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Iron ore trade expanding briskly

Within many commodity trades, positive influences are supporting imports into a wide range of countries. Prospects for the remainder of 2014 and into next year seem broadly favourable, although some indications point to a possible slackening of grain import demand over the twelve months ahead.

Benefits from reviving global economic activity are envisaged. A recent OECD analysis suggested that economic recovery could strengthen moderately this year and next. World GDP growth is forecast at 3.4% in 2014 (compared with last year's reduced 2.8%), followed by a further improvement in 2015 to 3.9%. Significantly, an improving overall trend is predicted despite expectations of a continued slowing in China.

IRON ORE

The outlook for global seaborne iron ore trade during this year as a whole is encouraging. As emphasized in table 1, however, most of the additional import demand estimated is likely to originate in China. Incremental volumes in the other main importing countries probably will be quite modest.

Positive steel industry performances among raw materials importers are shown by figures for crude steel production in the first four months of 2014. World Steel Association statistics reveal that European Union steel output was 6% higher, compared with last year's same period, at 58.5mt (million tonnes).

In Japan, a 2% rise to 36.5mt was achieved, but South Korea saw much faster 8% growth to 23.8mt. China's production was 3% larger, at 271.9mt.

COAL

Numerous coal importing countries look set to purchase higher volumes in the current year. While the focus remains firmly upon Asian buyers, where potential for rising volumes is clearest, other buyers are contributing as well. Some European purchasers may need additional quantities.

In Japan, which is still one of the largest coal importers, receiving about one-sixth of the world total (almost 192mt last year), two annual increases could be followed by

another rise in 2014, according to estimates. Although there is a possibility that several nuclear plants may resume power generation, with potential adverse effects on coal requirements, the timing is uncertain, and coal may not be the first alternative fuel to be displaced.

GRAIN

Predictions of global grain trade in the twelve months ahead are still subject to great uncertainty. In particular, upcoming harvests of wheat and coarse grains in Europe, North Africa, the Middle East and China will have a huge influence on imports. These crops remain dependent upon unpredictable weather. There are no signs currently of any large crop shortfalls, but conditions may change.

A tentative early forecast by the International Grains Council suggests that world grain trade could decrease slightly in 2014/15 starting July. After a very robust 12% increase during the year now ending, raising the total to 297mt, a 3% reduction is envisaged. Lower imports into China is the main negative element foreseen, accompanied by only limited changes elsewhere.

MINOR BULKS

One of the principal elements of the minor bulk sector is forest products trade, consisting of logs, sawn woods, wood chips and pulp and many other items. World seaborne forest products trade appears to have grown solidly by about 4% last year, reaching about 190mt. Additional volumes into key countries in Asia and Europe could enable trade to increase by a similar amount in 2014.

BULK CARRIER FLEET

Among bulk carrier sectors continuing to expand rapidly is the Handymax (40-64,999dwt) size group. This fleet's progress is shown in table 2. Lower newbuilding deliveries are likely during 2014, compared with last year, but scrapping could diminish as well. As a result, the world Handymax fleet's deadweight capacity could grow by 7% this year, only marginally less rapidly than seen in the previous twelve months.

TABLE 1: KEY IRON ORE IMPORTERS (MILLION TONNES)

	2009	2010	2011	2012	2013	2014*
China	628.3	619.1	687.0	745.5	819.4	880.0
Japan	105.5	134.3	128.4	131.1	136.5	138.0
EU-15	74.9	106.4	102.0	99.0	101.0	104.0
South Korea	42.1	56.3	64.9	66.0	63.4	65.0
Taiwan	11.9	18.9	20.5	18.5	21.0	22.0
Total of above	862.7	935.0	1002.8	1060.1	1141.3	1209.0

source: BREE, Bulk Shipping Analysis *BSA forecast

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

	2009	2010	2011	2012	2013	2014*
Newbuilding deliveries	10.5	19.0	22.0	20.8	14.6	13.5
Scrapping (sales)	1.4	0.4	2.2	4.7	3.5	2.5
Losses	0.0	0.2	0.1	0.1	0.0	0.0
Plus/minus adjustments	0.2	-0.2	0.1	0.0	-0.2	0.0
Fleet at end of year	92.9	111.1	130.9	146.9	157.8	168.8
% change from previous year-end	+11.1	+19.7	+17.8	+12.2	+7.4	+7.0

source: Clarksons (historical data) & BSA 2014 forecasts *forecast

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



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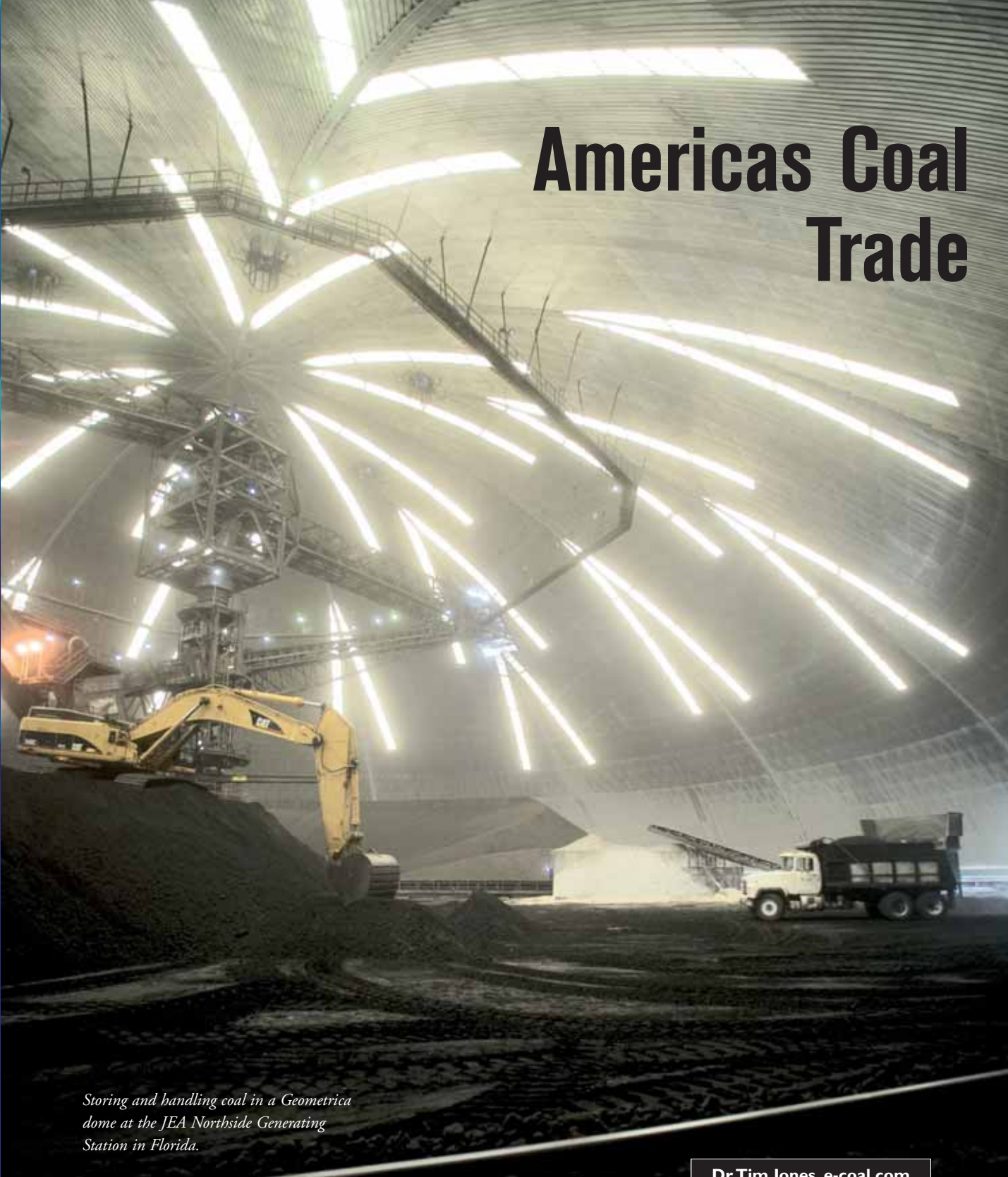
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Americas Coal Trade



Storing and handling coal in a Geometrica dome at the JEA Northside Generating Station in Florida.

Dr Tim Jones, e-coal.com

The start of 2014 was a quiet one for coal shippers in the Americas as international coal markets took a while to warm up. With 1 January falling in the middle of the week there was little trade reported before the holiday, and there was a quiet start as players returned to work.

Ongoing severe weather in the north Atlantic had been impacting port operations in Europe and North America during early January. Shipping had also been disrupted, with coal loading and deliveries being delayed. Most of that tonnage is understood to have been for contract deals, but with some spot purchases due for loading and delivery at the time as well. The spot price of thermal coal in Europe had been subdued, with an expectation that Colombian supply would be sufficient. The

market was aware, however, that Drummond was unable to load coal at the time following reports of an order to halt loading activities due to the issue over new legislation on barge loading. There were signs that the thermal coal spot price in Europe may have been firming as a result, and this was expected to have a knock-on effect on the spot market elsewhere. The Atlantic thermal coal spot price had started the year about US\$3/t FOB (free on board) lower than in mid-December. Pacific and Asian thermal coal spot prices were about US\$2/t less. Although the market appeared to be weak, the few signs seen in early January suggested that a slight firming was more likely than further falls during the course of the month. A flurry of trade was expected for some Pacific shippers in the Americas ahead of the Chinese

PROMPT SPOT PRICES FOR THERMAL COAL 2013

(US\$/t)
(FOB basis 6,700kcal/kg GAD) ash, 15% max, sulphur
1% max

Location	17 May 13	10 May 13	% change
South Africa	81.00	82.60	-1.94
Colombia	82.00	83.70	-2.03
Venezuela	82.00	82.0	0.00
Russia Baltic	81.35	82.70	-1.63
Poland	81.40	82.80	-1.69
Newcastle	88.00	87.50	0.57
Queensland	88.60	88.00	0.68
China	92.20	91.75	0.49
Russia East	91.00	90.70	0.33
Banjarmasin	77.40	77.00	0.52
Mahakam	79.10	78.70	0.51

Prices are FOB vessel except Banjarmasin and Mahakam River which are FOB barge Source: e-coal.com

PROMPT SPOT PRICES FOR THERMAL COAL 2014

(US\$/t)
(FOB basis 6,700kcal/kg GAD) ash, 15% max, sulphur
1% max

Location	16 May 14	9 May 14	% change
South Africa	76.75	75.80	1.25
Colombia	75.50	75.00	0.67
Venezuela	76.00	75.75	0.33
Russia Baltic	78.00	76.80	1.56
Poland	78.10	77.00	1.43
Newcastle	74.50	73.00	2.05
Queensland	75.20	73.70	2.04
China	93.00	92.00	1.09
Russia East	78.85	77.50	1.74
Banjarmasin	70.10	68.80	1.89
Mahakam	71.55	70.00	2.21

Prices are FOB vessel except Banjarmasin and Mahakam River which are FOB barge Source: e-coal.com

New Year holiday, with a lull during that time at the end of the month. The coking coal markets around the world had been quieter during the holiday period with limited demand seen in the spot markets. In the US domestic markets, however, the price of Central Appalachian thermal coal firmed as a result of higher natural gas prices in the USA.

Limited demand led to a further softening in the spot markets in the early part of 2014. Atlantic supply was impacted by government suspensions of coal operations in Colombia, and more than 6mt (million tonnes) of thermal coal exports were estimated to have been lost during the first quarter of this year. There were substantial decreases in the freight rates in mid-January, with Capesize rates falling significantly on the coal route from Hampton Roads to Rotterdam.

At the time, the spot price of low vol hard coking coal in the international market from the USA was hovering around a small discount to that of the indicator brand in Australia. This suggested an indicator spot price at Hampton Roads of about US\$131.80/t FOB which was some 50 cents down compared with the previous week. The spot price had decreased by a couple of dollars since the end of 2013. Spot deals were rare at that time, and sellers were involved in negotiations for quarterly contract supplies. They were therefore offering any tonnage in the spot market at prices in the high US\$130s per tonne FOB which was well above what European steel makers might have been interested in. They appeared to be concentrating on blending coal for the best economic result in their operations.

In the USA in January, JEA Northside issued a tender seeking 105kst of thermal coal for delivery in 35kt cargoes during April to June to the Northside Marine Facility in Florida. Coal specifications included CV 11,000Btu/lb (min) and ash 18% (max).

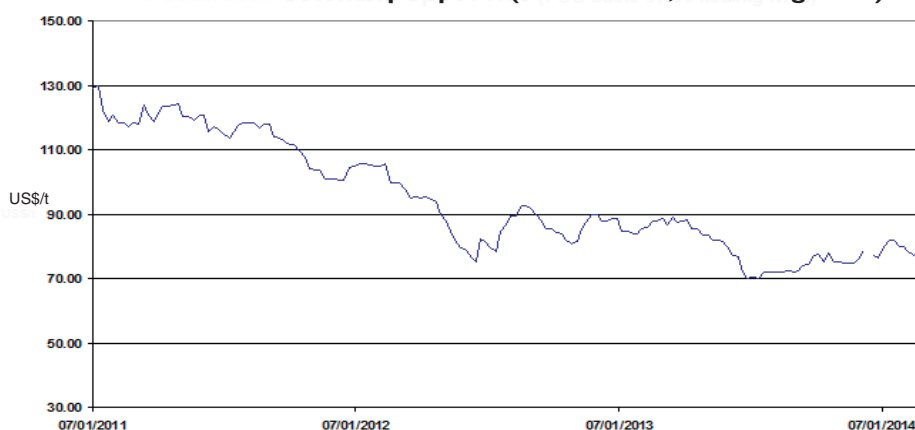
In Colombia in January, Drummond declared *force majeure* following an order by the government to suspend its barging and floating crane loading operations. An analysis at the time suggested up to 6.5mt of coal exports could be affected during the first quarter of 2014. It was also uncertain if Drummond's new port could be commissioned by 31 March, with a capacity of 60mtpa (million tonnes per annum). Meanwhile, in the USA the Arctic vortex led to freezing conditions in north America during January, with coal operations along the entire chain being affected. Conditions did not warm up back to normal until later in the month.

Thermal coal spot markets remained relatively quiet in all regions, but there had been a number of spot tender enquiries in Europe and Asia. The restrictions on Colombian supply saw further rises in the coal price in the Atlantic. As work resumed after the new year break, performance data for 2013 began to emerge, with records being set in some cases amid the apparent weakness in the commodities sector. Freight rates continued to decline on the major coal routes, except for the USA – Europe trips across the Atlantic.

In the USA, Southern Co issued tenders seeking a total of 4.5mst (million short tonnes) of coal. A spot tender requested offers for 1.5mst for delivery to several power stations during March to June, and there was a term tender seeking 1.5mstpa during 2015/2016. Imported coal would be considered, and specifications included CV 11,000Btu/lb (min).

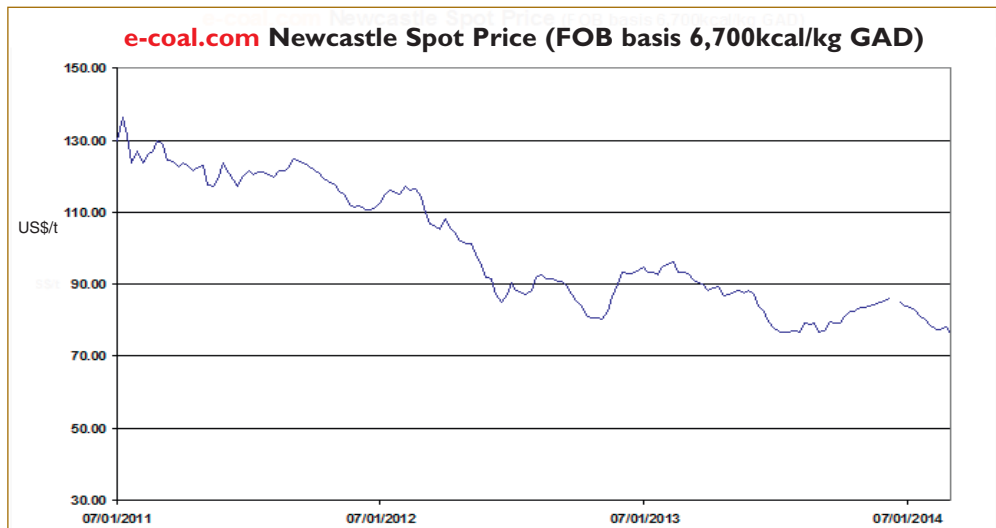
The Colombian government imposed a fine of US\$800,000 on Drummond for continuing to load coal at its floating crane and barge facility in January. All coal exporters were required to have direct

e-coal.com Colombia spot price (FOB basis 6,000kcal/kg NAR)



loading ports by 1 January 2014, and Drummond's loading operations were suspended on 13 January.

As February approached, a thaw in the US east coast ports was expected to relieve the freezing conditions which impacted coal operations there, and through much of the country. European spot market activity was still lacklustre, with some more seen in the eastern Mediterranean and Black Sea markets. Freight rates had eased again on all the major coal routes for Panamax and Capesize vessels. Overall, a softening in the spot price of thermal coal, and of freight rates had led to lower delivered prices into all areas around the world as February got under way. Hard coking coal prices had also been softening in the main



spot markets in Queensland and the USA.

While Drummond was restricted in its coal exporting from Colombia, there were reports that some European buyers had decided to wait for the miner to return to the international

E-COAL.COM INDICATOR PRICES

(CIF basis 6,700 kcal/kg GAD)
16 May 2014 and 9 May 2014

Europe – ARA	83.30	82.70	0.73
Asia	76.25	74.90	1.80

Source: e-coal.com

E-COAL.COM INDICATOR PRICES

(CIF basis 6,700 kcal/kg GAD)
17 May 2013 and 10 May 2013

Europe – ARA	87.30	89.00	-1.91
Asia	90.80	90.40	0.44

Source: e-coal.com



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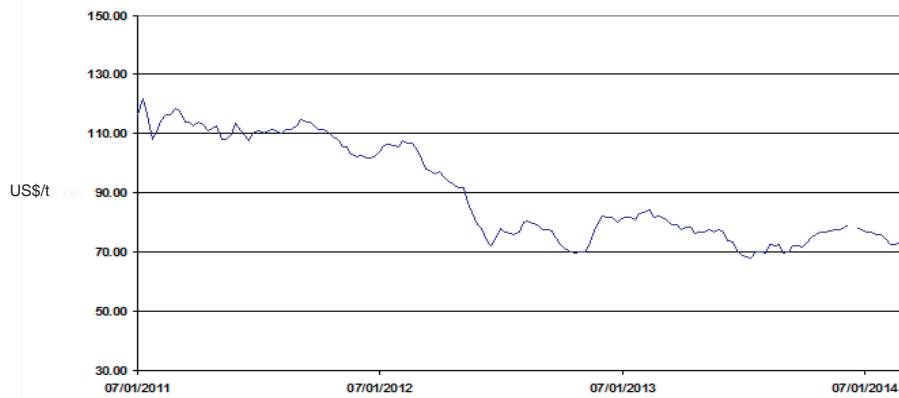
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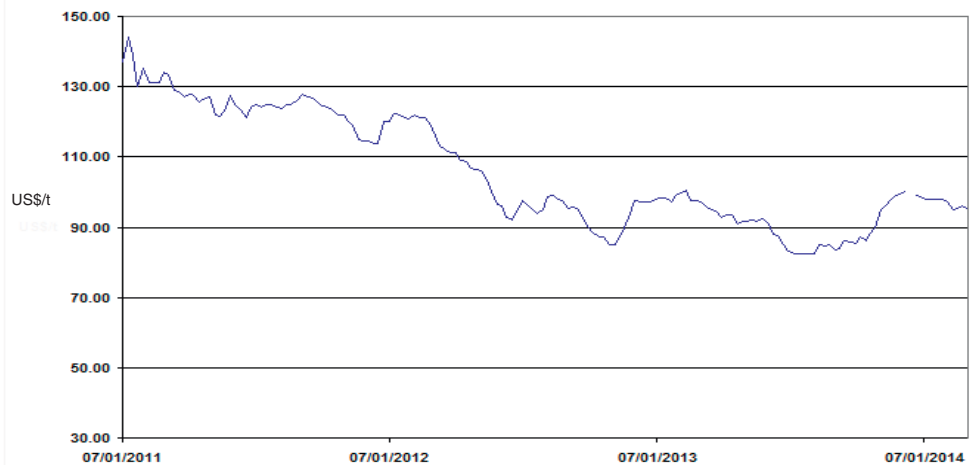
e-coal.com Mahakam River Spot Price (FOB barge basis 6,700kcal/kg GAD)

market in the expectation of lower prices after that. Freight rates turned around in early February, influenced by the stoppage at Richards Bay Coal Terminal which affected at least 1.5mt of coal vessel capacity and caused a backlog of shipping.

Alpha Natural Resources was reported to be planning to open a new sales office in London which was to be headed up by Nick Ingham. The company would be targeting European customers for Central Appalachian coal in the coming years, and Ingham has relevant experience from his work with Drax in the United Kingdom.

In the freight market towards the end of February, the Panamax rate on the US Gulf to the ARA ports route decreased by more than US\$2/t or almost 13%. The rates on the other main coal routes firmed, with the Capesize route from the US east coast to Rotterdam rising by some 3.5%. It was expected that loading of Panamax vessels would resume at Puerto Drummond after the middle of March. The new direct loading facilities were expected to be ready by then, but Capesize vessels were not expected to be loaded until later in April. This

on most of the major coal routes jumping by over 10%. In contrast, the Panamax rates on the major coal routes had softened slightly. New business for Colombian coal in particular was believed to have been done in the US thermal coal markets at the end of February. This had some influence on vessel

e-coal.com China spot price (FOB basis 6,700kcal/kg GAD)

availability in the spot freight market. Vessel congestion in the US Gulf area was also impacting freight rates. According to the U.S. Energy Information Administration in a report in February, the importance of coal exports would continue in the years to come despite the decrease in tonnage and value recorded in 2013.

e-coal.com Banjarmasin Spot Price (FOB barge basis 6,700kcal/kg GAD)

news served to ease concerns about supply in the coal markets at the time, and prices softened in the north Atlantic as a result.

Demand for thermal coal in Europe appeared to be limited to Russian, Colombian, and some Polish at the end of February, with the US exporters understood to be seeing little interest in their coal at the time. There had then been some strong rebounds in the freight market, with Capesize rates

Global coal demand and production challenges in China and India, as well as Australia, Indonesia, and South Africa will drive the US coal export sector. Modest growth in US coal exports is forecast to reach 160mst by 2040.

In parts of Asia there has been firmer demand for coal from north America over the past year, as reported in the Canadian port data published in early March. Neptune Terminals and Westshore Terminals reported a total of 38.1mt of coal was exported in 2013. This was an increase

OCEAN SPOT FREIGHT RATES (US\$/T) 2014

Route	Tonnage	16 May	9 May	% change
USG/ARA	65,000t	15.05	14.20	5.99
Roberts Bank/ARA	55,000t	21.20	21.10	0.47
HR+RB/Japan 16m	120,000t	24.85	25.00	-0.60
HR/Rotterdam	110,000t	9.95	9.90	0.51
Bolivar/Rotterdam	130,000t	9.05	9.00	0.56
Queensland/R'dam	130,000t	12.90	13.15	-1.90
Rich'ds Bay/R'dam	130,000t	8.10	8.35	-2.99

Source: e-coal.com

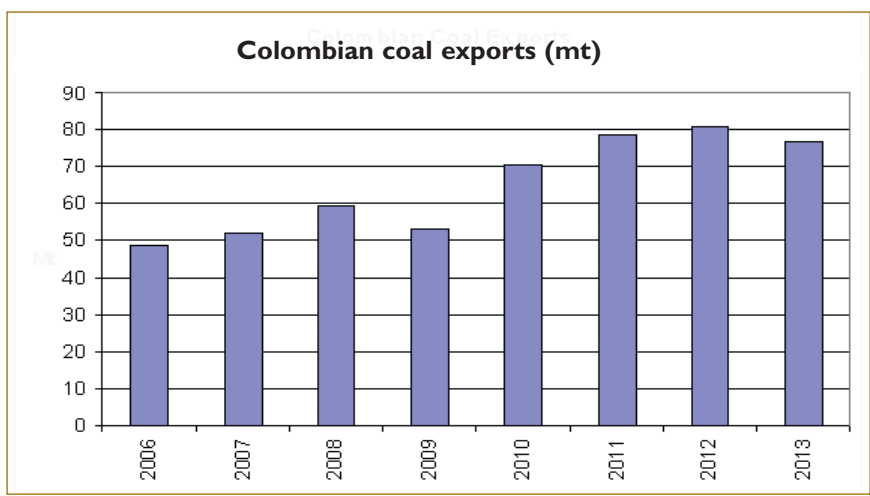
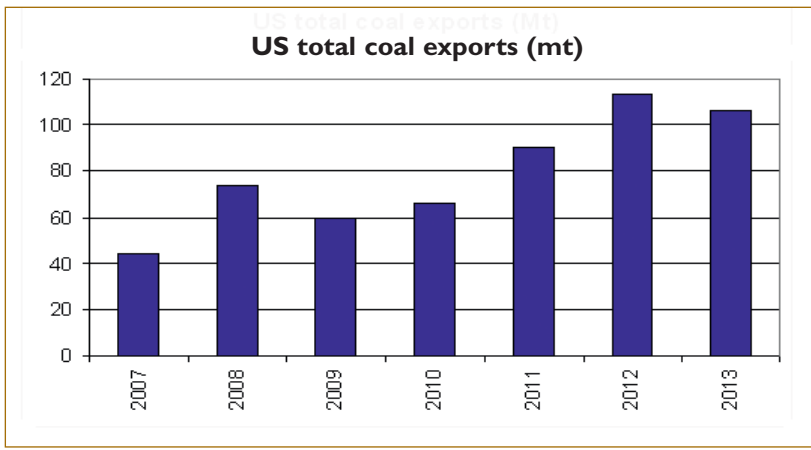
OCEAN SPOT FREIGHT RATES (US\$/T) 2013

Route	Tonnage	17 May	10 May	% change
USG/ARA	65,000t	15.00	15.40	-2.60
Roberts Bank/ARA	55,000t	20.00	20.55	-2.68
HR+RB/Japan 16m	120,000t	24.50	24.75	-1.01
HR/Rotterdam	110,000t	8.60	8.75	-1.71
Bolivar/Rotterdam	130,000t	8.40	8.60	-2.33
Queensland/R'dam	130,000t	13.05	13.00	0.38
Rich'ds Bay/R'dam	130,000t	6.50	6.50	0.00

Source: e-coal.com

of 5.4mt or 17% compared to the total recorded in 2012. Of this total, coking coal contributed 25.9mt which was an increase of 3.3mt or 14% compared to the previous year. Thermal coal exports increased by 2.1mt or 22% to reach 11.9mt. The Asian markets proved stronger for the exporters through the port in 2013.

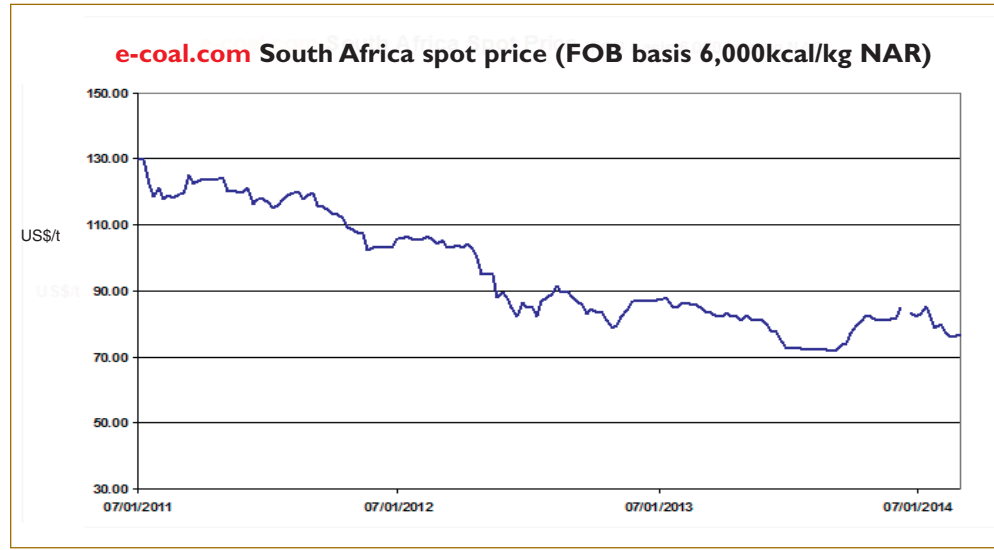
The European market had been reacting to the situation in Ukraine at the time, and concerns about the security of gas supply in Europe caused an increase in its price which led to a firming of the coal price at the start of March. The spot price of thermal coal in the Atlantic softened after tensions eased somewhat, but remained firmer as the situation continued



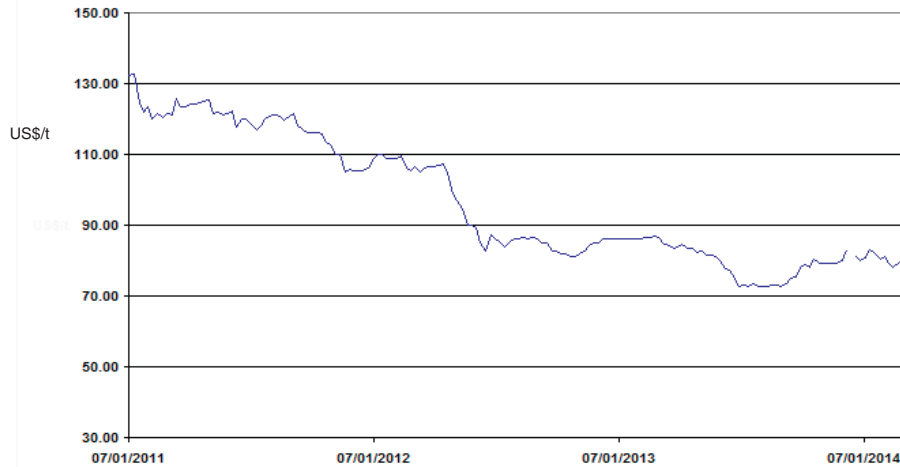
to be uncertain. Coal trade in the Black Sea markets had been particularly challenging, and US and Colombian exporters stood poised for more business as buyers sought more diversity of supply sources. In the freight market, the Atlantic Capesize rates soared amid the Ukraine crisis.

The Atlantic thermal coal spot market started March with some firming as trade picked up. The first quarter of 2014 had seen some activity in the spot market in the region, but most of the tonnage being

shipped appeared to be related to contract deals in Europe and the Mediterranean area. Spot prices have remained historically weak and in a relatively narrow trading range. There were some signs that a firming in the spot price for delivery to the northwest Europe ports could occur during the second quarter, with shipments for May picking up in deals at the time. Concerns about the supply of coal from Colombia remained a key factor in the spot market in the north Atlantic. Buyers from several consumers in Germany, Turkey, and the United Kingdom were understood to be in the market for prompt tonnage. Coal stocks on the pads at the ARA ports were reported to have decreased during March,



e-coal.com Russia (Baltic) spot price (FOB basis 6,700kcal/kg GAD)



traders were said to be less willing to sell at lower prices just yet. European activity in the spot market remained lacklustre as coal burn had been lower amid the milder spring weather. Coking coal contract talks were still ongoing in Asia amid indications of lower spot prices and a weakening market, and the American shippers awaited the outcome.

In the infrastructure sector, reports suggested the Fenoco Rail line could link up with the Central Railway System by the middle of next year. The system is currently

and needed to be replenished. The spot market for coking coal around the world has not seen much more activity since the start of the year, and prices have continued to soften. Demand in regions outside China and India has not been strong, so the American coking coal exporters have been unable to forge better deals elsewhere.

In Colombia in March, Drummond had begun ramping up production in an effort to catch up with lost shipments during the stoppage at its loading facilities since early January. Similar reports had been received that Cerrejon Coal was also boosting output. Consumers remained jittery about Colombian coal supply, however, and this had been reflected in price volatility in Europe over the month. Meanwhile, the new Puerto Brisa facility in Colombia was to be commissioned in April. The port has the capacity to accept Capesize vessels.

As the Atlantic market was waiting to see if Drummond resumed coal loading in April, it was sending mixed messages to buyers and sellers. Some market sentiment suggested the price should have been softening due to the likely improvement in supply. Wary of being caught out if coal loading was delayed, however, the sellers and

undergoing upgrades. Once the coal line is linked up, the coal producers in central Colombia would be able to rail their coal to the ports on the Caribbean coast to the north.

By the end of March in the Atlantic thermal coal spot market a recovery in Colombian supply was perceived, and some

Canada's coal exports (mt)



suggested there could be an additional 5–6mt of coal exported this year compared to last. Drummond opened its new coal port on 29 March.

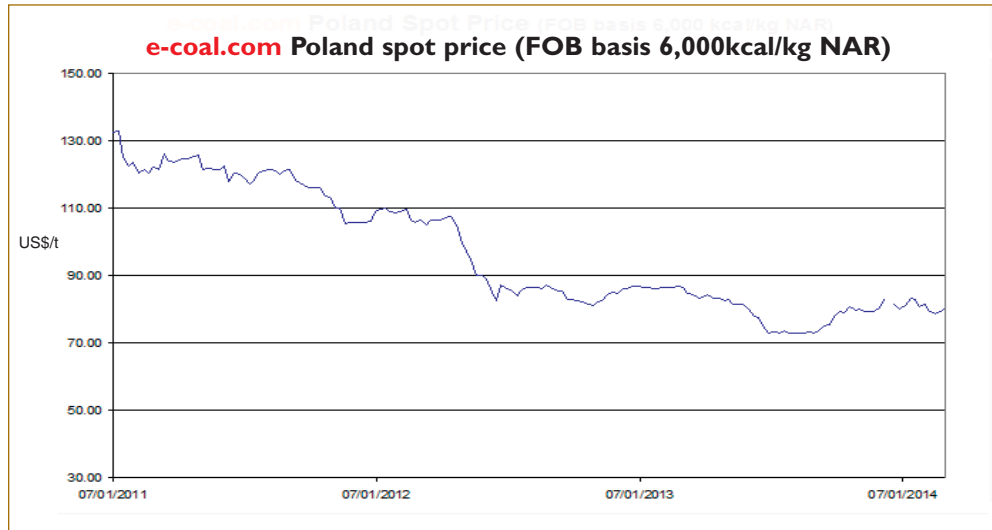


The Atlantic spot market for thermal coal saw a few trades done at the beginning of April, with European buyers showing activity through electronic platforms for cargoes required in May. In the freight market, rates softened on the major coal routes for both Capesize and Panamax vessels. The Capesize rate on the Bolivar – Rotterdam route decreased by 10.64% and this was influenced by the start of coal loading at Drummond's new facility which eased constraints on shipping in that area. Meanwhile in Europe there had been indications that some buyers had been considering their options regarding additional Colombian, Polish and US coals due to the potential situation with Russian supply following the Ukraine crisis. The US utilities started to come into the market, and Jacksonville Electric Authority issued a tender seeking up to 550kst of coal to supply its Northside power station in 50kt cargoes during June to September. Specifications included CV 11,000Btu/lb (min), and imported coal in Panamax vessels can be received at St John's River Coal Terminal. Southern Company was in the market seeking up to 4mst of coal for delivery this year. Imported coal can be accepted in Handymax or Panamax vessels, with the overall tonnages being 2.5mst during Q3 2014, and 750kst during each of Q2 and Q4. Specifications include CV 11,100-13,000 Btu/lb and ash 8% (max).

During April, it became more apparent how major coal market players have been ceasing their activities in recent months, and this was likely to have an effect on some aspects of the international coal sector. Among these companies are Cargill, Deutsche Bank, Koch Carbon, Merrill Lynch, and Total. Overall they had significant influence in the coal business, but have been operating in difficult conditions, particularly since the financial crisis.

Drummond was ramping up its new direct loading port facilities in April. Initial cargoes served as test material for the new equipment, with the operator finding performance to be better than expected during the first few days. By the end of this year the new port is expected to have a capacity of 60mtpa.

During April, lower spot prices for thermal coal in the international market coupled with low freight rates prompted some US consumers to enquire about new tonnage in the spot tender market. They are believed to have been aiming for offers of delivered prices in the mid-US\$70s per tonne basis



6,000kcal/kg NAR. Canada's Nova Scotia Power was in the market with a tender seeking up to 200kt of low sulphur and low ash thermal coal.

Germany's coal imports increased in 2013 to reach 50.6mt.



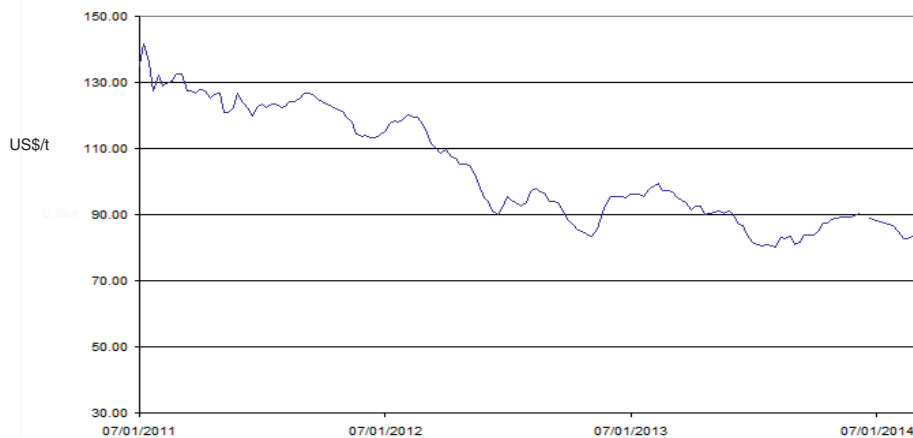
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e-coal.com Russia (East) Spot Price (FOB basis 6,700kcal/kg GAD)

This was 6.7mt or 15.3% higher than in 2012. The main supplier to Germany last year was Russia, with 12.5mt or 24.7% recorded, closely followed by the USA with 12mt or 23.7%. Higher coal burn in the wake of the nuclear closedown after the Fukushima disaster in Japan had been expected.

During May, the Atlantic spot market has been weaker with the main buyers in Europe showing little interest in prompt trade.

Coal stocks are understood to be adequate at present, and the approach of warmer weather is seeing lower coal burn.

Colombian supply is believed to be satisfying most European and US

import demand at present. US interest in imported coal on term contract basis is continuing with new enquiries announced. In the domestic market, Southern Co has been seeking sub-bituminous coal from the Powder River Basin with offers on a FOB mine basis. There were two options, with the first seeking up to 400kst per month during June to September 2014. The second option sought up to 400kst for delivery during October to December 2014. East

Kentucky Power was seeking up to 1.44mst of coal to supply the Spurlock power station. Delivery of 40kst per month for at least three years starting in January 2015 is required. Specifications include CV 11,000Btu/lb (min).

After a disrupted start to 2014, Colombian coal mining appears to be performing more strongly than has been thought. The government has released the latest statistics for Q1 2014 which indicates that total coal

output reached 24.55mt which was an increase of more than 33% compared to the 18.4mt recorded in the same period last year. The data from the National Mining Agency is comprised mainly of production from the big three miners operating in the country; Cerrejon, Drummond, and Glencore. The total for Q4 2013, however, was higher at 25.5mt and was during a period before the loading ban affected Drummond, as well as no disruption from industrial action.

At the time of writing, there have been strong signs that the long recession and global economic downturn is finally over. This is good news for the commodities sector which has been hit particularly hard over the past few years. Some major miners are now looking to invest in growth as they perceive the economic climate is improving. During the course of 2014 and beyond, we could see some real improvements in the international coal industry compared to the past five years or so, and the slump in stock market values of many coal companies could begin to recover. On another optimistic note for the Colombian miners, coal production and transport could be set to improve, from a weather perspective. Forecasters have suggested that the El Nino phenomenon will cause drier weather during the second half of 2014. So, the

climate could be changing in more ways than one. **DC**

Dr Tim Jones is Director of e-coal.com Consultancy and Editor of the weekly publication Coal Market Intelligence which covers 11 spot markets worldwide, gives key information on the latest deals and tenders, company news, people and jobs, industrial relations, and ports, shipping, and freight rates.

Venezuelan coal exports (mt)**e-coal.com Venezuela spot price (FOB basis 6,000kcal/kg NAR)**

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BLL wins another FTS contract

Bedeschi has received an order for the implementation of another Floating Transfer Station (FTS) for coal blending and loading in Indonesia (Logmarin devised the FTS to be equipped with Liebherr cranes), the engineering of which is under way and supplies are scheduled to commence later this year.

The strong partnership of Bedeschi, Liebherr and Logmarin together can offer integrated services leading to successful project implementation and whenever the client requires, (BLL) provides comprehensive advice and technically sound products.

