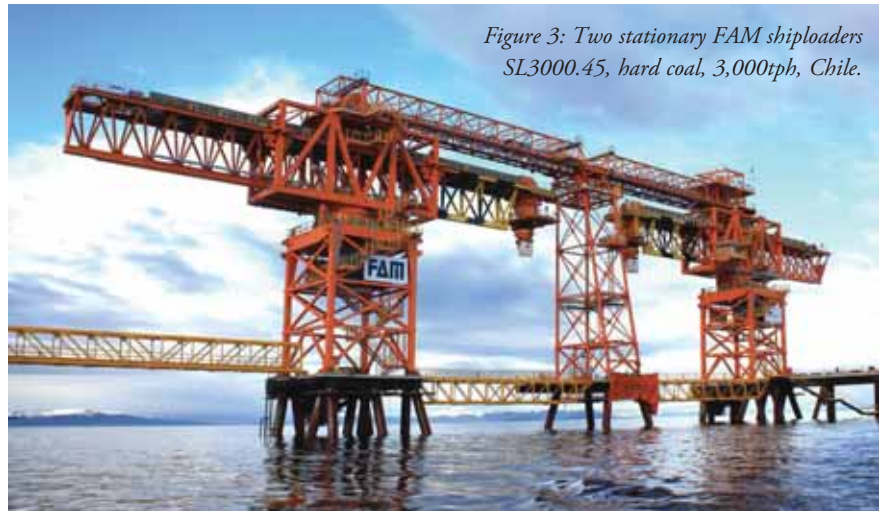


Figure 3: Two stationary FAM shiploaders SL3000.45, hard coal, 3,000tph, Chile.



Figure 4: Assembly work using the deck cranes of a heavy-lift ship.

several times, is a stationary shiploader as shown in Figures 3–5. Ships can be loaded by two slewable and movable booms equipped with feeding chutes that can be raised and lowered, in this case vessels of up to 140,000dwt for a Chilean client. The system is used for loading hard coal transported by a conveyor at a loading rate of 3,000tph.

Assembly conditions for systems located in the open sea always present a special challenge. For this project, pre-assembled large components were transported and installed using self-loading and unloading heavy-lift ships. For this purpose, two deck cranes with a load capacity of 1,000 tonnes each, installed on a vessel,



Figure 5: FAM shiploader in operation, Chile.

Figure 6: Transportation of the assembled FAM shiploader SL8800.25EK for Port Cartier, Canada.



came to use. Such transportation and assembly conditions require comprehensive and detailed planning and preparation carried out by FAM Engineering in cooperation with logistics companies.

Such system design has proven to be a

success also in other projects, for example, in seaport facilities of Latvia and Canada.

Naturally, clients prefer to have their shiploaders delivered to site of operation completely assembled and ready for production. For such situations, FAM has the right solution when equipment is

assembled prior to shipping in the home port, prepared for sea transportation, and placed and secured on a heavy-lift vessel. Figures 6 and 7 show the FAM shiploader type SL8800.25EK for handling iron ore at a rate of 8,800tph in Port Cartier, Canada. The FAM equipment was assembled in

Figure 8: FAM shiploader SL900.23DX, Port of Onne, Nigeria.





Figure 7: Loading the FAM shiploader SL8800.25EK for Port Cartier, Canada.

Bremen, Germany, shipped to Canada by a heavy-lift ship, and placed directly on rails on the jetty in Port Cartier.

The advantages of such an approach are obvious: within a very short period of time the equipment can be commissioned and put into operation according to contractually agreed technical parameters.

The global volume of handling activities is growing rapidly as does the demand for appropriate modern port facilities. Currently, FAM is involved in numerous projects which aim to make the port handling processes even faster and more efficient all over the world. One of FAM's most remarkable projects was a complete handling system for the port of Onne in Nigeria, where an FAM shiploader was recently installed at the top of a technology chain for loading urea at a rate of 900tph (Figure 8).

Material handling connects the entire world. The FAM Group provides its globally active customers with a wealth of knowledge, extensive experience, and high quality.

The most current examples of such a successful cooperation include a port facility with an FAM shiploader type SL1200.31.D.H for handling urea in Turkmenistan and an order of a third FAM shiploader type SL1500.27EXL for handling fertilizers by JSC 'Baltic Bulk Terminal', an operator of the port terminal in Saint Petersburg, Russia.

THE FAM GROUP

Headquartered in Magdeburg, Germany, the FAM Group has a total of 14 subsidiaries in Germany, Bulgaria, Chile, China, Canada, Russia, Singapore, Hungary, and Australia as well as representations, among others, in

South Africa and in the United States. Approximately 1,500 employees work for the FAM Group around the globe. Planning, project development, designing, manufacturing, assembly and startup as well as servicing of bulk material conveyor systems generate a turnover of about 300 million euro per year.

FAM successfully plans, designs, and manufactures turnkey plants and systems for mining, conveying, loading, and storing minerals, raw materials, and goods. FAM efficiently combines its know-how of serial and custom-specific production. In addition to engineering services, the company offers a complete range of manufacturing services as well as after-sales service. For more than 100 years, FAM incorporates in its global solutions professional competence, engineering know-how and top-level project management.

Spanish DF participates in the expansion of the largest Chilean dry bulk port

Duro Felguera (DF) recently finished the start-up for a new copper concentrate loading terminal in Bahía de Quintero (Chile) for Puerto Ventanas S.A., the largest bulk handling port in the area.

After connecting it to existing facilities, in late 2017, the company carried out the last tests at the facility. During these tests over 680,000 metric tonnes was handled and loaded with DF equipment.

The value of this turnkey project was over \$30 million, including the design, manufacturing, assembly and installation of a belt conveyor system and a travelling and slewing shiploader (the travel distance is 157 metres). DF's solution will increase the port's current capacity up to 1,500tph (tonnes per hour) of copper concentrate (the previous capacity was 800tph).

Puerto Ventanas was already considered the largest bulk handling terminal in the area; after completing the project, the port will attain an annual loading capacity of six million tonnes of copper concentrate, making it the most modern and technical port in Chile and one of the largest in all South America.

One of the most significant challenges DF had to face up to in this project was the site, right in the heart of the Pacific Ring of Fire. The high seismic risk meant that a specific design was required, complying with the NCh 2369 regulations for the seismic design of industrial structures and facilities. During assembly, the facilities went through earthquakes of up to 6.9 on the Richter scale and suffered no damage.

The new bulk handling system designed and developed by DF also boasts a long list of environmental protection elements, which significantly reduce copper concentrate fines emission (particles under



1mm) during shiploading. These elements include a fixed shiploader and belt conveyors, dust collector filters for 8,000m³/h and 10,000m³/h, aspiration systems inside the galleries, and transfer chutes and hopper designed to minimize material deterioration. Also of note is the 600-metre-long pipe conveyor which connects the onshore facilities with the loading quay.

