



DRY CARGO

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FEATURES

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■ Mobile Harbour Eqpt

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featuring...



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Dry bulk trade progressing solidly

World seaborne dry bulk trade still looks set to achieve a healthy growth rate of about 4% during 2014 as a whole. Commodity imports into many countries are expected to increase, assisted by China's positive contribution. A large part of the extra trade volume this year probably will be seen in the iron ore and coal sectors, together comprising more than half of the dry bulk total.

Signs point to global economic activity gaining momentum. Global GDP growth could edge upwards to 3.4% this year, from 3.2% last year and improve more noticeably in 2015, according to a recent (end July) IMF report. Demand for the products of various industries importing dry bulk commodities will benefit from this pattern.

IRON ORE

In 2014 world seaborne iron ore trade could grow strongly by about 9%, a rise of 105mt (million tonnes), to reach 1,315mt, as shown by table 1. Although most of the incremental volume probably will be comprised of Asia's additional imports, other countries could contribute significant extra quantities. Assumptions about key influences shaping Chinese purchases remain critical.

Another very large rise in China's imports of about 11%, raising the total to 910mt this year, is incorporated in the overall iron ore trade forecast shown. An increasing proportion of ore obtained from foreign suppliers, displacing supplies from Chinese domestic mines, supports the continued expansion. Among other importers including European countries, Japan and South Korea, higher volumes are envisaged.

COAL

The outlook for coal trade during 2014 is positive as well, in both steam and coking coal sectors. Three-quarters of the total is steam coal, seaborne movements of which are still benefiting from growing power station usage of imports in numerous countries. Volumes traded in the coking coal segment are reflecting higher steel production at blast furnace mills in many areas.

Overall world seaborne coal trade growth of about 40mt or 3% this year is shown in the table, raising the annual volume to 1,220mt. Most of the extra quantity could be steam coal. The greatest reinforcing influence seems likely to be higher imports into Asian countries, especially India. Earlier indications suggested another large rise in China, but there is now more uncertainty.

GRAIN

A predicted 5% growth rate for global seaborne grain trade (including wheat, coarse grains and soyabeans) in 2014, raising the annual total by 17mt to 365mt, mainly reflects a very strong first half. Prospects for the second half point to weakness emerging. Grain trade forecasts are partly speculative, because it is difficult to predict weather patterns which will determine both domestic harvests in importing countries and output in exporting regions.

Figures based on the conventional crop year, used in grain trade statistics, show a higher percentage increase for wheat and coarse grains trade during the period ending mid-2014. Forecasts on this basis show a reduction in trade during the current 2014/15 year, amid lower imports into China. A partial offset is foreseen, assuming higher Chinese soyabeans imports.

MINOR BULKS

Large and varied minor bulk commodity volumes comprise about one-third of global seaborne dry bulk trade. In 2014 the minor bulk sector's total, estimated at around 1500mt, may be flat compared with the preceding twelve months. Some favourable influences benefiting industrial bulks movements related to manufacturing and construction, the largest part, could be offset by reductions elsewhere.

BULK CARRIER FLEET

Further brisk growth in the world fleet of bulk carriers this year is predicted, at a slightly less rapid rate than seen in 2013, continuing the deceleration trend, as shown by table 2. A 38m deadweight tonnes or 5% increase to 761m dwt at end-2014 is estimated. Newbuilding deliveries are likely to be lower, but signs point to sharply lower scrapping as well.

TABLE 1: WORLD SEABORNE DRY BULK TRADE IN 3 MAJOR COMMODITIES (MILLION TONNES)

	2009	2010	2011	2012	2013	2014*
Iron ore	905	1005	1069	1124	1210	1315
Coal	842	954	1014	1111	1180	1220
Grain (including soyabeans)	295	297	313	328	349	365
Total major bulks	2042	2256	2396	2563	2739	2900
% growth from previous year		10.5	6.2	7.0	6.9	5.9

source: Bulk Shipping Analysis estimates and forecasts

*forecast

TABLE 2: WORLD BULK CARRIER FLEET (MILLION DEADWEIGHT TONNES)