The pooling of skills and expertise of Bedeschi, Liebherr and Logmarin provides dependable, integrated, cost-effective software and hardware solutions, and eco-friendly solutions in dry-bulk supply chain logistics.

Liebherr is a family-owned company and one of the most reliable and experienced world-class crane manufacturers. Fast handling, reliability and superior technology make Liebherr a leading maritime cranes supplier with tailor-made solutions for operations for any vessel, quayside, barge, transshipped and handling container, bulk cargo, pallet and

heavy lifts.

Logmarin Advisors, together with its sister company D'Appolonia, is the consulting & engineering advisory company of RINA Group (Italian Classification Society, IACS member). Logmarin Advisors is specialized in shipping and maritime logistics.

A world leader in the floating terminal market, Logmarin's devised and commissioned floating cranes and floating terminals have handled over 65 million tonnes of cargo during the last 12 months.

Logmarin can provide integrated and comprehensive advisory and engineering services, in shore terminal, mining and industry logistics infrastructures providing the optimal solution at any stage of the marine supply chain delivering value to the whole project implementation.

In a more and more competitive and globalized world, foresight and planning are as important as knowledge and experience.

'Theoretical' knowledge has to be merged with 'on site' experience, in order to carry out effective and efficient design and implementation.

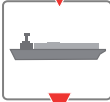
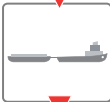
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Damen Shipyards Bergum ready for market recovery

The Damen shipbuilders in the Dutch province of Friesland will not just be sitting on their laurels after the delivery and christening of the two Damen Combi Freighters 3850 (the *Noordvliet* and *Zuidvliet*) and the Damen Combi Coaster 2500 *Anita*. "We are seeing a real market for smaller vessels and an interest in the vessels we build." The specialized yard, part of Damen Shipyards Group, is ready for a market revival.

This was what Remko Bouma of Damen Shipyards Bergum had to say about the developments in the maritime industry, in which Damen Shipyards plays a prominent role. This is because the Damen Group's shipyards have plenty to offer. The branch in Bergum contributes by building vessels in the 8200, 2500 and



DAMEN SHIPYARDS GROUP

Damen Shipyards Group operates 40 shipyards and repair yards, employing 8,000 people worldwide. Damen has delivered more than 5,000 vessels in more than 100 countries and delivers approximately 180 vessels annually to customers worldwide. Damen's unique, standardized ship design concept enables it 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 value and reliable performance. Furthermore, Damen vessels are based on thorough R&D and proven technology.



3850 series, as well as other products in its portfolio. The Combi Freighters 3850 *Noordvliet* and *Zuidvliet* have already been deployed in regular service from the Baltic States to the Black Sea, where their sister ships previously supplied by Damen have already proven themselves. The Combi Freighters 3850 generally transport project-specific, bulk and non-bulk cargoes. The *Noordvliet* and *Zuidvliet* showed what they could do on their maiden voyages, during which they transported parts and equipment for wind farms from Germany to the Mediterranean region. Both ships had cargo on both of their two cargo decks.

'ANITA'

Erik Schultz, the commercial director at Damen Shipyards Bergum, seconded his colleague Bouma's positive interpretation of the market, including while serving as master of ceremonies during the christening of the Damen Combi Coaster 2500 *Anita*. This sea/river vessel has been chartered by Vertom USC Holding, a Rotterdam-based tramp shipping agency. Among other things, *Anita* can transport 54 TEU or a total of 2,500 tonnes of dry bulk goods, steel, or other types of cargo. The sea/river vessel runs routes between the United Kingdom and ports in continental Europe. Through environmentally friendly features, in particular by flexibly deploying its main engine (which saves fuel) but other 'eco' measures as well, the vessel can be operated much more fuel efficiently than its predecessors in the same class.

This vessel and 'marine freight superbroker' (and former chair of the Dutch Marine Freight Brokers Association [Nederlandse Zeebevrachters Sociëteit]) Ary Vijfvinkel have something in common: *Anita* was named for Vijfvinkel's wife, Anita Vijfvinkel-Pevenage. Damen Shipyards and Vertom UCS Holding found this gesture to be a proper way to honour the man who for many years was the face of international marine freight brokerage. His wife *Anita* was proud to be able to assist with the christening of the vessel.



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 super yachts.

For nearly all vessel types Damen offers a broad range of services, such as maintenance, spare parts delivery, training and transfer of (shipbuilding) expertise. Finally, Damen offers a variety of marine components, especially nozzles, (flap-type) rudders, steering gear, anchors, anchor chains and steel works.

DAMEN SHIPREPAIR & CONVERSION

In addition to ship design and shipbuilding, Damen Shiprepair & Conversion offers a network of 16 repair and conversion yards worldwide, with dry docks ranging up to 420 x 80 metres. Conversion projects range from adapting vessels to meet today's requirements and regulations to the complete conversion of large offshore structures. DS&C handles 1,500 repair and maintenance jobs annually.

InterManager welcomes new protection for seafarers

InterManager, the international trade association for the ship management industry, has welcomed the adoption of new measures to protect seafarers against abandonment.

Amendments to the Maritime Labour Convention 2006, agreed at a meeting of the International Labour Organization in Geneva in early April, will ensure the provision of financial security systems to assist seafarers in the event of their abandonment and for compensation for seafarers' contractual claims for death and personal injury.

InterManager Secretary General, Captain Kuba Szymanski, said: "InterManager welcomes this protection for seafarers. As a percentage of the total international fleet, the number of ships abandoned is a very small amount. However, the tremendous effort demonstrated at this Special Tripartite Meeting, to resolve this weak link in the coverage of the Convention, sends a very clear and important message to the world: that we very much care for our global maritime professionals, our seafarers, who are the heart and soul of a ship."

The amendments now need to be approved at the June meeting of the International Labour Conference. If approved, they will require member states to ensure ships sailing under their flags maintain a financial security system to cover contingencies such as personal injury or death, long-term disability or abandonment. Vessels will be required to carry on board a certificate proving their coverage, in the form of either insurance, a national fund,

social security scheme or similar arrangements.

The amendments follow the first official Special Tripartite Committee meeting under MLC. Szymanski added: "We are grateful to the members of the Special Tripartite Committee for the tremendous effort and work which led to such concrete results. Coming to a resolution on the issue of abandonment further strengthens the MLC in the years to come."

Ship and crew managers consider the strengthening of the MLC to be an important boost to improving the recruitment and retention of seafarers. Szymanski said: "A strong Maritime Labour Convention document is a welcome development which sets the tone for providing a level playing field in the supply of seafarers, while guaranteeing better social benefits and living conditions on board."

"At the end of the day, having a solid governance document such as the MLC will be helpful in attracting future potential recruits into this profession. Given that shipping moves the world as the backbone of a global logistics supply chain, the MLC serves as an important tool that will go a long way to ensuring that the industry will continue to have the human resources needed to deliver on its mandate."

InterManager will continue to work closely with the Round Table organizations and other members of the Special Tripartite Committee to support the implementation of these MLC amendments.

Onboard management critical for vessel safety, says BSM

Attitude change is key to boosting shipping's professional image, says Rajaish Bajpae, Chief Executive Officer of Bernhard Schulte Shipmanagement (BSM).

Ensuring a robust and dependable safety culture onboard ship is essential to reducing large scale accidents at sea, which is why BSM has placed seafarer attitude-change at the heart of its loss-prevention strategy.

"Getting your onboard and shore-based management teams to embrace a loss-prevention mind-set is crucial to the industry goal of no injuries or loss of life, no damage or loss to cargo, no damage or loss to the ship, and no damage or loss to the environment," said Bajpae.

He added: "In BSM, we have an elaborate process to select our seafarers with the desired qualities for a career at sea. However, to ensure they have that moral duty (i.e. the 'attitude' and 'engagement') to themselves, their colleagues and the environment, we actively promote and embed a loss prevention mind-set which, through continuous learning and development, should further improve the way they work onboard."

According to Bajpae, the industry has to do what it takes to make shipping highly regarded as a professional, intellectually challenging and emotionally satisfying industry to work in. "It is important that we reinstall the pride in the seafarer's job and make today's youngsters dream of becoming a seafarer with the emphasis back on people. At BSM we entrust our top four officers and their teams with full accountability onboard because we believe it is essential to make them fully understand the very important position

they hold onboard our ships. This only serves to deepen their level of sense of identity, belonging, and involvement to be an active and recognized member," he said.

Placing quality, versatility and operational excellence at the heart of its operations has meant it is able to embrace a solution-centric approach to the needs of all its clients; a mantra which has created BSM into one of the world's leading third party ship managers, managing over 600 ships across all vessel sectors.

In an era of high demand for shipping skills, BSM provides an excellent concentration of shore and ship-based maritime and engineering expertise. The company believes in its people and its 19,000 employees, onboard and ashore, carry through its mission to assist responsible and demanding clients in achieving their business objectives through professionalism, dedication, enthusiasm and responsiveness.

Services BSM offers include:

- ❖ Crew Management and Technical Management through Bernhard Schulte Shipmanagement business and Commercial Management through Hanseatic Chartering;
- ❖ maritime catering through the Seachef operation;
- ❖ newbuilding and conversion supervision through the Schulte Marine Concept business arm;
- ❖ port agencies through Eurasia Port Agencies;
- ❖ vessel communication services through Teleaccount Overseas;
- ❖ travel through Eurasia Travel Network; and
- ❖ technology solutions through BSM Technology Solutions Delivery Centre (TDC).

Watching paint dry?

marine paints and coatings: more interesting than you might think

Marine paints find application in vessels of all kinds from luxury yachts to sea going cargo and passenger ships, writes Kunal Bose. Therefore, sales and margins of marine paints manufacturers at a given period will necessarily be decided to a major extent by the outlook for shipbuilding industry, which now is principally concentrated in China, South Korea and Japan. India is also making strides to emerge as a shipbuilder of consequence. The world shipping industry has been in the dumps for a long while. But now in a report published on 30 April, Moody's says the prospects for global shipping industry for the next 12 to 18 months have moved from negative to stable for the first time since 2011. At the same time, the report sounds the warning that the industry outlook could slip back to negative in case vessel supply exceeds demand by more than 2%.

The improvement in the shipping industry has come about on carriers postponing or cancelling new building contracts, idling ships and scrapping old, inefficient vessels and improved performances by economies in the West and Japan after being mauled by 2008's recession. It will, however, be foolhardy to underestimate the downside risks, which according to many observers, remain high as the order books of shipbuilders are once again rising. This is happening when growth in the world's biggest trading nation, China, has lost some steam. The Chinese economy grew at 7.4% in the first quarter of 2014, the lowest in 18 months. A spokesman for a leading marine paints manufacturer with a production base in India says "we are mildly enthused by forecast of World Trade Organization economists that global trade in 2014 will grow at 4.7% against the average growth of 2.2% in the past two years. Trade growth next year is forecast at 5.3%. For us, everything boils down to the volume of vessel space requisition by shippers for transporting goods across the globe."

Marine paints manufacturers are drawing comfort from a recent report 'Global Marine Coatings Market 2014-18' by Dublin based business intelligence agency Research and Markets, which

says coatings demand is to grow at a compound annual growth rate (CAGR) of 11.29% till 2018. One of the key factors to contribute to demand growth is the expected expansion of the oil and gas market. Oil and gas are the two growth engines of the world economy. At the same time, the report tells paints manufacturers to respond with speed to the growing consumer preference for eco-friendly products. Increasingly strict environmental regulations and more and more nations joining the global campaign to stop polluting the seas and save marine life will inevitably require of the marine paints industry to go on providing big funds for research and new products development. A member involved in preparation of the report is quoted as saying, "the increase in consumer preference for eco-friendly products is an important trend being witnessed in the global marine coatings market... Makers of marine coatings, which include anti-corrosive, anti-fouling and foul release products, are engaged in fine tuning and developing new and eco-friendly coatings to comply with increasingly strict regulations." The industry is responding fairly well to make products that protect the marine ecosystem. The underlying message of the report is CAGR of 11.29% will be achievable provided the industry remains unrelenting in making environment friendly marine coatings in line with national and international regulations.

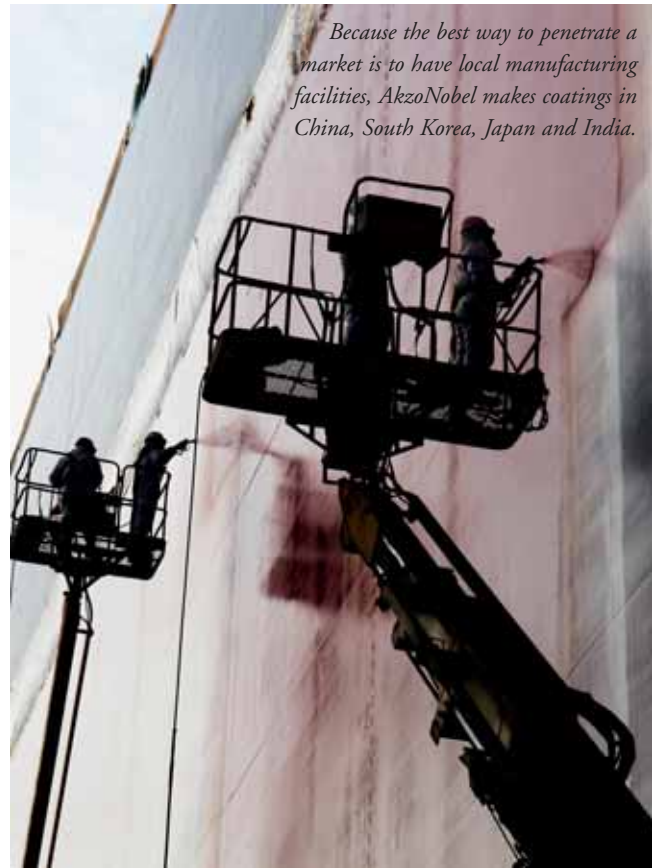
Marine coatings are required to be designed with particular functionality properties to adequately protect and preserve the surfaces of vessels to which these are to be applied. At the same time, increasingly rigorous demand is made on coatings manufacturers to make products which will not foul marine environment but contribute to economy in fuel consumption. Margins of shipping companies remain under pressure even while bunker fuel prices are down to around \$600 a tonne from a high of nearly \$720 a tonne in February 2012. Ship owners have employed all possible mean, like slow streaming (involving operating vessels at reduced engine power and substituting old fuel inefficient capacity by new generation fleet to cut their fuel

bill). Even then, better coating of the outside bottom and sides of ships is still required to trim the fuel bill. For example, in case coatings are not found good enough to stop barnacles from latching onto ship hull, the inevitable result is slowdown of the vessels sending the fuel bill up by as much as 40%. So technologically superior and environmentally friendly paints that keep ship hulls barnacle-free offer two benefits. First, the shipping industry makes a considerable saving on fuel head. Second, because of less use of fuel, sea water and marine life will avoid the kind of assault of the past. Environmentalists say that as new age ships with ideal coatings will be carrying fewer barnacles than before, native species will not be threatened by foreign species.

Responding to the demand of shipyards, Nippon Paint Marine Coatings introduced in April 2013 an ultra fuel saving type anti-fouling paint called A-LF-Sea, which is a marked improvement on the earlier LF-Sea type. Users of A-LF-Sea have confirmed that application of the coating leads to reduction in frictional resistance and therefore, of vessel fuel consumption and CO₂ emissions. The other industry leaders like AkzoNobel, Jotun, Chugoku, Kansai and PPG Industries have in recent periods introduced market coatings that allow vessels to sail with less frictional resistance. AkzoNobel first asks the question as to what could be major expectations of shipbuilders and ship owners from paints suppliers and then gives the answers, obviously based on customer feedback. Customers will gravitate to those paint makers who will stand by their products through the life of a vessel. Equally importantly they want “an attractive end result — a paint job that’s durable, polished and professional looking.” The bottom-line in all cases is, however, the likely environmental impact of paint products. The friendlier they are environmentally, the better their marketability will be.

American Coatings Association says the path-breaking development over the last few decades was the 2008 ban on organo tin tributyltin (TBT) compounds used as active ingredients in antifouling coatings. Copper-based coatings came as replacements. But soon concerns were expressed and rightly so over dissolved metal in bays and basins. This threw challenges to R&D centres of paints manufacturers to develop new sets of fouling protection coatings without any biocide. Progress in this direction is satisfactory. Take, for example, AkzoNobel’s Intersleek I100SR fouling control system, which is the first biocide free foul release addressing the issue of slime fouling on ship hulls. The company claims that Intersleek delivers “macro and micro fouling control with improved static resistance even in warm waters and is suitable for slow steaming.” As the movement of the ship through water can release slime built up during static periods, the vessels achieves less drag leading to improvement in fuel efficiency and reduction in CO₂ emissions.

Thanks to AkzoNobel coming up with a breakthrough digital tool Intertrac, it is now possible to accurately assess the risk of hull fouling depending on journey routes of vessels. The company explains the tool is designed to “analyse various data systems” the results of which are then used to prepare the fouling risk profile of a vessel. Armed with such a profile, paints manufacturer will develop a “coatings system appropriate to a vessel’s specific route.” Such coatings will improve operational efficiencies and running costs of ships. Awaiting patents codification, Intertrac software divides the world’s oceans and coastal waters into 60 large marine ecosystems, each with its own fouling risk and characteristics, including salinity, temperature, thermal range, seasonality and typical ph levels. According to Conrad Keijzer, executive committee member at



Because the best way to penetrate a market is to have local manufacturing facilities, AkzoNobel makes coatings in China, South Korea, Japan and India.

AkzoNobel responsible for performance coatings says “Interlac is a valuable tool enabling us to recommend optimal fouling control coating specifications which in turn generate major cost savings for customers.” Intertrac has created much excitement among shipbuilders and ship owners.

In response to growing competition to sell coatings as shipyards continue to nurse much idle capacity, paints manufacturers are giving extra attention to marketing and brand building. From AkzoNobel to Norway’s Jotun, every industry leader has the realization that the best way to penetrate a market and then raise share of that market is to have local manufacturing facilities. So AkzoNobel is to be found making coatings in China, South Korea, Japan and India. European paints manufacturers have gone on expanding their production base in Asian countries in three ways — by creating subsidiaries, acquiring either local assets (factories) or local companies and forming joint ventures. “Vessels coatings are a high tech business and owners of such technologies are averse to parting with these. So their owners are necessarily keen to buy operational factories offshore or form JVs with management control,” says an official of Confederation of Indian Industry. China remains one of the foremost growth markets for paints manufacturers.

For example, AkzoNobel, which is targeting a turnover of \$3bn in China by 2015 has plans to allocate 15% or more of its global R&D budget to the Asian country in the next few years. Interestingly, the company’s R&D budget for China and India, where also AkzoNobel is highly active, is set to exceed that for Europe. The message that comes out loud and clear from Western marine paints manufacturers is that they must go on raising their manufacturing profile in Asia where shipbuilding and repairing capacity is concentrated. Jotun already had a share of 25% of Indian marine paints market built over two decades. Last year, it commissioned its manufacturing unit in India in the belief that this was the only way to improve its share of the local market growing at a healthy rate.

Hempel: a century of pioneering in the marine industry



Hempel was founded in Denmark in 1915 by Jørgen Christian Hempel. Driven by innovation and the vision of helping to protect man-made structures from corrosion and fouling, the company has developed and grown into a renowned coatings supplier working in the decorative, protective, marine, container and yacht markets.

In 1917, Hempel introduced the world's first antifouling coating for ships' hulls based on modern science and technology. Today, Hempel is among the world leaders within antifouling and fouling release technology, and retains a close bond with the scientific community.

BROAD RANGE OF PRODUCTS

"Hempel's coatings cover a wide range of applications, from marine, oil and gas and power generation to infrastructure and light industry in almost every country in the world," says Christian Ottosen, Group Marine Marketing Director.

In the marine market, Hempel markets coatings to protect cargo holds and tanks, ballast tanks, topsides and superstructures as well as fouling control coatings for ships' hulls. The company also supplies coatings for new containers.

In the protective market Hempel supplies advanced protective coatings that add attractive and long-lasting protection to industrial structures. Hempel also offers coatings for the decorative market with a full range of solutions for both private homes and large building projects.

Hempel is also a major force in yacht coatings and boat care products with a full range of products for pleasure and racing boats, from small motor boats to large racing yachts.

FIRST SILICONE PATENT FOR UNDERWATER HULL COATING

"Hempel filed its first silicone patent in 1972 and the company's first commercial silicone-based coating, HEMPASIL, was introduced in 1999, Ottosen relates.

This pioneering product created a smooth, non-stick surface on the hull, preventing marine organisms from attaching to it. The result was less drag in the water, lower fuel consumption and lower CO₂ emissions.

Over the years, Hempel's research and development lab continued to improve this technology by optimizing its long-term stability and mechanical properties, leading to HEMPASIL X3, Hempel's flagship fouling release product with a fuel saving guarantee.

NEW CHALLENGES IN A CHANGING WORLD

"Three pivotal developments in the first decade of the 21st century were instrumental in the latest advance in fouling control technology," says Ottosen. "The first was the complete banning of TBT-based biocide on all vessels in 2008. The second was the financial crisis and the third the steady rise in bunkering costs."

Low demand due to the financial crisis and an over-capacity in the market left many shipping lines with a choice of lower rates or taking their vessels out of service. Many chose to adopt slow steaming. Others were forced into extended idle periods, in both cases making their vessels more vulnerable to fouling.

"With continuously rising bunkering costs, the time had come for the next major fouling control technology shift, and Hempel

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grabbed the chance to take the lead," Ottosen states.

VISION AND SCIENCE, HAND-IN-HAND




Hempel is committed to constant improvement of its performance with regard to energy efficiency and environmental impact. The development of ActiGuard® technology arose out of a wish to pursue an entirely new concept that would set the bar way above current standards. Fouling control was no longer enough. The goal now was a fouling defence solution that effectively protects against fouling throughout the service interval.

Hempel's new patented ActiGuard® technology introduces a new and unique way of producing an underwater hull coating containing a silicone-hydrogel that not only enables controlled biocide release, but also has the necessary long-term stability and mechanical properties. Hempel's latest hull coating product, HEMPAGUARD®, is the first to be based on this patented technology, offering substantial economic and environmental advantages.

HEMPAGUARD® — A NEW FOULING DEFENCE SOLUTION FROM HEMPEL — OFFERS UNIQUE SATISFACTION GUARANTEES

Fleet operators have long wished for a fouling prevention solution that could deliver significant fuel savings over an entire docking interval. Hempel's new, groundbreaking fouling defence coating using patented ActiGuard® technology is backed by unique performance guarantees and enables fuel savings, flexible trading and outstanding idle periods compared to standard antifouling.

As bunkering costs rise, fleet operators are asking for more from their fouling defence coatings. At present, a majority of operators still prefer antifouling coatings to fouling release coatings due to doubts about the fuel efficiency performance of fouling release over an entire docking interval.

		
Vessel type: general cargo Operation time: 19 months Activity: 69% Idle periods: 8 & 10 days	Vessel type: oil tanker Operation time: 22 months Activity: 85% Idle periods: 13 & 11 days	Vessel type: general cargo Operation time: 16 months Activity: 66% Idle periods: 20 & 17 days

The fuel efficiency challenge

"There is an obvious need for something far more effective than conventional antifouling and fouling release solutions," says Claes Skat-Rørdam, Hempel Marketing Manager, Fouling Control. "Coating suppliers have tried to supplement these technologies with various extra features, but they have not yet succeeded in delivering a satisfactory solution to the increasing fuel efficiency needs of an ever more competitive shipping industry."

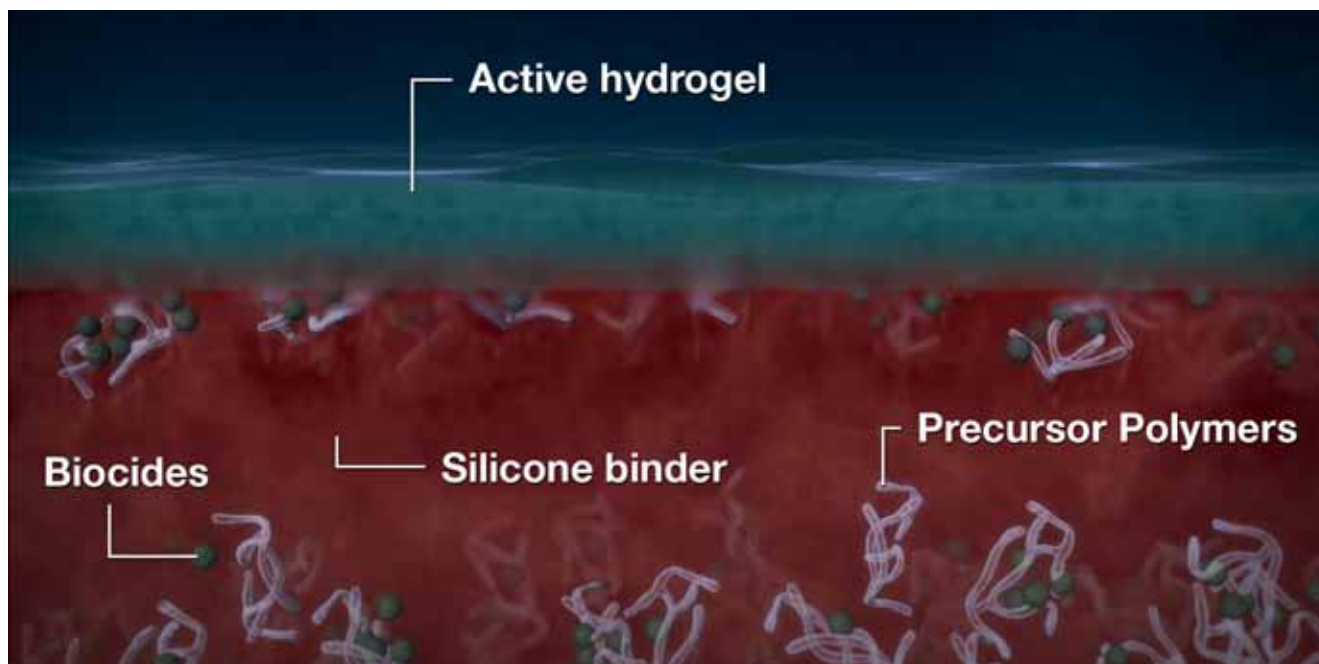
Coatings help to increase fuel efficiency by maintaining a smooth surface that minimizes friction when sailing, or that deters fouling with the help of biocides. This is not difficult to achieve initially. The problems begin, however, after a relatively short period, especially in warmer waters and, in particular, during idle time.

Shorter payback time, higher ROI

"Our approach was a radical departure from conventional thinking, Group Product Manager Torben Rasmussen explains. "Our aim was to develop a fouling defence technology that could sustain superior fuel efficiency for a significantly longer time. This would mean shorter payback time and a higher return on investment for the ship operator."

The result is HEMPAGUARD® using ActiGuard®, a patented new technology that enables a combination of a coating based on a special silicone hydrogel with controlled biocide diffusion, and an average decay of only 4% over the docking interval.

According to Torben Rasmussen the effect is always the same, regardless of the trading pattern of the vessel and, in particular, when slow steaming or even during extended idling in aggressive waters.



Technology breakthrough

"We have succeeded in cracking a nut that has eluded other coating suppliers by developing hydrogel precursor polymers that can retain and release the biocide over an entire docking interval," Torben Rasmussen continues.

"The active hydrogel microlayer prevents biological slime and other fouling organisms from attaching to the hull, thus boosting the antifouling barrier and significantly prolonging the fouling-free period."

HEMPAGUARD® releases 95% less biocide than a standard SPC. Moreover, the biocide is retained at the surface, thus eliminating the need for polishing as well as requiring only one coat compared with the two or three that are normally necessary in the case of antifouling. The surface has the same smoothness as conventional biocide-free silicone-based fouling release coatings.

First satisfaction guarantee in the industry

"HEMPAGUARD® is extremely flexible, eliminating the need to find a product suited to a particular sailing route, sailing speed or idle periods," Torben Rasmussen underlines. "Our tests have shown that HEMPAGUARD® retains its effectiveness when switching between slow and fast steaming anywhere in the world as well as during extended idle periods.

"This is particularly interesting for bulk carriers that can be redirected at short notice as well as larger container vessels and tankers that may wish to increase speed to meet schedules or slow steam to achieve extra fuel savings," adds Skat-Rørdam. "In

fact we are so confident about the performance of HEMPAGUARD® that we are offering a satisfaction guarantee contract for our top-tier product HEMPAGUARD® X7 on full blasted vessels. This means that if the customer is not satisfied, Hempel will pay for the conversion of HEMPAGUARD® X7 to conventional antifouling with no questions asked."

Idle period guarantee up to 120 days

The development of HEMPAGUARD® started in 2008. During the development period, panels coated with conventional antifouling and fouling release were immersed in the warm waters of Singapore together with panels coated with HEMPAGUARD®. The results are extraordinarily good with immersed panels remaining virtually free from fouling for up to four years.

"These results have led to a unique idle period guarantee of up to 120 days — more than four times as long as those offered by any other coatings supplier," Skat-Rørdam explains.

HEMPAGUARD® is recommended for all ship types whose owners wish to benefit from flexible trading, fuel savings and fouling defence at any speed or during idle periods.

LOOKING TO THE FUTURE

"We are committed to remaining focused on our goals, adaptable in a fast-changing world and quick to implement new ideas. We will strive to increase our understanding of our markets and customers, and offer innovative solutions that add value to their business," Ottosen concludes. DCI



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On-board self-unloading equipment, transshipment and floating cranes

Jay Venter

Global logistics solutions from Winning International Group

At the start of the century, Winning Shipping established operations in Hong Kong with the aim of providing maritime logistical services to the growing Chinese non-ferrous metal market. The company's initial logistics services focused on ferrying raw materials for alumina production enterprises.

HISTORY

In 2006, Winning Shipping relocated its headquarters to the transportation hub of Singapore to further drive the growth in the South East Asian region. This geographical shift gave the company the opportunity to strengthen relationships with its partners based in Indonesia and generate new avenues of co-operation. The proximity advantage also boosted its ability to overcome logistical bottlenecks via customizing operation processes whilst continuing to provide a cost-effective integrated logistics solution to its customers.

In April 2009, Qingdao Winning International Ships Management Co. Ltd was established, which is in charge of the company's own ships and third-party ship management.

The success of its corporate strategy led to the formal incorporation of the Winning International Group in 2010. As part of this transformation process, the company has expanded its core business areas to include ship chartering, transshipment services, fleet ownership, fleet management, resource development and

trade services. Currently, the group has 12 subsidiary companies, including a shipping operation company, a ship management company, a trading company, a resource company and a ship owning companies. It also has three joint venture companies with its business partners. The companies are domiciled in China, Singapore, Indonesia, Hong Kong and other countries and regions.

SERVICES

In 2012, the group integrated up stream to the design, construction and operation of Green Marine Logistics equipment: barge, transshipment and blending.

Winning has become one of the leading carriers for alumina production enterprises in Asia, taking care of 90% bauxite material handling from Indonesia to China for the end users.

The company is committed to the provision of door-to-door supply chain solutions for the manufacturing industries of tomorrow, starting from today.

Winning's mission is to provide maritime logistics solutions to global industrial and trading enterprises. It will work towards this mission by establishing the company as the leading logistics bridge between global resource production mines and industrial manufacturers in the





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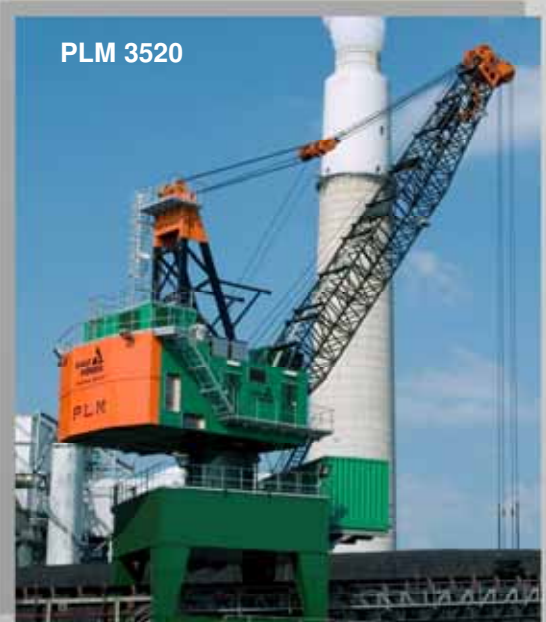
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Asia-Pacific region. In addition, as part of its corporate social responsibility, Winning strike to progress to environmentally friendly green assets to reduce its logistical carbon footprint.

BUSINESS AREAS

Winning Shipping's core business areas are entrenched upon the provision of door-to-door integrated supply chain solutions. These include mining, supply side stockpiling, jetty design, barging, transshipment, ship charters, fleet management, lightering operations, end-user side stockpiling and land transportation. The company is experienced in the pragmatic setup and management of supply chain from mines to the industries' doorstep by the adaptation of new technologies to tackle challenging operating conditions.

Winning's cornerstone operating principles are integrity and service. It firmly believes that by operating with integrity alongside the provision of service excellence, it can establish itself as the trusted provider of reliable logistics to its customers. It has successfully established itself as major oceanic carrier for most of the Chinese non-ferrous metal industries.

In addition, Winning has successfully established itself as the maritime solutions provider of choice for the industry of non-ferrous metal in China. Its strong desire for staff innovation has created co-operative opportunities for the development of a business model re-engineering.



FUTURE STRATEGIES

As part of its development plans for the next decade, Winning Group aims to expand its geographical reach from within Asia to a global operation, and commodity-wise to iron ore and coal. Winning will continue to invest in innovation and the development of new sectors for growth including pioneering sourcing of resources (entrusted by the end users), provision of critical logistics services, sourcing and financing of mining and land transportation equipment for the producers and expanding towards the development of resources.

Beltship Management Ltd: transparent technical management



GOING THE DISTANCE

With links stretching back to the turn of the century, Beltship Management Limited is a joint venture company that has been providing full ship management services since 1992. The partners in the joint venture are Globe Shipmanagement Ltd, a privately held company, and United States Gypsum Corp (USG), listed on the US stock exchange and an operator of vessels for more than 100 years. The structure of the business encourages attention to detail, providing a personalized service whilst its joint venture partner USG provides the necessary stability and peace of mind to its clients.

BELTSHIP MANAGEMENT LIMITED:

- ❖ provides technical management;
- ❖ invests heavily in infrastructure; and
- ❖ develops design for the transshipment market

As a technical management firm it specializes in self-discharging dry bulk carriers. The company's initial interests focused on the undertaking of technical management of USG's fleet whilst Globe Shipmanagement Ltd was responsible for the ships' crew management tasks. In a direction change in 2008, Beltship Management opened its doors to third-party clients and expanded the scope of its activities. Grounded in tradition but constantly evolving, its goal is to offer a superior service by proposing solutions to fit its clients' needs.

Beltship Management has grown its business with two major

clients as John McMillan, technical director explains: "Our client, Vale, has shown their trust in our management by providing two more vessels the *Ore Timbopeba* and the *Ore Itabira* in 2013. We are now in a position where we operate six vessels for the world's largest iron ore producer. With another client, African Minerals, our contract to transship iron ore has been expanded from 12mtpa [million tonnes per annum] to 20mtpa." To fulfil this expanded contract, Beltship Management has delivered to Sierra Leone a further two self-unloading bulk carriers, the *Nelvana* and the *Argosy*.

The Panamax-sized self-unloading vessels will operate on a continuous loop year round and have been upgraded to discharge in excess of 3,000 metric tonnes per hour over the full discharge allowing the business to maintain this rigorous schedule. Beltship is in the process of designing new vessels for this project and a new target transshipment still to be defined but expected to be in excess of 25mtpa

Forming an aspect of the contracts, Beltship installed Inmarsat's Fleetbroadband unlimited service in all six Vale vessels and also on the four vessels in Sierra Leone. The service provides the crew with free internet access and the ability to remain in touch with family and friends at home 24/7, which has greatly improved the crew's morale.

Beltship Management maintains quality assurance accreditation for its activities ashore, at its offices and on its vessels. The overall aim of the business is to provide safe, efficient and high-quality management services to its clients. In

The Self-unloading & Transhipment Specialists



bml



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Vessel Operations

BELTSHIP MANAGEMENT LIMITED

Building Partnerships Through Quality, Safety, Efficiency, And Transparency



addition to compliance with all relevant legislation, and as continued commitment to the care of the environment and the prevention of pollution, Beltship Management has adopted the international quality standard ISO 9001, and the Environmental Management System ISO 14001. Adherence to these codes enhances effective application of the quality system, including processes for continual improvement and assurance of conformity for its clients.

“The quality system is continuously evolving for effective application to company operations, for improving safety on board and ashore, and to minimize environmental impact wherever possible. To assist with this, we have recently invested in an all-in-one software solution, DNV Synergi Life, for managing all QSHE incidents, risk analyses and audits and inspections. The software uses systematic workflow to ensure corrective and preventative actions are reviewed and applied effectually, as well as monitoring trends to avoid reoccurrences and highlighting any opportunities for improvement,” explains McMillan.

“As a company we offer transparent technical management with clear and concise information on budgets and technological requirements and maintaining of certifications. Through encouraging close co-operation and openness into all parts of our operation we have been successful in building and maintaining a competitive edge in the market,” says McMillan. The business has a proven track record in transshipment operation in particular, which has provided evidence in its ability to successfully provide a turnkey solution in difficult environments such as the existing operation in Sierra Leone. “We are prepared to invest in our infrastructure to provide the client with the information they require such as our major investment in Synergi which provides Vale with in-depth analysis

of near misses and incidents and allows us together to better improve the safe running of the fleet,” he adds.

Beltship Management has a new concept design on the table for the next stage of its development in the transshipment market. Detailing the design McMillan says: “The vessel is a shallow draft, DP positioning vessel with a diesel electric driven azimuth propulsion system. The cargo discharge system is rated at 10,000 metric tonnes per hour and the vessel has a feeder system in the cargo holds, which replaces the conventional gate system thereby allowing discharge of any type of bulk cargo such as iron ores, bauxite, and gypsum. The cargo discharge system features only incline belts negating the need for lift belts, which can restrict discharge capacity and cargo type.”

In a separate contract, the business joined Shipperserv to facilitate the procurement processes. Shipperserv enables automatic interaction between the planned maintenance and purchasing system and the suppliers. Requests for quotes and purchase orders are automatically sent and received which saves valuable time and enables implementation of KPI's for the purchasing process.

As the business looks towards the next half of 2014, McMillan explains that a major focus for the company is to further consolidate its services to its clients by providing better and more efficient operation of the vessels. Considering the long term vision for the business he concludes: “Beltship Management is focusing on a number of contracts within the niche transshipment business, our goal is to build on our existing contracts and make the business one of the major transshipment operators worldwide. As one of the largest players already by volume transshipped and having already carried out more than 600 ship-to-ship operations in just over two years we would like to take this expertise and expand upon it.”

Terex Port Solutions strengthens position in Indonesia with three floating cranes

Terex® Gottwald floating cranes are frequently used in open sea to transfer coal from barges to seagoing vessels as seen in the picture. For the first time, Terex Port Solutions will supply three Terex Gottwald Model 8 floating cranes to handle bauxite on the open sea off the coast of Kalimantan.



WINNING INTERNATIONAL GROUP ORDERS MODEL 8 CRANES FOR BAUXITE HANDLING OFF THE COAST OF KALIMANTAN

Terex Port Solutions (TPS) strengthens its presence in Indonesia with three further Terex® Gottwald floating cranes. Winning Logistics Investments Pte Ltd (Winning), the logistics division of the Winning International Group based in Singapore, ordered the Terex® Gottwald Model 8 floating cranes in the G HPK 8200 B four-rope-grab variant for use off the coast of Kalimantan. The cranes will gradually start working there as of autumn 2014. Starting in June 2014, the cranes will first be delivered to China where the barges are built. There, the cranes will be connected to barges via their roller bearing slew ring at the shipyard. The floating cranes will then be towed to Kalimantan, the Indonesian part of Borneo, to help Winning handle bauxite on the open sea. With the commissioning of the three cranes, a total of eight floating cranes from Terex Port Solutions will be in operation off the coast of Kalimantan. Winning will be the fifth terminal operator on the open sea in the area.

LOADING FROM RIVER BARGES TO SEA-GOING VESSELS

Bauxite, from which aluminium is extracted, occurs in abundance inside Kalimantan. On its way to the smelting works, including one operated by the Winning International Group in the West-Kalimantan province, the bauxite is first transported from the mining regions to the open sea on river barges. Here it is

loaded onto seagoing vessels. To make future handling off the coast of the island more efficient, Winning is relying on floating cranes. The cranes are based on proven Terex Gottwald mobile harbour technology with similar features and capabilities. The G HPK 8200 B cranes provide a 63-t grab curve and a maximum hoisting speed of 140 m/min. They are powered by diesel generators installed on board the floating crane barges. Each barge also provides accommodations for 30 crew members, which includes dining and recreation rooms in addition to an operations center and a workshop.