The delivery of turnkey projects for bulk handling is one of the most traditional and most significant specialities in Duro Felguera; the company boasts several project references in Chile. DF Mining & Handling already delivered two projects for the local company CAP Minería to improve and extend various facilities that the company has in the country.

The scope of the first contract included the design, manufacturing and supply of a stacker with a capacity of 1,110tph and two belt conveyors with different lengths. The second contract formed part of the so-called Proyecto Cerro Negro Norte, which

for Duro Felguera involved two tasks: the first was the design, supply and supervision of the assembly and start-up of a mobile stacker for fines with a capacity of 1,626tph and the corresponding belt conveyor system, together with five other belt conveyors for the plant located in Valle de Huasco. The second project consisted of the same work to install a mobile stacker for iron ore or pellet feed, with a capacity of 1,000tph and 15 belt conveyors at the port of Punta Tototralillo.

ABOUT DURO FELGUERA

Duro Felguera (DF) specializes in the delivery of turnkey projects in the energy, mining & handling, oil & gas, smart control systems and defence and security sectors. The company also provides assembly and operation and maintenance services. Duro Felguera has a history of over 160 years and has been quoted on the Madrid stock market for over a century. Among other projects, the company is currently working on the Empalme II combined cycle power plant (800MW) and the new coal storage and supply facilities for the Petacalco power plant in Mexico; the cogeneration plant in Aconcagua and the copper concentrate loading system extension in Chile; the Vuelta de Obligado combined cycle power plant (800MW) and the open cycle power plants at Luján (127MW) and Matheu (254 MW) in Argentina; the Jebel Ali K open cycle power plant (500MW) in Dubai; the combined cycle power plant in Djelfa (1,200MW) and the bulk handling system at the port and plant of Bellara, in Algeria; and the Iernut combined cycle power plant (430MW) in Romania. Furthermore, the company has ongoing projects in Venezuela, Peru, Costa Rica, Belgium, Bahrain, Italy and Lithuania, among others.

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United States of Engineering

US ENGINEERING EXPERTISE

Jay Venter

Benetech celebrates milestone: 35 years in bulk material handling

Benetech began in 1983 with the aim to reduce combustible dust and improve bulk material handling systems. In 2018, the company marks 35 years of growth and innovation in designing world-class products, services and technologies for the material handling industry.

When Benetech started, its focus was dust suppression. As its industry awareness and expertise increased, so did the company's market presence and team of material handling specialists.

Benetech identified early on that companies in its profession often centred more on single products than on integrated, broad-view solutions for a business's bulk material handling systems and operating conditions. To fill this vital gap, Benetech researched and developed a full range of bulk material handling products, services and technologies with

versatile applications.

Along the way the company also enhanced its engineering and services groups to be the premier providers for dust suppression, dust collection, washdown systems, conveyor components and advanced transfer chute systems. Additionally Benetech does large capital projects, including conveyor build and rebuild, structural changes and Greenfield projects. This has established Benetech as a trusted provider of engineering, procurement and construction (EPC) capabilities for bulk material handlers.

TOTAL DUST MANAGEMENT

Benetech's customers benefit from the optimal range of Total Dust Management resources for all aspects of an operation's material handling needs.

Total Dust Management includes

multifaceted solutions such as the MaxZone® conveyor skirtboard system for situations in which an existing component is flawed, ageing or failing but budget and time constraints exclude a full system replacement. The MaxZone LoadZone system's modular design allows easy change-out of components for all applications without special permits or lengthy shutdowns. It also requires no welding.

Supported by Benetech's in-house engineering, equipment manufacturing, research, chemical production and field service, Total Dust Management ensures high-output industries such as coal, steel, cement, and paper and pulp can reduce dust, prevent spillage, improve material flow and achieve compliance. The result is greater safety, efficiency and profitability.



Before and after Benetech applied dust suppression to a biomass stackout.

BossTek introduces longest parts warranty in the industry

As a pioneer in atomized mist technology for dust suppression, BossTek® is excited to announce an industry-leading upgrade to the product warranty. Having previously set the industry standard with three-year/3,000-hour coverage, warranty on the direct drive fan motor of the entire product lineup has been increased to five-year/5,000 hours.

For over a decade, BossTek (Formerly Dust Control Technology) has built the DustBoss® line of atomized mist cannons, widely considered the most reliable equipment of its type on the market. Many of the early units sold are still in service today, delivering surface and airborne particle control. As industrial dust emissions become more heavily regulated, the improved warranty offers customers peace of mind and reflects on BossTek's commitment to superior durability and return on investment from its products.

"When we follow up with past customers, more often than not, instead of replacing their DustBoss, they're adding to their fleet as they expand," said BossTek CEO Edwin Peterson. "With so many of our oldest units still in the field cranking out wide area dust suppression, extending the warranty was an easy decision. Our product quality hasn't changed from day one."

The demand for atomized mist dust suppression technology has increased since air quality inspectors now test for smaller, non-visible particle sizes (<10 microns in diameter or roughly the size of pollen). These particulates can leave the site line and expose the surrounding community to potentially hazardous respiratory issues. Previously, industries like demolition contractors, bulk product storage (coal, ash, scrap metal, etc.) and ports have controlled dust by applying surface suppression using water sprayed from hoses, which create droplets from 200–1,7000 microns in size. But over time, operators have discovered that in order to control dust emissions, droplet sizes must roughly match the size of airborne particulates, which hoses cannot accomplish.

DUST CONTROL SOLUTIONS

Available in four sizes depending on the



needs of the application, a single DustBoss® unit can cover up to five American football fields with billions of mist droplets approximately 50 to 200 microns in diameter. Using a powerful industrial fan in the back of the cannon, engineered droplets are shot from a misting ring on the front in a cone-shaped pattern, reaching up to 100 metres. The huge coverage area is achieved by using the vertical adjustment and optional 359° oscillator. The tiniest droplets are small enough to travel with dust emissions, collide with particles too small to see and drag them to the ground. The larger droplets deliver surface suppression, without excessive pooling or saturation of material.

Hoses can pump out >100 GPM of high-pressure water and need to be controlled manually. At that volume, without extra steps taken to control pooling and runoff, operations can face workplace and environmental violations. DustBoss units are a one-touch operation, allowing workers to turn them on and walk away. The water pressure emitted from the mist nozzles is harmless, the maximum amount of water used is 39 GPM (average around 17 GPM) and the fans are guarded against reach-in injury, creating a safe and cost-effective operation.

The cannons can be mounted on a tower, steel skid or wheeled frame. They can also be purchased as Fusion™ units that feature an enclosed tank and genset

on a roadworthy trailer for applications that lack easy access to water and power or require exceptional portability. Able to be heat traced and insulated for cold climates, the Fusion line has quickly become a popular choice in a wide range of industries. The direct drive motor in those designs is also covered under the new parts warranty.