	2009	2010	2011	2012	2013	2014*
Newbuilding deliveries	43.7	80.8	100.1	100.1	62.8	55.0
Scrapping	10.6	6.5	23.2	33.3	23.1	17.0
Losses	0.3	0.4	0.4	0.1	0.4	0.3
Other adjustments/conversions	8.9	4.7	4.0	-1.1	0.0	0.0
Net change in fleet	41.7	78.6	80.5	65.6	39.3	37.7
Fleet at end of year	459.6	538.2	618.7	684.3	723.6	761.3
% growth from previous year		17.1	15.0	10.6	5.7	5.2

source: Clarksons (historical data) & BSA 2014 forecast

*forecast

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Contrasting changes in China's bulk imports

Imports of dry bulk commodities into China, after impressive expansion in recent years, now comprise over one-third of all global trade in these cargoes. Further growth is unfolding this year, but it seems unlikely that the 2014 rise will be as strong as the 13–15% annual increases seen in the past three years. A sharp deceleration is more likely, despite surging iron ore volumes.

A vital support, for the upwards commodity imports trend, is the continuing strength of economic activity generally, and activity in industries requiring foreign supplies of raw materials, fuels, and other commodities, in particular. China's economic growth, as a longer-term trend, is widely described as 'slowing', and fears have been expressed about a steeper slowdown, but a dramatic change does not seem imminent.

During the first half of 2014, gross domestic product (GDP) growth in China was slightly below the 7.7% annual rises seen in the past two years, at 7.4%. This recent development is broadly in line with expectations for the current year as a whole. The latest (end July) IMF forecasts for this year shows a 7.4% advance, followed by a further moderate slowing to 7.1% in 2015.

The relationship with commodity import demand is modified by other factors, some of which are specific to individual commodities. One influence is the progress of construction work and manufacturing industries. Infrastructure building and housing construction are particularly significant. A broad indicator is fixed investment spending, which the IMF expects to ease from over 9% rises annually in the past two years, to about 8% in 2014 and around 7% next year.

SURGING IRON ORE

Following last year's 10% rise in China's iron ore imports, to 820mt [million tonnes] (including some land movements but mostly seaborne), a similar jump is foreseen this year, as shown by the table. These volumes comprise well over half of China's total dry bulk commodity imports, and also comprise more than two-thirds of world iron ore trade, so the impact of any changes is huge.

Increasing steel production underpins growth in raw materials consumption and imports. Crude steel production was 7% higher last year, at 779mt, and rose by a further 3% in first half 2014, compared with last year's same period. But iron ore imports clearly are expanding faster, and in January–June this year the total was a remarkable 19% higher at 457mt.

This contrast partly reflects iron ore stocks changes. More significantly, with implications for the period ahead, is reduced international iron ore prices amid large new supplies becoming available in exporting countries. These supplies are proving advantageous for Chinese buyers, compared with high-cost and lower quality domestic iron ore production, which is being displaced.

SLACKENING COAL

Prospects for coal imports into China do not seem as favourable as

those for iron ore. The outlook tends to be harder to assess, however, because the range of influences is complex, including steel and electricity demand, domestic coal production, competition from other energy sources, and environmental (and therefore political) factors.

Last year coal imports (including lignite) grew strongly by 13%, reaching 327mt and comprising a quarter of the global trade total in this commodity sector. As an element of the Chinese coal market such volumes are nevertheless relatively small: the vast production from domestic mines is the main source. Imports are greatly affected by changes in the relationship between delivered costs for domestic and foreign supplies.

In the first half of this year, overall coal imports into China apparently were up marginally (by 1%) at 160mt. This small change, although not necessarily a good indication of the outcome for the entire year, illustrates the restraints now visible. In particular, measures designed to control pollution, especially air pollution in major cities, by restricting coal usage are prominent.

DIVERGING GRAIN AND SOYA

Underlying support for China's grain and soya imports is derived from the strong upwards trend in consumption. Although domestic grain harvests have also improved (but the relatively small soyabean output has declined), the market for foreign supplies has widened.

Soyabean imports are the largest component. After 9% growth last year to over 63mt, another substantial increase in 2014 is foreseen. While usage of soyabeans in livestock feed, and soyaoil in food manufacturing is still expanding rapidly, domestic soyabeans production has not risen but fallen. Consequently an increasing volume of imports is required.