PRODUCTIVITY EVEN UNDER TOUGH CONDITIONS

Built for use on the open sea, the three cranes for Winning are designed in accordance with Lloyd's Register Code for Lifting Appliances in a Marine Environment which allow the cranes to operate at wind speeds up to 24m/s and maximum wave heights of 2.5m. Winning opted for cargo handling cranes that combine high productivity with flexibility, as Sun Xiushun, president of the Winning International Group, underlines: "With floating cranes from Terex Port Solutions, we have decided on a top-level technological solution. These cranes can also be used reliably under tough conditions and therefore help to significantly increase the total handling volume of our fleet." He explains that after other solutions proved unsuitable, Winning has consciously opted for TPS in order to achieve its growth

objectives. In regards to the barges, Winning also involved a third-party supplier to equip them with an advanced anti-rolling system to improve operational performance. This is the first time Winning used this system. The system is designed to allow the floating cranes to operate at maximum working speeds and help each crane to handle more than 25,000 tonnes of bauxite daily in the harsh, open-sea conditions.

EIGHT CRANES IN EIGHT YEARS FOR INDONESIA

For Klaus Roehrig, Regional Director at TPS, the order from Winning is another important chapter in the success story of Terex Gottwald floating cranes in Indonesia: "The fact that we have sold eight cranes here since 2006 speaks volumes for the ability of TPS to offer high-performance solutions tailored to specific customer requirements and environmental conditions." Roehrig is pleased to gain a new customer and that Winning has seen rapid development over its twelve years of existence, and is still clearly on a growth course: "Winning has become firmly established in South Asia, particularly in the transport and handling of bulk material. We are delighted that such a dynamic group is counting on three Terex Gottwald floating cranes based on our mobile harbour crane technology for its planned growth phases," Roehrig continues.

A TOTAL OF 33 FLOATING CRANES WORLDWIDE

Since their market launch in 2004, floating cranes from TPS have quickly become accepted in various environments. A total of 33 of these cranes, including those for Winning, are or will be in operation worldwide.

Apart from Indonesia, the majority of TPS' floating cranes can be found on the Mississippi River in the United States. Similarly

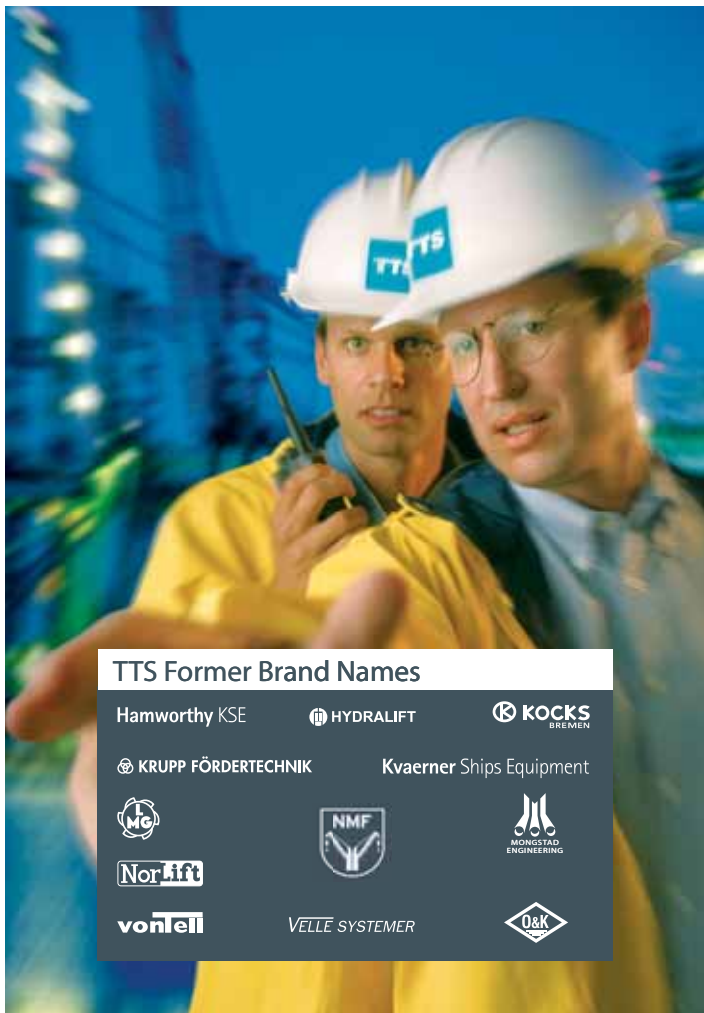
to Indonesia, US customers benefit from the flexibility, high-level performance and ease of servicing of the cranes due to the Terex Gottwald modular crane system design: in places where there are no, or only a few, quay facilities available, Terex Gottwald floating cranes in transshipment and ship-to-shore handling represent a competitive variant for handling all types of cargo. In addition to the open sea, they can also operate in ports, on rivers and in coastal waters.

ABOUT TEREX PORT SOLUTIONS

Terex Port Solutions is part of the Material Handling & Port Solutions business segment of Terex Corporation that supplies customers in ports with a unique combination of machines, software and services under the Terex and Terex Gottwald brands. Whether it is ship-to-shore cranes, reach stackers or fully automated, integrated handling systems for containers and bulk, Terex Port Solutions provides reliable solutions for rapid, safe, efficient handling of all forms of cargo with low downtimes and excellent return on investment.

ABOUT TEREX

Terex Corporation is a diversified global manufacturer of a broad range of equipment that is focused on delivering reliable, customer-driven solutions for many applications, including the construction, infrastructure, shipping, transport, quarrying, mining, refining, energy, utility and manufacturing industries. Terex reports in five business segments: Aerial Work Platforms, Construction, Cranes, Material Handling & Port Solutions and Materials Processing. Terex offers a complete line of financial products and services to assist in the acquisition of Terex equipment through Terex Financial Services.



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Latest generation CSL bulkers unveiled

CSL's two newbuild Trillium-class bulk carriers, CSL St-Laurent and CSL Welland at the naming ceremony held at Yangfan shipyard in Zhoushan, China on 24 April 2014.



In a naming ceremony held at Yangfan shipyard in Zhoushan, China on April 24, 2014, CSL unveiled the names of its two newbuild *Trillium*-class bulk carriers.

The first to be revealed was the *CSL St-Laurent*, named in honour of the mighty St Lawrence River on which CSL vessels have sailed for over 100 years. The second bulk carrier, the *CSL Welland*, was named as a tribute to the Welland Canal, the intricate system of eight locks that enables ships to navigate to and from North America's heartland.

The 36,100dwt, Seaway-size gearless bulkers are part of CSL's ambitious fleet renewal programme which oversaw the



delivery of four new *Trillium*-class self-unloading Lakers and three Panamax self-unloaders in 2012-2013.

The two new vessels are scheduled to enter the Canada Steamship Lines fleet later this year and will operate in the Great Lakes-St. Lawrence Seaway system.

Featuring IMO Tier II-compliant main engines and the latest environmental and safety technologies, the state-of-the-art new bulkers will be consistent with the high standards set by the *Trillium* Class of operational efficiency, reliability and environmental sustainability.

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MoU signed to construct berth 4 at Cuxport in Cuxhaven, Germany

In March this year, Olaf Lies, the Lower Saxony Minister of Economic Affairs, Labour and Transport, and Dr. Andreas Schmidt and Hans-Peter Zint, the managing directors of Cuxport, signed a memorandum of understanding for the construction of berth 4 at the Cuxport terminal in Cuxhaven.

Once the planned work has been completed in the spring of 2017, Cuxport will have at its disposal another 290 metres of pier alongside water deep enough for sea-going vessels and about 85,000m² of space for port handling operations.

"The Lower Saxony state government is fully aware of the huge significance of the port industry for the economic development of our federal state. The construction of berth 4 at Cuxhaven will create the conditions for further growth in the port sector on the North Sea coast and therefore pave the way for new jobs," said Olaf Lies, giving the reasons for the involvement of his government.

"We're delighted by the decision taken by the Lower Saxony state government to expand this terminal with us; we urgently need more handling and storage space in order to continue developing the business site at Cuxhaven. Utilization levels at the moment do not permit any further growth in terms of volumes," Hans-Peter Zint emphasized.

The completion of berth 4 will enable Cuxport to meet the steady growth in demand for a wide variety of efficient logistics services in future too. At the same time, the investment will safeguard existing skilled jobs in the Lower Saxony port sector and lay the foundation for creating new ones.

"None of this would be possible without the expansion of the port infrastructure by the state of Lower Saxony. Based on the excellent development and forecasts for this business, particularly in the RoRo and offshore logistics sectors, we assume that the newly created capacity at our multi-purpose terminal will soon be put to full use," says Hans-Peter Zint, looking to the future. Once the construction work has been completed, the area will be used for port handling and providing temporary storage for goods prior to their shipment by sea or distribution further inland.

ABOUT CUXPORT

Cuxport GmbH operates a multi-functional handling terminal at the deep-water port of Cuxhaven.

Cuxport not only provides extensive port handling opportunities, but also has an ideal geographical location for all kinds of maritime traffic and the best possible links to destinations further inland. The company is a joint venture; Rhenus AG & Co. KG has a 74.9% holding and HHLA Container Terminals GmbH owns 25.1% of the shares.

Drummond suspends operations

The Colombian government forced mining company Drummond to suspend loading operations at its port on the Caribbean coast on grounds that it had failed to adhere to environmental regulations. It has been asked to pay a fine for the days on which it had continued to operate outside accepted norms. *Barry Cross*



COAL INTO GERMANY

via Rhenus Midgard's Seaports

BTW (Bulk Terminal Wilhelmshaven) former Niedersachsenbrücke, Jade Bay (Germany):



- New: Capesize Vessels up to 250.000 dwt with a draft up to 18,50 m (60') sw
- Rail connections into Germany's hinterland and neighbourhood countries

Coal Terminal Nordenham on the River Weser (Germany):

- Rail- and inland waterway connections to Germany's hinterland and beyond
- Panmax- and partly laden Cape Size Vessels with a draft up to 13,10 m (43') fw

Both ports handle more than 5 million tons exceeding 10% of the imported coal into Germany.

Rhenus, a company with a long history, is one of the world's leading providers of integral logistics services and has annual turnover totalling 4 billion Euro.

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Ferroeste resumes bran transport to Paranaguá

In Brazil, the Ferroeste railway company has resumed the transport of bran to the port of Paranaguá, following an absence of seven years. The resumption has been the result of the signing of a commercial agreement between the rail operator, the Agrária co-operative (which owns the cargo) and ALL, which is the concessionaire of the section of railway between Guarapuava and the port terminal.

According to the co-operative, it is very satisfied with the

partnership, which will help to improve its financial situation, as well as upgrading the logistics discharge in the port itself. The use of rail will drive down costs, in addition to opening up new flows of cargo during the period outside the main harvest.

Before the agreement, Ferroeste was only allowed to handle imported fertilizer on the section of line. Now, it will have balanced cargo during the off-season. *BC*

Cemex moves into Sagunto

Cemex has begun cement exports from the Spanish port of Sagunto. The initial consignment consisted of 4,500 tonnes of white clinker bound for Greece. Previously, Cemex made use of the nearby port of Valencia, but has switched to Sagunto.

The drive to export more has come about because of the dramatic collapse of domestic demand and the only way for Cemex to survive is to find customers abroad. At the moment, foreign sales account for around 40% of total output of the company's Spanish output, although this is expected to increase during 2014.

According to the company's operations director, the market for white cement has rebounded positively in North Africa and Cemex is well placed to provide this, since, at Buñol, it has the highest capacity production plant in Europe. *BC*

Vale coal train attacked in Mozambique

In Mozambique, the Brazilian company Vale was forced to temporarily suspend export consignments of coal to the port of Beira after one of its trains was attacked and the driver injured. The train was carrying a shipment of coal from the

mines at Moatize to the Indian Ocean. Following the incident, an investigation was launched, although the Deputy Home Secretary blamed the attack on a rebel group known as Renamo. *BC*



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Shandong Lingong Machinery wheel loaders keep Krishnapatnam Port sleepless

The Krishnapatnam Port in Southern India never sleeps. An army of machines handles thousands of tonnes of coal, cement, wheat and other cargo every hour. And one contractor has noted the benefits of SDLG wheel loaders that perform 20 hours a day, without fail, delivering fast payback and excellent value.

India has long been considered one of the fastest-growing maritime trade markets in the world, specializing in bulk commodities and containerized trade. India's largest east-coast gateway is the rapidly growing Krishnapatnam Port – owned and operated by Krishnapatnam Port Company Limited (KPCL). It covers an area of 4,553 acres, and is becoming international traders' first choice for the handling of coal, cement, grain and other cargo.

The Indian government is investing in developing the port to handle larger capacities – and given its location, climate and world-class facilities, it will come as no surprise to see the port become one of the largest in the country in the coming years. Current estimates expect cargo to multiply from current levels of around 75mtpa (million tonnes per annum) to an impressive 200mtpa by 2020. But as cargo comes and goes around the clock, contractors require robust and reliable machinery to continue loading and unloading like clockwork.

FAST PAYBACK FROM PRODUCTIVE EQUIPMENT

Varhakhe Services is contracted by KPCL to handle the loading and haulage of cargo at the port. The company has a fleet of 18 wheel loaders from Chinese manufacturer, Shandong Lingong Machinery Co., Ltd. (known as Lingong).

"Twenty hours a day, 500 hours a month — every SDLG wheel loader runs like a factory," explains Sreeram Varhakhe, owner of Varhakhe Services. "In fact, their level of productivity and performance constantly send me to the bank - smiling!"

And, Varhakhe has been so impressed with the Chinese-manufactured loaders that he is planning to order a further five units in the near future.

SDLG wheel loaders are manufactured using advanced technology and lean manufacturing techniques to guarantee the highest quality equipment at a lower cost. The Varhakhe Services



A fleet of 18 wheel loaders from Chinese manufacturer, Shandong Lingong Machinery Co., Ltd. handles cargo at Krishnapatnam Port.

fleet is a mix of LG958L and LG936L wheel loader units. The 5-tonne-capacity LG958L has a 3m³ bucket and an operating weight of 19 tonnes. It features a Deutz 7 l six-cylinder engine with a rated power of 160kW. Its maximum break force is 18,355kg. The machine features ZF transmission and a single-lever hydraulic control system. Its operator-friendly cab offers all-round visibility and a modern fit design.

The LG936L wheel loader features a 1.8 m³ bucket and has an operating weight of 10.7 t. Designed with an intelligent power-shift transmission, the SDLG LG936L offers high power with a loading capacity of 3 t. It features a Tier 4 Deutz engine for optimized fuel saving. By designing robust and cost effective machines, SDLG is focused on giving its customers greater output for a lower cost. And Sreeram Varhakhe is one customer who's experienced that faster payback in real time.

"You effectively recover your investment in faster time," says Varhakhe. "That's how good the machines are — winners all the way!"

Varhakhe Services purchased all 18 of its SDLG units in a three month period, underlining the immediate impact they had on the company.

SERVICE THAT CAN BE COUNTED ON

With demand for equipment to work around the clock, Varhakhe finds that support from his local dealer is essential in ensuring that machines are always on hand.

"In a time-bound business where you simply have to stick to schedules no matter what, it all boils down to people — we share a deep and trusting relationship with SDLG," he says. "Thanks largely to the service that SDLG provides, our machine downtime is negligible."

SDLG has partnered with Hyderabad-based distribution partner, Detroit Mining & Construction Equipment Pvt Ltd, to offer aftermarket service to customers in the region.

"I really couldn't have hoped for better people or machines to work with," Varhakhe continues.

As KPCL continues to expand, so too will Varhakhe Services to deliver good value loading and unloading solutions at the port.

"I promise only what I can deliver, then deliver more than I promised — just like SDLG," says Varhakhe.





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Go to www.portofamsterdam.com or contact our Commercial Division, Cluster Energy directly via lex.de.ridder@portofamsterdam.nl

Dropping anchor in the Netherlands



getting the lowdown on the European bulk hotspot

The Port of Amsterdam: heading for success

The Port of Amsterdam will see an expansion of bulk cargo traffic as new infrastructure projects come on stream and terminal investments prove their worth, according to Lex de Ridder, Manager Cluster Energy.

DCI: Last year Port of Amsterdam finally achieved corporate status. This means that, as a registered public limited company, you can now take a more market-oriented approach to long-term planning even though the Municipality of Amsterdam remains the port's single shareholder. How is your new status impacting planning and performance?

De Ridder: It's all going very well, thank you. Last year was very good and the new organization has developed well. In the past, we have mainly focused on keeping and building our current business. But now we are corporatized we've been able to also gradually start looking at new activities. It has given the whole port a new spirit. We are also able to have more productive dialogue with our neighbour ports — the North Sea Channel Areas ports of IJmuiden, Beverwijk and Zaanstad. We can also act more as an equal partner with other ports in the region where we have mutual interests.

DCI: Has there been much progress in terms of pushing forward long-term strategic infrastructure projects that will boost dry bulk throughput?

De Ridder: Yes, we have been having very good dialogue and discussion about conditions for the new locks in IJmuiden which will be operational in 2019 and allow Capesize vessels within the dimensions of around 17 metres draught, 65–70 metres beam and 500 metres in length to enter the port. Also we've been co-operating with the port of IJmuiden on a new lightering station, to be relocated at a harbour on the North Sea in IJmuiden. We want to use this for coal, but also for cooperation in other green energy projects. We hope to combine the two, but also lightering of building materials and even agribulk where this makes sense.

DCI: What stage have the new port and lightering projects now reached?

De Ridder: It's all moving forward. A year ago we were working on environmental impact studies, planning design and licensing. A lot of that work is now complete. We're now going through the process of environmental permitting. In that sense we are also cooperating with the other ports in the region. We are trying to set the bar really high with this project, not just meet legal standards, but really set new standards on emission reduction, dust, smell etc. We want to give something back to the region, which is where the green energy and recycling projects we are encouraging also come from. But alongside that, we want to develop big cargo flows, whether that is coal, agribulk, building

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materials and minerals or even liquid bulk. The new locks, the lightering station, partnerships within the region and our new corporate model will, together, help us achieve all this, I think.

DCI: Can you tell me anything about the volumes you handled last year, did you grow throughput?

De Ridder: We set a record last year. Or, at least, the seaports of Amsterdam, IJmuiden, Beverwijk and Zaanstad together handled 95mt [million tonnes], up 1% compared to 2012 and higher than the previous record of 94.8mt set in 2008. The best performers were agribulk which was 17% higher and coal which was 14% higher.

DCI: What drove your coal volume gains?

De Ridder: Last year, coal was up dramatically, at an all-time high of 18.5mt. The stoppage of exports by Drummond from Colombia most likely played a role as when the big Capes don't come from there then we are even more competitive. But mainly what happened was the market conditions were good. The coal business is focusing on Amsterdam and Rotterdam. Also gas prices were extremely high so almost all the gas terminals were closed in favour of coal. Moreover, nuclear energy is being phased out in Germany so all the conditions were there for coal to do well last year.

DCI: Has this continued into 2014?

De Ridder: The first quarter was also extremely good, and Drummond helped. Growth in coal was 15%. Actually we are a

bit surprised that the growth keeps on continuing. Demand in Germany and Holland is not growing at this moment. It is supply-based growth. But I still think it will be a good year again. When you start this well, it would be strange if you end up below the year before. We really believe 2014 will be good for coal, the market has really peaked in the last 15 months.



DCI: Have you seen changes to where the coal coming to Europe via Amsterdam is sourced from?

De Ridder: Yes, shale gas usage in the US has meant more coal exports. The US is now almost becoming the second-largest supplier after Colombia, replacing Russia. Or at least you can say that the US is at the same level as Russia. Three to four years ago, Russia was the biggest source, but it will remain a major supplier. South Africa is now almost out of the picture as most of their exports go to India where they are dominant.

DCI: You had big gains last year in agribulk, where was the extra cargo coming from?

De Ridder: There was the economic crisis in Argentina which saw a shift of exports to Brazil, mainly soya beans and cattle feed, but also some cereals. But structurally, we will need to work very hard to maintain volumes this year and we're a bit behind so far this year. It was a peak last year, but the market probably will not peak every year.

DCI: How is bearish steel demand in Europe impacting iron ore imports?

De Ridder: Volumes have been down a bit but scrap was good

It's in our character



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the last year?

De Ridder: Our big coal stevedores have made an agreement which will see Rietlanden hand over a big 8.5 hectare parcel of land to OBA which will make operations smoother for Rietlanden and OBA. It means there is a lot of room for improving operations and investments and making the terminal work more efficiently because Rietlanden's terminal was an enclave in the middle of OBA's facilities. OBA can now add capacity and be more efficient. Although definite decisions have not yet been made, together with PoA they are now looking at how to achieve this transference and will decide later in the year.

DCI: Where does this leave Rietlanden?

De Ridder: They are doing very

last year. We opened a third scrap export terminal last year. This is an export terminal that can handle scrap steel and non-iron metals as well as plastics and paper from all over the world and is operated by ALBA Group subsidiary, ALBA Scrap Trading. It has an area of 27,000 square metres, a quay length of 180 metres and storage capacities of over 200,000 tonnes, so it is more than five times as big as the previous ALBA site in Dordrecht. Ships with a loading capacity of up to 50,000 tonnes and a draught of 12.5 metres can be dispatched at the new terminal which is kitted out with a material handler, a wheeled loader and a mobile harbour crane — a Liebherr LHM 550. So we have big hopes for this facility.

DCI: Last year biomass was showing great potential, has this continued?

De Ridder: We've also had developments here, for both biomass and biodiesel. A €160m new plant operated by Orgaworld will start doubling its capacity for biodiesel this year. They can recycle animal fats and vegetable oils so they have an advantage against other factories that can't. Eucocorp is going to open Amsterdam's first dedicated biomass plant at the start of next year. We have more projects like this coming up, related to energy and recycling waste. It generates energy for the region so we're giving something back.

DCI: What investments have been made by your various stevedores over

well, but with a little less land. They have enough space to grow though and they are continuously looking to invest and improve. For example: Rietlanden Terminals BV has the world's first terminal to be illuminated entirely by high-power LEDs. This was also made possible by PoA. The resulting energy savings make the port's lighting installation unique. Just like OBA.

DCI: Any more investments in the pipeline?

De Ridder: The port is always open to new investment and we're always encouraging all of our terminals to improve. We want to be ready for the future, for lightering, the new lock systems. We will not stop to invest in facilities and partnerships, all in the most sustainable and efficient way. It's clear in Northern Europe that Amsterdam and Rotterdam are becoming the dominant players for coal. But we need to always keep pushing for other dry bulk cargoes.





Rotterdam Bulk Terminal, your dry Bulk Cargo Specialist

Operating around-the-clock, RBT has a wide knowledge of dry bulk commodities and is continually expanding its specialization to understand and provide the right answer to all your challenges. Our future lies in serving our clients not only with effective transshipment and storage, but also by being a solution thinking partner.



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Rotterdam Bulk Terminal invests for success

Rotterdam Bulk Terminal is investing for success as it looks to update its technical park and expand the service range it offers.

The 70,000m² facility located on the Vulcan Harbour offers quay length of 440 metres and draught at high tide of 12 metres. But while draught prevents the handling of the largest bulk carriers, RBT does offer a wide range of storage facilities. Investment in superstructure is also consistent, with managers shopping for the up-to-date equipment to guarantee the highest possible standards.

Last year saw the introduction of a new BobCat S850 SJC (SJC stands for selectable joystick control), the largest in its line-up and ideal for use when emptying RBT's large 12,000m³ feed grain silos using polyethylene knives on the bucket for added safety.

Boris Sviderski, RBT's commercial manager, said the BobCat, with a rated operating maximum lifting capacity of 1,850kg had improved the handling of big bags while higher power boosted discharge speeds at RBT. "Maximum torque at a lower RPM save time and fuel" he said, "Sweeping activities with inland barges and cleaning silos and flat storage has therefore become more efficient."

This year RBT deployed a new Volvo L150G wheel loader which features a built-in dynamic weighing system. Developed for the heavy duty construction cargo handling and with weighing accuracy better than $\pm 1\%$ (under certain conditions), the highly accurate system helped to speed up truck loadings, according to Sviderski.

"The Volvo L150G provides high performance and productivity in combination with low fuel consumption," he said. "The D13H-F engine with Stage IIIB-compliant emissions, cares





not only for the environment but also enables safer operations in sensitive environments.”

RBT’s two gantry cranes and fixed 1,500-metre conveyor belt system are supplemented for lightering operations by floating cranes.

“With coverage of about 90% of the terminal area, most discharge and loading operations only require single handling, making the operations cost and time efficient,” said Sviderski. “Our terminal is also located close to the harbour entrance, in the 8-11 mile zone, and has no locks or bridges on the way which improves turnaround speeds.”

Volumes were steady last year and split between industrial minerals, coal, agricultural commodities and biomass. Biomass volumes did grow for residential usage, but industrial demand decreased, said Sviderski.

“At the same time the interest in handling PKS or wood

chips seems to keep rising,” he added. He predicted throughput would also be steady in 2014. “In general the industry shows constant interest in using Rotterdam harbour and RBT as the possible distribution or strategic partner in raw materials. “The cargo mix is pretty stable with the exception of some new products within mineral ranges which are handled on a spot basis.”

RBT is also helping customers with their logistics decisions and this is also expected to continue driving demand and throughput.

“For example, if a company wants to change from four storage location in three different harbours to using one storage location, then we can help them,” he explained. “This then allows them to charter larger vessels instead of four small ones. So we can help them optimize logistics and distribution to help reduce costs.”



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EMO: energizing your business



The EMO terminal in Rotterdam has a draught of up to 23 metres.

GATEWAY TO THE EUROPEAN HINTERLAND

Since 1973, the EMO terminal in the Rotterdam Port has been a major hub in transporting coal and iron ore from all over the world to the European hinterland. EMO has always been a reliable partner for its customers in helping to control these flows of goods by combining daily processes with a clear vision for the future.

EMO is able to accommodate the world's largest dry bulk vessels, and yet it never ceases to look to the future and plan ahead — now more than ever. The terminal has significantly increased its storage and transshipment capacity and efficiency. This will ensure that EMO is fully equipped to enhance its safety, efficiency and sustainability performance, and to continue to serve its customers as a reliable partner in dry bulk transshipment in the coming decades.

Equipment

- ❖ five unloaders, 3 × 85 tonnes, 2 × 50 tonnes lifting capacity;
- ❖ one floating crane, 36 tonnes lifting capacity;
- ❖ seven fully automated stacker reclaimers;
- ❖ three barge loaders;
- ❖ one sea shiploader;
- ❖ three fully automated coal wagon loaders, two for coal, one for iron ore;
- ❖ 160ha stockyard; and
- ❖ high-tech operations centre.

EMO FIGURES 2013

Unloading	35mt
Throughput	61mt
Storage capacity	7mt
Trainloading capacity	22 trains daily

EMO operates 24 hours a day, seven days a week. Its discharge capacity is 47mt (million tonnes) and its throughput capacity is more than 70mt.

EMO is a reliable partner. The company stays on top of the



The EMO terminal in Rotterdam is fully equipped to meet its customers' expectations.

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LOOK TO THE FUTURE AND PLAN AHEAD

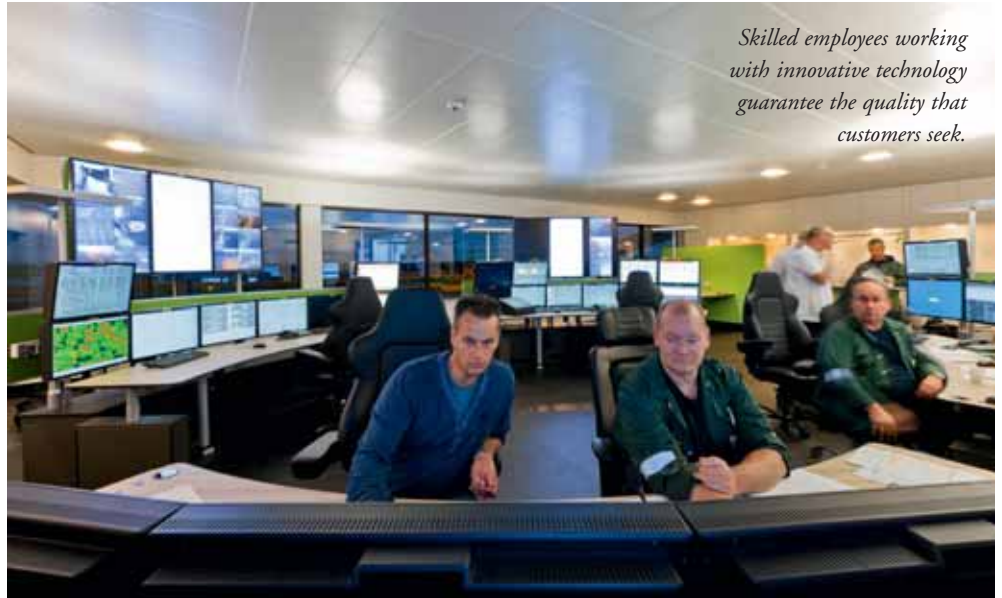
Since 1973, the EMO terminal in the Rotterdam port has been a major hub in transporting coal and iron ore from all over the world to the European hinterland. EMO has always been a reliable partner for its customers in helping to control these flows of goods by combining daily processes with a clear vision for the future.

EMO is able to accommodate the world's largest dry bulk vessels, and yet we never cease to look to the future and plan ahead – now more than ever! In 2012, we have strongly increased our storage and transshipment capacity and efficiency by commissioning five new, state-of-the-art projects: the seventh stacker reclaimer, the fifth unloader, the second fully automated coal wagon loader, a brand-new sea-going vessel loader along an innovative, new quay, and a high-tech operations centre. These projects ensure that we are fully equipped to enhance our safety, efficiency and sustainability performance, and to continue to serve you as a reliable partner in dry bulk transshipment in the coming decades.

latest developments in the market. EMO continually analyses its customers' needs, the quality of its services and the terminal's performance. In anticipation of market trends and customer needs, it is continuously geared towards offering a more efficient, cleaner and safer terminal, one designed to meet all expectations.

Meeting market demands

EMO's 160-hectare area currently offers 7m of storage. EMO is ideally located on a 23m-deep waterway connected



Skilled employees working with innovative technology guarantee the quality that customers seek.



EMO can load 22 trains daily.

directly to the North Sea. Rotterdam harbour has excellent rail and waterway connections to the rest of Europe.

New plants E.ON en GDF Suez in Rotterdam

A new 1,070MWe coal/biomass-fired power station built by E.ON on a neighbouring site is currently in the test phase. The same applies to the 800MWe coal/biomass-fired power station built by GDF Suez on the eastern section of the EMO site. Both of these ultramodern power stations will be supplied by EMO.

EMO is ISO 9001, 14001, 18001 and ISPS-certified.



Scrap recycling at Koster Metalen B.V. with SENNEBOGEN 850 R Electro



Electrically powered, a new SENNEBOGEN 850 R Special at Koster Metalen in the Dutch town of Beverwijk.

elevation, the materials handling machine conveniently covers an area of 1,400m². The machine can move flexibly thanks to the crawler undercarriage with 4.9m track width. For the operator, the maXcab Industry Comfort cab, which can be variably adjusted in height by 2.7m, at a height of over 10m, offers an ideal view of the mountains of scrap, and an ideal view into the scrap metal shears. For boarding and for maintenance purposes the SENNEBOGEN 850 R has a perimeter railing on the uppercarriage and walkways all around the mast.

Koster manager, Michel de Pagter, was quickly convinced of the advantages offered by the electrically powered materials handling machine. The robust workmanship and an extensive range of safety components were important

The Dutch sales and service Partner, Kuiken N.V., was able to deliver a new SENNEBOGEN 850 R Electro at the beginning of 2014. The electrically powered machine is impressive with the highest level of reliability at the lowest energy costs.

As a scrap recycling enterprise, for more than 80 years Koster Metalen B.V. has specialized in the further processing of ferrous metals and non-ferrous metals. The family business handles approximately 450,000 tonnes of material each year, and has set for itself the ambitious goal of achieving a recycling rate of almost 100%. For the logistics at the scrapyards in Beverwijk, recently Koster Metalen has been relying on a new SENNEBOGEN 850 Electro. The electric machine with 250kW drive power was specially designed to meet the customer's requirements. With a reach of up to 21m and a 5m mask

features. "We anticipate lower operating costs and service costs, and a longer service life than comparable diesel machines can provide. We can handle minor maintenance tasks ourselves, thanks to the well-designed machine structure. For regular maintenance and spare parts supply we rely on the dependable service offered by Kuiken N.V.," explains de Pagter.

Operator Freek van Stein has particular praise for the good overview from the elevated maXcab Industry cab. The inclined windshield and a set of surroundings cameras combined with the lighting package are very effective when charging the scrap metal shears — an important plus in terms of work safety. Also on long work days in the machine, comfortable work is ensured, thanks to outstanding ergonomics and the air suspension comfort seat, emphasizes van Stein.

Celebratory inauguration of SENNEBOGEN Academy and Museum

"With the opening of our SENNEBOGEN Academy we are investing in the future. Instruction and training are the supporting pillars of every enterprise. We are building on well-trained employees and dealers and we are also offering our customers the perfect environment to even better 'experience' our machines. At the same time the Erich Sennebogen Museum ventures to look back to the roots of the family-run enterprise, SENNEBOGEN." This is how CEO Erich Sennebogen concisely expresses the idea of the recently opened Academy.

With the official opening of the SENNEBOGEN Academy and the Erich Sennebogen Museum in May 2014, the family-run enterprise sets another milestone in the



more than 60-year company history. In its facilities, the newly-founded SENNEBOGEN Academy GmbH & Co. KG houses a modern machine training center, including demonstration site, in addition to generously-dimensioned training rooms and conference rooms. In an authentic manner, the Erich Sennebogen Museum offers insights into the more than 60-year company history. With the historic machines in view and framed by original contemporary documents and exhibits, the museum invites all to have a look around. In the future the pyramid-shaped building will also offer facilities for events of all types, from a conference to a formal ball.



European Bulk Services Rotterdam



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European Bulk Services: serving bulk customers in the Port of Rotterdam

European Bulk Services (EBS) B.V. is an internationally respected stevedoring company with a focus on the storage and transshipment of dry bulk goods. EBS operates from two strategically located terminals in the Port of Rotterdam and has its own fleet of crane vessels. Approximately 180 full-time employees work for EBS, generating approximately €45 million in revenues per year. EBS is a wholly owned subsidiary of H.E.S. Beheer N.V.

TERMINALS

European Bulk Services (EBS) B.V. conducts its business operations from two strategically located areas in the Rotterdam



Terminal Laurens haven.

port area, namely the EBS Europoort terminal (at the Capesize dolphins), and the EBS St. Laurens haven terminal, a Panamax terminal. The terminals have excellent connections to deep seaways, hinterland by inland waters, railways and trucks by highways. The terminals can be reached without having to pass a single lock. All types of ships can be handled at these terminals, from Capesize to coastal and river barge. The Europoort terminal is one-and-a-half-hours' sailing time to/from the pilot station and the St. Laurens haven terminal is three hours' sailing time to/from the pilot station.



New storage shed Laurens haven.

NEW STORAGE SHED FULLY OPERATIONAL

EBS is proud to present the new storage shed at Terminal Laurens haven. The new concrete building, with a net volume of 30,000m³, consists of three compartments of 10,000m³ each. This new storage facility, which will be suitable for dry bulk products of all kinds. The roof will have movable steel hatches which can be opened and closed remotely by the crane operator. Due to an advanced security system the grab cannot cause any damage to the walls of the shed.



Terminal Europoort.

EBS EXTENDS ITS EUROPOORT AGRI TERMINAL

European Bulk Services has built a 65,000m³ storage shed at its Europoort Terminal for a major client which wants to use the terminal as an agri-hub. A long-term contract has been signed which, from mid-2014, will boost agribulk volume by around 1mt (million tonnes) a year, bring a further rise in profitability and improve the product mix.

The existing deep-water jetty will also be extended by the Port of Rotterdam. On this new jetty, which will accommodate vessels with a draught of up to 16 metres, EBS will install a new



Expansion Europoort terminal.

hopper and a new conveyor system linked to the existing conveyors. The existing train/truck loading station will be modified and extended. Completion of the new storage shed and related conveyors and extension of the train/truck loading station is expected in the first half of 2014. Construction of the new deep-water jetty is currently scheduled for completion in early 2015.

MAGNETIC SEPARATORS OF IRON PARTS OF COAL

In order to meet the special requirements of the coal import market, EBS has invested in several (electro) magnet systems for cleaning contaminated coal with iron parts. The St. Laurens haven terminal, with a depth of 13.85m, is perfectly equipped to handle and store, amongst others, coal from Russian load ports. These load ports have a similar maximum draught to the St. Laurens haven.

Receivers of Russian coals can be extra sure of the quality of their coal if their product is cleaned for metals via the EBS de-ironing installation. The electro magnets are installed in such a way that the coal can be cleaned either via storage or via board to board discharge operations.

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Liebherr Maritime Cranes boosts scrap handling capacity in Amsterdam

Established in 1972, Maja Stuwadoors Group B.V. (Maja) is well-known for valuable expertise in the loading and unloading of bulk goods, operating a fleet of seven floating cranes in various ports. To cope with increasing business, the company has opted for its first Liebherr mobile harbour crane, type LHM 550, in order to upgrade its facilities. Providing a maximum lifting capacity of 124 tonnes and an outreach of up to 48 metres, the crane is equipped with two winches for highly efficient scrap handling. In four-rope grab operation the maximum lifting capacity is 75 tonnes and more than 40 tonnes at 43 metres outreach.

In Amsterdam, a major client for Maja Stuwadoors is ALBA Group (ALBA). ALBA, a provider of environmental services and raw materials, has recently opened a new export terminal in Amsterdam and trusts in Maja's long-term experience. Due to the flexibility of the new Liebherr machine, Maja is capable of successfully completing all cargo handling tasks ALBA requires. ALBA, Maja and Liebherr are family-owned companies, each with decades of experience in their businesses.

In February 2014 the new crane for Maja rolled-off at the Port of Amsterdam. "The LHM 550 significantly increases our scrap handling capacity. Moreover, our portfolio comprises many other materials and thanks to its flexibility the new machine can be operated wherever it is required, especially in peak times. For that reason, our customers will also strongly benefit from this investment," said Arie Holleman, director at Maja Stuwadoors.

The short timeline of the project is remarkable. In late November, Maja Stuwadoors and Liebherr were in touch for the first time. After negotiations in December, the contract was signed in January. Manufactured and tested in Rostock, the crane was delivered fully assembled, just one month after signing. Right after rolling-off the barge, the crane was ready for operation in the middle of February. "Business is on the rise and fast delivery was very important for us. The close and professional collaboration between both partners was impressive and facilitated a short delivery time," added director Marco Holleman.

Before the LHM 550 moved its first load of scrap, Maja's

Maja Stuwadoors Group B.V.'s new Liebherr mobile harbour crane LHM 550 handling scrap.



crane drivers were well instructed on site. This practical training comprises operational topics as well as safety features. Maja Stuwadoors attaches great importance to well-trained crane drivers in order to maintain its high quality standards regarding damage-free and fast scrap handling.

The LHM 550 for Maja Stuwadoors also represents an anniversary crane for Liebherr Maritime Cranes. In total, the manufacturer has now delivered 30 mobile harbour cranes to the Netherlands.



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Flexible, energy efficient transshipment by the Netherlands' NKM Noell



Floating Cranes are playing an increasingly important role in ship-to-ship and ship-to-shore bulk loading, unloading and transshipment of numerous cargoes including coal. Because they require no port infrastructure, floating cranes are flexible and can operate within or outside of ports. The importance of floating cranes is particularly being driven by port charges and bulk carrier size. Higher port charges are generally causing operators to reconsider their loading and unloading operations, moving them away from the quayside. Larger bulk carriers and the resultant deeper draughts mean that the ports need to be deepened or the bulk carriers must lighten their cargoes before entering port. Due to their flexibility and high throughput capacity, NKM Noell's lemniscate floating cranes are increasingly used in The Netherlands to transship cargo from bulk carriers into barges for further shipment.

ADVANCED CONCEPT

Predicting these developments, NKM Noell started to develop an advanced floating crane concept in 2005. Computer simulations, interviews with crane drivers and thirty years of experience showed that crane throughput could best be increased, not by substantially increasing the hoisting capacity, but by increasing luffing and slewing speeds. With the intention to develop a floating crane, stability considerations played another major role.

In contrast with a crane designed as mobile crane in NKM Noell's crane the operator has always and in any circumstances a direct view on the grab. The operator does not have a look at the screen to see into the hold. Also due to the lemniscate concept the rope sheaves at the top of the jib are a lot lower, the rope length is therefore shorter. This reduces grab swinging. This both results in very short cycle times and high capacities. Especially during bad weather conditions (fog, rain) and during

night time and joint operations with shovels in the hold. The excellent operator visibility results in a lower capacity drop in adverse conditions.

In general reliability, availability and the crane's lifetime are key aspects in the design. Essentially, the crane must be economical to operate and be environmentally friendly. In this respect, one optional design feature of the NKM Noell floating crane is the use of a flywheel to 'charge' the generator-sets located in the pontoon. The flywheel itself is 'charged' using regenerated energy from the movement of the grab.