DustBoss Fusion

"This warranty demonstrates commitment to our customers," Peterson concluded. "When they revisit their dust control plans in the face of changing regulations, we want them to be confident that they are getting the highest quality product on the market, with the best return on investment."

An innovator in dust suppression, BossTek offers a wide range of equipment and accessories that enable atomized mist technology to control fugitive particles for applications in demolition, construction, bulk material handling, waste and scrap processing, recycling and landfills. Recently the company has extended its expertise to odor management solutions using similar technology, which distributes safe and environmentally friendly topical and airborne deodorizers. Headquartered in Peoria, IL (USA), the company's dust and odour-control units are designed and manufactured in the USA and delivered to customers around the world, with its equipment sold to users in 40 different countries to date.



Plant expansion streamlines production and product delivery for Mack Manufacturing

Mack Manufacturing, an American manufacturer of heavy-duty hydraulic grapples, grabs and clamshell buckets, recently completed construction of a 10,800ft² (1,003.35m²) expansion that has allowed new efficiencies throughout its production process.

The new facilities are housed in a standalone building adjacent to the main plant. Mack acquired additional property for its 11-acre site to accommodate the added space. Four years in planning and construction, the structure now houses all of Mack's assembly and finishing operations, up to final shipping.

According to Matt Davidson, Vice President of Sales & Marketing, the expansion is a major step forward for the company's production line. It houses a wide range of processes — assembling fabricated components, sandblasting, paint, crating and shipping. All those activities previously shared a 100ft by 45ft area in the main plant.

Now, with almost three times as much space to work with, each operation has the dedicated space it requires, laid out

specifically to allow for significant improvements to the workflow.

The improvements also include upgraded technologies such as a closed-loop recovery and purification system for its high pressure washing area, and a fully sealed steel-grit sandblasting stage that reduces the cost of consumable material and enhances its environmental controls.

In the main plant, the former prep shop is now home to Mack's hydraulic shop. Davidson says that the move led to a reorganization of its cylinder production, machining and fabrication areas that reduces handling and streamlines the

overall manufacturing process.

Now in its fourth generation of operation, Mack's head office and manufacturing site now totals more than 60,000ft² (5,574,18m²) dedicated to its 'quality first' engineering and production of clam shell buckets, grapples and grabs for all overhead and mobile material handling applications including: logging, aggregates, scrap, waste handling, dredging and ship-unloading.

ABOUT MACK MANUFACTURING

Mack Manufacturing is a global manufacturer of industrial material handling attachments, specializing in heavy-duty hydraulic grapples, grabs and buckets for overhead cranes and mobile equipment. Established in 1942, Mack continues to operate as a family-owned business committed to the development of highly-skilled welders, fabricators and support staff. Mack's head office facility in Theodore, Alabama, is fully equipped to complete every step of attachment manufacturing and remanufacturing tasks under one roof, from engineering to precision machining to final finish.



Mack Manufacturing's new 10,800ft² (1,003.35m²) prep shop was four years in the planning.



The expanded Mack Manufacturing prep shop in Theodore, AL is fully equipped to assemble, finish and ship its crane grapples, grabs and clam shell buckets to customers worldwide.

CST celebrating 125 years

Celebrating 125 years in business is an impressive achievement for a company that works within the extremely volatile, challenging and ever-changing industrial manufacturing industry, but that is exactly what CST has done.

CST THE HISTORY

In 1893, the Columbian Steel Tank Company, as CST was originally named, was founded by Andrew Kramer of Kansas City, Missouri, as a fabricator of livestock water tanks.

CST Industries is the result of several strategic mergers and acquisitions over the past 125 years, including Trico Industries, Black, Sivalls & Bryson (BS&B, later renamed Peabody TecTank), A.O. Smith Harvestore, Harvestore Products Group, (later renamed Engineered Storage Products), Conservatek and Temcor; a dynamic combination of the world's leading factory coated steel tank, aluminium cover and dome companies.

The company had many market influences that presented opportunity for growth. A shortage in downstream oil and gas storage capacity resulted in a surge of business for CST from 2012 to 2015 for both new tank and retrofit applications. Global growth required that the company rapidly expand sales, support and operations in Latin America, Middle East and Asia. This development and strategy of globally placed offices enabled CST to better service the growing energy and water industries in these markets and solidify their place as the global leader for best-in-class storage and cover solutions.

LED BY INNOVATION

"Innovation has always led the company and our dedication and drive has brought many firsts to the industry," says Tim Carpenter, CEO of CST Industries. "Part of what allows us to lead with innovation begins with a global footprint. We are tied very well to mega-trends driven by population growth in the areas that we operate. Many countries need to improve infrastructure to advance the quality of living and can do so via our current industry leading product portfolio and ability to innovate new solutions to meet customer needs."

THE PRODUCTS & INDUSTRIES THEY SERVE

The company's range of products include, but are not limited to: TecTank™ liquid and dry bulk bolted storage tanks; OptiDome®; Aquastore®; Vulcan; Harvestore® and



CST Covers' aluminum dome structures are ideal for the following applications: potable water, petroleum, wastewater, bulk storage and architectural structures.



Slurrystore® structures.

"Our products are about improving the customers' value proposition. Just over the past few years, the company has launched products driven by customer need that include the TecTank FP® — a customer driven solution that installs faster and lasts longer for dry bulk storage, Edgecoat II™ — the only tank coating process in the world offering a 360° coating solution of tank panels and the OptiDome system — a flush batten sealed dome with a dual-web I-beam, Harvestore Raptor Series Premium Unloader Cutter and Conveyor Chains — designed with alloy bushings for maximum strength, new technologically advanced Harvestore Breather Bag and XL Unloader Gearbox," said Carpenter.

Coatings are also a vital part of the CST product offering. Along with pioneering coatings for tanks in 1893 and enamelling glass-fused-to-steel technology to tanks in the 1940s, the company also owns the achievement of being one of the first to factory-coat tanks with epoxy in 1978 (Trico Bond 478). Through decades of research and development, CST developed Trico Bond EP® and Trico Bond SD™ coatings and engineered the OptiBond™ Epoxy Coating process, now proven through years of in-field experience and performance data. Together with CST's Vitrium™ glass coating, the company offers coating solutions that provide owners'

peace of mind by ensuring the coating protecting their assets will have a long life and serve with distinction.

CST's Vitrium glass-fused-to-steel product is the coating of choice for the municipal water and wastewater markets around the world.

"CST recently-released Edgecoat II, an advancement of its market leading and industry first Edgecoat offering," Carpenter clarified.