Grain (wheat and coarse grains) is a smaller component which has greatly strengthened in the past twelve months, since last summer's domestic grain harvest. Although this production was larger, shortages were experienced, boosting imports up to this summer, after which there is an expectation that ample supplies will cause imports to fall back again.

WEAKENING MINOR BULKS

Many other commodities are also prominent among China's dry bulk imports. Among these, bauxite and the processed form alumina, and nickel ore have become the largest, accompanied by manganese ore, steel products, wood pulp and others. Both bauxite/alumina and nickel ore imports expanded to reach over 70mt last year.

Some of last year's increase, however, was the result of a short-term distortion. In advance of Indonesia's planned ban on unprocessed mineral exports, which began in January 2014, Chinese buyers greatly boosted bauxite and nickel ore imports. These enlarged stocks currently are being consumed, reversing the impact on purchases.

Richard Scott

CHINA'S DRY BULK IMPORTS (MILLION TONNES)

	Main bulk commodities					
	2010	2011	2012	2013	2014*	% change
Coal (incl lignite)	184.6	222.2	288.9	327.2	335.0	+2.3
Iron ore	619.1	687.0	745.5	820.3	910.0	+10.9
Soyabeans	54.8	52.6	58.4	63.4	67.0	+5.6
Steel products	17.2	16.8	13.6	14.4	14.0	-2.8
Bauxite/alumina	34.7	47.1	45.1	75.4	55.0	-37.1
Nickel ore	25.1	48.3	65.0	71.2	50.0	-39.8

source: China Customs, USDA, BSA * BSA forecast # 2014 compared with previous year

Waste not, want not?

if only...



Kunal Bose

It is yet another facet of the crisis of civilization, particularly manifest in developed economies like the US and the UK. But the evil practice of mindless wastage of food, when one in seven of the global population — that is, one billion people — goes to bed hungry every night is catching on fast with emerging nations like China and India. In some developing countries too, where urbanization is spreading rapidly, the food wastage culture is threatening to raise its ugly head. As purchase points of fruit, vegetables and other food items for the growing ranks of the middle class in emerging nations shift from neighbourhood shops to supermarkets, extravagance in buying is becoming increasingly visible. This is very much in excess of actual food requirements of families.

The US, which rightly prides itself on so many things from breakthroughs in science to a pulsating democracy, invites scorn for allowing as much as 40% of its food go to the bin uneaten. This amounts to annual food wastage of \$165bn. But to get a fair idea of the opportunity cost of wastage of such gargantuan proportions, one has to consider that getting food from the farm to fork consumes 10% of the US energy budget, demands allocation of half the country's land and gobbles up as much as

80% of fresh water used annually. Uneaten food also accounts for the single largest portion of the US municipal solid waste that goes into landfills. Methane emissions by food rotting in landfills, therefore, remain a point of irritation for environmentalists.

Based on a recent compilation of figures by the Waste and Resources Action Programme from two studies involving nearly 3,000 households across the country, the UK does not show itself in any better light either. Britons are found to be throwing away annually around 7mt (million tonnes) of food, including 1mt of untouched items. In this is found confirmation of an earlier finding by Institutions of Mechanical Engineers that close to half the food bought from UK supermarkets ends up in the bin. Except for a small percentage of the population of developed countries aware of the dimensions of global hunger, and who believe that discipline in food buying and consumption at the micro level could make a change in the situation, the rest are given to mindless indulgences. Experts see in this behaviour a bizarre psychological disorder that people have come to believe that they have not provided properly for their families unless food is left on the plate or rots in the fridge.

If extravagance in buying in blithe disregard of global hunger is a curse of developed economies, India and several other countries will let go to waste astonishingly large quantities of food at every stage of the journey from the farm to the table. B.Thiagarajan, member of Indian Planning Commission committee on 'encouraging investments in supply chains' says deficits in technology inputs in farming, cold chain and logistics are causing huge annual losses of horticulture products running into millions of dollars. The Food and Agriculture Organization of the United Nations estimates that nearly 40% of India's fresh fruit and vegetables worth an estimated \$8.3bn will routinely perish before reaching consumers. What the FAO survey has not, however, taken into account is the growing family level (middle class upwards) wastage of food in Indian urban centres. It also has become an annual feature with India that a combination of unscientific storage and leaving foodgrains exposed to nature would lead to post-harvest rotting of over 16mt of foodgrains. The World Bank says the annually wasted foodgrains, worth at least Rs500bn, could feed one-third of the country's poor.