This feature reduces energy consumption and smoke emissions.

PRINCIPLE DESIGN

The design of the advanced crane concept is derived from the classical lemniscate crane and incorporates the lessons learned from the above.

This has resulted in a crane design that includes:

- ❖ Electrical drives, the NKM Noell lemniscates do not have hydraulic drives. The installed electrical drives need less maintenance and are more reliable. Also an electric drive is more energy efficient than a hydraulic drive, resulting in lower fuel consumption.
- ❖ a strong and stiff steel structure
- ❖ a low centre of gravity
- ❖ redundancy in the slewing and luffing mechanisms
- ❖ a fully balanced luffing system
- ❖ optimized slewing speed
- ❖ optimized luffing speed
- ❖ PLC control
- ❖ semi-automatic grab control
- ❖ a comfortable cabin with sophisticated suspension and optimized view

- ❖ a safe escape route (no need to enter the machinery room)
- ❖ low fuel consumption
- ❖ low smoke emissions
- ❖ low exhaust emissions
- ❖ a minimum design life of 25 years
- ❖ elevator access (optional)
- ❖ use of flywheel (optional)

THE PRODUCT

Based on the principles described above, NKM Noell designs and builds cranes to customer specification. Each crane is tailored to the customer's specific needs.

NKM Noell can also supply the pontoon on which the crane is installed and can arrange the installation. Life-time maintenance is available via a Service Level Agreement (SLA) and any delivery is backed by the comprehensive NKM Noell guarantee. Even though custom-built floating cranes are complex, NKM Noell's continuous improvement approach is continually driving down delivery times.

NKM Noell Special Cranes GmbH is a supplier of special cranes and special handling equipment. In addition to advanced special cranes, it can also supply R&D, consulting, feasibility studies, design, engineering, manufacturing, shipping, installation, commissioning, training and after sales service."



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Customized import-only services to remain popular, says Marcor

After a prosperous 2013, managers at Marcor Stevedoring believe the ability to offer customized import-only services to agribulk and minor bulk customers will continue to prove successful in 2014.

Already this year the Rotterdam stevedore has benefited from a bumper harvest of Ukraine grains which has seen imports of maize soar. "There has been bigger supply and competitive prices, in combination with low availability of soya from South America due in part to port congestion, which has affected supply reliability, Black Sea maize imports use in compound animal feeds have become an alternative this year," said director Aad Groenenboom.

The good start to the year driven by agribulk, which usually represents about two thirds of throughput at Marcor with the rest consisting of minerals and metals, should keep volumes steady in 2014 on the back of a strong 2013.

"We are confident for the future, we are heading for a good year," said Groenenboom. "This year we are expecting the same volumes as last year which was also very good mainly due to good volumes of soya from South America."

The terminal operator offers a range of modern floating equipment including four grab cranes, two weighing towers and a storage vessel. Groenenboom said Marcor's success in agribulk markets in one of the world's most fiercely fought stevedoring markets was down to its ability to add — or at least retain —



the cargo's value.

"Everybody can handle these products but it is how you do it that's the key," he told *Dry Cargo International*. "If you damage maize, for example, then its value falls. We only use mechanical gear, which is far better for corn than pneumatic handling equipment which can cause damage.

"Our four grab unloaders can do over 50 cycles per hour each at 25 tonnes per lift, so we can also unload cargo quickly. We are very efficient and confident in the service we can offer. We take care of the product and do exactly what we promise we'll do. And we always minimize spillages and losses."



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NM Heilig delivers new shore loading system to client in dredging and maritime sectors

NM Heilig BV, founded in 1978 as a family-run company, is now a major force in the bulk handling and recycling industry. NM Heilig has many years of experience and has been involved with the design, manufacture, supply and installation and commissioning of numerous projects worldwide.

Most recently NM Heilig designed and produced a shore loading system for a large international company in the dredging and maritime sectors. The company was in need of a semi-mobile system for one of its own fall pipe vessels. It wanted to be able to load and unload vessels all over the world, therefore this system should travel along on board the vessel. Before, the company was only able to load and unload its commodities at ports where loading systems were available. The costs of getting the commodities to the port and onto the vessel are rising. Now the company can use its own shore loading system at any place in the world, which offers a more efficient logistic chain and makes the client flexible in choosing the location for transshipment.

SHORE LOADING SYSTEM

NM Heilig's custom-designed shore loading system consists of two parts, an extraction feeder, which consists of a bunker and a heavy duty vibration feeder and a conveyor belt, with undercarriage, that is driven by two motors. The system can be loaded with a front loader and an excavator. The complete system is fitted with a most effective dust suppression system, this can be switched on when the broken rock material includes a lot



of dust. Both parts of the system can be controlled by an advanced human machine interface or by remote control.

The length of the conveyor belt is 40 metres with a discharge height of 16 metres. The capacity of the shore loading system is rated at 2,000 tonnes per hour. Individual parts of the system weigh less than 30 tonnes, due to the capacity of the crane on board of the vessel. The system is not tied to the vessel and can be relocated at any time. The shore loading system has a radial mode, this enables excellent trimming ability when loading the vessel. The system is also maintenance-friendly due to the platforms



alongside the entire conveyor belt.

N.M. Heilig B.V. organizes and executes all project activities in accordance with ISO 9001 quality system and is as a contractor VCA-certified as well as for assembly. Due to its extensive experience and expertise, it can customize its equipment to guarantee the precise material handling properties and output required by its customers. For this project several offshore and crane standards were applied, especially regarding to the coating system and the selected materials used for the installation.

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NEMAG hard at work supplying recent orders

Netherlands-based NEMAG, supplier of grabs for the bulk industry, is currently very busy in the Dutch ports with very recent supplies and recently received orders of, amongst others:

- ❖ **Pacorini Metals Vlissingen:** supply of clamshell grabs for handling ferro-silicone and ferro-manganese ore for a Liebherr LHM 280;
- ❖ **Zeehavenbedrijf Dordrecht:** supply of 30m³ alumina clamshell grab in the latest environmentally friendly execution (see 'Nemag unveils environmentally friendly grab', on p40 of the January 2014 issue of *Dry Cargo International*) for a TEREX Port Solutions 50-tonne floating crane
- ❖ **Rietlanden EDF Amsterdam:** supply of 36m³ coal handling clamshell grab in the latest environmentally friendly execution for a TEREX Port Solutions 50-tonne floating crane;
- ❖ **European Bulk Services:** supply of a 22m³ alumina handling clamshell grab in the latest environmentally friendly execution;
- ❖ **OBA Amsterdam:** supply of a 38m³ scissors grab for one of its 50-tonne grab unloaders;
- ❖ **EMO Rotterdam:** supply of 60m³ scissors grab for EMO's 85-tonne wide span grab unloaders;
- ❖ **EECV Rotterdam:** supply of scissors grabs for handling iron ore and coal for its 60-tonne DEMAG grab unloaders;
- ❖ **RWE Eemshaven:** supply of scissors grabs for handling coal at its 26-tonne grab unloaders at the new coal fired power station; and
- ❖ **TATA Steel IJmuiden:** supply of scissors grabs for handling coal and iron ore for its 40-tonne grab unloaders.

As well as the above, NEMAG has been awarded with contracts (repeat orders) from Rhenus Midgard Germany, ABP Immingham (for TEREX Port Solutions mobile cranes), E-On Liverpool (for TEREX Port Solutions mobile crane), TATA Steel United Kingdom, ArcelorMittal France and ILVA Italy.

The success of NEMAG can be summarized as 'producing grabs which result in the lowest handling costs per tonne material transferred'. The success is supported by intensive cooperation with – for instance – Technical University Delft and other Knowledge Partners, as well as a direct knowledge exchange with end users. This drive has resulted in a customer base which include the largest bulk handling companies world wide, spreaded over more than 60 countries.

NEMAG SERVES FOUR MAIN MARKET SEGMENTS:

- ❖ steel plants (including major clients such as ArcelorMittal and Tata Steel, as well as other Asian and South American steel companies);



- ❖ power stations;
- ❖ OEMs (original equipment manufacturers), including crane manufacturers such as Kone, TEREX Port Solutions, Liebherr and ZPMC; and
- ❖ major stevedoring companies.

Typically, Nemag's average customer is a big terminal — whether it is a steel plant, power station or stevedoring company. The terminal is likely to have a high berth occupancy, and Nemag's grabs are used on cranes ranging in size from medium to very large. About 80% of the cargo flow worldwide comprises either coal or iron ore, and Nemag's customer base reflects this fact — approximately the same percentage of its grabs are sold for use handling coal or iron ore, in the steel or energy market segments. The remaining 20% of its grabs are used to handle grain, animalfeed, scrap metal, minerals, biomass, fertilizer, agribulks and more.

Nemag celebrates its 90th anniversary this year. As a company, it believes in long-term growth, rather than short, unsustainable bursts of growth. This approach has enabled it to make sure and steady progress in the marketplace, and to do the very best it can for its customer base.





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OBA unloads first cargo at ACP Terminal

*The Capesize Sea Triumph (292m x 45m)
with a cargo of coal, being discharged with
OBA's 50-tonne floating crane
NIJLPAARD at the ACP Terminal*



The recent acquisition (1 April 2014) of the ACP Terminal by OBA Bulk Terminal Amsterdam marked another step in the continuous optimization of OBA's capacity utilization, meeting the customer's requirements for flexible and efficient services. This site, with an available storage of 9 hectares and a quay of 330 metres, was previously used by Rietlanden.

OBA now has three terminals, namely; Main Terminal, ACP and Terminal North which form one integral facility with

a total quay length of 1.7km and a storage availability of 70 hectares. In the new situation there are additional technical and operational possibilities to intensify the use of conveyor belt systems. Because of that the handling frequency and the internal transportation by trucks and pay loaders will be reduced substantially resulting in positive effects for the environment which is clearly an important consequence as well.

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HITACHI

Reliable solutions

Hitachi launches ZH210LC-5 hybrid in Europe

Hitachi Construction Machinery (Europe) NV has launched the first of a new generation of excavators, the ZH210LC-5 hybrid. The latest innovative Zaxis-5 model has been designed to deliver reliable performance with fewer emissions and less fuel than conventional models¹.

More economical for owners, easier for operators and better for the environment, the ZH210LC-5 hybrid incorporates advanced technologies adopted from hydraulic, electric and battery-powered excavators. The result is the TRIAS HX system, which reduces fuel consumption and CO₂ by up to 31%.

EXCEPTIONAL FUEL EFFICIENCY

The new ZH210LC-5 hybrid excavator will provide energy-saving performance, but without compromising on power, speed or ease of operation. Thanks to the flexible combination of a proven hydraulic motor and an eco-friendly electric motor, it can give the same high levels of efficiency and smooth swing motion as all Zaxis-5 hydraulic models.

The TRIAS HX system combines a hybrid system with an energy-efficient TRIAS hydraulic system to achieve extremely low levels of fuel consumption. The hybrid system incorporates a swing motor that converts energy generated during swing braking into electrical energy. This is transferred via the Power Control Unit and stored in the capacitor unit, before being used to help the engine accelerate and move the upper structure.

The energy-efficient TRIAS hydraulic system enhances the performance of the Hitachi ZH210LC-5 hybrid excavator. This employs a three-pump/three-control valve system, which results in greater accuracy and reduces pressure loss that consequently saves energy. The ZH210LC-5 also has an electric power assist system that comes into force for small swing operations. It uses energy from electric swing motors to carry out such movements, further reducing the machine's fuel consumption.

REDUCED RUNNING COSTS

While the ZH210LC-5 model matches the performance characteristics of the other medium excavators in the Hitachi Zaxis-5 range, its ability to switch between the hybrid and TRIAS systems results in further reduced running costs and an even greater contribution to profitability.

In addition, the ZH210LC-5 has been designed with a monitoring system, which highlights fuel consumption and energy usage on an average hourly and daily basis. This gives the operator an accurate indication of the machine's efficiency and encourages greater awareness of economic operating techniques.



After a day's work, for example, the operator can check how fuel is saved and identify ways to further reduce consumption. The HYB icon on the monitor indicates that the hybrid system is operating and is illuminated once the amount of electricity in the capacitor has reached a sufficient level.

TESTED UNDER EXTREME CONDITIONS

Prior to launch, the ZH210LC-5 hybrid excavator underwent a rigorous winter test in the Arctic Circle under the supervision of Finnish contractor Maansiirtoliike Kemppe Oy. It used the machine for earthmoving and loading trucks from January until March 2014 on a road construction project in Rovaniemi alongside its existing fleet of conventional medium Zaxis-3 and -5 excavators.

In freezing temperatures that plummeted to -30°C , the machine was tested to the limit by experienced operator Kari Saraniemi. "The swing motion on the hybrid excavator means that it is even more smooth and precise than a conventional machine," he enthuses. "In addition, it is less noisy in the cab and the fuel consumption is excellent."

Kari carried out daily checks on the hybrid system in addition to the routine maintenance managed by Finnish Hitachi dealer Rotator's technician Pasi Törmänen. "It has been really interesting to work on the hybrid winter test and to learn about Hitachi's latest advanced technology," he explains. "The system has been easy to maintain and is extremely reliable, but the most impressive aspect for me is how quiet the machine is."

The owner of Maansiirtoliike Kemppe Oy, Tuomo Kemppe, says, "I would have no hesitation in recommending the ZH210LC-5 and we will evaluate its purchase price and running costs next time we are buying a new machine. The hybrid machine is very quiet and easy to operate, the swing motion is smooth and responsive, and the fuel consumption is certainly favourable in comparison to our other machines working on the same site."



¹ The fuel consumption is compared with the ZX210-3 model in P-mode.

Feeder assessment, design and supply from Jenike & Johanson

Proper selection of a screw, belt, rotary valve (rotary air lock), or vibratory feeder should be integrated into the material handling system design early in the process. Jenike & Johanson specializes in feeder assessment, whether troubleshooting problems or implementing a new design for a challenging bulk material. During equipment engineering, it carefully considers the flowability of the bulk material, as determined through flow properties testing.



This approach eliminates typical problems seen in bulk material handling designs when the equipment is specified without a complete understanding of a material's flow behaviour or unique characteristics such as abrasiveness, friability (attrition or breakage of particles), or dustiness.

THE SOLUTION

Jenike & Johanson provides effective functional engineering for feeders. Its designs consider:

- ❖ configuration that meets the needs of the user (e.g., throughput, spatial constraints)
- ❖ critical bulk material flow properties that help to determine feeder features
- ❖ features for screws, belts or aprons, and rotary valves:
 - ❑ screw: tapered shaft and increasing pitch to maintain mass flow;
 - ❑ belt: interface design between hopper and feeder for mass flow;
 - ❑ rotary valve: spool above rotary valve including vent design; and
 - ❑ vibratory: interface design to ensure mass flow discharge.
- ❖ operational requirements: e.g., speed, power, torque, or special features.

EXPERIENCE HIGHLIGHTS

- ❖ design/supply of 450mm-diameter twin mass flow screws for feeding wood chips;
- ❖ retrofit of coal belt feeder with innovative interface that allows belt reversing;
- ❖ development of specialized micro-dosing feeder for granular product;
- ❖ design of 300mm-diameter mass flow screw for hot lime at 800°F (427°C);
- ❖ design of air assisted/fluidized feed system for ultra-low

density microspheres; and

- ❖ supply of high accuracy biomass dosing feeder operating at high pressure

After completion of the feeder's functional design, Jenike & Johanson can provide mechanical design and structural engineering services that result in drawings needed for fabrication. This additional engineering task is a vital step for achieving successful feeder implementation.

EQUIPMENT SUPPLIED

Jenike & Johanson can also supply custom engineered equipment. From concept – design – engineering – optimization – fabrication – supply.

- ❖ mass flow screw feeder – critical for maintaining mass flow from a hopper;
- ❖ J-Purge™ gas system – highly efficient, energy saving method for solids purging;
- ❖ slide or pin gate with expansion joint – robust shut-off gates for slotted outlets; and
- ❖ Solids Pump® – gas sealing screw for dosing solids into pressurized systems.

Reliable flow often depends upon seemingly small, but very significant, construction details. To ensure that its equipment works effectively, Jenike & Johanson takes responsibility for all such details when we supply custom equipment. The result is dependable, quality equipment with a long life.

ABOUT JENIKE & JOHANSON, INC.

Jenike & Johanson is a leading provider of powder and bulk solids handling, processing, and storage technology. Over the past 55 years, it has tested over 10,000 unique powders and bulk solids and worked on more than 7,500 projects, giving its team very broad, real-world and in-depth experience to address a wide variety of bulk material handling and engineering needs.

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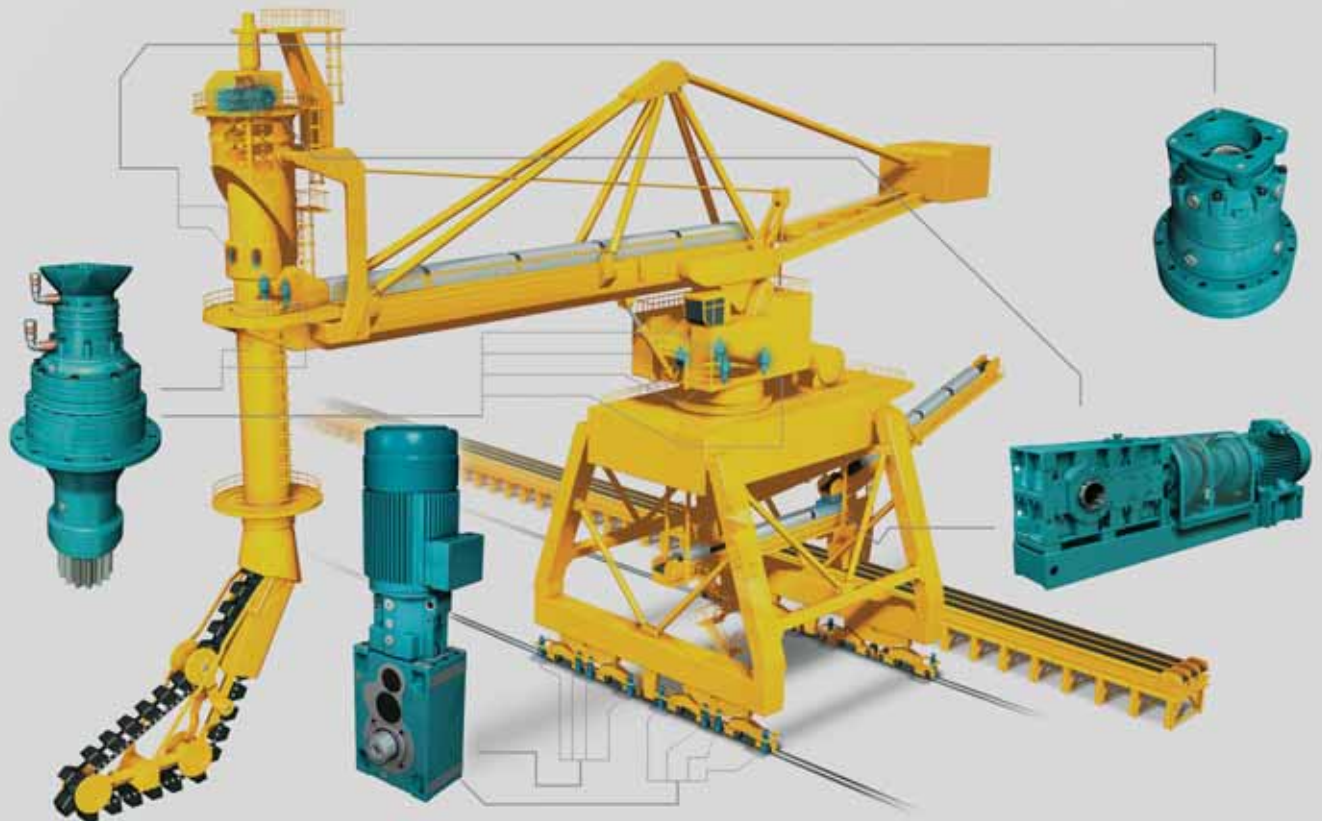


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DOCKSOLID biomass hoppers for ABP as Buttimer launches equipment brand

At the time of writing, Irish mechanical engineering company Buttimer was set to deliver two ship unloading hoppers to the Port of Hull for ABP (Associated British Ports). The delivery was set to take place in the middle of May.

The biomass hoppers, for handling wood pellets, are part of Buttimer's DOCKSOLID bulk port equipment brand, launched to coincide with the order. Buttimer has sold similar hopper units to the ports of Cork, Dublin, Gdynia in northern Poland and many others. Buttimer's bulk port equipment is entirely engineered in Ireland — the two hoppers for ABP were built in Co Tipperary. Buttimer overcame strong European and international competition from established global engineering brands to secure the contract from ABP.

Buttimer is launching the DOCKSOLID brand in order to clearly position its bulk port equipment in the global marketplace, and has already received interest from ports in Europe, the Middle East and further afield. DOCKSOLID's three core features are: state-of-the-art environmental controls, flexibility of use & manoeuvrability, and well-engineered structural design for strength and longevity.

ABOUT BUTTIMER

Buttimer Group is a mechanical engineering company, with expertise in steel structures and the design, fabrication and installation of material handling systems for dry bulk products. Based in Cahir, Co Tipperary, the company was founded in 1978 by Edward Buttimer. The company serves sectors such as ports, food and beverage, mining and power generation.



SCHADE solution for Brazilian stockyard

Five years after the delivery of a first bridge scraper for the cement plant at Sobradinho, SCHADE was able to carry out another contract by the Brazilian cement producer CIPLAN Cimento Planalto S/A: SCHADE delivers a circular column equipped spreader with a flow rate of 1,800tph (tonnes per hour) (max 2,000tph) and a 23-metre beam as well as a belt width of 1,400 millimetres. Besides, the scope of delivery includes a SCHADE bridge scraper equipped with a harrow covering the entire area of the stockpile's profile. The bridge scraper can be operated with a flow rate of 700tph.

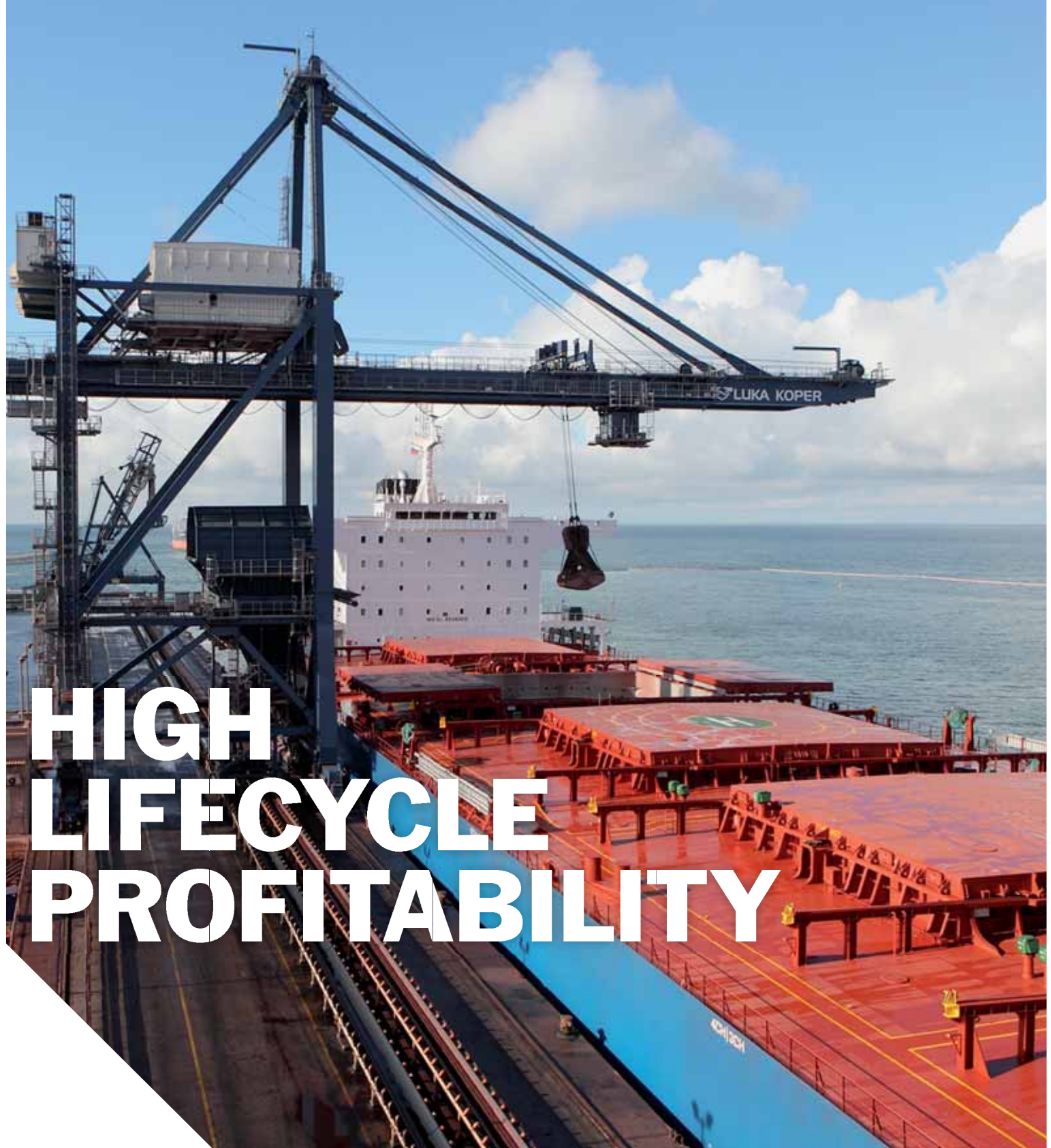
The structural steelwork was sourced by AUMUND Brazil based in Sao Paulo through AUMUND Asia in Hong Kong and delivered to Brazil. With its in-house quality control AUMUND Hong Kong guarantees the meticulous selection of the parts. The supervision of construction is provided by AUMUND Brazil in close co-operation with SCHADE alignment supervisors.

During planning of the project, SCHADE built a circular stockyard with two belt conveyor bridges. The second belt bridge transports the material directly to the mill's pre-hopper on demand. The raw mill was not equipped with a larger storage hopper. Instead a passage straightener permits the passage directly to the mill. The control mechanism of the SCHADE reloader was so constructed, that the central

outlet hopper will always contain raw material. Below the central outlet hopper a controlled feed belt weigher has been installed, transporting the demanded material flow directly to the raw mill. Initial operation at CIPLAN Cimento Planalto at Sobradinho is planned for this year. The plant produces about 1,6 million tonnes of cement per year.

ABOUT THE AUMUND GROUP

The AUMUND Group is active worldwide in the conveying and storage of raw materials and solid fuels. With technically sophisticated and innovative products the AUMUND Group today is recognized as a market leader in continuous process applications demanding absolute reliability and availability. The manufacturing companies AUMUND Fördertechnik GmbH (Rheinberg, Germany), SCHADE Lagertechnik GmbH (Gelsenkirchen, Germany), SAMSON Materials Handling Ltd. (Ely, England), as well as AUMUND Logistic GmbH (Rheinberg, Germany) are consolidated under the umbrella of the AUMUND Group. In conjunction with the headquarters of the manufacturing companies, the global business is effectively supported through a total of eight dedicated sales/support locations in Asia, Europe, North and South America plus representatives and agents in over other 100 countries.



HIGH LIFECYCLE PROFITABILITY

The Konecranes AGD Grab Unloader offers you the best lifetime value. A simple, remarkably effective rope reeving design and standard components give you high operational reliability and reduced maintenance. And your drivers will enjoy the good response time of the modern AGD control system.

IHI's involvement in biomass handling projects

Biomass ship-unloader at Hitachinaka Thermal Power Plant.



IHI Transport Machinery Co., Ltd is a leading Japanese company involved in the production of material handling equipment & systems. Its material handling equipment includes systems such as shiploaders, conveyor systems and land-side material handling equipment. To date, it has delivered a great deal of material handling equipment to domestic and foreign customers.

IHI's equipment is used widely to handle commodities including coal, iron ore, grain and much more. Recently, the company has been involved in a range of biomass handling projects.

BIOMASS HANDLING EQUIPMENT INSTALLED AT A POWER PLANT IN KYOTO PREFECTURE

- ❖ 300tph (tonnes per hour) conveyers;
- ❖ 600tph conveyers;
- ❖ mixed combustion rate: 3%;
- ❖ commencement of operation: August 2008;
- ❖ annual handling volume: approximately 60,000 tonnes;
- ❖ power generation capacity: 900MW.

BIOMASS SHIP-UNLOADER FOR TOKYO ELECTRIC POWER COMPANY, INCORPORATED

(delivered to Hitachinaka Thermal Power Plant, Ibaraki Pref.)

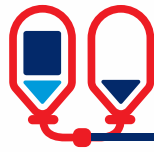
- ❖ 480tph biomass ship unloader;
- ❖ commencement of operation: April 2012;
- ❖ annual handling volume: approximately 70,000 tonnes;
- ❖ generation capacity: 1,000MW

BIOMASS HANDLING EQUIPMENT AND STORAGE FACILITY TO BE INSTALLED AT A POWER PLANT IN FUKUSHIMA PREFECTURE IN 2015

- ❖ 500tph biomass ship unloader;
- ❖ 550tph, 200tph, 80tph conveyers;
- ❖ 2,500t (3,800m³) steel silo ×8;
- ❖ mixed combustion rate: 3%;
- ❖ commencement of operation: March 2015;
- ❖ annual handling volume: approximately 14,000 tonnes;
- ❖ power generation capacity: 1,000MW × 2

IHI's biomass ship unloader has been developed based the technology of its pneumatic ship unloader for grain. It makes it possible to reduce dust emissions by adopting a sealed structure between nozzle and receiving conveyer.





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Liebherr LHM 550 for Terminal du Grand Ouest



Located at the French Atlantic coast, Terminal du Grand Ouest (TGO) has opted for its first Liebherr mobile harbour crane (LHM), type LHM 550.

TGO is the single container and breakbulk terminal operator at Montoir de Bretagne/Saint-Nazaire. Moreover, the company also specializes in scrap metal handling. Due to increasing business, additional crane capacity was required. TGO offers multiple services and demanded a versatile machine. Consequently, a mobile harbour crane was the best solution for the terminal as it can be used for safe general cargo operation and efficient scrap, bulk or container handling — just by an easy exchange of the lifting attachment. “The LHM 550 helps us to develop our heavy-lift cargo handling and scrap metal business, especially in terms of loading heavier parts and larger vessels. The crane offers a lifting capacity up to 144 tonnes, which is unique in this region,” says Ilyasse Aksil, CEO of TGO.

Manufactured and pre-tested at Liebherr’s production site in Rostock, the mobile harbour crane arrived in January 2014. The LHM 550 has demonstrated its capabilities right from the start. The first jobs included some impressive lifts, loading a sterilization chamber onto a vessel. Destined for Vera Cruz in Mexico, the chamber came in four pieces, each weighing 91 tonnes. Thanks to the remarkable lifting capacity of the new crane, these parts were loaded directly to the vessel, saving costs and emissions.

“We are optimistic that this investment in advanced port equipment will also attract new customers, since we have expanded our service portfolio while maintaining the high quality standards TGO stands for,” adds Aksil.

Although the LHM 550 is the first for TGO, Liebherr has delivered to Montoir de Bretagne in France before. In 2012, Liebherr Maritime Cranes delivered its 1000th mobile harbour crane to the Atlantic coast. The LPS 550 was ordered by Montoir Bulk Terminal and is configured for highly efficient bulk handling.

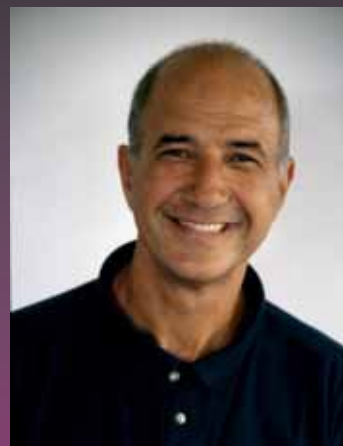
RIP Wubbo Ockels

Shortly after the May 2014 issue of *Dry Cargo International* went to press, Wubbo Ockels, the first Dutch astronaut to go into space, died from complications related to renal cancer.

Ockels (see p123 of the May issue)

was a great inspiration to employees at Van Aalst Bulk Handling, some of whom had the honour of meeting him personally.

DCI would like to extend its condolences to Mr Ockels’ family.





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Townsville opts for Liebherr LHM 420

Australian-based Northern Stevedoring Services (NSS) has placed an order for a Liebherr mobile harbour crane, type LHM 420, to operate on Berth 3 and 4 in the Port of Townsville, Queensland. The operations of the stevedoring company span all of regional Queensland's major port facilities, providing the full range of stevedoring and logistics solutions. The new crane is the third LHM crane for NSS, which has been operating an LHM 550 and an LHM 1300.

"It's taken a few months to get quay approval, but Liebherr never gave up, offering solutions to all the problems," said General Manager Chris Ullett. "The quay has many restrictions, but between the port authority, Liebherr and ourselves, we finally made it work."

The crane comes with double supporting pads and software to assist in meeting the quay limitations, along with Liebherr's Cycoptronic anti-sway system and a twinlift spreader. The LHM 420 is also fitted to operate with the Rotabox system for dust-free high-value mineral handling.

"We've had a few sales on the West coast last year, as well as Darwin. It's been a while since we have delivered a crane here in the East, so great to win this order," Liebherr's salesman, Gordon Clark said. "I think the support of Morrow in the area has helped us a lot in the last years."

This brings Liebherr Maritime Cranes' mobile harbour crane tally for Australia up to 10 in the last 18 months, with two for Fremantle, one for Bunbury, Geraldton, Port Hedland and Darwin, three for Henderson and now one for Townsville.



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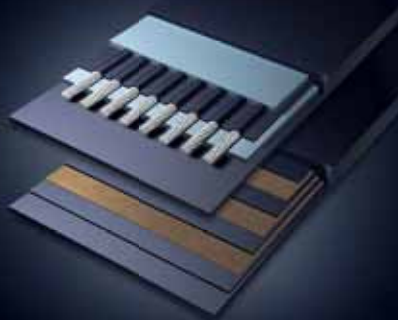
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Getting down and dirty

the intricacies of handling coal



A view of Korchakol mine located in Siberia near the city of Novokuznetsk.

Louise Dodds-Ely

Coal transshipment with Coeclerici: the global raw material provider

With a network of offices around the world, Coeclerici has more than 100 years experience in the sourcing, marketing and transportation of raw materials from mines to energy and steel industries around the world, writes *Capt. Giordano Scotto d'Aniello*, head of the commercial department at Coeclerici.

Founded in Genoa (Italy) in 1895 Coeclerici started operations by importing coal from UK. Over the years, Coeclerici succeeded in consolidating the expertise into mining, shipping, trading of coal and logistics, building up worldwide partnerships and widespread networks in each continent.

Committed to continual improvement, Coeclerici adapts itself to the changing needs of its customers and the market conditions of the industries it operates in by investing in state-of-the-art equipment, innovative technology and floating transportation.

Known for developing long-term agreements and partnerships with major world producers, Coeclerici also has a strong reputation for investment and has invested directly in the development of certain mines over the years.

In 2008 Coeclerici acquired 100% of Korchakol, a steam coal mine based in Siberia near the city of Novokuznetsk; it was the first ever steam coal mine to be bought by a Western company.

The acquisition included the production site and transportation system for carrying the raw material to nearby customers as well as a loading centre.

Viewed as a major investment for Coeclerici Group, Korchakol had the logistics in place to ensure easy transportation of raw materials to the port of Murmansk, where the company is well established; it also formed part of the group's corporate strategy to promote enhanced upstream integration in purchasing coal from Russia.

Organized as a parent company with four divisions: mining, trading, logistics and shipping, Coeclerici has created an integrated and flexible structure that guarantees efficiency, security and quality for organizations with complex procurement requirements. The synergies between these four divisions have developed over the last century to ensure the best possible results as close checks can be made at every single stage of the procurement process.

Committed to evolving with the demands of the market, the group strengthens its logistics division service offering by establishing strategic international relationships with major coal producers, such as PT Berau Coal, the fifth-largest coal producer in Indonesia and international partnership with local companies.

The four Floating Transfer Stations (*Bulk Java, Bulk Borneo, Bulk Sumatra, Bulk Celebes*) were designed to the specific needs of PT Berau Coal right from the drawing board and are being used to conduct offshore coal transloading operations at Muara Pantai anchorage, East Kalimantan, Indonesia, at a loading rate, each, in excess of 40,000 tonnes per day.



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FTS Bulk Celebes during operations at Muara Pantai anchorage (East Kalimantan – Indonesia).



One of the strong points of Coeclerici's logistics division business is that it is market-oriented and focuses on the real customer's needs. The floating terminals Coeclerici designs, builds and operates for its client, are innovative vessels, built to highest technological and safety standards by the most advanced shipyards in the world.

The floating terminals are cost effective alternative to fixed port infrastructures, useful for solving logistical bottlenecks, port

restrictions, draught limitations or lack of port facilities.

Another significant example is given by the two 53,776 deadweight last-generation transshipment units, *Bulk Zambesi* and *Bulk Limpopo*, specifically designed to overcome logistical constraints inherent to the port of Beira (Mozambique), as well as to optimize, from both a commercial and environmental point of view, Vale's coal handling process from the Moatize mine to worldwide importers.

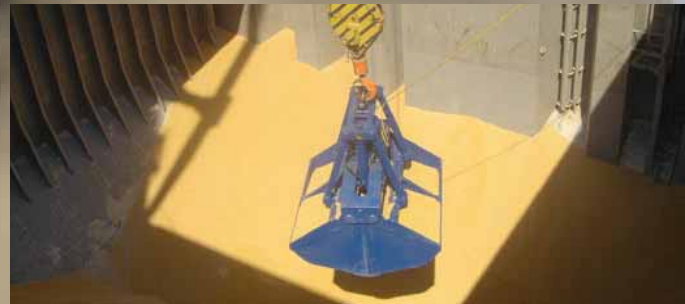
FTS Bulk Java during operations at Muara Pantai anchorage (East Kalimantan – Indonesia).





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Bulk Limpopo *transshipment*
vessel during operations in Beira
– Mozambique.



In addition to these transshipment units employed by PT Berau Coal and Vale, Coeclerici Logistics owns the following vessels:

- ❖ *Bulk Wayuù* in Venezuela
- ❖ *Bulk Pioneer* in Indonesia
- ❖ *Bulk Irony* in Italy
- ❖ *Bulk Kremi* in the Black Sea.

Viewed as the cornerstone of Coeclerici's business since its inception, the shipping segment was further strengthened in 2013 via a joint venture with Italian firm d'Amico Group. An important step in Coeclerici's growth strategy, the partnership has resulted in dACC Maritime Limited, a Dublin-based company that has two 60,000dwt Supramax bulker newbuilds on order, with options for two more, at the world-renowned Oshima Shipyard, Japan.

Strongly committed to environment protection and the stringent control of sea and air pollution, both d'Amico and Coeclerici have chosen vessels designed with compartments that recover and treat residual water from cargo holds. In addition, the vessels have class notation ENVIRO, for gas limitations from the combustion, double wall fuel and oil tanks, as well as GP certifications that ensure no environmentally harmful materials were used during the construction.

Furthermore, the design will include integral technological upgrades that ensure the units are highly flexible and specialized from both a technical and commercial aspect. The propulsion will include the most up-to-date Man/B&W engine, ME type electronic controlled with low RPM, which will enable speeds of 14.5 knots when combined with cutting-edge solutions to the propeller and hull. This remarkable design will save approximately seven tonnes of fuel on a daily basis when

compared to similar modern vessels in operation.

Due for delivery in the second half of 2015, the first two vessels will potentially be followed by the two optional ships in 2016. Operating in a challenging market, which rewards firms that invest and adapt, this joint venture of two leading shipping firms is certain to lead to exceptional results as a wide range of shipping expertise and managerial experience knowledge is shared.

With a firm belief that correct conduct and true transparency throughout all operations is key to ongoing success, Coeclerici has developed a coveted reputation for excellence over the years. Through continued technological enhancements that provide safe and environmentally friendly transportation, the group ensures full compliance with IMO resolutions, IACS class standards, IOPP/ISPP standards and ISO 9001 requirements for lower dust emissions from coal handling operations.

This is made possible through the utilization of products and technology such as closed grabs, water spray systems, duly designed hoppers, wholly enclosed conveyer belts and shorter grab cycles. This commitment to high standards and serving customers with a comprehensive range of quality services is certain to hold Coeclerici in good stead as emission and fuel regulations become increasingly more stringent in the shipping industry.

Despite a challenging economy in 2013, the group recorded a turnover of €652 million. With a tradition for continual strengthening of its corporate structure via joint ventures and partnerships as well as ongoing strategic investments in areas of potential growth, Coeclerici has developed a group that is fully capable of prospering in the most challenging global economic markets.