The OptiDome, CST's premium dome product, was not only invented to be the world's most efficient and effective dome product but was also designed to offer a globally compliant product that is fast, easy, safe to install and reduces emissions and maintenance on the external floating roof. With the combined heritage of Conservatek and Temcor, CST's OptiDome sets a new standard in engineered aluminum cover and dome technology. The geodesic dome design uses gasketed stainless steel fasteners and is available with exposed or non-exposed sealant at the nodes.

Carpenter stated: "The new OptiDome technology allows CST to provide the most effective cover solution for even the world's largest storage tanks. Our domes eliminate the need for internal columns, which increases storage capacity and simplifies internal tank maintenance required for floating roof operation."



One of Jack Daniels' distilleries uses CST tanks for grain receiving and processing.

CST: THE FUTURE

As for the future, CST is currently developing many new products that it feels will be real game changers for the industries they serve.

"We're ecstatic about growing with Solace Capital. Solace understands industrial project businesses and they understand our markets and industries both from an operational and strategic perspective. They're engaged in supporting

CST and very interested in continuing to invest in the business. We are looking forward to driving CST growth as we have for 125 years — via innovation, mergers and acquisitions, where appropriate partnering with other great companies makes sense, and provide consistent solutions for customers around the world. To this end, Solace's vision of the right investments and CST are spot on. We are very confident that the fit with Solace is a perfect one," Carpenter added.

Solace has already proven itself to be active with regards to acquisitions and Carpenter said the company has a robust funnel of acquisition targets where there is a very serious opportunity for growth to enable even better solutions to customers and partners wherever and whoever they may be.

CUSTOMER AFTERCARE

In addition to engineering, manufacturing and installation support, CST ensures its customers are cared for long after the initial work is complete. The company has always serviced tanks and domes upon request but has advanced their maintenance programme to ensure all customers receive OEM-quality services from CST and CST authorized professionals such as the CST Authorized

Dealer Network.

The CST maintenance programme offers Remote Operated Vehicle (ROV) and drone tank inspection, visual & ultrasonic inspection, repair, modification and turnkey services.

COMPANY HISTORY SHAPES CULTURE

"As a large global company, it is important to ensure all staff, wherever they are based, are aware of the CST company ethos alongside its business practices and processes. To achieve this the company relies on CST+ Business Process — the heartbeat of our business," Carpenter said, "We train and develop our team members on the tools and processes of CST+. Our culture is a 'people first' approach as we truly believe that we are only as strong as the people that make up CST."

CST has five manufacturing facilities, technical design centres and multiple regional sales offices located throughout North America and the United Kingdom. International offices are located in Argentina, Australia, Brazil, India, Japan, Malaysia, Mexico, Singapore, Spain, United Kingdom, United Arab Emirates and Vietnam. It currently has an installed-base in more than 125 countries and plans to work in many more, something that could be achieved by future acquisitions.

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ASGCO® introduces new Pit-Skalper® belt cleaners

“Complete Conveyor Solutions” is proud to announce the introduction of a new model to its industry leading line of primary belt cleaners. The Pit-Skalper® is based on the proven technology and performance of the Skalper®, which is used throughout the world in the harshest environments. This new design is specifically geared to handle the needs of aggregate, ready mix, portable crushing and screening plants, sand, gravel, asphalt and recycling, while providing superior cleaning to remove carryback from the conveyor belt.

Pit-Skalper® uses the same patented E-Z Torque® tensioner as the rest of the Skalper® line featuring a stainless steel spring, allowing the blades to self-adjust throughout the entire life of the blade, making it the most robust and accurate

belt cleaner tensioner in the industry. The tensioner and mounting tube are zinc plated for corrosion resistance and the blades can be quickly changed from one side of the conveyor belt.

“We listened to the needs of our customers; they want an effective belt cleaner that can hold up to the tough conditions of portable crushing and screening operations, recycling facilities and ready-mix and asphalt operations,” said Aaron Gibbs, President of ASGCO. “After working with our engineering and manufacturing teams we developed a primary belt cleaner to meet and exceed our customers’ expectations.”

Pit-Skalper® can be installed on any belt with maximum blade speeds of 600fpm (3.0m/sec) and a pulley diameter of 10–20”.

ABOUT ASGCO®

ASGCO® “Complete Conveyor Solutions” founded in 1971 and headquartered in Allentown, PA is a leading manufacturer, distributor and service provider of proprietary conveyor and screening equipment and accessories that improve the safety and performance of bulk material handling systems.

ASGCO® is a diversified and innovative company with three major divisions that serve specific targets of the material handling industry. The growth of the company, over the years, is due to recognized improvements in the efficiency, safety and productivity of its customers operations. At ASGCO® the company continues to strive to make the handling of bulk materials more efficient, safer, and more productive.

Superior Industries and MIMICO create new partnership in New Zealand



Superior's Pinnacle® Conveyor's distinguishing feature is its 22 degree stockpiling incline. Standard conveyors only stockpile at 18 degrees.

Superior Industries, Inc., a US-based manufacturer and global supplier of bulk material processing and handling systems, says Matamata Industrial Machinery Imports Ltd (MIMICO) has been appointed the sole New Zealand distributor for Superior's line of washing systems and conveying equipment.

MIMICO's sales and service operation spans the country, with head office in Matamata and branches located in Auckland, Paraparaumu and Christchurch. MIMICO has service agents in 15 locations as far north as Whangarei and as far south as Invercargill.

“We're proud to work with a number of world-class equipment brands and we're happy to add Superior to our stable,” says Chris Gray, MIMICO's general manager. “It's important that we provide our customers with industry-leading

equipment and, in Superior's range of washing systems and conveying equipment, we are definitely adding that to our offering.”

The product range on offer in New Zealand will include Superior's Aggredry® Dewatering Washer for fine materials, which will be on display at the 2018 edition of QuarryNZ, and the Alliance™ Low Water Washer. In addition, the RazerTail® Truck Unloader is just one of Superior's conveyors available in New Zealand, alongside the TeleStacker® conveyor for radial stacking.

“At Superior, providing innovative products is the key component to our success,” says Jeff Steiner, the manufacturer's territory sales manager in the Oceania region. “New Zealand customers can be sure that if they purchase Superior wash systems or

conveying equipment from MIMICO, they'll be getting the best equipment and support available on the market today.”

ABOUT SUPERIOR INDUSTRIES, INC.

Superior Industries engineers and manufactures groundbreaking, bulk material handling equipment and cutting-edge components. From its headquarters in Morris, Minnesota, USA, the manufacturing firm supplies bulk crushing, screening, washing and conveying systems for industries including construction aggregates, mining, bulk terminals, agriculture, power and biomass. In addition to its home plant in Minnesota, the 45-year-old Superior operates from additional engineering and manufacturing plants in Alberta, Canada; Arizona, USA; Georgia, USA; Michigan, USA; Nebraska, USA; and New Brunswick, Canada.

DCi

Handling coal at the EMO terminal in Rotterdam.