But India is not the only culprit among emerging and developing countries in allowing food going waste in a milieu of growing hunger. The FAO says 42% of fruit and vegetables and up to 20% of the grain produced in the Asia-Pacific region will never reach the consumer. India, however, starkly stands out because of sheer volume of its production of grain and horticulture and level of poverty. Favourable weather has raised India's horticulture production to 280.70mt in 2013/14 from the previous season's 268.84mt. From a report by the country's leading chamber of commerce Assocham, it will be deduced that rising production will call for celebration only when the country is equipped with sufficient on-farm processing facilities, cold storage capacity and a refrigerated transportation network. Thiagarajan says, India's requirement of cold storage space to keep fruit and vegetables fresh round the year and cosmetically appealing is conservatively estimated at over 60mt, while the



B. Thiagarajan.

available capacity of 30mt is unevenly distributed among 30 states and seven union territories.

Production of most fruit and vegetables is seasonal but the demand remains more or less even round the year. This combines with the fact that horticulture products degenerate quickly unless "these are scientifically harvested and kept refrigerated till their arrival at the table are problems crying for solution," says Thiagarajan. Reacting to various estimates of spoilage of horticulture products in India — like 40% by the FAO and 30% by government officials — he says what is "missing is any authentic estimation of loss. Whether it is here or in any other major horticulture producing country, it will be advisable to get comprehensive surveys of wastages done with assessors going to grassroots where different crops are grown and then cover the entire supply chain up to the table." Building an extensive network of cold chain and refrigerated transportation is an expensive proposition in which the initiative is to be taken principally by governments. It also falls on them to create the right condition for the private sector, including supermarkets to participate in cold chain network building. Indian political parties cutting across their ideological disposition are not, however, showing enthusiasm in allowing foreign direct investment by supermarket chains like Walmart and Tesco. What is not to be wished away is that such chains are not only supposed to offer better prices to growers of fruit and vegetables but also make these available to final consumers at lower rates.

It is common knowledge here that the food marketing system is so tilted in favour of aggregators and traders that prices of fruit and vegetables at the first point of sale as a proportion of final retail rates are in the range of 25% and 40%. Unfortunately, New Delhi so far has not found a way to reform the food trade system in a way that will benefit growers and final consumers at the same time. Hopefully, global supermarket groups will be able to clear Indian misgivings about their functioning, like no lobbying for getting policies tinkered in their favour. Going forward, they will have to appear convincing that their operation, involving creation of cold chain capacity will bring better rewards to farmers as it will make food prices attractive for consumers. At the same time, Thiagarajan believes that groups of progressive Indian farmers should be encouraged to form co-operatives, thereby creating conditions for them to pool resources to participate in the national campaign to build cold chain. As through co-operatives, they will elevate themselves to marketers, they stand to secure better prices for their produce from the trade and supermarkets. Indian farm sector contributing over 14% to gross domestic product is on the cusp of change.

Grain trades

Burgeoning grain and oilseed supplies weigh on feed prices in 2014



Loading grain using two spouts into the Federal Rideau (photo: Fednav).

Near ideal growing conditions in North America, Europe and Asia have boosted prospects for the 2014 global harvest, forecast at over 2.5bn/t, and potentially the highest output in history for corn, wheat and soybeans, pressuring prices across the grain and oilseed complex, easing food inflationary pressures, while boosting upward-trending stocks. The Food and Agricultural Organization (FAO) confirmed that global food prices fell to a six-month low in July, helped by steep falls in grain and oilseed prices.