Cat® 834K Coal Scoop moves material more efficiently

The Cat® 834, introduced in the mid-1960s, has set the standard for wheel-dozer design and performance for almost 50 years, ensuring customers optimum productivity, durability and availability through multiple life cycles. The new 834K Coal Scoop builds on the strengths of its predecessors with engine choices that tailor it for use worldwide, a completely new cab, drive-train refinement, new monitoring and diagnostic features, new safety features and structural enhancements. This purpose-built machine is available with ergonomically designed coal scoops to carry (23m³) and doze (46m³) to help achieve top efficiency and productivity while keeping costs down.

PRODUCTION-FOCUSED POWER TRAIN

Rated at 496 net horsepower (370kW), the Cat C18 engine used in the 834K is available in three configurations: Tier 4-Final (Stage IV) using a diesel particulate filter and a selective-catalytic-reduction system to control emissions; Tier 3 equivalent without



after-treatment; and Tier 2 equivalent without after-treatment.

The C18 uses Caterpillar's field-tested, mechanically actuated, electronic unit-injection system for precise control of fuel delivery, yielding optimum performance and economy in all operating situations. Fuel-saving enhancements for the 834K Coal Scoop include engine-idle-shutdown and engine-idle kick-down systems, and the delayed-engine-shutdown system protects the engine from hot shut-downs. An on-demand, hydraulically driven cooling fan reduces horsepower draw for increased efficiency.

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The Cat 4F/3R planetary power-shift transmission used in the 834K Coal Scoop features a new advance productivity electronic control shifting system, which is designed to provide greater machine momentum through shift points, enhancing performance and saving fuel. Forced-flow oil lubricates and cools the transmission's high-torque clutches to ensure long component life.

For increased productivity and precise control, the 834K Coal Scoop's impeller clutch torque converter (ICTC) allows the operator to adjust rimpull from 100% to 25% in order to match hydraulic effort and rimpull to the operating situation. The ICTC system reduces tire wear and permits full-throttle shifts for greater productivity.

The 834K Coal Scoop's axles feature shaft-mounted, oil-cooled, multiple-disc brakes. The braking system can be equipped with auxiliary oil coolers for added protection. To reduce brake loads, an available automatic retarding system maintains a set downhill speed, minimizing brake use.

NEW OPERATOR'S STATION

The 834K Coal Scoop features a completely redesigned operator's station, with automatic temperature control, new touch-screen display with soft keypad, electro/hydraulic parking brake, and the Cat Comfort III seat with air-ride suspension and integral controls—including the Steering Transmission Integrated Control (STIC) that allows convenient joystick steering. Interior sound levels also are significantly reduced to a quiet 71 dB(A).

The 834K Coal Scoop also is equipped with the Cat next-generation Vital Information Management System (VIMS™ 3G), which features a large touch-screen interface and easy-to-use navigation to keep operators informed of the machine's operating conditions. The system, with data-logging capability, features an Ethernet connection module and an integrated Cat Product Link telematics system, which transmits data to a secure web-based application (VisionLink™).

STRUCTURAL STRENGTH

Reflecting the solid design of its predecessors, the new 834K Coal Scoop retains its massive full-box-section rear frame that resists torsional shock and twisting forces. Heavy-duty steering cylinder mounts are designed to transfer and effectively dissipate steering loads into the frame. Blade-mounting push beams have a 'through-width' design, versus simply being attached to the sides of the frame, a design that dissipates the stress of blade corner-loading into a larger area of the frame.

New for the 834K Coal Scoop is a redesigned rear-axle trunnion, now wider and bolted directly to the frame rails, eliminating the previously used intermediate casting and allowing loads to be more effectively dispersed. In addition, the 834K's lower articulation point (lower hitch) has been strengthened with an increase in front-frame plate thickness and a significant increase in pin diameter in conjunction with a larger bearing.

SAFETY AND SERVICEABILITY

A major design focus of the 834K Coal Scoop is operator safety, and to that end, the new model features a standard rear-view camera, repositioned access ladders, full-perimeter railings and convenient ground-level panel that houses a stairway light switch, engine-shut-down switch and lockouts for the starter and transmission.

Available for the 834K is the Cat Detect system, which supplements the rearview camera with radar sensors on the rear of the machine to provide both audible and visual indicators of objects in its working space.

The 834K Coal Scoop's routine service points are accessible from ground level or from large, skid-resistant platforms. Swing-out doors on both sides of the engine give ready access to daily maintenance items, and ecology fluid drains facilitate service and protect the environment. For added convenience, the Electronic Technician diagnostic port and the VIMS service port are conveniently located in the cab's right console.



Blug Grabs – ideally suited for coal handling applications



*Image 1.
Blug's products are present in
52 countries and there are
more than 3,000 Blug
working grabs in the market.*

Blug has been in business since 1965. In that time, the company's product portfolio has evolved and expanded, giving successful quality-based solutions to different applications and environments. Blug's target is to offer the highest lifecycle value, high-duty grabs for all type of crane and material requirements. It sees the grab business as a global activity, and offers expertise in engineering and customer-focused developments without any limitation due to grab technology or working conditions. Blug's

products are present in 52 countries and there are more than 3 thousand Blug working grabs in the market (see image 1).

COAL HANDLING APPLICATIONS

Coal represents a large proportion of bulk products in port applications; it's historically been one of the 'star' materials more usually handled by grabs and therefore, grab solutions have undergone continuous evolution and specialization to improve

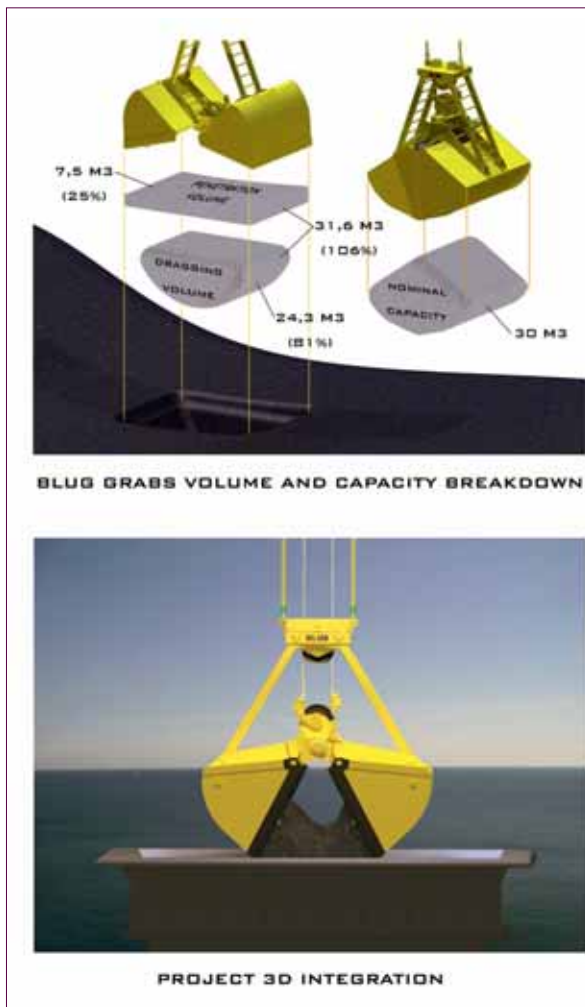


Image 2.



this material's loading cycles.

Based on a 0.8–0.9t/m³ average density, Blug's range for coal handling offers a wide variety of options depending on the crane and capacity requirements. The key factor in obtaining a fast return of investment for this kind of applications is to optimize the grab's capacity/own weight ratio and offer the highest lifetime versus purchase, start-up and maintenance costs.

Credeblug has been continuously adapting and developing its rope-operated product range to improve loading capacity and environmental impact. One of the aspects that have been specially developed during recent years has been the ecologically friendly grab range. Due to pollution that bulk material loading can produce over the environment, Blug products include dust-proof closed valves structure.

Blug grabs' sizing process is specially developed so that the grab weight is minimized. Nominal volume is always defined by the capacity inside the valves/arms but real loading volumes can change from cycle to cycle. Dragging volume is a fixed parameter limited by the grab's size and geometrical conception, whilst penetration volume can change substantially due to the grab's working inclination, material compaction or crane operator ability. Blug grabs' volume definition is always based on dragging volume so that high loading values can be regularly assured, minimizing production non-controllable variables (see image 2).

The current market situation demands fast loading-unloading cycles to minimize docking costs. That's why Blug grabs are always designed giving priority to reducing opening and closing operation times by optimizing the fold reeving system. The application of high strength- and wear-resistant

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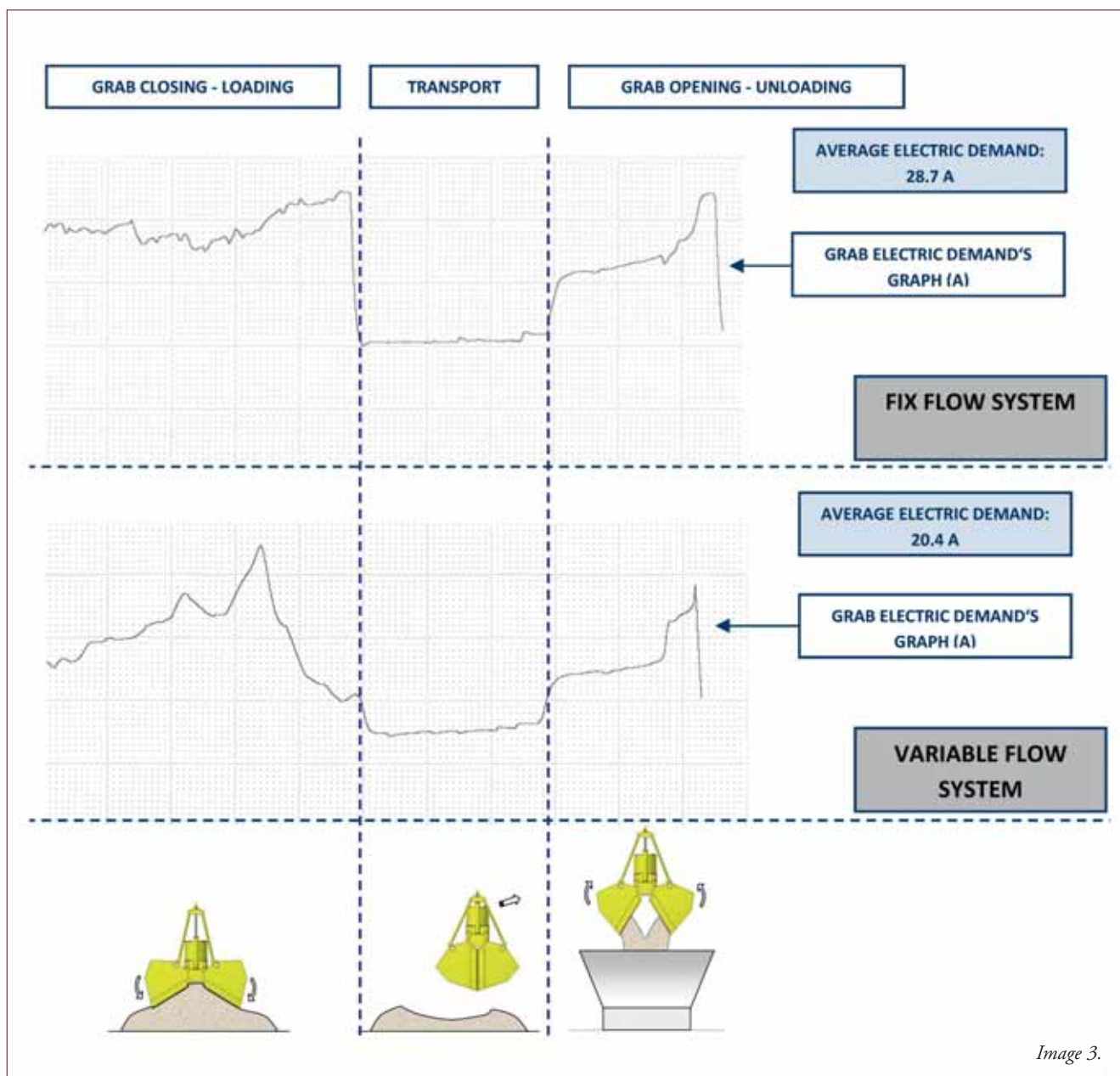


Image 3.

materials makes it possible to reduce the thickness of the structure and pulley blocks without penalizing reliability. Blug's grabs offer excellent capacity/dead weight ratios: the CM4G-45000-0,8 clamshell grab with 45m³ capacity and 16 tonnes dead weight is a good example.

SHIP-UNLOADING TECHNOLOGY

Blug's research and development department is leading ambitious projects that increase product's value and incorporate innovative technology to the company's products that are applicable to bulk and coal handling applications:

- ❖ **Energy efficiency:** as electric efficiency has become a very important factor in reducing customers' operating costs and grabs' environmental impact, Blug's variable-flow hydraulic systems' electric requirements have been optimized thanks to its continuous evolution saving 25 tonnes of CO₂ emissions per medium-size grab and working year in comparison with fix-flow classic hydraulic system. To improve grab efficiency, the electro-hydraulic Blug range includes Parker-brand variable-flow piston pump-operated hydraulic system. This kind of component adapts and optimizes continuously the grab's developed power during opening/closing operations. The most important advantage

of this system is that the electric demand is reduced more than 40% comparing it with fixed flow hydraulic systems.

To control and register variable flow system's electric demand, Blug has performed different test comparing both systems' behaviour. These tests results have been controlled by an external certification organism and these are the results obtained with two equivalent grabs operating with different hydraulic units working on same 8m³ grab structure (see image 3).

- ❖ **Design for impact protection:** Blug regularly develops detailed impact simulation for critical elements that are normally exposed to impacts. These areas are reinforced so that stress transmission can be dispersed over the structure without major damage and low weight increase. The company's patented rib reinforcing and inner body oil circulation tubular systems are good examples that offer a longer lifetime for critic components and minimize non-programmed maintenance actions.

Incoming deliveries are related with biomass, mineral and cereal handling as well as scrap handling grabs. Blug has recently been awarded a contract for the supply of three urban waste handling grabs for western Asia and two 10m³ bulk handling clamshell grabs for the Spanish market.

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Coal handling efficiency with Terex Fuchs



One of Turkey's largest service providers in heavy transportation and the handling of bulk material — especially in ports — is the company Aydinvinc. Aydinvinc, a family-owned company, specializes in heavy hauling and material handling in the ports of Bursa, Gebze and Bandirma. The company is heavily involved in

the handling of bulk goods in the harbour areas.

One of the largest trading centres for Aydinvinc is the Port of Gebze in the area of Kocaeli. Here, Aydinvinc handles all bulk goods like coal, sand, gravel, grain up to scrap and raw materials.

The modernization of the port facilities, in response to





growing bulk handling on the quay, has made it necessary to provide shorter turnaround times during loading and unloading of materials. For this task, the Terex Fuchs Dealer Yuraterex, located in the area of Istanbul, provided the most efficient and appropriate machine solution.

'Versatile, highly stress-resistant and suitable for large handling capacities in port operations' were the requirements of Aydinvinc for its new material handling machine.

In close co-operation with the customer, the dealer Yuraterex and the Terex Fuchs Application Center, an individual powerhouse has been configured. Electro-hydraulic drive conception, 7m height to the substructure and a crawler chassis were assembled on a Terex Fuchs RHL880D XL-trac. With an optimum power dissipation through the pyramid-shaped undercarriage in the extra wide tracks, this 96-tonne machine can move large loads quickly at 22m radius on unpaved surfaces. With 12m viewing height, the machine ensures the best view from the operator in the cargo hold of various vessels.

Especially in coal handling, it is important to maintain effective ways to use the right equipment. Vessels must be cleared quickly and it is important to ensure the flow of materials for further

processing. The RHL880D XL-trac is an effective and efficient solution to handle materials in record time. With up to 600 tonnes of coal and an consumption average of 80kW per hour, this machine has proved to be a reliable and efficient workhorse at Aydinvinc.

Unlike conventional devices, such as cable cranes, the RHL880D XL-trac is ready for immediate use and can be driven to different locations thanks to the 70m cable-reel on the undercarriage. With the powerful and precise hydraulic control system, heavy loads like steel-coils can be loaded exactly. In Gebze, up to 5mt (million tonnes) of bulk cargo are handled every year. With its rapid loading cycles and high load carrying capacities, the RHL880D XL-trac plays a crucial role in the success of the port operators and thus for Aydinvinc.

The management of Aydinvinc is very pleased with the flexibility and ingenuity of the machinery specialists at Terex Fuchs: "We have received a machine that is perfectly tailored to our needs. Particularly advantageous is the low-maintenance and highly efficient electric drive. The low operating costs of this machine have exceeded our expectations, with every handled tonne of material this machine pays off for us."



Bulk Material handled by Experts

Tenova TAKRAF is a key supplier of individual machines and integrated systems for handling bulk materials in mine stockyards, ports, power stations and metallurgical plants. Each project is approached from the end-user's viewpoint in order to deliver optimized solutions that meet and exceed requirements and expectations.

Complex material handling operations starting from train unloading via stockyard handling and blending to ship loading are handled on the basis of extensive experience and know-how in bulk handling. Stackers, Reclaimers, Stacker/Reclaimers, Scrapers, Ship Loaders and Ship Unloaders are reliably in operation all over the world.



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- Preassembled option, for easy installation



Cable Chain

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Conductix-Wampfler has one critical mission: To keep your bulk material handling operations running 24 / 7 / 365. You need proven, worry-free energy solutions - and Conductix-Wampfler has them. Our systems provide reliable electric power and water to stacker/reclaimers, barge and ship loaders/unloaders, bulk conveyors, tripper systems, and gantry cranes. Conductix-Wampfler systems are rugged, low maintenance, and time-tested in tough, dusty environments. All products are backed by the largest sales and service network worldwide!

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CONDUCTIX
wampfler
DELACHAUX GROUP

Conductix-Wampfler – meeting the tough requirements of its coal customers

Coal handling is a tough business and customers expect solutions which are able to meet the demands of this rugged environment. Conductix-Wampfler, part of the Delachaux Group, knows what it takes to withstand the rigours of this market, after all it has been in it since 1902.

The company specializes in the design and manufacture of power, data and media transfer systems for mobile applications and produces the broadest range of solutions available from any single supplier in the market. Active on every continent, the company has Centres of Excellence, responsible for production, R&D, engineering and central support functions located in Germany, France, USA and Italy, with dedicated production centres in Ireland, India, UK, China, Australia and Brazil. So if it's a cable reeling drum for stacker in South America or a energy guiding chain for a crane in China, Conductix-Wampfler has the solution.

Conductix-Wampfler knows coal handling, which comes under its Mining & Bulk Material Handling focus market. A team of highly experienced experts in the field of stockyard and bulk transport applications deal with hundreds of requests for solutions per year. Working closely with the dedicated Global Market and Application Support team and the teams at the Global Centres of Excellence, Conductix-Wampfler is at the forefront of the supply of hard-working, long lasting, heavy duty solutions in this market.

The company provides an impressive choice of solutions designed to accommodate the full range of movements required by today's heavy duty coal handling equipment, supplying solutions for stacker and reclaimers, stockyard cranes, shiploaders/unloaders, car dumpers and tripper conveyors.

PRODUCTS

Handling the robust, heavy cables and hoses required for modern coal handling systems is no problem to the Conductix-Wampfler range of motor driven and spring cable reels, heavy duty festoons and energy guiding chains. Long/gantry travel can be accommodated by a range of solutions, from large level wind reels handling over 2,000m of cable, through monospiral, 3-2-3 and random winding drums for shorter run lengths. When combined with the Conductix-Wampfler fibre optic rotary joint, the systems are able to utilize combined power and fibre optic cables, which have the ability to transfer large amounts of data quickly and efficiently.

CABLE REELS

Conductix-Wampfler produces reels with a wide range of powering options, from the company's patented MAG Drive magnetic coupler, through torque motor, hydraulic and variable frequency drive systems. The reels can be supplied with an impressive range of slip ring and fluid rotary joints, able to handle voltages up to 36kV and pressures of over 400 bar.



Cables and hoses are sourced from premium suppliers, with many of them made to Conductix-Wampfler's own design.

Conductix-Wampfler cable reels are utilized on many coal handling sites, from surface mines and stockyards to bulk ports and processing sites, transmitting power and control signals, data and dust suppression water to stackers, reclaimers and combined

stacker/reclaimers of all types, grab cranes, tripper conveyors, ship loaders and unloaders and mobile hoppers

I-BEAM FESTOONS AND ENERGY GUIDING CHAINS

For shorter run lengths and slewing motions with multiple cable/hose requirements, Conductix-Wampfler produces a range of heavy duty I-beam festoon systems and energy guiding chains. The festoon systems are configurable to accommodate a wide range of I-beam dimensions with either parallel or tapered flanges and designed to fit existing installations or according to the customer's wishes. The components are hot dip galvanized as standard, but are available in stainless steel for especially harsh environments. All come with stainless steel fasteners as standard.

Steel energy guiding chains are especially suitable for multiple cable/hose requirements on car dumpers and for slewing motions on a variety of equipment. Available in hot dip galvanized or stainless steel, the chains can also be supplied with ATEX certification.

Where infinite rotation is required, Conductix-Wampfler can supply slip rings and fluidic rotary joints. With Ingress Protection up to IP67 and with ATEX 21 and 22 certifications available, the units are able to handle most of the environmental requirements seen in the coal handling world.

Coal handling equipment demands robust solutions, providing high machine availability and low maintenance; the Conductix-Wampfler range fits the bill, being designed and built to withstand the aggressive environment of dust, water, salt and high/low temperatures common in this market.

RECENT CONTRACT AWARDS

The Asian market is vital to all producers, transporters and users of coal and this is no exception for Conductix-Wampfler. Its sales and marketing organization in China is growing with the demand for international products in this region. In the last three months, Conductix-Wampfler has been awarded contracts with some major Chinese players in the coal handling market. Baosteel has accepted offers for MAG Drive cable reeling drums for a stacker/reclaimer at its Majishan works and for two drum reclaimers and four stacker/reclaimers at its Zhanjiang operation.

Power stations also demand 24/7 solutions and the renowned Conductix-Wampfler MAG Drive technology has also been selected at Baiyin and Shanxi power plants for use on their hard-working stacker/reclaimers.



OPTIMIZED MATERIALS HANDLING? **THIS WAY!**

Operations everywhere rely on bulk materials handling systems for continuous performance. Sandvik has steadily developed into a technological frontrunner and leading global supplier of some of the world's most impressive machines for stockyards and other operations.

Rely on Sandvik to make your mining business more efficient and more competitive.

Join the movement toward The Future of Mining.
It's This Way: mining.sandvik.com



Sandvik equipment: handling coal at every stage



Sandvik stacker/reclaimer handling coal in Canada.

Wherever bulk material — including coal — is handled, Sandvik Mining is present. In addition to meeting the needs of the mining industry, the company also excels in meeting the needs of downstream operations, such as power plants and mills, ports and terminals with an approach tailored for each application.

Reclamation, stockyard storing, sizing, homogenization and transportation are all materials handling processes Sandvik supports. The offering for turnkey projects, individual new equipment or upgrades and modernizations includes consulting, systems design, engineering, procurement, erection and support. Sandvik applies materials handling and automation technologies to help customers best utilize their assets. Additionally Sandvik designs and manufactures a full range of conveyor components like idlers, pulleys, belt cleaners, etc. used in materials handling equipment, whether for new systems or replacement parts for any existing system. The goal is to make the customers more successful through long-term cooperation and partnerships; success comes from efficient process design, innovative engineering and a dedication to reliability. Through the well developed Sandvik Mining organization, global parts logistics and local services keep the continuous materials handling processes running.

BULK MATERIALS HANDLING SYSTEMS

Sandvik Mining's Materials Handling business offers all services related to bulk materials handling, including feasibility studies, conceptual plant layouts, design, engineering, and the entire execution of complete systems to handle coal, ore, bauxite and other different materials — a vast range of equipment for

applications such as the following:

- ❖ conveying, stacking, reclaiming and blending of bulk materials;
- ❖ loading bulk materials into ships;
- ❖ unloading bulk materials from ships; and
- ❖ crushing, sizing and feeding of bulk materials.

This offering supports the continuous transfer of the material in various fields of materials handling solutions, whether as individual machines or as complete turnkey installations. The classical application of these systems and machines relates to stockyard facilities at mines, at export and import ports and in stockyards of power stations, steel works and processing plants. According to the requirements of the downstream consumer, Sandvik's systems can reach output rates up to more than 10,000tph (tonnes per hour).

COMPLETE HANDLING SYSTEMS FOR PORTS

All around the world, sea-going and coastal vessels are constantly being loaded or unloaded with different bulk materials. In order to ensure a thriving international sea trade, to load the material at the export terminal and unload the vessels in the import terminal, to store the material at the ports continuously and in a very short time, a high standard of perfection in port-handling methods is needed — an area where Sandvik has a vast experience.

Sandvik ensures a smooth transfer to and from bulk terminals with a complete offering of reliable ship unloading and shiploading equipment.

Many different developments for all capacities and applications are included in Sandvik's range of shiploaders which provide

Sandvik secures major Mining Systems order in Australia

Sandvik Mining has been awarded a major materials handling contract in Australia.

The value of the contract exceeds 450 million SEK and will be executed and contribute to Sandvik Mining's business for the period of the years 2014 until 2016. The order for the project at Australia's east-coast includes engineering, procurement and construction of two bucket-wheel stacker/

reclaimers for coal handling with stacking capacity of 8,600tph (tonnes per hour) and reclaiming capacity of 7,250tph.

"The importance, size and complexity of the project and the impressive performance data again demonstrate Sandvik Mining's capability to provide high-tech solutions in the area of mobile materials handling machines," says Gary Hughes, president of the Sandvik Mining business area.

PL200 shiploader in Colombia.



transportation is highly advanced, resulting in installation of fully operational shiploaders with capacities up to 20,000tph in just a few days. The range includes a variety of shiploaders which provide travelling, telescopic functions, luffing and/or slewing installed onto longitudinal jetties, or radial shiploaders which incorporate a fixed pivot point.

SHIP UNLOADERS (PU SERIES)

Sandvik ship unloaders of the linear gantry and level-luffing types are constructed in proven designs and a wide range of sizes to service vessels from 5,000dwt to 250,000dwt. Focusing on grab technology, they offer

travelling, telescopic, luffing and/or slewing as well as radial functions. The ship unloading of high-density bulk material at fast flow rates is conducive to the company's offering of grab-type unloaders of gantry or level luffing design. For the intermediate storage of bulk materials in ports, Sandvik's complete range of stockyard equipment and systems incorporates stackers, reclaimers and stacker/reclaimers.

The equipment can be supplied with various modes of operation, including manual operation by onboard operators, semi-automated and fully-automated operation integrated in a central, remote control system.

SHIPLoadERS (PL SERIES)

Sandvik linear gantry and quadrant bridge type shiploaders are constructed in proven, eco-friendly designs with a wide range of sizes to service vessels from 5,000dwt to 250,000dwt. Central to the Sandvik philosophy is minimal disruption of the port during installation of the shiploader and its supporting equipment. Sandvik's process for off-site construction, assembly, testing, commissioning and heavy-load

efficient, rational solutions to demands for quayside flexibility and are the perfect rigs for unloading materials with different bulk densities.

As with continuous ship unloaders, they can be constructed,

PL200 shiploader in the Netherlands.





assembled, tested and commissioned off-site if necessary, then shipped to site and installed with minimal disruption to port activities.

AUXILIARY EQUIPMENT

Sandvik's product portfolio of standard equipment for bulk materials handling applications covers HC-series belt conveyors and HF-series belt feeders, both having fixed and mobile units. With a wide range of standard modules and components these devices can be tailored exactly to meet the needs of the application. The advantages of the mobile equipment make them ideal and cost-effective in conveying and stockpiling materials.

COMPLETE HANDLING SYSTEMS FOR STOCKYARDS

Stockyards, either as a circular or longitudinal layout incorporating particularly feed conveyors, stackers and reclaimers, have a central function in the fields of materials handling as they serve as material buffers, reserve or blended storage between incoming and outgoing materials. As buffering, composing and homogenizing performed by a stockyard can vary quantity as well as quality fluctuations can be balanced out with the correctly chosen system. As the priorities for each application and stockyard operations are different, it is necessary to consider various questions before selecting type and size: throughput required, characteristics of the materials to be handled, homogenizing effect required, open or roofed storage and importantly, the future upgrading of the storage. Sandvik offers a complete range of products to provide customized solutions for each customer's specific requirements. The equipment comprises:

- ❖ reclaiming technology for bucketwheel boom type-,

- bucketwheel bridge type-, scraper type-, drum type units;
- ❖ stacking technology for the most commonly used stacking methods: chevron, windrow and coneshell;
- ❖ combined stacking/reclaiming technology for bucketwheel or circular units;
- ❖ conveying technology including transfer stations; and
- ❖ auxiliary equipment with hoppers, feeders, crushers, etc.

Covered storage is used where environmental aspects require the full enclosure of the stockpiles and stacking and reclaiming activities. It can either be arranged in the form of a longitudinal/rectangular configuration or in a circular configuration covered by dome-type structures.

STACKERS (PS SERIES)

Sandvik stackers effectively stockpile bulk materials in an efficient and orderly manner. Stationary or travelling, borne on rails or crawlers, they can be supplied in fixed, luffable or luffable-and-slewable boom designs, with capacities from 150tph to 20,000tph. The choice of design depends on factors such as the stacking method and size of the stockpile, the type of material, the required throughput and the demand for mobility. Tripper cars or tripper systems for transferring material from the yard conveyor to the stacker are considered part of the stacker.

RECLAIMERS (PR SERIES)

Sandvik reclaimers are designed to reclaim bulk materials from stockpiles at mines, ports, steel plants, power stations, etc. in a quick, efficient and orderly way. They are available in several main types, including bucketwheel, scraper and drum-type reclaimers, and in many configurations and sizes, with capacities from 500tph to 20,000tph and more. The choice of design depends on factors such as the size and shape of the stockpile, the type of material to be reclaimed, the required reclaiming rate and the need for blending or homogenization.

STACKER/RECLAIMERS (PD SERIES)

Sandvik stacker/reclaimers come in two main types: bucketwheel models for alternate stacking and reclaiming, and circular units, which normally stack and reclaim the material alternately but can be designed to do so simultaneously if required. The bucketwheel models, normally supplied complete with tripper cars, are compact and economical for longitudinal stockyards where simultaneity is not required and where there can be large variations in the demand for stacking and reclaiming capacity. Standard circular units, which build a ring-shaped stockpile and are normally housed inside a covered dome because of environmental aspects, both continually stack the stockpile at one end of the ring and reclaim the material simultaneously from the other end.

TRANSPORTATION SYSTEMS (PC SERIES)

Sandvik has a highly skilled projects division specializing in the design, manufacture, installation and commissioning of conveyor systems for a full range of applications. The company also upgrades and modernizes systems and supply a comprehensive range of its own quality components and spare parts.





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Inspecting the goods: RC Inspection ensures high quality deliveries



The core business of RC Inspection is to provide an independent, fast and reliable sampling and analytical services with a direct people-to-people approach.

The offices of RC Inspection are strategically based around the globe meaning that it can offer its services at short notice and giving excellent turnaround times to its customers, acting as a true partner in business.

The company can offer the highest levels of expertise for both physical sampling, inspection and analytical services in the fields of bulk ferro alloys and noble alloys (high purity/rare earth/minor) metals, minerals, ores, scrap materials and all kind of solid fuels.

RC Inspection solid fuels department performs inspection and analysis for different products. Its services are mainly performed on several sources of steam coal, coking coal, PCI coal (pulverized coal injection), metallurgical coke, pet coke (petroleum coke) and anthracite of various origins. RC Inspection performs extended service list in Europe like The Netherlands, Belgium, Germany and Ukraine as well in Turkey, Russia, South Africa, Mozambique, China, Hong Kong, United States, Colombia and Indonesia.

The company has adopted a successful business strategy and excels in terms of expertise and the technologies it uses. It believes in training and guidance of both its surveyors and its office staff to be sure that the working quality is ensured. Surveyors and office staff of RC Inspection have been educated internally by senior coal technicians, so that it can guarantee that the cargo-interest will be protected in a most representative way. In the past few years, this strategy has paid off and the company has grown and now has successful offices strategically based around the globe.

All of the company's surveyors are fully equipped with state of

the art means of communication to perform to perfection. The sampling is performed with ISO stipulated equipment. The equipment handed out to its surveyors consist of the basic safety equipment and additionally the ISO shovels in various sizes to conduct the sampling according to standards, digital photo-camera, temperature-control Infra-red equipment as well the conventional equipment for temperature-control of stockpiles.

The new requirements, set out by BAM (Bundesanstalt für Materialforschung und -prüfung), the German Institute for Materials Research and Testing, will be followed by RC Inspection. The company will also provide technical services and temperature control to avoid any problems during the transportation of coal cargoes into Europe.

For the cargo range of coal, cokes, petcoke and anthracite, RC Inspection is leading the way in deep temperature control and infrared temperature control. RC Inspection has the equipment and the expertise to perform deep temperature control and infrared temperature control on incoming cargoes prior to discharge operations, during discharge operations as well during the period of stockpiling and re-loading operations ex-stockpile to protect the cargo and avoid any spontaneous combustion.

RC Inspection carries out services for many national and international clients, international trading houses and coal consumers such as coal-fired power-stations. The company's client base is spread around the globe, so it can deal efficiently with different customers and time zones. Its office staff also work outside office opening times and during the weekend to make sure all is under control and clients are constantly updated. RC Inspection prides itself on this personal service, which ensures that its customers are happy with its work.



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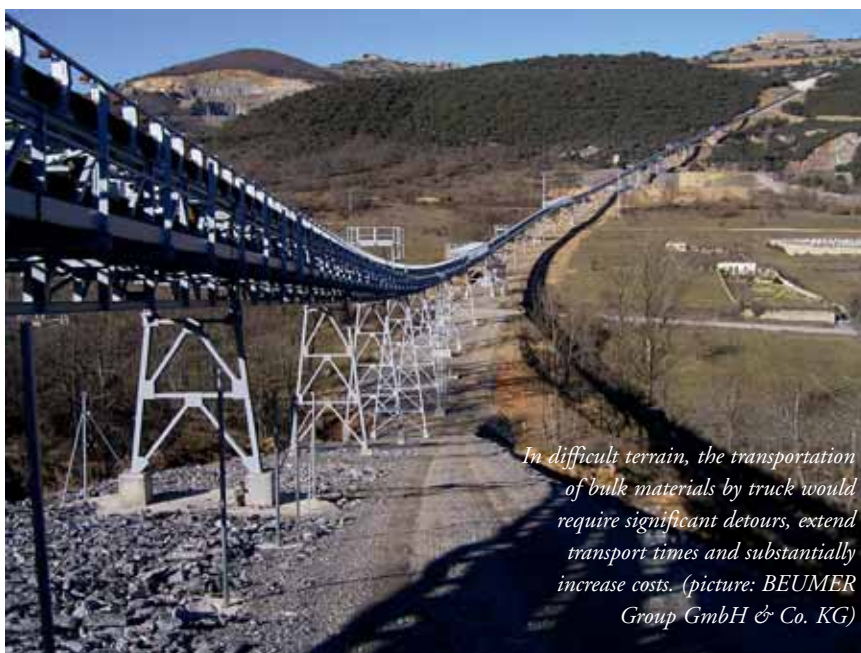
The ever increasing technical demands in the bulk materials industry are reflected in the expectations of the user. Manufacturers who not only supply everything from one source but also undertake the complete project to the point of turnkey handover are in demand. The Beckum, Germany-based BEUMER Group with affiliations around the globe develops customized system solutions for conveying and loading, palletizing and packaging, and sortation and distribution systems.

BEUMER also acts as the main contractor on behalf of its customers. “A significant trend is that more and more clients want to commission their systems in a turnkey state,” says Dr. Gerd Oberheuser, head of system technology at the BEUMER Group, regarding the increased market requirements. EPC (engineering, procurement & construction) or EPCM (engineering, procurement & construction management) are the buzzwords here. EPCM is an enhanced form of project management. “This trend can be seen in many parts of the bulk materials industry, for example in cement and opencast mining,” explains Oberheuser.

COMPREHENSIVE PORTFOLIO FOR THE BULK MATERIALS INDUSTRY

With the acquisition of Enxco Teknologies India Limited in 2011, the BEUMER Group has expanded its business activities in India and in doing so has strengthened its presence, particularly in the cement industry, in one of the world's most important growth markets. For example, the portfolio includes horizontal and vertical belt conveyor systems, belt bucket elevators, heavy-duty bucket elevators for particularly large delivery rates and heights, and steel cell conveyors fitted with chains or belts for clinker. The intralogistics specialist also provides grinding mills, silos and systems for filling, palletizing, packaging and loading.

As well as the cement and mining industry, BEUMER system solutions, such as belt conveyors, are also in increasing demand in the coal industry. The conveyor solutions are also used in the firing of power stations. These are also more and more frequently heated with environmentally compatible fuels such as wood pellets, shredded tires and waste. BEUMER supplies suitable systems for transporting the fuels to the boiler, for example.



In difficult terrain, the transportation of bulk materials by truck would require significant detours, extend transport times and substantially increase costs. (picture: BEUMER Group GmbH & Co. KG)

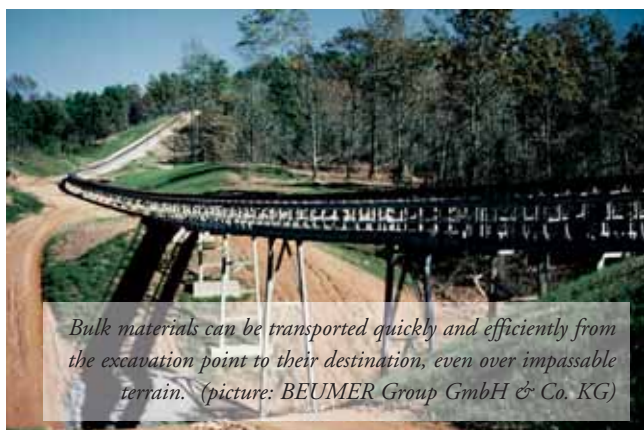
CHANGED CONDITIONS

“For a quotation to be accepted, contracts are often only placed on an EPC basis,” remarks Oberheuser. This means that, as well as supplying the equipment, BEUMER is responsible for the whole process. This includes the design of the entire system, the installation, the commissioning and the instruction of subcontractors. Not only does a high availability of machines and systems play a decisive role, but also optimum support. For this reason, BEUMER has set up competence centres in the Czech Republic, in Austria, at its headquarters in Beckum, and in North America. These take care of research and development, sales, project management and purchasing.

With its solutions, the BEUMER Group helps users to work more cost effectively and in a more environmentally friendly manner. BEUMER belt conveyors enable companies to transport large quantities of bulk material from the quarry or mine to the factory or port as cost effectively and as quickly as possible. Trucks have considerable disadvantages in this regard. Road building is expensive, and the more raw materials have to be transported from the excavation point to the factory, the more journeys have to be made. Added to this are the operating costs and emissions caused by trucks — both with regard to fuel consumption and personnel costs as well as noise and dust. As a result of the direct route, the material is transported much faster than by truck. In addition, belt conveyors can be operated with significantly fewer personnel. Another aspect compared with trucks is the lower energy consumption, which at the same time reduces CO₂ emissions. Depending on the project, belt conveying systems need up to 90% less primary energy than comparable truck transportation.

COST-EFFECTIVE AND ENVIRONMENTALLY FRIENDLY CONVEYING

Belt conveyors can overcome long distances, steep gradients and tight curves, and can be individually matched to the particular task and topography. Use is made of durable, tension-resistant conveyor belts. In doing so, BEUMER uses various calculation programmes to determine the optimum belt design. These enable tensile forces to be analysed and also forces which occur due to acceleration and deceleration — always taking into account the intrinsic weight of the belt and the transported



Bulk materials can be transported quickly and efficiently from the excavation point to their destination, even over impassable terrain. (picture: BEUMER Group GmbH & Co. KG)

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material. They are also used to determine possible curve radii. BEUMER also provides advance feasibility studies. In addition, the belt position is calculated in advance with the appropriate curve radius for the empty and loaded states. With their slender lines, belt conveyors overcome broken terrain and other obstacles such as rivers, roads, buildings or rail tracks. Horizontal and vertical curves in the routing can also be overlapped. Depending on the requirement, BEUMER offers open troughed belt conveyors for higher throughputs and larger mass flows as well as larger curve radii, and enclosed pipe conveyors for products which need to be protected against the effects of the environment.



Belt conveyors will transport iron ore from the terminal to the port located 3km away (picture: Vale).

At the port of Callao in Peru, BEUMER will be installing pipe conveyors with a length of around three kilometres for transporting copper, lead and zinc concentrates for completion in 2014.