Netherlands focus

Jay Venter

CEO of Port of Rotterdam Authority calls on EU to intensify its investments in a stronger infrastructure

During the 15th ESPO conference, held from 31 May to 1 June this year, the CEO of the Port of Rotterdam Authority Allard Castelein called on the European Union to step up its investments in the infrastructure of ports and hinterland connections. This will further strengthen Europe's economy and competitive position.

"A port is only as strong as its hinterland connections," according to Castelein. "Solid infrastructure connections to and from ports and port-industrial complexes are of crucial importance for European prosperity and employment." That is why he calls on the European Union to free up more financial resources for infrastructure investments in its upcoming long-term budget. One concrete programme the Port Authority CEO was referring to in this context is the expansion of the so-called Connecting European Facility (CEF) to include European energy transition projects. This will ensure that ports remain future-proof, healthy and competitive. With this recommendation, Castelein joins ESPO and 40 partner organizations, which recently made a likeminded call in Ljubljana.

In addition, Castelein drew attention to the challenges faced in the area of geopolitics, digitalization and the energy transition. To realize the targets set out in the Paris Agreement, Castelein called on ports to take their responsibility and show leadership. "Nevertheless, for a true, systemic change, we need to do more,"

noted Castelein. "In this major transition, we are completely dependent on each other. No organization can realize the energy transition on its own. It requires us to all put sustainability high on the agenda. The need to make this energy transition is so urgent that in addition to collaboration and decisive action, we count on the EU and local authorities to offer generous support and constructive policies."

ACCESSIBILITY

In order to strengthen its position as a large European logistical and industrial hub, the port of Rotterdam works continuously to improve accessibility. In this context, sustainable solutions are sought to optimize access to Europe by road, rail,

pipeline and coastal and inland navigation.

ENERGY IN TRANSITION

The Port of Rotterdam Authority is committed to combating climate change and wants to play a leading role in the global energy transition. The reduction of CO₂ emissions and efficient use of raw and residual materials are important tasks for the Port Authority.

DIGITALIZATION

Trends and developments in the field of digitization are changing the environment in which we all. The supply chain partners see opportunities in digitization, with the potential to improve the competitiveness of the Port of Rotterdam.



Allard Castelein, CEO of the Port of Rotterdam Authority, addressing the 15th ESPO conference.



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An update on the new sea lock at Port of Amsterdam

A new large sea lock is being constructed at the entrance of the North Sea Canal at IJmuiden that will provide access to the Amsterdam port region.

The new lock will be 500 metres long, 70 metres wide and 18 metres deep, making it the world's largest sea lock. Construction began in January 2016 and the new lock will be available for shipping at the end of 2019. From then on, the port of Amsterdam will be accessible 24 hours a day.

BENEFITS AND REASONS FOR THE NEW LOCK

- ❖ The North Lock will reach the end of its technical service life in 2029 and has become too small for today's ever-larger seagoing vessels.
- ❖ The new lock will be able to accommodate vessels with a maximum of 339m in length, 57m in beam and 13.75m in draught, allowing new-generation larger vessels to pass through the North Sea Canal smoothly and safely.
- ❖ It will be possible for one large vessel, or multiple smaller vessels to pass through the lock at the same time, the total maximum length of vessels being 460m.
- ❖ The New Sea Lock will be tide-independent and will be accessible 24/7.
- ❖ With a larger lock, the port has the possibility to grow from today's 90mt (million tonnes) to 125mt of goods handled per year.

Commissioned by Rijkswaterstaat (Dutch Directorate-General for Public Works and Water Management), the new sea lock will be built by the OpenIJ consortium of contractors during the next few years. The project is a collaborative venture of the Ministry of Infrastructure and the Environment, the Province of North Holland, the Municipality of Amsterdam, the Port of Amsterdam, and the Municipality of Velsen. The project is co-financed by the European Union's TEN-T programme.

AN UPDATE — WHAT HAPPENED IN MAY

The new fendering system between the Middle Lock (number 1 in the picture) and the new sea lock will be completed in the month of May 2018 and that means that the closure of the Middle Lock will end. The lock gate chambers of the inner and outer head continue to grow in height



An artist's impression of the new lock being constructed at IJmuiden, which will be available at the end of 2019.

(numbers 2 in the picture) and the builders are also working at the lock chamber walls (number 3 in the picture).

THE IJMUIDEN MIDDLE LOCK WILL BE AVAILABLE AGAIN

April was the month in which the Middle Lock was closed due to the construction of the new fendering system. The fendering system was completed on Thursday 3 May, so now ships can use the Middle Lock again. In relation to safety, the public road across the lock complex will be closed until next year (spring 2019).

LOCK GATE CHAMBERS ARE STILL GROWING IN HEIGHT

The lock gate chambers of the inner and outer head continue to grow rapidly in height. An additional crane will be installed at the lock gate chamber of the inner head to get all the reinforcement steel into place. The lock gate chamber of the outer head grows faster in height than that of the inner head, because it has been designed for only one lock gate and therefore has less surface area.

By the end of May, the rear wall of the inner head will be at its highest point before the complete structure will be sunk during the course of this summer. The structure will sink from 5 metres below to 22 metres below NAP.

CONSTRUCTION WORK ON THE LOCK CHAMBER WALLS

A series of construction activities on the future lock chamber walls will be carried out in May, including the application of a smooth finish to the surface of the walls, the installation of anchor beams and the



drilling of anchors. Another two metres of concrete will be poured on top of the anchor beams. The top of the concrete walls will then be finished by a smooth rounded steel cover slab. This way, the lock chamber walls are gradually taking their final shape.

ABOUT THE PORT OF AMSTERDAM

The Amsterdam port region is one of the world's largest logistics hubs. Handling 100mt in cargo traffic annually, Amsterdam is one of Western Europe's Top 5 sea ports.

The Port's strategic and central location within Europe makes it easily accessible and ensures excellent connections to all major European markets. The Amsterdam port region is comprised of the ports of Amsterdam, Beverwijk, Zaandam and Velsen/IJmuiden.

The ports in the North Sea Canal Area handled a total of 100.8mt of cargo in 2017, including more than 81.3mt in the Port of Amsterdam. The port region employs some 70,000 people in all, roughly half of whom are based in Amsterdam.

Damen ASD Tug 2913 for new deep-water bulk terminal at Saqr Port launched by Albwardy Damen, UAE

The new ASD Tug 2913 for Saqr Port, part of Ras Al Khaimah (RAK) Ports, has been launched at the Albwardy Damen shipyard in Sharjah, UAE. Ordered twelve months ago, the tug will join the RAK Ports tug fleet and operate in the new and impressive deep-water bulk terminal currently nearing completion at the port. There its 80-tonnes of bollard pull



will provide additional power for manoeuvring Capesize vessels.