RIISING DEMAND, LOWER PRICES ENCOURAGE GREATER FEED USE

Global wheat and coarse grain output is forecast at 1,984mt (million tonnes) in 2014, slightly below last year's record, but with coarse grain crops still in the ground upward revision, especially for US corn yields, is likely. Higher feed use of coarse grains is driving consumption forecast to rise to 1960mt in 2014/15. The combination of burgeoning grain supplies and much lower prices, with corn down by almost 30% since May, is

MAJOR FEEDSTUFFS — PRODUCTION, USE, FEED & STOCKS 2013–2014/15 (MT)

	Prod 13/14	Prod 14/15	Use 13/14	Use 14/15	Feed 13/14	Feed 14/15	Stock 13/14	Stock 14/15
Wheat	714	716	706	707	132	135	184	193
Coarse grain	1,274	1,268	1,236	1,253	738	753	207	222
Total Grain	1,988	1,984	1,942	1,960	870	888	391	415
Oilseed/Meals crush	504	522	416 *	427 *	270*	280 *	81	100

Source: IGC/USDA-Prod-mainly harvested Jul-Dec/Local Marketing years *Crush/Oilseed/Meals-Ex. Fishmeal

problematic for farmers considering planting decisions in the next few months, but is expected to improve profitability and expected to encourage greater uptake by feed, food and industry processors. Global supply of cereals is expected to outstrip demand, while stocks are expected to rise to 415mt by the end of 2014/15. Rising soybean output in the US is mainly responsible for the large increase in oilseed production forecast at a record 522mt; the steep fall in the price of soybeans to encourage greater uptake of oil-meals, expected to increase to 280mt-increases in a number of countries but mostly reflecting rising demand in China.

DEARTH OF WHEAT SUPPLIES IN EUROPE BUT PLENTY OF QUALITY ISSUES ESPECIALLY IN FRANCE

With the bulk of the large winter wheat crop in the Northern Hemisphere harvested rising estimates for Black Sea output, and good US spring wheat yield potential have combined to keep the pressure on prices as global grain exchanges hit multi-year lows at the end of July. USDA is forecasting global wheat output at 716mt, just surpassing last year's record. Smaller crops in the US 58mt, following a severe drought, and in Canada 28mt-where plantings were sharply reduced in response to low prices offset by significant increases in China 126mt and Russia. Ikar raised its forecast for the Russian wheat harvest to 59mt. The quality of the large EU harvest of 148mt has been undermined by wet weather rain hampered wheat harvesting in western Europe, which slowed field work and lowered crop quality, particularly in France, but also in Germany, Poland, Bulgaria, and Romania, raising the question of how much of the crop in France will be of sufficient milling quality to sell to overseas markets-reports suggest as much as 50% of the French wheat crop is expected to be of feed quality.

FARMERS' DILEMMA AS WEAKER PRICES WEIGHS ON PLANTING DECISIONS

In the coming months, planting decisions for Southern Hemisphere and Northern Hemisphere winter wheat will be made in the face of rising grain stocks, falling prices, negative margins and potential losses that will weigh heavily on farmers planting decisions, especially those with higher production costs. Planting of the Argentine wheat crop is 90% complete while some analysts expected additional hectares excess rains have saturated soils in the central and southeastern parts of Buenos Aires province, likely to cut final acreage in line with last year. Meanwhile, Europe's harvest woes and crop downgrades have helped support a strong rebound in Australia's high protein wheat prices, improving the cash premium over the CBOT

futures price by \$10/t. While analysts believe the current CBOT price is getting close to 'bottoming out' further falls would have many Australian growers thinking about what to plant next season as margins tighten when prices drop below \$220/t. Rabobank forecast that Australian grains and oilseeds are expected to outperform CBOT prices due to continued *El Niño* risk premiums and tight domestic stocks; Australia and New Zealand Bank forecast wheat price of \$300/t in the first half of next year, driven by stronger prices and a weaker Australian dollar.

WHEAT FEED USE FORECAST TO RISE TO 135MT

Larger quantities of wheat are expected to be fed to animals in 2014/15 especially in the EU up by 9mt to 57mt, due to much greater availability of feed wheat, following the downgrading of a sizeable proportion of the French milling wheat crop to feed status, with smaller gains in the CIS countries notably Russia and Ukraine.