“Depending on the landscape and environmental conditions, we can install overland conveyors with horizontal curves with lengths of up to 20 kilometers,” explains Oberheuser. Gradients of up to 15° can be realized depending on the characteristics of the materials to be conveyed. After planning, installation and commissioning, maintenance and service are no more laborious than with a straight conveyor. On average, the annual maintenance costs are only around 2% of the investment sum. In Canada, BEUMER is currently installing a conveyor with a length of 3.48km for a large mining concern. This will convey up to 6,000 tonnes of iron ore per hour. This large-area conveyor system must withstand extreme temperatures of down to -40° and heavy snowfalls. BEUMER has designed all mechanical and structural elements for the extremely low temperatures. For example, the system is fitted with a feed conveyor and an unloading system with tripper car.

As main contractor, BEUMER is equipping a new distribution centre off the shore of Malaysia with 17 trough belt conveyors with a total length of 12km for a large iron ore exporter. The conveyors will ensure swift transport of iron ore from super-size freighters to the mainland. BEUMER will deliver and install the conveyors, put them into operation and take full charge of engineering, all according to a strict timetable.

Join the revolution!

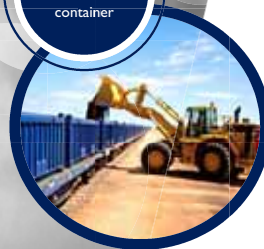
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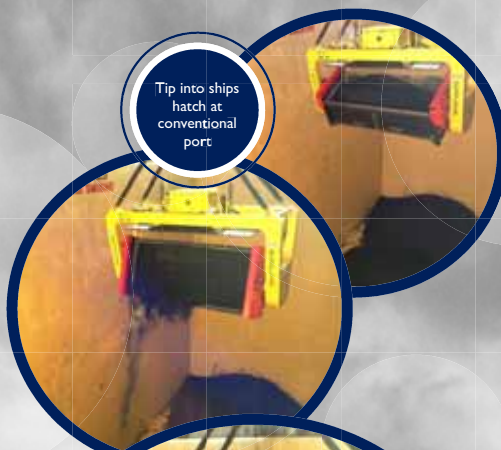
A fast, efficient and a cost effective way of transferring bulk materials into a ships hull



Load ore at mine in container



Tip into ships hatch at conventional port



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Fast to Market ✓

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- Mobile Harbour cranes
- Ships cranes
- Reach Stackers

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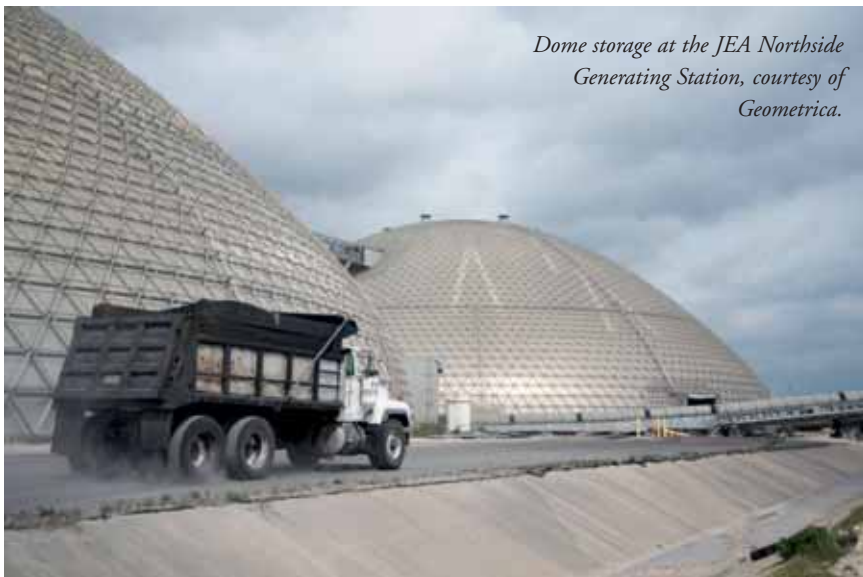
with RAM REVOLVER®

Worldwide coal storage under cover with the help of Geometrica

Worldwide, coal and petroleum coke fuel power generation — Geometrica has built many facilities to store these materials under cover and help industry protect the environment, writes *Melanie Saxton of Geometrica*. This paper presents a few examples from the US, Tunisia, Taiwan, Indonesia and Mexico. Around the globe, Freedom® technology allows the building of stockpile covers regardless of terrain or weather conditions.

FUEL IN FLORIDA

The JEA Northside Generating Station uses coal and petroleum coke, in combination with oil and natural gas, in three large steam units and four small diesel-powered peaking units to produce more than 1,300MW of peak electric capacity. Two online 300MW, circulating fluidized-bed (CFB) combustors serve customers in Northeast Florida, which is also home to US Navy bases and a major port.



Dome storage at the JEA Northside Generating Station, courtesy of Geometrica.

circular dome spans 90m — all reinforced with arch ribs. “We assembled the domes in half-arch segments on the ground. Then we lifted the arches into place, and stitched them to the growing structure,” says Fernando Gracia, Geometrica’s lead designer for the project. “This minimized the amount of time workers had to spend working at heights.”

To complete the project, FLSmidth supplied machinery and engineering. Turkish contractor, EKON, was FLSmidth’s partner for civil work which compares in scale to that required to build an entire town. The plant began to take shape in late 2010 and was completed in 2013. Designed to produce 5,800 tonnes per day of cement, it is now Tunisia’s largest and most technologically advanced cement plant.



The Geometrica coal storage dome at the cement plant in Djebel Ressas in Tunisia.

Geometrica provided the circular coal storage domes spanning 122m to shelter the plant’s fuel supplies of coal and petroleum coke. The innovative interior cladding of the space frame structures was developed to provide safer fuel storage. This Freedom® technology was an instrumental part of JEA’s successful repowering strategy for converting two ageing oil/gas-fired steam plants to also burn solid fuels.

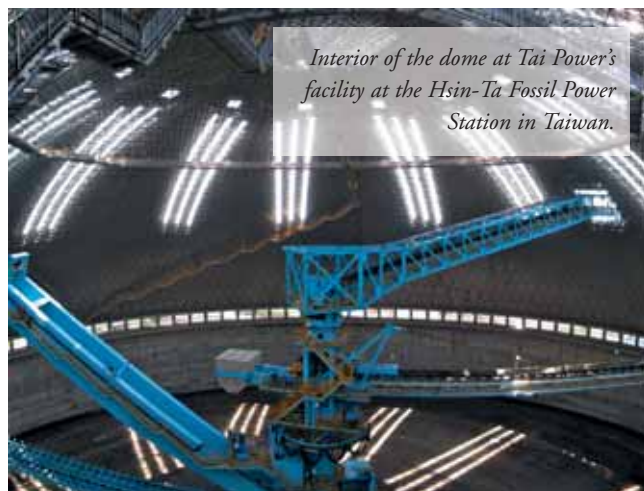
As the eighth-largest municipal utility and clean-coal powerplant in the United States, JEA provides less costly, cleaner and more efficient electric, water, and wastewater services. The plant received the prestigious 2002 Powerplant Award for outstanding achievement in the development of a successful repowering strategy that increased efficiency while reducing both emissions and the cost of electricity.

CEMENT IN TUNISIA

When a cement company in Tunisia needed bulk storage solutions, Geometrica supplied three structures for a new plant in Djebel Ressas. The coal storage dome covers 50 x 300m, the additives storage dome covers 50 x 200m, and the limestone

POWER IN TAIWAN

As part of its expansion plans, Tai Power needed covered fuel storage at its Hsin-Ta Fossil Power Station in Kaohsiung Hsien, Taiwan. The state-owned company retained Gibsin Engineers to draw up the plans and specifications, including four 126m diameter concrete silos with internal automated stacker/reclaimer system and metal dome covers. Each unit



Interior of the dome at Tai Power's facility at the Hsin-Ta Fossil Power Station in Taiwan.

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View from the water: Pupuk Kaltim's Geometrica coal-storage dome in East Kalimantan, Indonesia.



would store 180,000 tonnes of coal in a live pile, providing a total capacity of 720,000 tonnes.

The metal dome covers presented several challenges, from saltwater spray to recurring typhoon winds, and would have to be built after the coal stacking/reclaiming equipment was installed. Specifically, it would have to be designed to minimize accumulation of coal dust on the structural members to prevent fire and explosion hazards.

Geometrica fabricated 37,000 nodes and 120,000 galvanized steel tubes, plus assorted purlins, hardware and accessories for each structure at a facility in Kaohsiung. Construction began July 2006 using the 'perimeter-in' method. Turnover of the domes and testing of the first silo started in October 2007, and attests to Taiwan Power's commitment to a clean and safe environment.

FERTILIZER IN INDONESIA

After carefully considering the fluctuations of the natural-gas market in recent years, Pupuk Kaltim launched a project to diversify its fuel with a new coal boiler at its Bontang, East Kalimantan facility. Environmental impact was a concern, and Pupuk Kaltim chose to use only clean-coal technologies including a circulating fluidized-bed boiler, a Geometrica coal-storage dome and a continuous barge unloader. These technologies are used at a previous Geometrica project, the JEA Northside power plant in Jacksonville, Florida, to help keep the environment around the facility pristine.

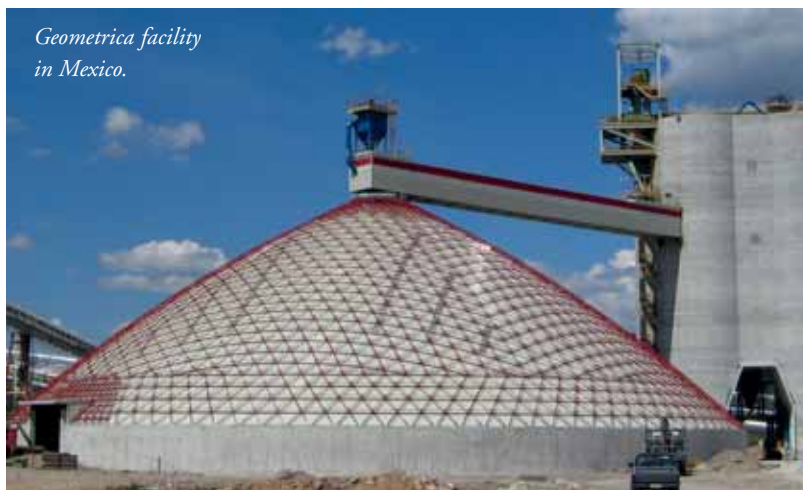
Mr. Supriono, a mechanical engineer with Pupuk Kaltim, made the initial contact with Geometrica in 2009. The dome was to be supported by a 10-metre-high, reinforced-concrete, perimeter-ring wall and would cover 40,000 tonnes of coal, plus a coal stacker and a portal reclaimer. Specifications were challenging. The dome not only had to resist the specified environmental loads, withstand corrosive attack from the humid Kalimantan environment and help control explosion hazards, but also use technology that permitted fast construction by local crews and without special equipment.

COAL IN MEXICO

As a supplier of bulk storage applications, Geometrica is devoted to helping plants, mines and waste management facilities achieve the optimum and most economical solution for protecting their stockpile materials from the elements. Mexico is no exception. Geometrica supplied 70m circular coal storage domes for Cementos Moctezuma's Cerritos and Tepetzingo plants.

The design called for conical stockpiles built by dropping the material from the dome's apex. This stacking method is subject to generating dust inside the dome, therefore these units also feature Geometrica's internal cladding, preventing the fuel from creating a hazard by accumulating on internal structural members. Polyester powdercoat on the exposed structure adds an architectural touch to these beautiful and advanced cement production facilities.

These are some examples of Geometrica's many storage solutions for power generation around the world. Custom CAD software enables Geometrica to design and generate geometries exactly suited to a project's requirements. And the inherent economy of the dome shape conserves materials and eliminates wasted space, making it an ideal bulk storage solution for coal storage.



Geometrica facility in Mexico.

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Bedeschi's success in the coal industry

Coal is one of the most important energy sources in the world. The use of modern technology to reduce the impact on the environment of the coal power plants is very important today, as is the use of more efficient and economical methods of storing coal.

Combining the latest available stacking and reclaiming technology for coal storage at power plants is a great advantage that Bedeschi can offer as described in the following case studies.

ENEL

This project is of turnkey design, as it includes the engineering, construction, complete supply of materials, commissioning and starting up of the equipment to develop the 2,640MW plant. South Brindisi is one of the biggest coal-fired power plants in the country. It is operated by ENEL Produzione S.p.a. The power plant will use coal sourced from Indonesia and South Africa. The project takes into account environmental concerns and will aim to take the place of the current outdoor longitudinal coal storage at the power plant. This will involve the implementation of two new domes with a wooden covering structure and an environmental impact almost equal to zero. The dome's dimensions will be as follows: diameter 150m, height 45m, total stored volume of coal 350,000 tonnes. The use of circular technology in the stacking and reclaiming operation will also see an increase in efficiency. The contract placed with Bedeschi, which started in August 2011, includes the supply of all the mechanical components and the electrical and control systems for two STK R 35/2000 circular stackers and two PAL PRD 300/36+240/24 double arm slewing lateral portal reclaimers for coal handling at the power plant. These mechanical components and electrical and control systems will be installed into the complete automation of stacking and reclaiming operation. The stackers have been designed for 3,000tph (tonnes per hour) and the reclaimers have been designed for 1,500tph.

ENEL PROJECT DATA

Material	Coal
Bulk density	7.7–10t/m ³
Grain size	0–100 mm
Moisture	7.4%
Resting angle	38°
Stacking rate	3,000tph
Reclaiming rate	1,500tph

The project is unique because the two machines will be equipped with state-of-the-art safety and environmental systems. The project uses various new technologies. The machines will be equipped with a vacuum cleaning system for standard maintenance operations, a water spray system for dust suppression and de-dusting operations, an air compressed system and also, due to highly restrictive classification of the hazardous area (ATEX 22.2), two firefighting systems. A gas firefighting system will be located in the power and control cabins, while a high pressure water firefighting system will be installed in the machine column to prevent and fight any fire that may occur on the heap surface of the stored coal or on the belt conveyors onboard the machines.

In December 2013, Bedeschi started the erection phase of the first dome. The entire project will be completed by the end of 2015.



TIRRENO POWER

Tirreno Power is planning to improve the coal handling facilities in the Vado Ligure site.

The design phase requires developing the coal handling system from the storage area to the unit charging bunkers in order to allow proper execution of operations, as well as to increase the

TIRRENO POWER PROJECT DATA

Material:	Coal
Bulk density:	0.75–0.85kg/m ³
Grain size:	0–50 mm
Moisture:	max 14–18% (free flow)
Resting angle:	35°
Stacking rate:	1,500tph
Reclaiming rate:	1,200 + 1,200tph

Bedeschi at Vanino Port

In today's economic environment, companies that want to be competitive, innovative and perform successfully need to do more than simply offer standard solutions to their customers. They need to adapt their thinking to meet modern-day needs and satisfy the particular demands of their customers.

Globalized economics leads also to new challenges: major projects, big efforts and environmental protection.

Bedeschi has recently entered into a contract for the development of Vanino Port, on the east coast of Russia. The deepwater coal handling facility will form an integral part of a \$6.7 billion federal project to enhance the capacity of the Elegest coal mines located in the centre of the Tuva Republic near Kyzyl. The ambitious project, being undertaken by Russian firm Tuva Energy Industrial Corporation (TEIC) LLC, includes the construction of a 400km railroad connecting the mine to the region's main commercial hubs and the new port terminal in Vanino. As a result of the integrated mining, railway and port project, it will be possible to export about 15 million tonnes of coking coal annually. Bedeschi has been selected for the complete port development project amidst tough international competition during the bidding process.

Bedeschi's scope of work can be broadly divided into three parts: receiving coal; storage & retrieval of coal; and shiploading.

Coal will be transported from mines located more than 4,500km away by open top wagon cars. Each train will carry 6,000 tonnes of coal. The port will have railway siding to receive and unload two rails of 95 rail cars simultaneously. The 3,200tph (tonnes per hour) unloading facilities will include positioning devices capable of handling 95 rail cars at a time. The cars will be unloaded by using wagon tipplers. Bedeschi will supply the new port with a double tippler station, capable of rotating four 100-tonne wagons with a total capacity of around 6,000tph. The overall positioning and unloading time of each car will be only 145 seconds in total. Coal will be collected in large hoppers, into which the cars will be unloaded, and through a series of feeder belts and conveyors will be transported to the stacking area where

VANINO PROJECT DATA

Material	Coal
Reclaiming capacity:	2 x 4,750tph
Annual capacity:	15mt
Total conveyor length:	approx. 7.5km
Stacking capacity:	2 x 3,000tph
Shiploading:	2 x 4,750tph
Stockyard volume:	650,000 tonnes
Vessel type:	Up to 2 x 120,000dwt

two automatic stackers will distribute coal in segregated piles at 3,000tph each. The total stock capacity at the port will be about 600,000 tonnes.

The retrieval of coal from the storage will be done by means of two bucketwheel reclaimers at 4,750tph. These will be feeding from a conveying system leading to a jetty equipped with two shiploaders of 4,750tph capacity each. The shiploaders and the jetty will be able to load vessels up to 120,000dwt capacity.

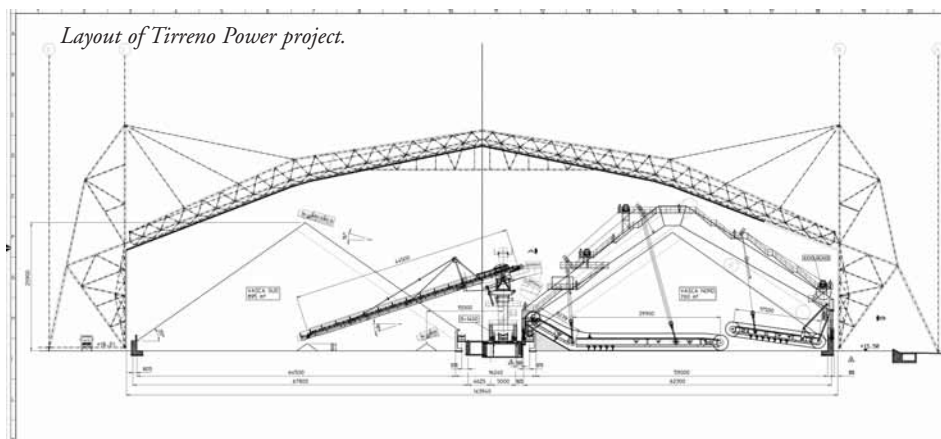
Engineering activities of this project is presently going on and the scheduled deliveries of the equipment are in 2015. This prestigious project is a culmination of the advancements made by Bedeschi in the marine sector where Bedeschi has implemented various port and offshore logistics projects.

Vanino Port will serve the coking, coking coal concentrate and energy coals for international markets including Korea, China and as far away as Western Europe, and will be capable of handling two 120,000dwt vessels simultaneously.

The strong partnership of Bedeschi, Liebherr and Logmarin together can offer integrated services leading to successful project implementation and whenever the client requires (BLL) provides comprehensive advice and technically sound products.

The pooling of skills and expertise of Bedeschi, Liebherr and Logmarin provides dependable, integrated, cost-effective software and hardware solutions, and eco-friendly solutions in dry-bulk supply chain logistics.





avoid pollution. The water sprinkler system on top of the hoppers suppresses coal dust during the grab delivery. The spill plates which are found on the sea side of the hoppers are opened during cargo operations to cover the gap between the floating terminal and coal barge which eliminates any chance of coal spillage. The swivelling capability of the shiploader means that there is no need to shift the *Princesse Chloe* alongside. Coal is evacuated from

indoor reliability of the whole coal conveying system. The stockyard will be covered by a structure and the machines requested have to be designed according to the capacity requested and the dimensions of the shed. The supply consists of a turnkey plant equipped with two longitudinal double boom reclaimers, one rotating stacker and two belt conveyors. The equipment will respect the ATEX norms. For safety, a firefighting system is in place to signal and stop fire with inert gas inside the power cabins on board of the machines.

PRINCESSE CHLOE

The Floating terminal devised by Bedeschi, Liebherr and Logmarin, *Princesse Chloe*, began coal transshipment operations in 2011 in Indonesia, at the Maura Pantai anchorage in the Sulawesi Sea (East Kalimantan) for PT Berau Coal. The daily designed loading rate is 50,000 tonnes, which amounts to over 800,000 tonnes per month.

Liebherr supplied the two cranes, while Bedeschi supplied the cargo landing system, which consists of two duly designed hoppers and an array of conveyor systems leading to a telescopic/shuttle shiploader. The hoppers are designed to accommodate the footprint of the large grabs and are trunk-pyramidal shaped with asymmetrical walls to ensure a smooth flow of coal into the transfer chute, accounting for sticky coal through vibrators fitted into the hoppers in order to maintain the required flow rate. In addition, the mesh grill that eliminates any oversize or undesirable material that could damage or block the conveyor system helps to maintain the required flow rate. Bedeschi, upholding its goal to be environmentally friendly, has installed the following two features on the hoppers, which aim to

the hoppers on variable-speed belt feeders, and then fed to a conveyor system which leads to the ship-loader. Transfer points are designed to ensure that no blockage occurs and that the material flows smoothly. All conveyors are enclosed to avoid airborne pollution.

Double independent generator sets are installed on the vessel, ensuring 24 hour a day non-stop operations and 100% redundancy.

Princesse Chloe is capable of loading large vessels up to Capesize. It is designed for maximum coal transportation. Fuel consumption is very low, making the whole system more efficient. In 2011, *Princesse Chloe* loaded 41 vessels between Panamax and Capesize, achieving an average daily loading rate up to about 47,000 tonnes of coal and achieving a best performance rate of over 56,000 tonnes.

CONCLUSION

Bedeschi is a leading supplier of machinery and services to bulk material handling and minerals industries, focused on handling difficult materials from sticky coal or clay to dry and wearing iron ore and minerals.

Bedeschi's wide set of products include: bucket wheel, lateral, portal or frontal bridge, semi portal and quarry reclaimers, stackers, longitudinal, circular and vertical wall blending storages, belt conveyors, crushers and air/gas cleaning systems.

The choice of the best machines to be selected depends on several factors including the type of coal handled and requirements for blending. Bedeschi's technical department is available to assist users and recommend the most appropriate technical and commercial solution.



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BUCKET ELEVATORS

Jenike & Johanson: working to eliminate coal fires

Much of the world's coal handling and storage equipment was placed in service many years ago, with little consideration given during design to the flow properties of the coal. Moreover, many facilities that have operated relatively trouble-free for many years are switching fuel sources to low-sulphur sub-bituminous and/or PBR (Powder River Basin) coals. Failure to consider the flow properties of these new coals can cause more than just headaches.

In addition to issues with coal flow stoppages and poorly designed transfer points, many of Jenike & Johanson's clients approach the company after catastrophic fire or explosion events have occurred in their facilities. The problem is often a funnel flow discharge pattern of the coal in the client's bunkers, resulting in significant pockets of stagnant coal. Coal will self heat when stored at rest and under pressure, and in the worst cases, will catch fire and or explode.

The solution to these coal fires and explosions is often conversion to a mass flow pattern, which eliminates stagnant pockets of coal. With mass flow, all of the material is in motion while the storage vessel is discharged, which provides a uniform residence time for all the coal. The opportunity for stagnant coal to self heat is eliminated, thus eliminating coal storage fires.

To engineer solutions to convert bunkers from mass flow to storage flow, Jenike & Johanson's clients send coal samples to its lab for flow properties tests, using the widely accepted Jenike Shear Tester. With cohesive strength and wall friction data learned from testing, the company's engineers are able to recommend hopper modifications to provide mass flow for most existing bunkers. Modifications are always case specific, but may include a combination of revised hopper geometry, a low friction hopper liner, a revised feeder arrangement, or a bin insert (or Binsert®).

Jenike & Johanson's clients typically report that not only are coal fires eliminated by its engineered solutions, but they often report significant gains in live capacity in their modified bunkers due to the elimination of stagnant regions that previously did not discharge. Coal fires aren't the only problems that Jenike & Johanson can solve. The following highlights some of the different challenges the company helps solve in the coal industry.

COMMON COAL INDUSTRY CHALLENGES

Poor material flow in the coal industry will yield electrical generation losses, throughput limitations, non-uniform processing, dust emissions/spillage, bunker fires, and even equipment failure. These problems require frequent operator intervention and increase maintenance costs. A significant amount of equipment designed decades ago to receive, convey, crush and pulverize traditional fossil fuels is no longer suitable for handling low-sulphur coal.

ENERGY & POWER INDUSTRY CLIENTS

To the right is a sampling of clients for which Jenike & Johanson has successfully provided bulk material engineering services for in the energy and power industries.



- ❖ AEP;
- ❖ Duke/Progress Energy;
- ❖ Southern Power;
- ❖ Ameren;
- ❖ FirstEnergy;
- ❖ TVA;
- ❖ Dominion;
- ❖ PSE&G; and
- ❖ Xcel Energy.

TECHNOLOGY ADVANCEMENTS

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- ❖ transfer chute analysis and design (use of DEM calibrated to coal properties);
- ❖ prediction of absolute wear in transfer chutes and hoppers/silos;
- ❖ hopper analysis and design; and
- ❖ optimization of chutes and belt configurations to minimize spillage, dust, and wear.

COAL INDUSTRY SERVICES

Jenike & Johanson offers a wide array of services for the Coal industry:

- ❖ on-site review of flow problems
- ❖ fuel, ash, and reagent flow testing
- ❖ silo, hopper, feeder, standpipe design
- ❖ pneumatic conveying testing of ash
- ❖ bunker structural engineering
- ❖ coal stockpile design (gravity-reclaim)
- ❖ crusher and mill/boiler chute design
- ❖ railcar unloading hopper design

Whether reclaiming from a stockpile, feeding biomass for co-firing with a fossil fuel, or conveying waste streams to storage silos, Jenike & Johanson can help achieve reliable material flow and transport at coal handling facilities.

For more information on Jenike & Johanson's activities in the bulk materials handling industry, please see p66 and p141 of this issue.



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Lafarge Group cement plant. As an energy-efficient and environmentally sound production process is very important to Lafarge, the systems have been completely modernized. (all photos: BEUMER Group GmbH & Co. KG)

Lafarge belt bucket elevator upgrade

BEUMER modernization considerably increases service life

Spectacular residential and office buildings, tunnels and other infrastructure facilities — nothing can be built without cement. To produce cement for various applications in an economic way, Lafarge modernized the production facilities at its plant in the town of Wössingen, in the Baden region, Germany. The modernization included the existing belt bucket elevator to the raw mill. The intralogistics specialist BEUMER offered its innovative heavy-duty bucket elevators, permitting higher conveying capacity and longer service life. Thanks to this new technology, the existing bucket elevator could be easily altered.

The preheater tower of Lafarge Group's cement plant looms just a few hundred metres before the sign Wössingen, near Karlsruhe. In the 1970s, the plant has been taken over by the international producer of cement. "We have almost 78,000 employees in 78 countries," says Stephan Schenk, head of servicing and development at Lafarge Zement Wössingen GmbH. Worldwide, Lafarge is a market leader in many countries, such as France, England, Poland, Greece and Austria. In Germany, Lafarge is among the six leading producers. "Thanks to the state-of-the-art technology and a high sense of responsibility, we produce approximately 800,000 tonnes cement per day for various applications and requirements at our Wössingen site," explains Schenk. Lafarge places particular value on production methods that are both energy-efficient and environmentally sound. For this reason, the systems were modernized for more than €60 million in 2008 and 2009. Now, the cement plant has a five-stage heat exchanger and a new clinker cooler.

"We changed from the Lepol process to the energy-saving dry process with heat exchanger and precalciner with no interruption to the operation. To make the production more cost-effective and environmentally sound, we changed from the two-kiln operation to a single rotary kiln," explains Schenk. "The kiln line has now a considerably higher capacity. The system is fed with approximate 150 tonnes of raw material per hour. Accordingly, the complete production has changed," the engineers says. Due to the increase in performance and

modernization of the kiln line, the flow rate of the bucket elevator for the raw mill had to be increased considerably. The bucket elevator transports limestone to the mill bunker.

HIGH WEAR OF THE BELT

"Due to the higher flow rates we had to face more problems with the coarse-grained material," remembers Schenk. Larger particles became repeatedly jammed between belt and bucket, causing substantial wear. Conventional belt bucket elevators are limited by the maximum grain size of the material to be conveyed as the conventional bucket mounting results in a gap of about 25mm between bucket and belt. Larger particles may get stuck in this gap. This quickly results in belt damage when the belt runs around the return pulleys. "The belt became porous already after two years," explains Schenk. A new solution needs to be found both to avoid belt cracks and to meet the growing requirements. Nevertheless, long-term thinking was called for. "Because a new belt is very expensive," adds Schenk.

NEW HEAVY-DUTY TECHNOLOGY GETS THE JOB DONE

At first, the engineers from the Wössingen plant wanted to replace the existing belt bucket elevator with a central chain bucket elevator. "We would have solved the problem with the transport of coarse-grained material," says Schenk, "but a new central chain bucket elevator would have become quite expensive." In search of a suitable solution, the cement producer contacted some manufacturers of vertical conveyors — among others, the BEUMER Group, headquartered in Beckum, Germany. The co-operation between BEUMER Group and the cement plant in Wössingen has a long tradition. For decades, the market leader has established itself successfully in this sector and could impress the customer with its solution. "When specifying our conditions, BEUMER recommended the newly developed technology," remembers Schenk. "Central chain bucket elevators which transport limestone are subject to high wear as the raw material contains abrasive particles which





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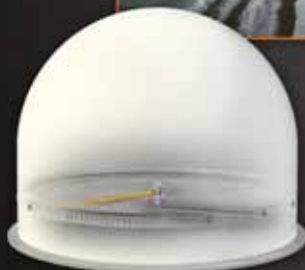
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act as sandpaper," says Schenk. Though identical with that of belt bucket elevators if used for materials that have little abrasive action, the service life of chain bucket elevators is much shorter in the case of strongly abrasive materials. After thorough consultation with the BEUMER specialists only the belt and the buckets were renewed applying the new heavy-duty technology. This technology is used to feed material with particle sizes up to 120mm and up to 6% moisture into the raw mill. "The capacity is now 800tph [tonnes per hour]," enthuses Schenk.

This is possible thanks to the new bucket geometry. There is no more gap between belt and bucket. Coarse-grained material does not jam during scooping and filling process. The buckets are mounted firmly to the back of the belt by segments and bolts. Belts with wire-free zones are used for the new heavy-duty bucket elevators just as with all BEUMER belt bucket elevators. The buckets can be fastened to the belt without damaging the steel wires or even cutting them. The traction forces of the bucket



The belt bucket elevator has been upgraded with the BEUMER heavy-duty technology. The new bucket shape ensures smoother running and thus less noise.



There is no longer a gap between belt and bucket. The result is that material cannot get caught any more during the scooping and filling process.

elevator belt are maintained to the full extent. The new bucket shape also ensures smoother running and thus less noise. Depending on the material to be conveyed, BEUMER offers buckets which are adapted to the material or mount a dynamic bottom into the bucket elevator boot. This prevents wet and sticky material in the bucket elevator boot. And if explosive material is to be conveyed, all components are available in an ATEX version.

To convince the employees of Lafarge of the new technology, BEUMER invited Schenk and two of his colleagues to Beckum. "The new technology was demonstrated with a miniature bucket elevator. This hits the nail on the head," he says with a smile. Demands that neither conventional belt bucket elevators nor central chain bucket elevators can meet. "BEUMER adapted the buckets to our specific requirements by using test material."

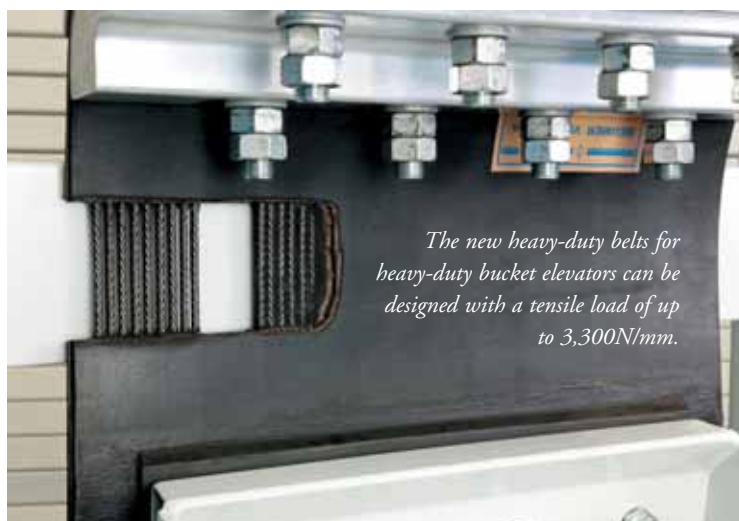
A BELT THAT RESISTS HIGH LOADS

While developing the heavy-duty bucket elevator, the tensile strength of belts with wire-free zones was strengthened. The current belt has a tensile load of 2,500N/mm, the new belt with wire-free zones has a

tensile load of 3,300N/mm. The conveyor belts are more resistant against mechanical wear, and they are able to transport coarse-grained material and have high tensile load, all this makes the new heavy-duty bucket elevator the favourite conveying system for strongly abrasive material with high capacity and large centre distance. "This belt has twice the service life of a chain. Bucket elevators fitted with this belt are a clear improvement over central chain bucket elevators when used for strongly abrasive material, such as clinker, ore or blast-furnace slag," Schenk learned in Beckum.

The timeline was tight, just two months to plan and realize the modification. "We've got the ball rolling in October. The date of delivery was at the beginning of January and the bucket elevator was operational at the end of February," Schenk says. Employees of Lafarge carried out the assembly under the watchful eye of the BEUMER specialists. It was less of an undertaking for the cement plant. "BEUMER handled all the planning, we only had to mount the buckets and the belt."

"This solution saved us a lot of money," says Schenk. "The complete modification cost about €80,000. In comparison, a new conventional belt would have cost €60,000. If we assume that the BEUMER solution lasts twice as long, the modification would amortize after a short period of time," stresses Schenk. "Even after six months of operation there are no signs of wear. This was quite different with the old belt." **DCi**



The new heavy-duty belts for heavy-duty bucket elevators can be designed with a tensile load of up to 3,300N/mm.

Bulk Materials Handling

With more than 100 years of experience our customers benefit from a unique know-how in the field of bulk materials handling. We supply complete solutions for transporting and handling raw materials in stockyards and port terminals, from individual machines to turnkey plants.

85 t lifting capacity

We supplied the largest grab-type ship unloader of its kind in the world with a lifting capacity of 85 tons for EMO, The Netherlands, Europe's largest dry bulk terminal for coal and ore.



Engineering Excellence **3**



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Shiploading success stories



TKRT shiploaders are ready for transportation by means of roll-on /roll-off.

High-performance shiploading equipment for terminals

GIANT SHIPLOADERS FOR THE CAOFEIDIAN IV COAL TERMINAL IN CHINA

From 1999 to 2012 ThyssenKrupp Industrial Solutions, BU Resource Technologies (TKRT, formerly TKF) successfully supplied more than 18 high-capacity shiploaders for ships up to 200,000dwt and at 6,000/8,000tph (tonnes per hour) to the ports around Bohai Bay of Northern China, China's most important coal terminals. This success story will be continued by the further award of four additional shiploaders which are proven to be the largest ones in size in China.

In 2013, a milestone contract was awarded by China Huaneng Group to TKRT for the design, supply and installation of four 6,800tph shiploaders for coal, for its new coal terminal, Caofeidian No. 4 Coal Terminal.

They are equipped with portal travel gears, boom with shuttle head and a loading device

with trimming spoon, which allows for 360° slewing. With this option, it is possible to achieve the homogenous filling of the corresponding ship holds up to the uppermost edge, at a high nominal loading capacity.





Loading spout with slewable and tiltable trimming spoon.

All of these machines are designed to load ships at a rated capacity of 6,000tph (maximum 6,800tph) and for Capesize ships and down to very small ships sizing to 15,000dwt. In order to save space on the jetty, a special design for the tripper car is adopted in the shiploaders. Each base machine is equipped with a luffing boom, shuttle head with pin rack and pin drives, loading spout and trimming chute. All mechanisms including for the belt conveyor are equipped with variable speed drives by means of frequency converter.

To serve the different sizes of ships, a shuttle with rack and pinion drive, controlled by a frequency converter, is incorporated into the luffing boom, varying the outreach so that the shiploader can serve vessel sizes from small ships to a maximum Capesize ship.

A modern drive control and PLC system is incorporated in the shiploaders; operation is mainly controlled via the computerized panel in the operator's cabin. The high degree of automation and the visually assisted operator's guide in Chinese allow the operating staff to operate the machines easily and in a comfortable fashion.



For environmental protection, a dust suppression system using water spray is installed with a suction pump, water tank, spray pressure pump and spraying nozzles for all transfer points and the loading spout and cleaning compressed-air line. Special measures are also taken in the design to the transfer points and materials flow for a better and functional sealing of the chutes and skirting.

In 2015, these giants will take shape and commissioning will take place, so that they can be put into commercial operation at the beginning of 2016.

As one of world leading suppliers of materials handling equipment, TKRT has developed a complete range of products for mines, bulk terminals, stockyards and fertilizer, steel and cement plants. With more than 100 years' experience, TKRT today supplies a complete range of products for bulk materials handling for mines, ports and terminals:



Similar giant shiploaders at the port of Tianjin, China.



Shiploader at the assembly yard in China; the tripper car is on the left side.



FULLY ASSEMBLED HIGH CAPACITY SHIPLOADER FROM THYSSENKRUPP READY FOR SHIPMENT TO ARCELOR MITTAL IN LIBERIA

In 2011, ThyssenKrupp won the order for two bucketwheel reclaimers, one bridge type reclaimer, three stackers, one car dumper and one shiploader for the iron ore mine of Arcelor Mittal in Liberia. The new shiploader will be able to load iron ore at a rate of 10,000tph to ships with a maximum size of 90,000dwt.

The shiploader is a classic coordinate type, with luffing and shuttling boom. A special feature is the rail track with one rail at the waterside but two rails at the landside. The wide rail gauge from the land- to the waterside of 30m normally would require a wide and heavy tripper car also running on this rail gauge for transferring the material from the ground-based pier conveyor to the shiploader's boom conveyor. To gain weight and space, the landside is equipped with two rails at a distance of 7.5m, used as the runway for the tripper car. The shiploader itself is resting through a hinge point at the landside also on both rails and is therefore supported by in total three rails.

To reduce erection and commissioning time at the site in Liberia, the shiploader will be delivered fully erected and

Shiploader resting on the three rails at the assembly yard in China.



pre-tested to the site. The new shiploader is nearly finished at the assembly yard in China and will be delivered by heavy-lift vessel to the site in Liberia soon.

THYSSENKRUPP WILL DELIVER ONE OF THE WORLDWIDE BIGGEST SHIPLOADERS TO LKAB IN NARVIK/NORWAY

ThyssenKrupp won the order for one of the biggest shiploaders in the world to be delivered to LKAB in Narvik/Norway. The new shiploader will be able to load iron ore at speeds of up to 11,000tph, to ships with a maximum size of 180,000dwt. ThyssenKrupp has already built shiploaders for higher capacities and bigger ships, but what makes the new shiploader for LKAB so unique and giant is the unusual design.

The machine will be of a design used only on a very few shiploaders: it is a so called 'linear shiploader' similar to a radial or quadrant machine, but not using a circular curved but a short straight runway. Therefore the shiploader's bridge is carried by non-powered travel gear at the pivot point to compensate for the bridge movement due to the non-constant radius. In addition to the compensating travel gear, the linear type needs a second pivot point above the travel gear of the straight runway and a roller table at the feeding point as the feeding point moves in relation to the shiploaders belt conveyor due to the compensation move of the bridge.

ThyssenKrupp has used this unusual design due to the fact

Subportal with hinge point to support the shiploader on the landside double rails.





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Dust-free loading procedures independent of any weather conditions: The M.V. GOLIATH reaching Sydney.



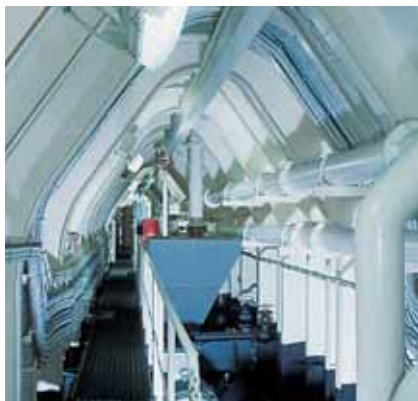
During the voyage on the River Seine in France: The cement barge of LAFARGE Cement.

Self-discharging cement carriers

with advanced systems, which are fully automated and able to achieve high loading and unloading rates. Unique for the IBAU concept is the space saving midship tunnel design that integrates the discharge equipment and divides the holds into a port side and starboard compartment. The midship tunnel eliminates an

additional hold for the discharge equipment. The self unloaders are loaded and unloaded by means of IBAU Pumps, rotary piston blowers and other IBAU components, all made to measure. In seaborne transportation as well as river/lake transport IBAU HAMBURG has an excellent project experience.

Effective. Efficient.



The revolutionary IBAU HAMBURG Tunnel concept: Midship tunnel with the IBAU Pump and aeration panels.



The M.V. CEMSEA and the M.V. CEMSTAR during supply voyage.