The tug was launched in the presence of Capt. Cliff Brand, the Chief Executive Officer of RAK Ports, and Capt. Michael Magee, the Harbour Master of RAK Ports. Capt Brand highlighted in his speech the importance for the UAE economy to build “in the UAE for the UAE” and the added value of having the building yard around the corner for support during the life time of the vessel.

Capt. Magee commented that this tug is an important addition to the fleet for the safe operation of Capesize vessels at the new terminal, and added that he is impressed with the adaptability of Damen, the high quality of build and level of service.

Saqr Port is the major bulk-handing port in the Middle East and a vital part of the regional economy. Located at the foot of the Hajar Mountains, it serves the fast-growing quarry industry in the emirate of Ras Al Khaimah, from where each year 55 million tonnes of bulk materials are exported through the port to countries around the Arabian Gulf.

The ASD Tug 2913 was selected for the new terminal based on its twin attributes of being both compact and powerful. These will allow it to handle the large carriers using the new terminal within the restricted waters of the harbour. The proximity of the Hajar Mountains also brings challenges in the form of powerful winds that can sweep across the port with little or no warning.

In addition to its power, the 29-metre ASD Tug 2913 also features high freeboard and a raised quarterdeck for safe operations in rough seas.

RAK Ports is a long-standing customer of the Damen Shipyards Group. Its seven-strong fleet is comprised of a Damen ASD Tug 2411, a Damen ASD Tug 2310 and five Damen Stan Tugs.

The ASD Tug 2913 tug for RAK Ports is the first of a series ASD Tugs 2913 under construction at Albwardy Damen in the UAE. Consistent with the Damen philosophy, another three tugs of this type and a series of 60- and 70-tonne ASD Tugs are being built for stock. The stock construction enables the yard to offer well-proven vessels at very short notice to operators across the region and beyond. With the convenient location of Albwardy Damen, RAK Ports and all Damen clients can depend on a fast and efficient maintenance and repair service in the Arabian Gulf and its surrounding waters.

DAMEN SHIPYARDS GROUP

Damen Shipyards Group operates 34 shipbuilding and repair yards, employing 10,000 people worldwide. Damen has delivered more than 6,000 vessels in more than 100 countries and delivers some 160 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.

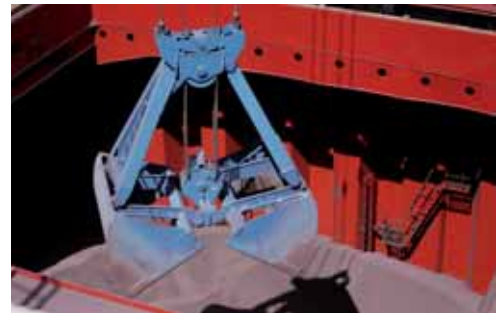
Damen offers a wide range of products, including tugs, workboats, naval and patrol vessels, high speed craft, cargo vessels, dredgers, vessels for the offshore industry, ferries, pontoons and superyachts.

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, anchors, anchor chains and steel works.

Damen Shiprepair & Conversion (DSC) has a worldwide network of eighteen 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, the largest of which is 420 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 voyages.



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North Sea Port signs cooperation agreement with Port of Quebec

Canada has been a major trading partner for North Sea Port for years. In the margins of the Belgian State visit to Canada on Friday, 16 March, North Sea Port concluded an agreement with the Quebec Port Authority in order to boost the cargo traffic between both ports.

This agreement with Quebec is at the same time the first co-operation agreement of the North Sea Port merger port. Moreover, there has already been a consultation with the competent minister of Quebec on the spot.

BULK CARGO AND FOOD

North Sea Port wants to strengthen the trade relations with the east coast of Canada with a lot of attention to bulk cargo and foodstuffs — two sectors in which North Sea Port is standing strong. The port of Quebec in its turn wishes to further develop its position in the region as a supply and removal port for bulk goods. Moreover, Quebec wants to examine the development possibilities for cars and containers.

REALIZE MORE CARGO

Both ports have strong ambitions. They want to realize more cargo between Quebec and North Sea Port for cereals and crops (wheat, maize, colesseed and rapeseed), fertilizers, ores and minerals, wood and food. This can be done by exchanging information on local companies, by promoting meetings between companies from both regions and



North Sea Port.

by participating in local fairs and events. Both ports will also exchange knowledge on port management, energy management, cooperation models with the city, the development of shortsea lines and setting up a network of medium-sized ports.

CANADA: FIFTH-BIGGEST TRADING PARTNER

Between Canada and North Sea Port there already exists a strong economic basis. Canada is the fifth-biggest trading partner with a total cargo traffic in 2017 of 3.9mt (million tonnes) — 3.5mt on import and 0.4mt on export. As an easterly located port in Canada, Quebec — and consequently also its hinterland region — can easily be reached for North Sea Port. And, the reverse, via North Sea Port, Quebec can have easy access to the European hinterland. Moreover, in recent times the CETA trade treaty between the

European Union and Canada has been concluded, which can strengthen the agreement even more.

ABOUT NORTH SEA PORT

North Sea Port is the new company formed by the merger between Ghent Port Company (Flanders) and Zeeland Seaports (the Netherlands). Appropriately, it will be known as: North Sea Port.

Eight publicly-owned shareholders agreed to this cross-border merger. On behalf of Zeeland Seaports in the Netherlands, incorporating the ports of Vlissingen and Terneuzen, they are the province of Zeeland and the municipalities of Borsele, Terneuzen and Vlissingen. On behalf of the port of Ghent, they are the city of Ghent, the municipalities of Evergem and Zelzate and the province of East Flanders.

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ZHD Stevedores – family-owned, decades of experience

ZHD Stevedores is a proud, independent family-owned company with decades of experience in the stevedoring industry.

With various cranes at its different terminals, ZHD is able to cope with all kinds of freight flows of bulk, break bulk or containerized cargo. Due to its entrepreneurial attitude, the company sees new kinds of cargo as a challenge to show its expertise in stevedoring.

WHAT ZHD DOES

ZHD has continuously evolved over the years in order to better serve its national and international clientèle. ZHD has invested substantially in new sites, quays, cranes, open and closed storage facilities and its skilled employees.

Next to its specialization in transshipment and storage of dry bulk, ZHD provides tailor-made business solutions to its clients.

SERVICES

ZHD Stevedores is specialized in the transshipment and storage of a variety of bulk cargoes. But also breakbulk and containers are commodities that have taken a bigger part in the transshipped tonnage in the last decade.

Next to the traditional stevedore core activities, ZHD offers additional solutions to existing and new customers. Using its expertise, terminal positions, and investment strategies, ZHD also strives for business-to-business co-creation into long-term beneficial relations.