3D view of the LKAB shiploader, pivot point with compensating travel gear on the left side, straight rail track on the right side

that LKAB operates already a linear shiploader built at the beginning of the 1970s. The reason for choosing this type of shiploader at that time was the limited space on site and the small amount of civil work needed on the pier due to the short straight runway.

The new shiploader will be built in addition to the existing one on a new pier, but it is planned that a second new shiploader will replace the existing one at a later date. Therefore the design of the new shiploader has taken into account some of the specifications of the old one, by keeping the same distance between the runway and the pivot point as used on the existing one. Therefore a true copy of the new shiploader can be used in the future to replace the old one.

The geometry and the design will make the new shiploader one of the biggest ever built. The total length of the machine with the upper carriage in its extended position is 152m while the maximum span of the bridge between straight rail track and

pivot point totals 77m. The upper carriage itself allows for a shuttling way of 44m while the necessary compensating travel length of the bridge on the pivot point due to the straight runway totals 28m. The boom of the upper carriage has a length of 55m and is totally enclosed to ensure a maximum amount of environmental protection during the loading operation.

Taking into consideration the polar environment at the site, the new shiploader will be delivered fully erected and pre-tested to Narvik to keep the erection time at site to a minimum. Due to the giant size, the high weight and the special design of the shiploader ThyssenKrupp had to develop a unique erection and shipping method in close co-operation with specialized shipping companies.

Even for a company like ThyssenKrupp, which has vast experience in shiploaders, the new LKAB machine in Narvik is a big challenge and will mark another impressive milestone in the long history of shiploaders built by ThyssenKrupp.

3D view of the LKAB shiploader, with upper carriage retracted and boom in upper position.



Bedeschi supplies shiploader and conveyors



Port of Brisa, Colombia: Bedeschi shiploader awaiting the first vessel for coal inauguration.

In Colombia, at the Port of Brisa, Bedeschi has completed the supply of more than 3km of conveyers and a shiploader with a loading capacity of 6,000 tonnes per hour. The travelling, slewing and luffing shiploader is equipped with a curved chute to enable complete distribution of cargo inside the holds of vessels so as to avoid broken space. Vessels up to 180,000dwt can be loaded at this port. The multi-purpose

terminal of Brisa will primarily handle coal, but will also be able to handle other dry bulk cargo too. This port is at an advanced stage of commissioning and trial operations.

Bedeschi relies on Logmarin Advisors for the logistics optimization of its terminal facilities, supervision and assistance during commissioning, which already started for the South American terminal.

TMSA: the South American shiploader choice

Every day millions of tonnes of bulk commodities are loaded, discharged, stored and transferred. Many different forms of external transportation to move those products are used: seagoing vessels, barges, railcars and trucks. These operations all have a range of operational problems that must be overcome. Finding the optimal design, system selection should include and consider many influencing parameters:

- ❖ physical properties of bulk commodities;
- ❖ desired hourly capacities and annual tonnages to be handled;
- ❖ investment and operation costs;
- ❖ size, type and design of carriers which will transport the cargo and the arrival patterns;
- ❖ location of the plant, facility restrictions;
- ❖ design of the quays, jetties, dumping pits and loading facilities;
- ❖ environmental conditions;
- ❖ maintenance costs and estimated downtime of the chosen system;
- ❖ cleanliness, flexibility and adaptability of the equipment;
- ❖ types and costs of auxiliary equipment for trimming, digging, feeding and clean-up; and
- ❖ safety.

To complicate matters, some terminal operators wish to



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For Post Panamax?

In 2014 the Panama Canal expansion completes, allowing LARGER vessels through the Canal. Terminals around the world are preparing now for these LARGER vessels.

Maximum Panamax Ship Size:

	Current	New
Length	296.5m	366m
Beam	32.3m	49m
Draft	12.6m	15.2m

Agrico loaders can load any size ship at any loading rate!



Agrico shiploaders can take you into the future!



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Fixed concrete tower



Fixed steel tower.



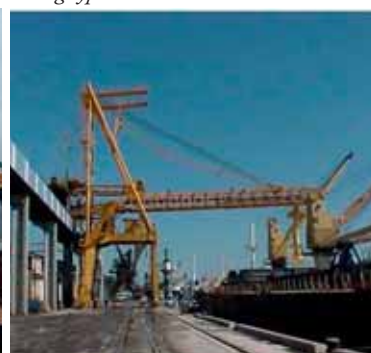
Fixed steel tower shuttle and slewing type.



Longitudinal travelling: luffing boom.



Slewing-type mobile loader.



Shuttle-type mobile loader.

handle various different products using the same system.

Aspects such as product loss, contamination and degradation during handling operations must also be considered.

TMSA Tecnologia em Movimentação S/A, in Brazil, is one of the big suppliers in the South American market for bulk solids material handling, especially in port terminals, heavy duty and long distance conveyors. The company has a large portfolio of different shiploader designs, including a complete turnkey travelling unit with the feeding belt supplied to AGP in the Port of Grays Harbor – WA, USA.

The TMSA shiploader product line includes more than seven types of ship and barge loaders with over 70 units supplied and a further eight units under current open contracts: one system with three fixed towers for Vale in Argentina and five travelling slewing type for different ports in Brazil.

High handling rates and larger carriers place new demands on equipment manufacturers for more efficient, larger and heavier handling systems. Larger bulk carriers have posed problems in connection with the length of over-ship booms to the entrance and interior of the ship's holds. The design of ship's hatches varies considerably and this can place strong constraints upon the average handling rates. In addition, large vessels may stand high above the edge of the quayside and this can make loading and unloading operations difficult.

Because of the stress distribution in a ship's hull, and for other structural reasons, it is not generally permitted to completely load one hold in one operation; a phased work schedule is required. During the various phases, the loading or unloading element has to be moved from hold to hold, without causing damage to the vessel or the equipment.

PHYSICAL CONSTRAINTS TO BE CONSIDERED

In terms of the location, there are important factors which influence the layout of the terminal and the equipment design, such as:

- ❖ weather conditions (rain, wind, storm, excessive temperatures);
- ❖ the infrastructure or the design of the berths and quays including their length, water draught, varying corner loads or wheel pressures and varying track gauges;
- ❖ fluctuations of the tide resulting in big water level differences, and stream currents or waves which can cause longitudinal, lateral and vertical movements of the vessel docked at the quay;
- ❖ the movements of the ship must get priority when designing a loading/unloading system — it must be assumed that a ship has a mass and that her movements cannot be stopped by any equipment.

TYPES OF SHIPLADERS

The ability to reach all points in the holds of a wide range of vessels must take into account the following factors:

- ❖ travelling along the ship (on quayside rails / on a pontoon);
- ❖ luffing of the boom in a vertical plane is of particular importance to insert the boom and to follow the product level and the tide;
- ❖ slewing of the boom, clockwise and anticlockwise through a minimum angle of 180°;
- ❖ kicking in/out of the elevating element can be a help for working under overhangs and in the corners of the holds;
- ❖ parking position when the machine is not being used it should be possible to withdraw the boom, enabling the vessels to dock or leave the quay without difficulty; and
- ❖ storm anchor — it is recommended to have the shiploader structurally anchored to the quay.

The optimum type, cost and effectiveness of auxiliary equipment for feeding, cleaning and trimming make the ideal loader. In addition, loading must be closely co-ordinated with the feeding conveying, storage and silo load out systems of the port terminal.

Ideal Solutions for Port Facilities

- Equipment for solid bulk material handling
- Designed to meet customer's needs
- High quality, excellent durability

- Reliability and short term delivery
- Shiploader retrofit and upgrading
- Dust aspiration systems



Sugar 3,000 t/h



Iron Ore - 4,000 t/h



Grain 1,500 t/h



Grain/Ore 1,000 t/h wood chips



Grain - 1,500 t/h



Grain - 2,500 t/h / wood chips



Kaolin 1,100 t/h



Grain - 1,500 t/h each tower



Dust trap - Upgrading

In order to cover this wide range of requirements, TMSA conceived different shiploader designs, with retractable or telescopic spouting and with the possibility to fit, at the lower end of the spout, a trimmer for spreading the material in the ship's hold or a dust free loading device.

Three types of loading spouts are currently offered by TMSA:

- ❖ the inclined telescopic gravity spout with hoisting and slewing possibilities;
- ❖ the slewable horizontal boom conveyor with its vertically hanging loading pipe; and
- ❖ the shuttle horizontal boom conveyor with its vertically hanging loading chute.

Loading gantries can be fixed or mobile; each loading system has its own merits and must be considered case by case.

Shiploading berths are expensive and complex. They involve the integration of a conveyor system, loading structures and supporting infrastructure. Shiploaders can affect the design and cost of the infrastructure and vice versa.

Loading port terminals with piers are typically equipped with mobile shiploaders and terminals without piers are provided usually with stationary fixed loading towers.

1. Stationary fixed loading towers

These are made of steel or concrete, with different types of boom, which can be slewed, shuttled, lifted and lowered. They are an efficient and cost-effective solution. Ship hatches can be



AGP/USA: 1500 t/h grains, 'A'-type — non-slewing, luffing boom; travelling telescopic chute.

loaded individually or simultaneously by several loading lines.

2. Mobile travelling shiploaders

Travelling shiploaders comprise the main portal frame, an articulated boom with a moveable head conveyor, travelling bogies and a Cleveland Cascade-type telescopic loading spout.

Travelling systems normally travel at 15 to 20m/min (maximum 27m/s), using 32 wheels driven by motor reducer units with electromagnetic brake and speed control by frequency inverter.

With all types, blocking sensors stop the loader in case of proximity to another loader or obstacle. A set of electrical drives with PLC and exclusive supervisory system is provided with safety devices for product conveying, loading cells for overloads control of steel cables, sensors, emergency brakes and other standard devices.

2.1. Shuttle or 'A'-type travelling gantry; luffing boom; shuttle telescopic chute

This has a boom belt shuttle conveyor with a boom hoisting system with a lifting angle from 0° to 75° with a hoisting drive with steel cable winch. It is structurally fixed at 75° to support out of service winds.

In the slewing-type loader, the boom stays horizontal, parallel to the quay.



RUMO Logistica, Brazil: 3,000tph sugar, luffing and slewing boom; fixed telescopic chute.



2.2. Slewing and luffing boom with fixed telescopic chute

The Cosan and the Copersucar shiploaders in Santos, Brazil, both have a loading capacity of 3,000tph for bulk sugar. The combination of movements makes it possible to reach all points of vessel's hatches.

TMSA searches for the best and most economical solutions, based on its long and rich experience as a shiploader specialist. All solutions must meet the client's requirements in terms of performance and reliability, weighed against, not only the capital cost, but also the operation costs of the project.

LOADING AREA AND REACH FOR EACH SHIPLoader TYPE

A selected shiploader design has the ability to reach all points in the holds of a wide range of vessels.

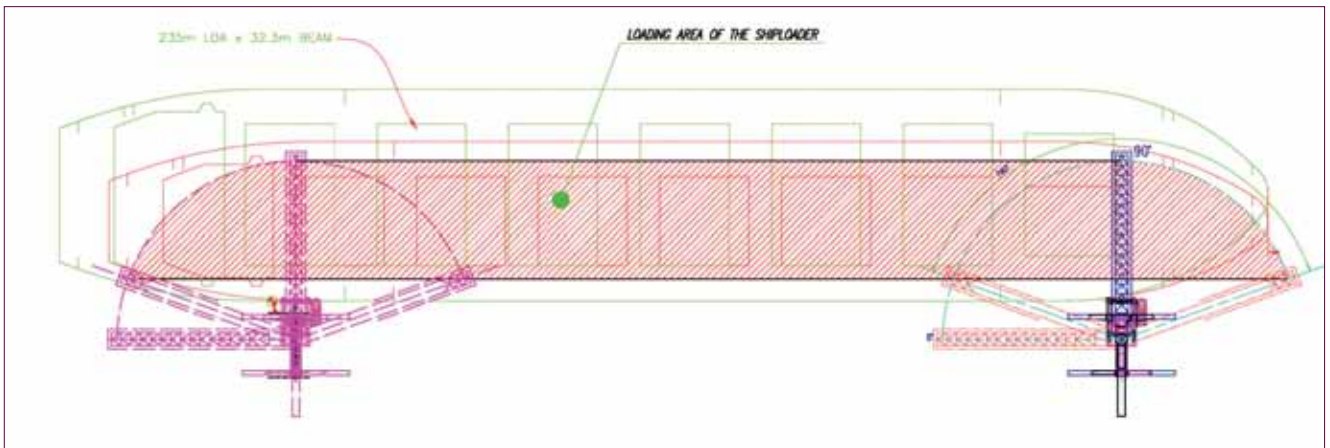
handle the dust generated during shiploading. TMSA has developed a system for dust suppression and trimming (combined): the 'Dust Trap' which can be adapted to existing shiploaders.

TMSA also supplies conventional designs, such as telescopic Cleveland Cascade loading chutes or the new DSH Dust Suppression Hopper from New Zealand. It has already installed in existing shiploaders, with great success, a DSH for loading 1,500tph in Santos Port, Brazil, and is expecting new orders for 2,000tph and 3,000tph units.

ACCESSORY/COMPLEMENTARY EQUIPMENT FOR PORT TERMINALS

TMSA partners with other interesting equipment manufacturers for port terminals, including:

- ❖ **Absam, France.** Surface truck unloading unit and the Manutube, an enclosed belt conveyor with a belt sliding



DUST CONTROL SYSTEMS FOR SHIPLoadERS

The pollution of the environment is a critical topic with many dock sites situated close to residential areas and stringent health laws and regulations being applied for the dust control and the reduction of noise levels.

High efficiency circulator fans, cyclones and compact filters

inside a plastic tube with no idlers, fully enclosed.

- ❖ **VIGAN, Belgium,** for pneumatic ship-unloading.
- ❖ **Telestack, Ireland,** for mobile telescopic shiploaders.
- ❖ **Ravestein, the Netherlands,** a shipyard and construction company, specialized in building bridges, modular loading quays as well as design and construction of crane and

shiploader pontoons which substitute the conventional concrete pier avoiding long term civil works.

TMSA, offers different solutions for the conveying of bulk material to the shiploaders. It has supplied belt conveyors with capacities up to 20,000tph and shiploaders for sugar, iron ore, coal, alumina, kaolin, grains and other heavy duty commodities ranging up to 4,000tph.

The company's wide technological portfolio offers belt conveyors that can be open, covered or enclosed, such as the RopeCon system, pipe conveyors, overland conveyors or conventional trough conveyor belts with high capacities. TMSA has the knowledge and experience for the proper selection of a shiploader and conveying system which will fit the needs and budget of each project.

Different dust control systems supplied by TMSA



DSH Dust Suppression Hopper for 1,500tph sugar loading



Cleveland Cascades.



'Dust Trap' system TMSA.

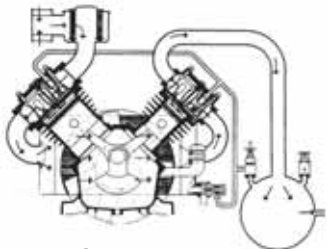


Horizontal compact filter.



Turbo Power

Pneumatic Ship Unloader Technical (R)evolution



Piston Compressor (<1800)



Roots Blower (1900)



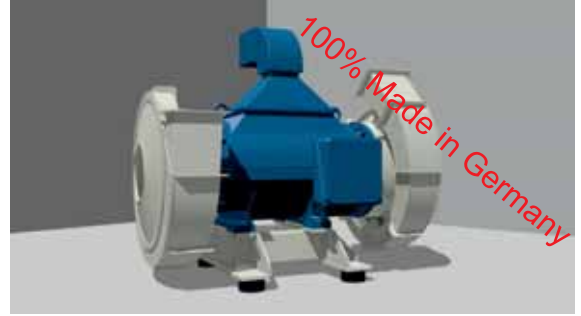
Fan with Air Flow Regulator (1960)



Fan with frequency inverter and automatic belt tension (2000)



TURBO POWER single stage (2009)



TURBO POWER double stage (2011)

MULTIPORT SHIPUNLOADERS ADVANTAGE

- RELIABLE
- LOWEST POWER CONSUMPTION
- EFFICIENT
- 100% BLOWER DIRECT DRIVE - No V-Belts, No cardan joints, No bearing blocks...

With TURBO POWER Direct Drive (single or double) on the motor shaft. With temperature and vibration bearing monitoring control (upper right picture).

*** IN STOCK ***



“Other manufacturers provide equipment. E-Crane provides SOLUTIONS”

OUTREACH	26.4 m / 86.5 ft
LIFT CAPACITY	19 t / 20.9 T
APPLICATION	Barge Unloading
POWER SOURCE	200 kW / 300 hp electric motor

the ORIGINAL balanced crane

over 30 years of experience

BALANCED DESIGN = LOWER OPERATION COSTS
ALL ELECTRIC - NO DIESEL FUEL REQUIRED!

Having gravity work for you instead of against you reduces horsepower requirements and power consumption up to 50%

- 1 LOW ENERGY COSTS**
Balanced design reduces horsepower requirements by up to 50%
- 2 BUILT TO LAST**
Purpose built for 24/7 duty cycle operation
- 3 REDUCED MAINTENANCE**
Longevity of E-Crane parts results in lower maintenance costs and minimal downtime



E-CRANE®
EQUILIBRIUM
www.e-crane.com

Floating E-Cranes expand bulk handling capacity on the water



Many shiploading or unloading ports are faced with problems such as congestion, no land for expansion, and costly outdated infrastructure. Ports confronted with these problems must search for new and creative solutions to handle them. An ideal solution is to move bulk handling operations — including shiploading — to the water, with barge mounted E-Cranes.

BALANCED DESIGN IDEAL FOR BARGE MOUNTING

An E-Crane distinguishes itself by being a fully balanced heavy duty crane. The E-Crane design is based on an ingenious parallelogram style boom that provides a direct mechanical connection between the counterweight and the load. This unique four-bar mechanism system ensures that the E-Crane remains in near perfect balance throughout its working range. This unique feature results in an important economic advantage as an E-Crane requires approximately 50% less power consumption compared to competitive cranes, whose counterweights are fixed or only linked to the boom and not the load.

Along with the significant energy savings that a balanced design provides, it makes the E-Crane ideal for mounting on a floating barge. Because the crane is balanced, the movement of the E-Crane causes very minimal listing and movement of the barge. A barge-mounted crane is also beneficial because it floats

up and down along with the material barges and ships when the water elevation changes. This means that the cycle of picking material out of the barge or loading ships is never affected by water fluctuation. The operator never has to adjust to this fluctuation and no cycle time is added compensating for varying water levels.

Additionally, an E-Crane being installed on a barge or pontoon can be built and tested locally and then floated to its final destination. This eliminates costs and difficulties of local logistics and marine construction. Also, a floating terminal can be moved and located at the closest point suitable for the end user, optimizing the set-up, making bulk handling faster and more efficient. The complete terminal can also be relocated quickly and cost effectively if required, because of the modular concept.

A PROVEN SOLUTION

The E-Crane is designed specifically for barge- and shiploading and unloading, and is a proven and trusted solution in many bulk material handling industries. Most dedicated systems for offloading coal, limestone and other bulk materials are costly, inflexible, and require an expensive, hard to maintain infrastructure. E-Crane's versatility, reliability and flexibility allows for tailor-made material handling solutions. These custom



solutions, combined with E-Crane's modular design, make E-Crane the ideal equipment for any bulk handling application.

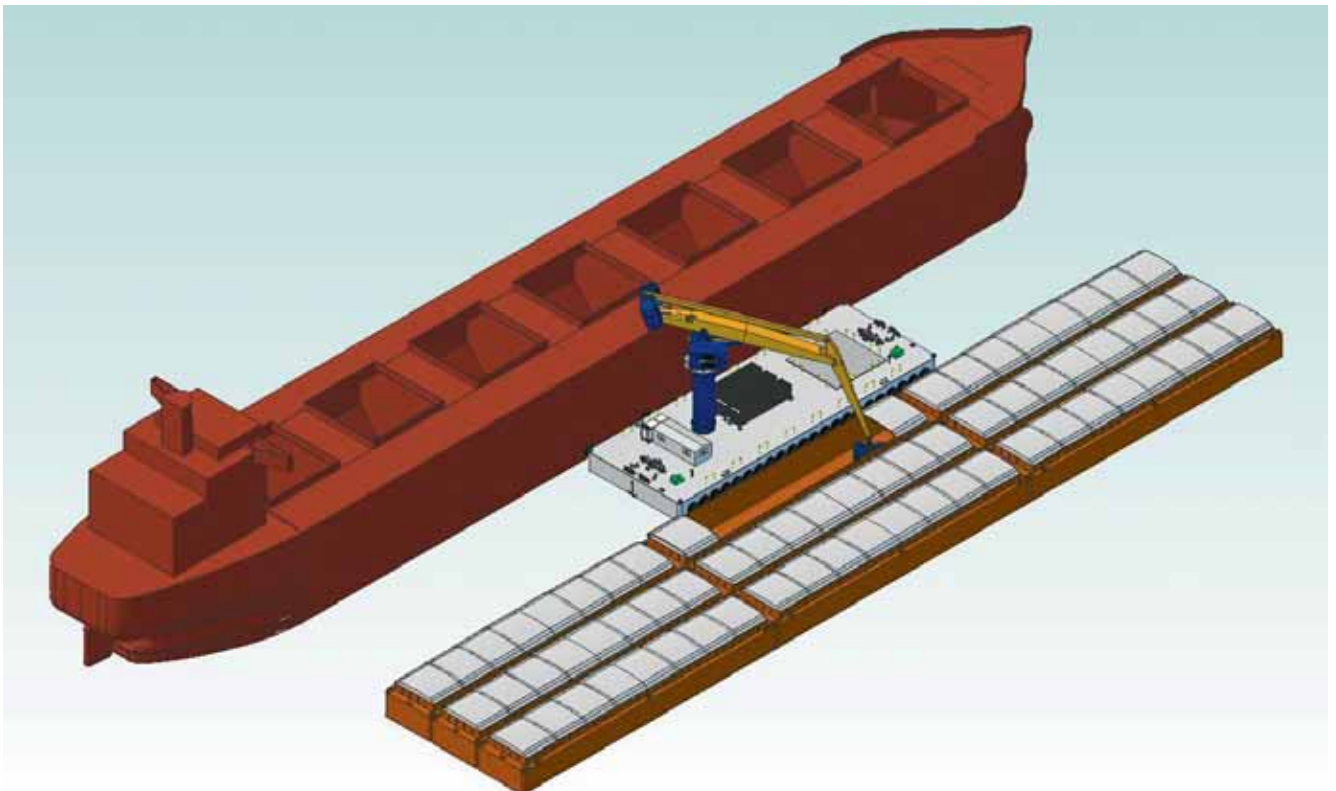
The standard E-Crane product line consists of five series of balanced hydraulic cranes (E-Cranes): 700 Series, 1000 Series, 1500 Series, 2000 Series, and 3000 Series. The E-Crane is placed firmly between production line excavators (or material handlers) and large scale dedicated unloading structures. Even the smallest E-Crane offers much more unloading capacity than the standard excavator, while the larger E-Cranes compete with dedication systems in terms of production but come in at only a fraction of the installed cost with even less annual maintenance costs.

The E-Crane series offers models with up to 50 tonnes duty

cycle capacity and outreaches of up to 150ft (50m).

ABOUT E-CRANE WORLDWIDE

E-Crane Worldwide is a modern, state-of-the-art engineering and heavy equipment construction company, based in Adegem, Belgium and with subsidiary companies for sales management, technical support and service in The Netherlands (E-Crane International Europe) and Ohio, USA (E-Crane International USA). E-Crane Worldwide develops turnkey material handling solutions with engineering services, equipment manufacturing, erection, operator/maintenance training and custom tailored on-going service programmes for its clients.





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- Custom engineered to accommodate job site.





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Turnkey projects for mineral processing and bulk material handling facilities, mainly concentration plants and loading/unloading terminals at ports.

With over 150 years' experience, the company boasts over a hundred references in various different countries in Europe, America, Asia and Africa.



www.dfdurofelguera.com

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Recent coal handling projects from Spain's Duro Felguera (DF)

DF, the Spanish industrial group, has been a public listed company on the Madrid Stock Market since 1905. Since it was founded, the company has been continuously evolving to adapt to market changes and increasing requirements on its projects with faster delivery times and higher performance.

The company's engineering department is based at its headquarters in the north of Spain, which facilitates the development and design of the material handling machines and conveyors for all projects.

In recent years the company has been focused on the international market; taking advantage of its worldwide presence, it has maintained its competitive level of prices without compromising quality. Three new subsidiaries have been opened recently in key areas in the world to take care of new markets: the Middle East, Indonesia and Australia.

PT Duro Felguera Indonesia is a licensed Mining Services Company in Indonesia, to supply material handling solutions for mining companies on a turnkey basis. It also assists DF projects in other countries by sourcing commercial supplies in Indonesia for material handling projects.

DF Mining & Handling is specialized in project development on an EPC basis, in areas such as bulk material handling, mining and mineral processing. DF M&H carries out the complete process to develop a project: engineering, procurement, manufacture, erection, commissioning, operation and maintenance.

LATEST PROJECTS

Coal and coke shiploader for Kinder Morgan Terminals, USA

This is DF's latest commissioned machine, in May 2014, and the second shiploader DF has successfully installed in the USA.

This state-of-the-art loader was designed at DF's headquarters in Gijon and manufactured and assembled in China, with all commercial items supplied from Europe.

It is a travelling, luffing and slewing shiploader equipped with a shuttle boom, boasting a nominal rated capacity of 5,000stph (short tonnes per hour) of coal and also designed for coke.

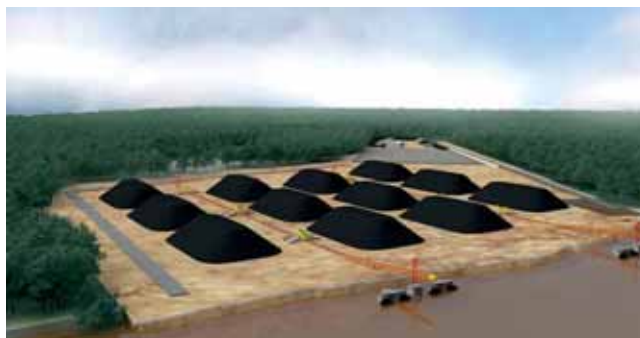
The machine is designed to be capable of loading bulk carriers



ranging in size from 40,000dwt to 118,000dwt. It has the latest dust suppression system design to comply with environmental regulations.

The final destination of the shiploader is Kinder Morgan's existing Deepwater Terminal at Pasadena, Texas. Due to the fast track delivery time, the machine was fully assembled and tested in the workshop and transported on large pieces to minimize the down time of the existing terminal in Texas.

Jambi Coal Terminal, Indonesia



Jambi Province is one of the coal mining areas on the Indonesian Island of Sumatra. Coal from mines located in remote areas is transported by truck to the main port in the city to load ocean barges to send the coal to the mother vessel.

In January 2014 the regulations concerning coal transportation by truck in this province established that truck coal transportation is no longer permitted, in order to reduce the damage caused to roads by the continuous queues of trucks.

PT Bara Ria Sukses has contracted PT Duro Felguera Indonesia to develop the Jambi Coal Terminal on an EPC basis at the limits of the area where coal transportation by road is no longer allowed, roughly 80km up the Batanghari River.

The complete terminal is designed to receive and stock coal from different clients, before loading it onto the barges that then transport the coal to the vessel at the anchor point in the ocean.

Turnkey supply of river barge loading terminal, consisting of:

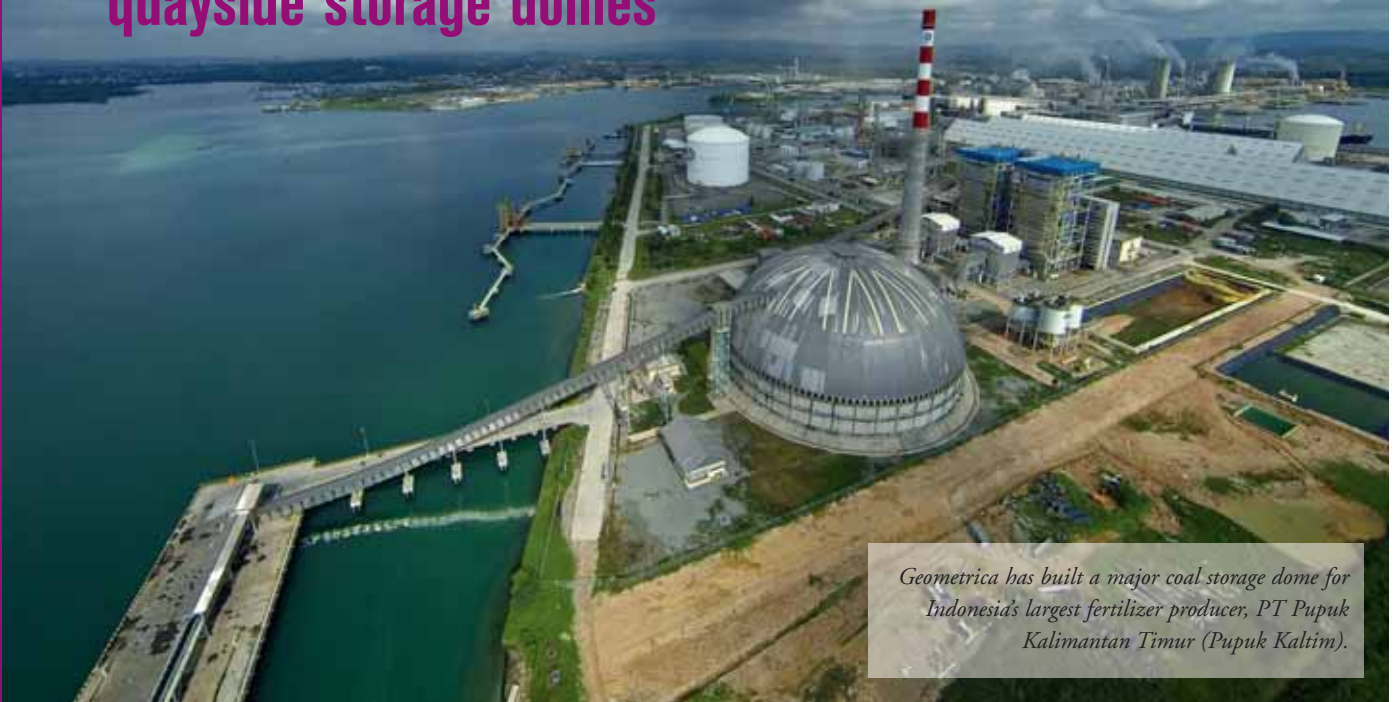
- ❖ two barge loading conveyors with a capacity of 800tph (tonnes per hour) per hour each;
- ❖ loading hoppers with variable-speed belt feeders; and
- ❖ complete civil works including the marine jetties.

Jambi coal is very soft with low calorific properties, and due to the logistics in the area it was necessary to design a system capable of loading large pieces of coal in order to minimize degradation.



Complementing the shiploader

quayside storage domes

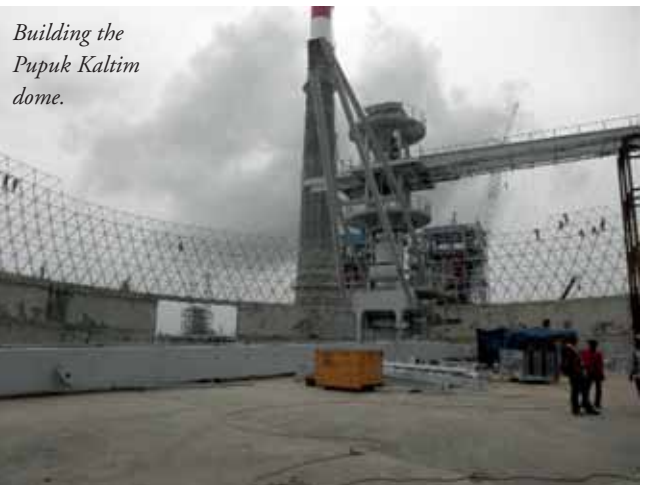


Geometrica has built a major coal storage dome for Indonesia's largest fertilizer producer, PT Pupuk Kalimantan Timur (Pupuk Kaltim).

Shiploaders are a common sight along the jetties and piers of the world, writes *Melanie Saxton* of *Geometrica*. Yet these enormous machines would have no loads if it were not for the ancillary port infrastructure. Marine transport of solid bulk materials such as iron ore, coal, fertilizers, grains and wood chips is made possible through the use of port stockpiles. As bulk material gets loaded and unloaded from the ship, it is unloaded and loaded from the stockpile. *Geometrica* is pleased to play a part in the overall picture as an international supplier of long-span storage domes that help ensure such port stockpiles are environment-friendly.

COAL HANDLING IN BONTANG

The city of Bontang is no stranger to shiploading and unloading. Located in the province of East Kalimantan on the Island of Borneo, this ocean estuary is the headquarters of Indonesia's largest fertilizer producer, PT Pupuk Kalimantan Timur



Building the Pupuk Kaltim dome.

(Pupuk Kaltim). Pupuk Kaltim supplies subsidized or non-subsidized sectors with urea, ammonia, NPK and organic fertilizer. The facility owns and operates its own port and special harbour, and provides an excellent example of shiploading and related technologies, such as bulk storage.

With the natural-gas market fluctuating and the government encouraging the use of coal, Pupuk Kaltim launched a project to diversify its fuel usage. It added a coal boiler in 2009. The fuel storage dome for this boiler was designed and prefabricated by *Geometrica*.

Geometrica had already met a high bar of achievement when previously designing the JEA Northside power plant dome in



Jacksonville, FL. This award-winning facility boasts a pristine interior and exterior, and the similarities between JEA and Pupuk Kaltim’s vision were remarkable. Geometrica was selected to supply Pupuk Kaltim’s long-span application based on an ability to meet very specific environmental and logistical needs. Corrosive salt and the inland marine eco-system were one thing — but the 10m-high reinforced-concrete perimeter ring wall covering 40,000 tonnes of coal was quite another, not to mention a coal stacker and a portal reclaimer. Fortunately, Geometrica has provided design, procurement and construction services for marine related bulk handling processes worldwide, including quay-side storage.

Like JEA, Pupuk Kaltim chose to use only clean-coal technologies, a circulating fluidized-bed boiler, a coal-storage



local labourers and supervise their work,” said Ahmad Mardiani, Pupuk Kaltim construction manager. “Because of their contributions and cooperation, our local labourers were successful and proceeded without delays.”



dome and a continuous barge unloader. “This project was very similar to domed bulk-storage facilities we have built worldwide,” says Jorge Parada, Geometrica’s site consultant. “Our galvanized-steel dome technology has proved itself in many environments and applications. Pupuk Kaltim’s application along the coast of Indonesia in a tropical rainforest, is a great example.”

The coal boiler produces the steam required to help Pupuk Kaltim deliver over three million tonnes of urea to the area. The dome had to resist specified environmental loads, withstand corrosive attack from the humid Kalimantan environment and help control explosion hazards, and also use technology that permitted fast construction by local crews without specialized equipment. The dome structure is made of galvanized steel, and the cladding is corrosion-resistant aluminium. “Experienced Geometrica technical-support staff came to Bontang to train our



UREA STORAGE IN VERACRUZ

Grupo CICE called Geometrica about its need to store urea as it arrived at the port of Veracruz. Urea is an extremely corrosive material. When exposed to humidity, it attacks both aluminium and galvanized steel. Further, the coast of the Gulf of Mexico is one of the most corrosive atmospheres anywhere on earth, as industrial and marine exposures combine to torture metal. CICE is a diversified logistics and transportation company. It needed to store up to 15,000t of urea while waiting for transport, and needed a building that would withstand the corrosive attacks from inside and outside the building.

Geometrica’s solution for this challenging problem was a unique building of 52m internal clearance width, 18m clear height at the centre, and 120m length. The building’s lightweight



The urea storage facility for Grupo CICE at the port of Veracruz in Venezuela.

skeleton is made of high-strength aluminium alloy and left exposed. But since urea can attack aluminium, the structure was protected by applying FRP cladding to its underside. The combination is perfect, with each material exposed only to conditions they resist: the aluminium structure is resistant to the corrosive atmosphere, and the polymer cladding resists urea attack, and prevents it from attacking the structure.

Construction took place quickly. Half-arches were assembled on the ground and lifted onto place with two light cranes. The whole construction process took four months. CICE's general



manager on site, Cesar Zamora, said of Geometrica "Excellent quality, service, and products. 100% recommendable."

APPLICATIONS FOR PORT AND SHIPPING TECHNOLOGIES

Geometrica works with plant facilities to envision the highest calibre of co-ordination between port and shipping technologies and the domes and plant facilities that feed them. Whether a combined shiploader/unloader is required, or a quadrant shiploader, dual linear shiploader, or a combination of both for larger vessels, Geometrica stands ready to design long span applications that complement operations portside.

DCi



Formed in the USA

US Engineering Expertise



Jay Venter

Conceptual and functional engineering from Jenike & Johanson

Jenike & Johanson is a leading bulk material handling, processing, and storage company. It delivers engineered solutions to achieve reliable powder and bulk solids flow based on proven theories and decades of project experience.

In today's competitive environment, just having a standard design for a silo, transfer chute, feeder, or stockpile may not be good enough. In fact, implementing a design that does not carefully consider critical bulk material properties can lead to costs far exceeding the initial capital costs for the equipment.

This is precisely where Jenike & Johanson adds value to the engineering process. The company's conceptual and functional engineering designs are developed with thorough consideration of representative powder and bulk solids flow characteristics, and provide the critical information to convey the design intent.

Using its proven bulk material flow theories, cutting-edge analytical models (simulations of material and equipment interactions), and decades of experience, Jenike & Johanson determines the most cost-effective, safe, and practical designs to correct existing material handling problems, as well as to provide reliable equipment designs for new installations.

JENIKE & JOHANSON'S EXPERTISE COVERS THE FOLLOWING AREAS:

- ❖ **Storage systems:** engineered to ensure reliable, consistent material flow;
- ❖ **Transfer chutes:** designed to prevent plugging, minimize

abrasive wear;

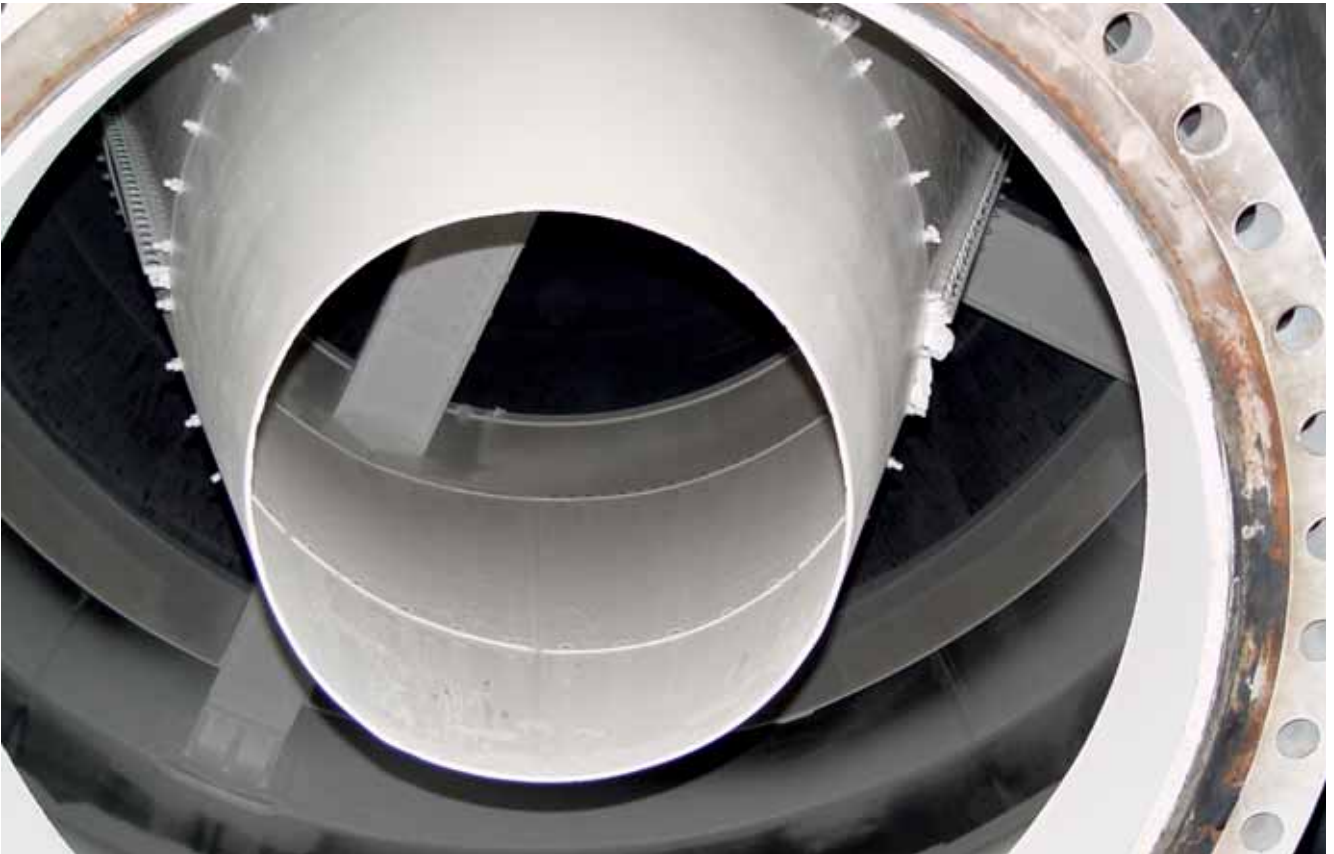
- ❖ **Processing vessels:** developed to purge resin volatiles or act as a dryer;
- ❖ **Feeders:** optimized screw and belt feeders that maintain reliable flow;
- ❖ **Stockpiles:** designed to maximize gravity reclaim and avoid ratholing;
- ❖ **Pneumatic conveyors:** engineered for flow, prevention of wear and attrition; and
- ❖ **Peer reviews:** review of proposed system design from material flow basis.