TRANSSHIPMENT

ZHD offers efficient and quality-based transshipment for optimally servicing its customer demands. Therefore it constantly invests in its equipment and facilities, reviews its services and enables expert advice and operation through its people. Reliability, quality and economical efficiency are key drivers for its transshipment options now and in the future. This is achieved with the following equipment:

- ❖ mobile cranes up to 50 tonnes in bulk and up to 100 tonnes in breakbulk;
- ❖ floating cranes up to 50 tonnes in bulk and up to 100 tonnes in breakbulk;
- ❖ bridge crane up to 50 tonnes;
- ❖ handling of bulk, break bulk and containers;
- ❖ excellent water and road connections; and; and
- ❖ weighing facilities

STORAGE

ZHD offers a wide range of storage solutions located at its terminal locations (Terminal Dordrecht and Terminal Moerdijk Vlasweg).

BUSINESS SOLUTIONS

With core competencies in transshipment and storage, ZHD can provide tailor-made business solutions to build up long-term relations with its customers.

ZHD offers added value in logistic services using its expertise derived from its core processes in handling materials for transshipment and storage.

TERMINALS

TERMINAL DORDRECHT

In Dordrecht, the largest ZHD terminal is situated, both in tonnage, quay length and square metres. Also the ZHD head office is situated on the terminal in Dordrecht.

TERMINAL MOERDIJK GRAANWEG

The Graanweg Terminal is a dedicated terminal where ZHD serves long-term customers with the transshipment of specific bulk products.

MOERDIJK ROODE VAART TERMINAL

The Roode Vaart terminal is the newest acquired location of ZHD in Moerdijk. This terminal is under development and will be delivered with a quay and storage facilities.

TERMINAL MOERDIJK VLASWEG

The Vlasweg terminal is the largest terminal of ZHD in Moerdijk in both tonnage, quay and square metres. The Moerdijk office is situated at this terminal and consists of warehouses and weighbridges.

MOERDIJK ZHD STAAL TERMINAL

The ZHD Staal Terminal is a dedicated terminal with bridge crane and quay to serve our long-term customer. This terminal is specialized in the transshipment of steel coils.

ROTTERDAM FLOATING TERMINAL

In the port of Rotterdam, ZHD offers direct ship-to-ship transshipment with its floating cranes using the public buoys and dolphins.

Here the company is able to service larger draught carriers in an effective way. Its self-propelled floating cranes, especially when they are working simultaneously, are able to unload at competitive tonnes per hour.



Cement carrier 'NACC Quebec' successful in operation



Van Aalst Marine & Offshore installed a pneumatic load and discharge system on the cement carrier NACC Quebec, which enables it to load cement at 1,200tph.

Chartered by McInnis Cement, Canada, the Netherlands-based company Van Aalst Marine & Offshore, engineered, produced and installed a pneumatic load and discharge system for the 15,000dwt cement carrier *NACC Quebec*, it announced in January 2018.

The vessel began her life as a 139-metre long and 20-metre-wide bulk carrier in 2011 but was transformed in China into an ecologically efficient, self-discharging dry bulk cement carrier in 2017. The owner of the specialized *NACC Quebec* which officially entered service in mid-2017, is NovaAlgoma Cement Carriers Limited, a 50/50 joint venture between Algoma Central Corporation and Nova Marine Holding SA of Luxemburg dedicated to building a global fleet of modern cement carriers to support infrastructure projects worldwide. "Because of the many specific requirements and wishes of the client, this was one of the most challenging projects in our history," commented Wijnand van Aalst, CEO of Van Aalst Group.

With more than 850 vessels outfitted, Van Aalst is extremely experienced in the market of fully automated bulk cement handling systems. "In addition to the production and installation of this state-of-the-art cement load and discharge system, we were also responsible for the entire engineering. This totally enclosed cargo handling system is tailor-made and enables the *NACC Quebec* to load 1,200 tonnes of cement per hour. For discharging the cement from a total of four tanks to a shore terminal, the vessel is equipped with



special pumps transporting cement at a speed of 700/800 tonnes per hour. A conveying distance of maximum 400 metres can be achieved. Significant amounts that have not been achieved in this industry before. During the development of this particular system, based on vacuum — pressure technology, we did not shy away from any challenge resulting in a very well thought-out concept."

"We were very pleased to establish this new relationship with NovaAlgoma and Van Aalst that allowed us to take advantage of their cutting edge technology, attention to ecological details and their long-term marine transportation and cargo handling expertise," said McInnis Cement Vice President Logistics and Distribution, Mark Newhart. On behalf of Algoma Central Corporation CEO Ken Soerensen added

that developing this Canadian flagged cement carrier was a very exciting project for his company as well. "The productive and professional partnership approach between McInnis, Van Aalst and ourselves have proven to be very successful in achieving and exceeding the requirements of the project by the use of advanced technology."

McInnis Cement is a privately-held company with corporate headquarters in Canada and the United States. The company's plant in Port-Daniel-Gascons, Canada is the first new plant to serve Eastern Canada as well as the U.S. Eastern seaboard and Great Lakes region in more than 50 years. The company's goal is to supply its customers with superior-quality cement that is consistently produced and reliably distributed, based on sustainable development principles.

Dino has a dust solution for any load



The Dino DR300 SilverLine is a Dino with a capacity of 45 m³/hour and equipped with the five most popular options for loading into bulk trucks.



Dino and fit it with a rotary valve. The dust particles collected and knocked out of the baghouses then fall straight back into the product stream.

UP TO 30M² FILTER AREA

The standard Dino filter has a total area of 12m². "In some cases a bigger filter area is wanted", says Roel Kneepkens, sales engineer at Van Beek. "We have developed a

The Dino mobile bulk truck loader is mobile to use and can load quickly, simply and safely. But how does it actually perform with regards to dust prevention during loading? Does a mobile bulk truck loader actually have solutions for this? Van Beek has decades of loading experience and over that time the company has developed numerous innovative solutions.

CAN BE USED ON ANY DINO

A particular property of all these solutions is that they can be used on any Dino, even if it is a decade old. Van Beek has in fact developed modules that can be attached to any Dino.

CHEAPEST AND EFFECTIVE

The loading bellows on the outlet side of the Dino is an extremely popular means of reducing dust. This can be connected quickly, safely and efficiently to the manhole on the top of a bulk truck and for a small investment eliminates a lot of dust development.

MORE SAVINGS WITH EXTRACTION UNIT

The loading bellows can be connected to an extraction unit. This creates a negative pressure in the loading compartment and so fewer fines or small particles escape during loading.

The next logical step in dust reduction is to connect the inlet hopper of the Dino to the extraction unit. The unit immediately extracts most of the dust that is released when emptying big bags or 25kg bags.

OPERATION OF DUST FILTERS

The extraction unit extracts the dust through a row of filters. At set times a blast of air passes through the filters, this knocks out the dust which then falls into an easily removable collection bin underneath. To minimize product loss Van Beek can fit the filter unit above the body of the



The Dino is mobile and can load quickly and safely.



module for this with a filter area of 30m².”