Jenike & Johanson's engineers do not only consider typical design parameters such as storage capacity, feed rate, or bulk density. They also focus on vital design factors (e.g., hopper angle, material of construction, outlet size) that will allow the equipment to work functionally from the start and provide decades of trouble-free operation.

STRUCTURAL ENGINEERING FOR BULK MATERIALS

Jenike & Johanson's structural group includes engineers with extensive project experience in design and analysis of bulk material storage structures used in power, chemical, mining, food, and agricultural industries. Its group consists of civil and structural engineers who have decades of structural engineering experience factoring in unique bulk material behaviour and external loading conditions such as wind or seismic.





Expertise — structural engineering

- ❖ Structural analysis and design for new/existing concrete, steel, aluminium silos;
- ❖ Inspection of failures with bulk solids storage structures;
- ❖ Rehabilitation of existing structures experiencing signs of distress;
- ❖ Design of purge columns for volatiles stripping (degassing) and drying;
- ❖ Evaluation, review, analysis of concrete and steel storage structures;
- ❖ Advanced structural modelling, stress and fatigue analysis of storage structures;
- ❖ Design of let-down chutes, inserts, distributors, other internal structures in silos; and
- ❖ Design of support for ancillary equipment attached to silos.

Experience — structural engineering

- ❖ Rehabilitation engineering for two of the largest concrete storage silos in South America that were experiencing severe concrete deterioration from coal handling;
- ❖ Design of numerous ASME code purge columns for polyethylene and polypropylene stripping operations. These vessels include a wide variety of internals, including Jenike & Johanson's patented J-Purge™ system;
- ❖ Analysis of failure and design of repairs for internal let-down chutes in large steel silos handling grains and beans;
- ❖ Design of 30ft (9m) diameter silos for underground storage of trona ore;
- ❖ Inspection and design of repairs for a wide variety of structural failures including buckling, abrasive wear, corrosion, fatigue, collapsing masses of solids, and damage from freezing and other environmental factors; and
- ❖ Retrofit design for 1,500-tonne-capacity silo handling hot

lime at 800° F (427° C) to improve flow reliability.

Design tools – structural engineering

Jenike & Johanson performs structural design calculations, stress and fatigue analysis using its extensive proprietary and commercial software capabilities such as COMPRESS, RISA, and ANSYS®. The company's engineers have the knowledge and valuable experience to analyse and design storage structures based on critical design loads including all relevant internal (solids and gas pressures) and external conditions. Jenike & Johanson routinely applies its unique structural engineering skills to provide valuable input for customized bulk material handling equipment such as its J-Purge™ gas introduction system, slide gates, and transfer chutes.

Jenike & Johanson has the experienced staff, knowledge, and specialized tools to perform both physical and real-world analytical modelling studies. The company understands the importance of making sure the models are accurately scaled geometrically and with respect to bulk material flow properties.

Physical modelling capabilities

- ❖ Proof-of-concept prototyping, pilot-scale and unique solids process modelling;
- ❖ Powder fluidization and pneumatic conveying tests;
- ❖ Silo quaking, thumping, vibration testing, and analysis;
- ❖ Flow visualization experiments;
- ❖ High accuracy micro-feeding;

Physical modelling: project examples

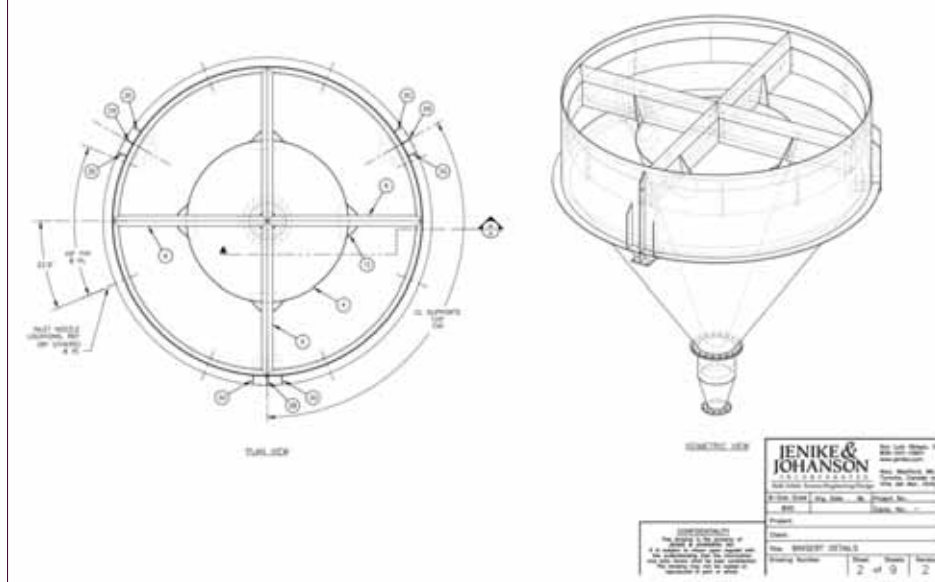
- ❖ Feeding a sticky, cohesive powder at extremely low rates (1g/minute);
- ❖ Micro-dosing a seasoning mixture uniformly;
- ❖ Aligning pharmaceutical tablets in a high speed filler;
- ❖ Filling of ammunition cartridges at high speeds;
- ❖ Feeding a reactor with biomass with continuous, high accuracy control;

- ❖ Operating powder fluidization model at high temperature; and
- ❖ Testing of large particle bulk solids (e.g., coal and switch grass).

Analytical modelling capabilities

Using proprietary tools developed in-house based decades of bulk material handling research and commercial software such as ANSYS®, Jenike & Johanson has extensive analytical modelling capabilities.

- ❖ Discrete Element Method (DEM) simulations of particle flow;
- ❖ Transfer chute analysis and design (use of calibrated DEM model);
- ❖ Prediction of absolute wear in transfer chutes and hoppers/silos;
- ❖ Hopper analysis and design;
- ❖ Rotating equipment (kilns, blenders) analysis;
- ❖ Process Equipment Analysis;



- ❖ Particle-gas diffusion modelling for purge column residence time analysis;
- ❖ Particle drying analysis for design of direct drying (contact bed) systems;
- ❖ Gas-solids models for powder settlement, flow through lock-hoppers;
- ❖ Air blaster design tool for selection, location, and usage optimization;
- ❖ Finite Element Analysis (FEA);
- ❖ Stress and deflection calculations for silos, hoppers, and structures; and
- ❖ Fatigue analysis for connections that are bolted, flanged, and welded.

Phoenix Products Company Inc, serving light to bulk and mining industry

Phoenix Products Company Inc. designs and manufactures superior lighting fixtures for some of the world's harshest environments and has been serving the bulk and mining industry since the 1950s. Phoenix has always had a reputation for high quality, expertly fabricated metal parts that are designed and manufactured in the USA. This caught the attention of one large mining equipment company in the 1950s. The company was frustrated with years of constant lamp replacement due to extreme shock and vibration on the equipment and as a result, commissioned Phoenix to design a shock-resistant light fixture. The new fixture stood up to the conditions and greatly reduced the amount of lamp replacement necessary. This fixture, the Sturdilite®, was Phoenix's entry into the rough service lighting industry and was so exceptional that it is still in use today.



Today, Phoenix serves many international bulk companies by continuing to engineer and perfect its patented designs. Phoenix offers an impressive line of LED fixtures, which allow customers to dramatically increase lifespan, decrease maintenance costs and significantly reduce energy consumption. All Phoenix fixtures are backed by competitive warranties and supported with outstanding customer service and technical expertise.

Phoenix lights are still designed, engineered and manufactured in the USA with a focus on quality and durability. The new HDL-LED Series is a great example of the heavy duty composition of a Phoenix light fixture. Phoenix uses marine-

grade extruded aluminium housing and an anodized finish for additional protection against corrosion. The HDL-LED also utilizes a replaceable, impact-resistant and UV-stable lens, as well as a conformal coated circuit board, fully potted driver and 316 stainless steel hardware.

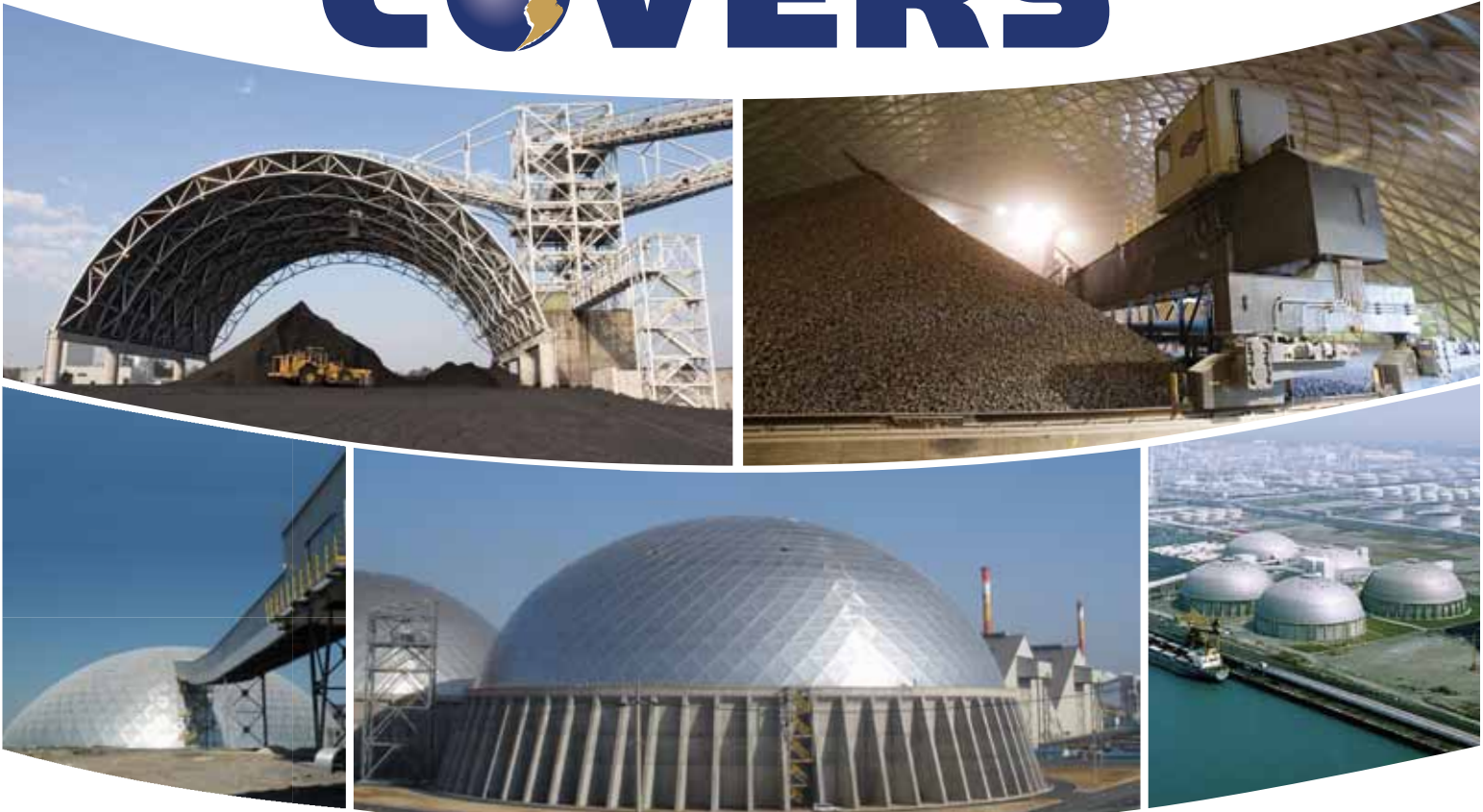
The HDL-LED features a versatile, compact design and provides the essentials for most bulk equipment applications including several output levels, optic options and emergency battery backup. The standard fixture is designed for surface mount, conduit mount and continuous row mount. It is ideal for electrical and machine rooms, access way and conveyor illumination and other areas of the machine that are difficult to access.

The HDL-LED Series provides 30W, 60W and 90W configurations delivering 3,000, 6,000 and 9,000 lumens, respectively. The fixture features an AC or DC driver with a dimmable option.

The HDL-LED carries a five year limited warranty. It is ETL certified to UL 1598 and 1598A with a pending UL 844 (Class I, Div II; Class II, Div I & II; Class III) listing. As is typical with Phoenix fixtures, the HDL-LED is designed to be easy to repair in the field. Repair parts are available for purchase. The HDL-LED Series provides significant maintenance reduction, energy savings and instant-on lighting. These features help reduce downtime and significantly increase safety on the equipment.

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CST Covers has the bulk storage industry covered



Photo courtesy of Essroc Italcementi.

CST Covers, through its heritage as Conservatek and Temcor, has supplied thousands of aluminium geodesic domes to the bulk storage market for more than 50 years. CST Covers has completed over 16,000 projects in over 90 countries worldwide.

CST Covers' geodesic aluminium domes are uniquely designed for each application, taking into account the specific storage and operational requirements of equipment involved in the handling or processing of the stockpiled material.

Structurally efficient and lightweight, clear-span aluminium domes maximize bulk storage capacity, minimize foundation costs and provide dependable protection from the elements while remaining virtually maintenance-free.

CST Covers strut and panel system mechanically locks the panels securely into place, incorporating a seal with a fully engaged gasket. This design is the key to being able to provide effective water and gas tight domes.

The closure system features aircraft quality tolerances in the manufacturing process. The system ensures a long-term reliable seal.

CST Covers uses silicone for its batten seals. Silicone is an inert material not affected by ultra-violet light.

Tighter tolerance manufacturing facilitates quick and trouble-free dome installations. Although aluminium is naturally resistant to corrosion, CST Covers' alloy selection optimizes the

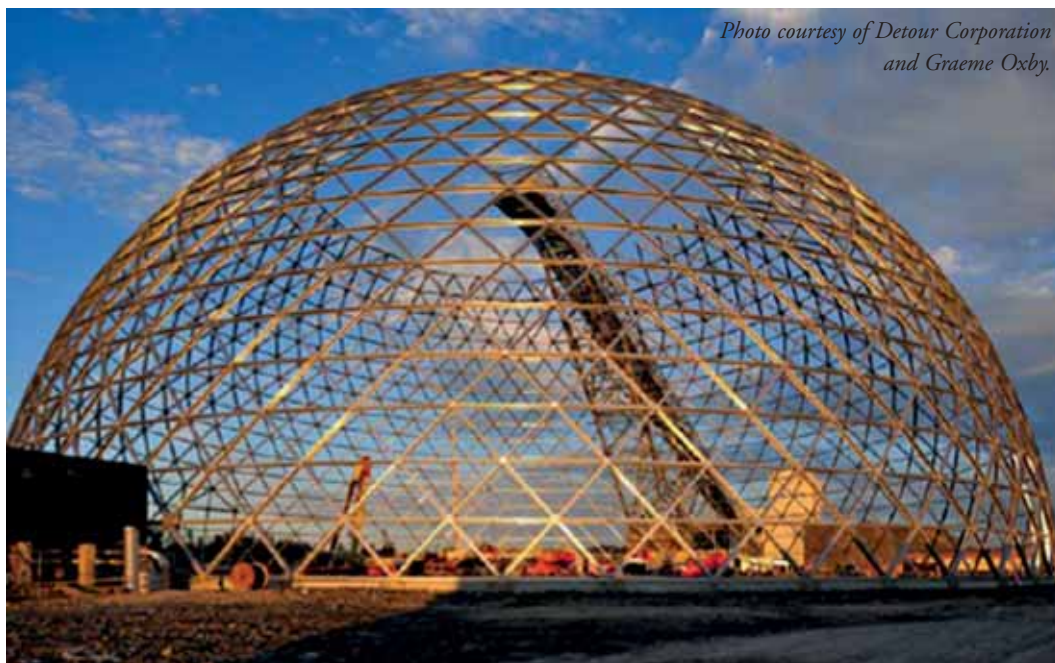


Photo courtesy of Detour Corporation and Graeme Oxby.

corrosion resistance and strength properties of the structures, resulting in covers ideal for harsh industrial applications or salt-laden environments such as port facilities.

CST aluminium domes can meet your exact functional and dimensional needs with sizes up to 320 meters in diameter. They can be designed to enable installation of stacker/reclaimers, allow conveyor/truck entries and be used for storage of most dry bulk material. The unique space truss design and highly engineered components combine to make CST aluminium domes an ideal solution for challenging environmental enclosure and bulk storage problems. Whether it's keeping the elements out or getting the largest amount of bulk in the smallest amount of space, this solution has proven itself time and again.

CST also offers custom aluminium vaults which can be designed to meet the demands of almost any bulk storage application. CST vaults are designed to accommodate many different reclaimer system used in bulk storage facilities.

Martin Engineering's conveyor inspection programme cuts costs, improves safety



Martin Engineering's Walk the Belt™ programme provides scheduled reviews of conveyor systems to maximize productivity and service life.

Martin Engineering is helping conveyor users reduce operating costs and improve safety with inspection and maintenance programs designed specifically for each individual system. The Walk the Belt™ programme from Martin Engineering provides regularly-scheduled reviews of belts, cleaners, tracking, chutes, dust control and other components from experienced specialists with the training and expertise to maximize productivity and reduce downtime. Featuring immediate transfer of data and photos to facility managers, the programme establishes an evolving record of each belt for current analysis and future reference. By taking responsibility for routine maintenance and identifying potential issues before components fail, technicians assist customers in maintaining system performance and extending service life, while minimizing fugitive material and unplanned shutdowns.

“Every conveyor is different, even within the same facility” observed Martin Engineering global market development manager Mark Stern. “So we create a specific inspection plan based on the design, capacity, throughput requirements and the desired level of fugitive material abatement.”

Stern said that while it's common for conveyor owners to perform service on their systems only when a component fails, it's actually less expensive in the long run to incorporate continuous maintenance into a plant's operational plan. “Routine inspections can extend the life of the belt and conveyor components by preventing correctable issues from turning into major and costly headaches,” he explained. “These programmes help our customers maximize the throughput and safety of their conveyors, while reducing the chances of catastrophic failure that could interrupt production.”

Conducting conveyor inspections and maintenance can pose significant risks to employees, as these activities bring workers into close proximity with the conveyor system under potentially

dangerous conditions. Staff members are exposed to moving belts, rolling components and pinch points, all in an environment that is commonly dirty, distracting and noisy. Outsourcing those functions to trained professionals will relieve system managers of the burden.

FINDING A SPECIALIST

As plants across many industries struggle with staff reductions, some facilities now entrust some or all of their conveyor equipment installation and maintenance work to outside contractors. The approach keeps maintenance management in the hands of the plant, while outsourcing the actual labor.

One of the advantages of the Martin® Walk the Belt™ programme is that it relieves plant personnel from a duty for which they may not be well-trained, allowing them to remain focused on core business activities. “Our technicians are a specialized group, with the expertise necessary to achieve high conveyor efficiency and keep the system running at maximum productivity,” added Value Stream Manager Mark Streb. “They're well-versed in current best practices and regulations, able to advise customers on proven solutions for common industry issues such as safety, dust management and spillage reduction.”

Fugitive material management is a key element of the inspection programme, and one of Martin Engineering's specialties. As problems from the creation, accumulation or escape of dust are multiplied by the increased possibility of regulatory citations, fines and shutdowns, it's imperative that plants prevent the escape of fugitive particles. A key to minimizing the release of dust is the proper maintenance of components such as belt cleaners, transfer point seals, dust curtains, suppression systems and air cleaning equipment. Proper adjustment and timely service will minimize carryback



By taking responsibility for routine maintenance and inspection, technicians help customers maintain system performance, while minimizing unplanned shutdowns.

and dust issues all along the conveyor.

The Martin Engineering technicians do more than walk along the length of the belt, of course. In fact, one of their inspection techniques is standing stationary at a number of points along each conveyor and watching one or more complete revolutions of the belt, noting its condition, tracking, carryback and other observations. They take detailed notes, identifying trouble spots by component name and location as they are found, often logging data directly into a smart phone or tablet immediately at the site. Digital cameras and other devices allow the technicians to take photos, record video, make rough measurements and perform other tasks, then share a wealth of information with customer operations personnel for discussion and prioritizing.

Maintenance and repair tasks can be included in the programme and performed routinely, or scheduled upon request. Martin

Engineering professionals can also provide a comprehensive survey of the entire plant's material-handling system, including measured levels of respirable and fugitive dust and spillage. This report delivers grid-based results, giving the client real information that can be used to prioritize needs and avoid misplaced spending.

"A conveyor is a complex system of interlinked components," Strelbel reminded. "If even one component or subsystem stops functioning, processes both upstream and downstream will be affected, potentially leading to a shutdown or worse. In a large facility, even a fraction of a percent of system availability could be measured in millions of dollars," he added.

"It's like buying a car," Stern concluded. "Effective upkeep will reduce the total cost of ownership. Finding a capable and trustworthy professional mechanic helps avoid unexpected breakdowns, saving time, trouble and money over time."

Martin Engineering supplies bulk material handling technology and equipment around the world for a wide variety of applications, including mining and coal handling, cement/clinker, rock/aggregate, biomass and other materials. Founded in 1944, the firm is headquartered in Neponset, IL, offering manufacturing, sales and service from factory-owned business units in Brazil, China, France, Germany, Indonesia, Mexico, South Africa, Turkey, India, the UK, Japan, Russia, Peru and under exclusive licence with ESS Australia.

THINK THIS IS NEW TECHNOLOGY? THINK AGAIN..



Australia
Titanium Ore – 50°
Mobile shiploader – 1000 t/h



Canada
Diamond ore – 50°
3 units – small footprint



Spain
Green Pet Coke – 90°
"S"- Shape



Canada
Pebble Ore – 90°
Ability to fit in tight space



DSI Snake Sandwich High Angle Conveyor elevating coal at a 75° angle for a steel plant in Northern Spain.

Dos Santos International is the world's foremost authority on high angle conveyor applications and design of sandwich belt high angle conveyors. With more than thirty years of materials handling and engineering experience, we offer the most advanced high tech conveying solutions. **BUT THE TECHNOLOGY ISN'T NEW.** DSI's high angle solutions have been proven time and time again to be the most reliable and economical solution in the industry.

The DSI Sandwich Belt High Angle Conveyor offers many advantages. It's **PROVEN** in over 100 installations worldwide. It's **RELIABLE** for rugged mining conditions, yet gentle enough for friable materials. It's **ECONOMICAL**, fitting into tight spaces and small footprints. Elevating millions of tons of material at various installations all around the world, users have agreed it's the most reliable, low cost and low maintenance conveyor system available. **Let us prove it to you.**

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Dos Santos International to supply landmark high angle conveyor to transfer terminal

Dos Santos International has been awarded a contract near the Gulf of Mexico, which includes engineering support and supply of a DSI Snake Sandwich High Angle Conveyor — the widest belt width, highest volumetric rate DSI Snake to date.

Dos Santos International has long provided expert engineering support to a major transfer terminal on the Mississippi River delta, North American Gulf of Mexico. Barge tows of coal and coke from all over the USA travel south on the Mississippi River to the terminal where they are unloaded to storage. The stored material is later reclaimed and loaded into ships that deliver the coal and coke to power plants, steel mills and chemical plants, along the Gulf coast and all over the world. The terminal transfers 20 to 30 million tonnes annually.

BACKGROUND

When built in 1965 the terminal consisted of a bucket ladder type continuous barge unloader (CBU), a storage yard, served by a reversing yard belt with a bucket wheel type stacker reclaimer (S/R), and a slewing, luffing and telescoping type loader for Gulf barges and small ships. The main market was the power plants along the North American Gulf coast. Additional down river dock structure was later added along with clamshell type unloading equipment to handle specialty materials.

International coal trade increased dramatically through the 1970s. A major expansion of the terminal, in the early 1980s sought to capitalize on the increased coal trade. A second, parallel, but higher capacity system was added just up-river from the first. The new system included a double bucket ladder, pivoted arm type CBU, a storage yard served by a reversing yard belt with a bigger, higher capacity stacker reclaimer (S/R) and a new travelling, luffing, telescoping ship loader on a new dock structure between the two storage yards. The new travelling shiploader could easily load large ships. Parallel tripped conveyors at the new dock, one running up-river, the other down-river, allowed the shiploading of the coal from either yard. Other than sharing the common ship loader, the two storage yards remained isolated from each other depending entirely on the availability of their local equipment. At each stockyard it was not possible to simultaneously stack and reclaim.

A major expansion currently under way will end the isolation. Ahead of the expansion, the original S/R of the down river yard was replaced with a new, modern S/R with the increased operating parameters of the upstream system. The current major expansion includes:

1. An additional parallel reversing yard belt at each storage yard, served by the yard's stacker reclaimer.
 - a. Either yard belt tripper can feed the S/R to stack-out
 - b. In reclaim mode, the S/R can load either yard belt through a bifurcated chute with actuated flop gate.
2. Two additional stackers at each yard; one on either side of the S/R:
 - a. Each stacker has a reversing boom conveyor that can stack to either side of the track.
 - b. Each stacker is loaded by either of its two yard belt trippers.
3. Up river and down river conveyors to direct material flow from either CBU to either storage yard or from reclaiming at either yard to ship loading via either end of the main dock
4. Three new slewing, telescoping shiploaders, located downriver

of the main dock. These new shiploaders, though stationary, are designed with the combined operating range to load large ships without repositioning.

The isolation is ended with the new up-river and down-river conveyors that link the two storage yards. To preserve maximum stacking range along the yards the up/ down-river conveyors must hug the CBU dock line, locating them alternately over land and over water. The original yard belts are broken into two flights at the respective junctures with the up/ down-river conveyors. Thus, from either CBU, material flow can be alternately directed to either storage yard for stack out or directly to any of the shiploaders.

HIGH-TECH TRANSFERS

The new expansion maximizes flexibility allowing continuous stack-out at either or both yards with simultaneous continuous reclaim to ship loading from either or both storage yards. This flow path flexibility is facilitated through elaborate junctures of high-tech control flow chutes, particularly at the ends of the new up/down river conveyors. These transfers are contracted separately to the control flow specialists of Power Techniques of Alma, Illinois, USA and M & J Engineering of Germiston, South Africa. These control flow chutes are well known in the trade as Weba Chutes.

ENVIRONMENTAL AND OPERATIONAL IMPROVEMENTS

The current expansion afforded the opportunity to establish better environmental controls and to better deal with nagging operational issues. These are related. Whereas conventional open troughed belt conveyors can ideally operate at inclines as high as 15° to 17°, practically, variations in material characteristics can greatly affect this, significantly lowering the incline angle.

Barged coal often arrives in very wet condition. The barges may have been loaded with wet coal and/or the open barges may take on additional moisture from long exposure to downpours of rain. In transit, excess water tends to gravitate to the bottom of the barge. When unloaded by the bucket ladder type CBU, the first 'hogging' pass delivers a moist coal mix but the final pass drags the barge's bottom and bails the excess water. In many cases such a wet material/free water mix cannot be conveyed at any significant incline and tends to run back, spilling from the conveyor. Operational and design parameters for the terminal expansion were developed from such experience. As a result: 1) conveyor incline angles are limited to 9° throughout the terminal; 2) All new elevated conveyors are to have full length drip pans to catch any spillage so that wash-down can direct it to a strategic collection point. These two mandates promise to improve the environment at and around the terminal.

DSI SNAKE, OPTIMAL PATH FROM THE DOWNRIVER CBU

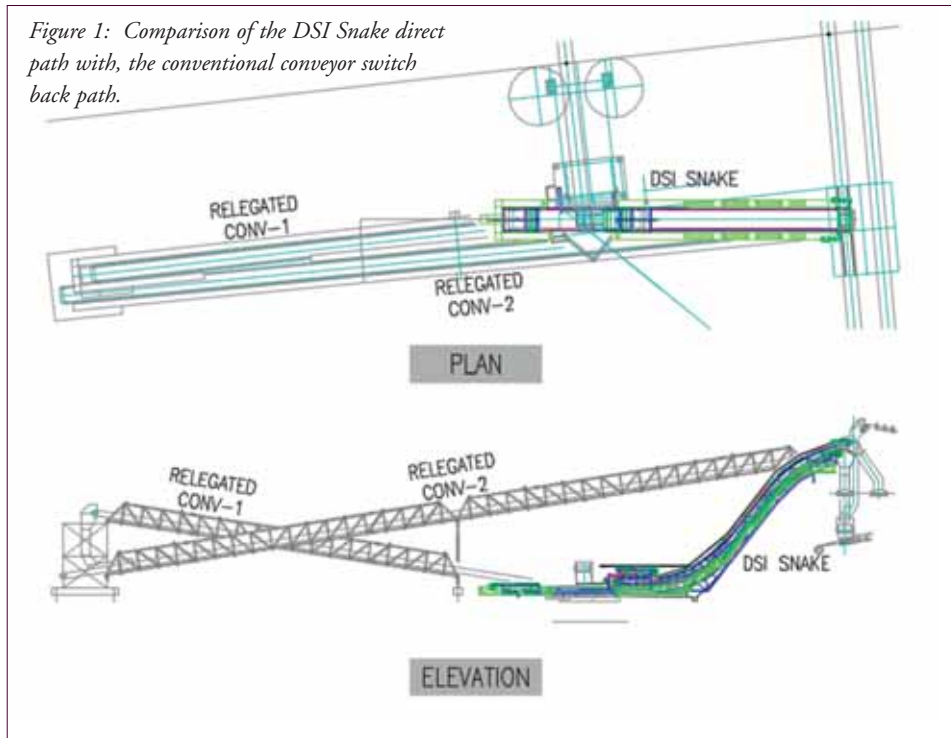
The new system layout required a new conveying path from the downriver CBU to the new down-river transfer complex. The direct path to discharge over the down river yard belts subtends an incline angle that far exceeds the capability of any conventional open troughed belt conveyor. The reflexive solution was to use two conventional conveyor flights in a switch-back arrangement. The 9° maximum incline limitation and the location over water made this a costly proposition. The large (environmental) footprint was also a negative.

Because of the long relationship with Dos Santos International, terminal personnel knew there was a better solution: a DSI Snake Sandwich High Angle Conveyor. At 3,629tph (tonnes per hour) [4,000stph] of coal this will be the highest volumetric rate to date for a Dos Santos Sandwich Belt High Angle Conveyor. The Terminal management, in their due-diligence, sent key professionals to visit the operation of Dos Santos Sandwich units handling coal at high volumetric rates. These visits, and discussions with operating and maintenance personnel, confirmed that the DSI Snake was the best solution.

The DSI Snake was ordered in April of 2014. Presently in engineering, the high angle conveyor will deliver by year end and will begin operation in early 2015. The new DSI Snake profile is depicted in Figure 1 along with the alternate conventional conveyor solution for contrast. Figure 2 shows the Snake arrangement along with a summary of the design specifications and features. At 2,438mm (96") of belt width this is the widest Dos Santos Sandwich Belt unit.

The Snake is part of the coal flow path from the original down-river CBU to the top of the new downriver transfer tower. The bucket ladder type CBU unloads the coal from the barges and discharges it onto the gathering 'A' conveyor, which discharges to the connecting 'B' conveyor. The DSI Snake receives the coal load from the B-conveyor discharge and elevates it continuously up to the transfer tower, for distribution to the alternate terminal destinations. The CBU travels up and down the support tower as required; to clear the empty barge at the highest river level and to dig into the fully loaded barge at the lowest river level. Thus the tail of the connecting B-conveyor follows the CBU travel while the head end pivots to the resulting incline angle. The material discharge onto the DSI Snake unit will vary accordingly.

Special features of the Snake include galvanized steel structure, corrugated covers and wind guard, and a full length



stainless steel drip pan to a strategic discharge point at the foot of the inclined structure. Naturally, at 52° incline the drip pan will be self-cleaning. Additionally the bottom belt tail end is extended back, behind the loading area, in order to facilitate belt splicing.

The lower end of the Snake will be largely supported on existing structure while the main incline structure will be supported on a new pile group at the bottom and on the new transfer tower at the top. A pair of smaller piles will support the bottom belt take-up area.

The DSI Snake Conveyor will be a substantial improvement over the switch-back conveyor arrangement originally conceived. Its use will eliminate a transfer, along with the substantial additional tower and foundations that would be required to support the switch-back transfer. Its shorter path and material containment will further limit the environmental impact of the material handling system. These, among other benefits of the DSI Snake, make this unit an ideal solution for this application.

This latest order is proof of the continued growth and confidence in the DSI Snake Sandwich High Angle Conveyor technology and its many advantages.

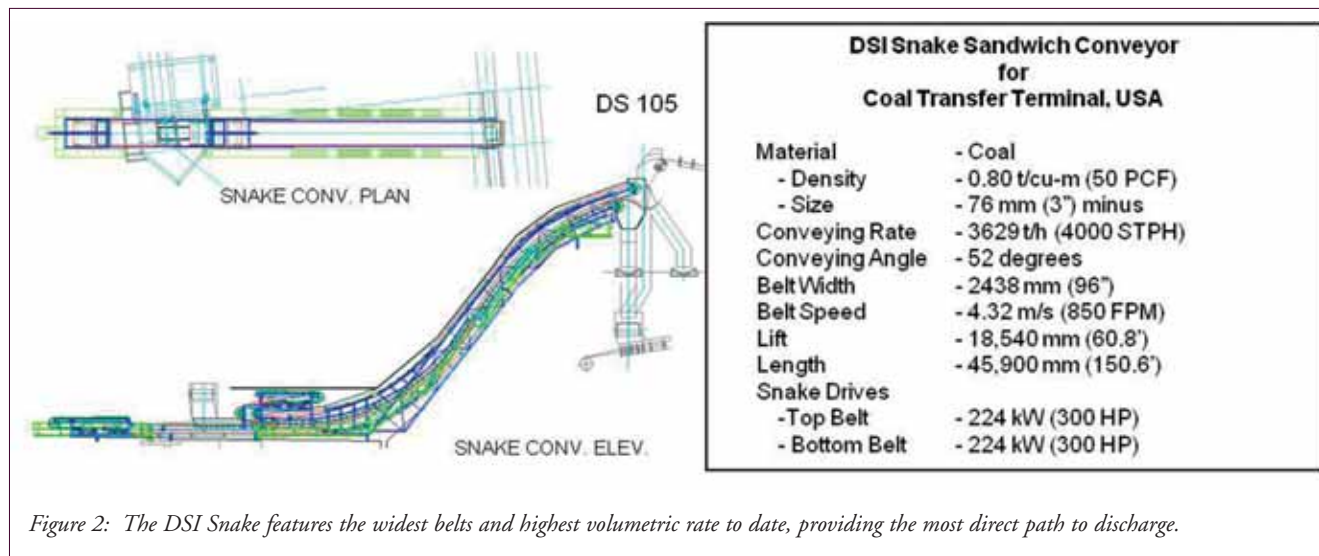


Figure 2: The DSI Snake features the widest belts and highest volumetric rate to date, providing the most direct path to discharge.

Safety solutions for conveyor applications



The FOUNDATIONS Workshop series teaches bulk materials handling personnel how to operate and maintain clean and safe belt conveyors.

Martin Engineering, specialist in conveyor safety technology offers a suite of products and services to protect workers from fast-moving rollers and belts, helping bulk material handlers maintain safer and more productive operations. The components and training from Martin Engineering can be used alone or together to help prevent accidents and injuries, reducing risk while benefiting productivity.

Designed to prevent workers from being drawn into a moving return roller, the Martin® Return Roller Guard is an economical way to raise safety awareness and reduce injuries. The solid upper section delivers pinch point protection, and the slotted lower area allows visual inspection while preventing contact with the roller.

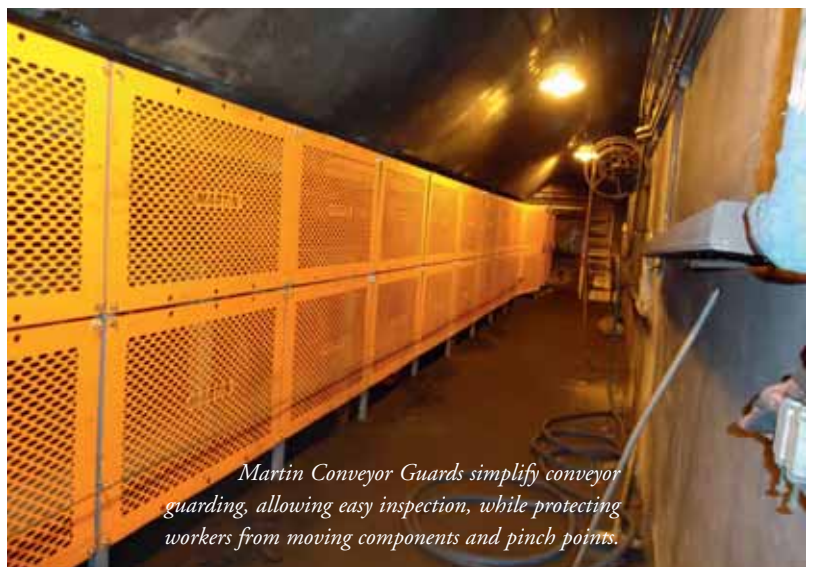
Installation is straightforward, with brackets included to mount the guard directly to either the side or bottom of the stringer. Quick-release pins allow easy service, with side and bottom panels that swing open for cleaning or maintenance, and removable end plates provide access to roller bearings. The guards are designed to fit all major roll manufacturers' sizes (CEMA C, D & E). Installation is recommended on all return rollers that are less than 7 feet (2.13 metres) from the ground, or in locations where the roller is otherwise within reach of workers.

The Martin® Return Roller Basket is designed to prevent a return roller from falling in the event of a mechanical failure, recommended for rollers that are more than 7 feet (2.13 metres) off the ground and out of reach for any workers. The combination of guards and baskets provides a systematic approach to conveyor guarding that's

easy to use and safety compliant.

Like the Return Roller Guard, slotted panels allow easy inspection, while keeping workers protected. Brackets designed to fit all major roll manufacturers' sizes are included to mount the basket directly to either the bottom or side of the stringer. Quick-release pins allow easy access, and side panels swing open from either top or bottom for cleanout or service. Both the roller basket and guard are available in painted steel and two grades of stainless steel.

Martin® Conveyor Guards simplify conveyor guarding to improve plant safety and productivity. The heavy mesh guards allow easy inspection, while keeping moving components and pinch points isolated from workers. The rugged modular design



Martin Conveyor Guards simplify conveyor guarding, allowing easy inspection, while protecting workers from moving components and pinch points.

The Martin® Return Roller Guard delivers pinch point protection, allowing visual inspection while preventing contact with the roller.



is supported by a supplied angle iron structure, and attachment to the conveyor equipment is not required. Installation is straightforward, with wedge clamps that allow panels to be removed and re-installed quickly.

The guards conform to OSHA 29 CFR 1910.217 when installed with a minimum of 5.5 inches between the guard opening and hazard. Available in a range of sizes from 24" x 24" (610mm x 610mm) to 36" x 50" (914mm x 1,270mm), they feature a universal design that can be used in a variety of combinations to fit almost any application. Systems can be easily expanded or relocated as needed.



The Return Roller Basket was developed to prevent a return roller from falling in the event of a mechanical failure.

SAFETY TRAINING

Martin Engineering has expanded its FOUNDATIONS™ Training Program on the design and development of more productive belt conveyors to offer three customizable seminars. Training is available to suit individuals with varied levels of experience and responsibility from new hire to senior engineer. Attendees attain a better understanding of conveyor safety and performance, helping to justify upgrade investments and increase profitability.

The FOUNDATIONS Workshop series has been teaching bulk-materials handling personnel how to operate and maintain clean and safe belt conveyors for nearly twenty years. All

programmes offer the opportunity for customization/localization to feature specific images, conditions and problems from the customer's site. Programmes are flexible as far as location and length. The presenters are highly trained and have many years of hands-on experience around conveyor systems. These industry experts keep the programmes lively and interesting, while giving attendees a new outlook on conveyor operations.

Martin Engineering supplies conveyor products and industrial vibrators around the world for a wide variety of bulk material handling applications, including cement/clinker, rock/aggregate, coal, biomass, grain and other materials.

DCi

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