DUST PREVENTION FOR LOADING FROM BIG BAGS

Whether material is being loaded from big bags, shovels or 25kg bags, the Dino has a suitable dust-reducing module for a variety of applications. For big bags with a flexible hose underneath Van Beek can fit the cover on the inlet hopper with a round hole into which the flexible hose fits precisely. In combination with an extraction unit this gives minimal dust development. Van Beek can fit the inlet hole with a flexible hose clamp for even less dust in the warehouse or logistics department. For big bags with no flexible hose, Van Beek fits the inlet hopper, a sort of big open metal box, with cutters that cut a cross in the bottom of the big bag. The product then runs straight into the Dino, during which only a minimal amount of dust can escape.

FILLING CABINET FOR SMALLER BAGS

For smaller bags the Dino can be extended with a lockable filling cabinet. The operator lays the bags on a screen and cuts them open. The product then falls straight into the Dino.

CAN ALSO BE EXTENDED LATER

By working with modules, the Dino can also be adapted to new situations or requirements even years after its purchase. “For example we had a client who had bought a Dino 12 years ago to load granulates. They had now changed over to powders and this created a lot of dust. By fitting the Dino with dust extraction and a loading bellows the problem was solved in an instant,” says Kneepkens.

DEMAND FOR DUST REDUCTION GROWING

Due to more stringent requirements for the protection of personnel, according to

Kneepkens clients are increasingly often extending the Dino they have already been using for years with dust-reducing modules.

“You see fewer and fewer logistics departments where the personnel always wear a dust mask for their work because of dust clouds. Companies are doing all they can to reduce dust and by upgrading their Dino a great saving can be made for a low investment.”

DINO REMAINS MOBILE

The strength of the Dino is that it is mobile and can load quickly, simply and safely. When developing the dust-reducing modules, Van Beek has taken great care that the Dino retains these positive properties even with its extensions. So even with an extraction unit or an extra-large filter area the Dino remains mobile, quick and safe.

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Eurosiloreports on recent contracts

FGD GYPSUM SILO FOR RTU

In Bosnia Herzegovina, Eurosilore is are pushing hard to meet the new schedule for the delivery of a full stack FGD gypsum silo at the thermal power plant of RTU. The project for MHPS-E was shortened by almost five months after Eurosilore started the initial building phase.

MEETING THE CHALLENGE

To cope with this challenge, Eurosilore deployed an optimized transport schedule, together with additional support on site in order to get the equipment assembled and installed in time. Meanwhile, it was also necessary to meet the strict quality control and documentation requirements of RTU. In close co-operation with MHPS-E, the quality inspections have been scheduled and all documents have been submitted successfully in the past months.

HIGH LEVEL REDUNDANCY

At the request of MHPS-E, Eurosilore has implemented a high level of redundancy in the silo control. The system has a redundant power. This is to maximize the availability and to meet the overall power plant standards. The electrical engineers of ESI investigated and implemented this system into the electrical MCC.

"In order to comply with environmental regulations, the exhaust of the power plant at Ugljevik needs desulphurization. This means the space for storing and forwarding the FGD gypsum is quite limited. Therefore the Eurosilore is the system of choice, as well as for MHPS-E as for RTU," says Richard Spaargaren, sales director ESI Eurosilore.

SPACE SAVING CONCEPT

The FGD gypsum silo in Ugljevik integrates a dewatering facility on top, a slotted column system for flawless reclaiming of the sticky material and truck loading underneath the silo. All the equipment is successfully installed in and under the silo, supervised by Eurosilore's project manager Jan-Willem Hanskamp. The building of the silo is now being finished and the commissioning will take place later this year.

POTATO STARCH SILO KMC

As a global supplier in potato-based ingredients KMC turned to ESI Eurosilore again to help build a new potato starch silo

at the plant site in Brande, Denmark. To support the increasing production rates, extra storage capacity for potato starch is needed on top of the existing storage facilities. The additional potato starch storage extends the period that KMC can process potato harvests, which leads to increased production.

PROVEN CONCEPT

Following the successful commissioning of the world's largest potato starch silo in Karup in 2016, KMC asked ESI Eurosilore to



design, assemble and install identical equipment for a newly build silo to be ready end of this year. The input mechanism exists of screw conveyor with slewing bridge and augers on an auger frame. Reclaiming of the very fine particle material is done by the same augerframe functioning in reversed direction to a central shutter column. The equipment is designed to handle 60,000-tonne stored potato starch with an input and output rate of 50tph (tonnes per hour).

MAKING THE DEADLINE

As a result of the tight deadline, Eurosilore is now in the process of manufacturing the mechanical and electric parts. In the coming weeks, everything needs to be assembled, tested and accepted by KMC. Shipment and delivery at the building site is scheduled for end of May. Hoisting the silo equipment into the currently build silo, is scheduled in June. ESI Project Manager Jan-Erik Dijkman says: "The co-operation with KMC runs smoothly, so decisions can be made quickly. To make the deadline we partner with reliable subcontractors who are capable to work under time pressure. Our job is to stay on top the project, from design to commissioning."

THE VALUE OF FGD GYPSUM

Reducing emissions of sulphur dioxide from

coal fired power plants has one side effect that adds to the obvious environmental benefits. The flue gas desulphurization process produces high quality FGD gypsum. Compared with mined natural gypsum, the industrially produced gypsum is more pure and therefore offers a wide range of environmentally friendly applications.

This turns the output of flue gas desulphurization into a basic material for industries around the world. From agriculture for soil improvement to panel products in construction, cement production, water treatment or glass making.

COST-EFFECTIVE OPERATION

Turning the production of FGD gypsum into a cost-effective operation does however present strong challenges at operational plant sites. The wet output from the desulphurization installation needs to be transported to a facility where

it can be dewatered. From there on, the FGD gypsum needs to be stored at another facility and ready to be loaded into trucks. This requires ground space that is usually not available. Also operators, power shovels and transport are needed. The main issue is: how to achieve cost and space saving logistics for this by-product of desulfurization?

THE ALL-IN-ONE EUROSILO CONCEPT

To answer up to these challenges, we have developed a compact solution that has been adopted by numerous coal-fired power plants. The Eurosilore concept incorporates three functions into one unit, requiring only a third of the ground space. Dewatering, storage and load out are all located in one building with a fully automated silo system. This adds up to a huge advantage.

Instead of a separate dewatering, storage and load out facility there is a single cost effective solution. Next to that, the specially designed reclaim mechanism, based on the slotted central column, offers high reliability in handling FGD gypsum or other cohesive material. Compared to conventional mass flow silos with a discharge plough feeder system, the Eurosilore increases the storage period from a few days to over three months without the risk of blockages.

DC

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