SPECTRE OF INCREASING SUPPLIES PRESSURE PRICES AS RUSSIAN SALES LEAD THE MARKET

Wheat prices surged on speculation that the volatile geopolitical situation, between Russia and Ukraine could interrupt Black Sea export, which so far the flow of exports, have been unaffected. But the tense situation escalated through July and August. The EU and US imposed financial sanctions on Russia who in turn imposed a one-year ban on agricultural goods from the US, EU, Australia, Canada and Norway. The tensions in the region are unresolved, but have begun to wane as Russia pulled-back troops from the border with Ukraine. Overall, global wheat trade is expected to fall by 9mt to 151mt reflecting better domestic crops, less demand from North Africa, South America and a steep cut in Chinese imports. Reduced exports from the US, Canada, EU and Kazakhstan have been partially offset by larger sales from Russia and Ukraine expected to export 23mt and 9mt respectively and Australia 20mt; while Argentina's exports (depending on government policy) are expected to rise to over 6mt this year. Russia is typically the price leader, during the first part of the season, and this year's increased surplus is pressuring prices. Lower global prices also reflect ample supplies in other major exporting countries, a surplus of feed-quality wheat and weak corn prices.

QUALITY DOWNGRADES TO FRENCH WHEAT LIKELY TO RULE OUT NORTH AFRICAN MARKETS

Top-grade milling quotations were supported by reports of quality problems in Europe and the possibility that exports especially from France and possibly other European countries will be unable to meet Egypt's strict import specifications. Trade estimates indicate that only one-third of French wheat will show the Hagberg number of 225 seconds required by the country's

WORLD WHEAT PRODUCTION 2010-2014 (MT)

	2010/11	2011/12	2012/13	2013/14	2014/15
EU	137	138	134	143	148
E Europe	3	4	4	4	4
CIS Baltics	81	115	77	104	110
N & C America	87	83	92	98	87
S America	28	26	18	20	24
N East Asia	39	39	36	41	35
F East Asia	227	236	249	249	256
Africa	21	24	24	26	25
Oceanic	28	30	23	27	26
Total	651	696	658	714	716

Source: FAO, USDA, IGC trade-totals may not add due to rounding

WORLD WHEAT SUPPLY & DEMAND 2010-2014/15 (MT)

	2010/11	2011/12	2012/13	2013/14	2014/15
Production	651	696	658	714	716
Consumption	655	697	680	706	707
Trade	134	154	147	161	152
Stocks	198	197	176	184	193
Key exporters *	70	58	48	54	56

Sources: IGC, USDA-Production-mainly harvested Jul-Dec/Local marketing years/

*Argentina, Australia, Canada, US, EU, Kazakhstan, Russia, Ukraine, US



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usual export markets in North Africa, with perhaps half of the crop below the 180 seconds required for any milling uses. UK grain merchant Gleadell said that the revised specifications “would rule out North African milling markets,” and show “the magnitude of the problem faced by France this season.” The General Authority for Supply Commodities (GASC), the official grain buyer for Egypt, bought 175,000/t of Russian wheat (end-July) with prices c. \$247–249/t bringing the total since the start of the marketing season to 0.89mt of wheat (355,000/t Russian origin) at a cost of more than \$230m excluding freight. With Russian prices nudging higher, US wheat was the cheapest offer, but uncompetitive on freight. CBOT’s September contract closed at \$5.33/bu (\$196/t-13Aug); with UK Feed wheat November contract at new lows of £122 (\$204.50-12Aug).

RIISING FEED DEMAND TO ABSORB LARGE COARSE GRAIN SUPPLIES

Favourable growing conditions continue to support the outlook for abundant global supplies of coarse grains, boosted by a potentially huge US corn crop; larger global crops of corn and sorghum partially offset by a smaller barley crop. USDA’s provisional forecast for the global coarse grain harvest is 1,268mt (Corn 985mt, Barley 136mt, sorghum 64mt); strong demand for feed, is driving consumption, expected to grow by 17mt to 1,253mt (Feed use up by 15mt to 753mt, Food/Industry up by 2mt to 500mt), allowing further rebuilding of global stocks expected to rise to a fifteen-year high of 222mt. Global trade is expected to fall by 6mt to 148mt, mainly reflecting smaller imports into the EU, China, Egypt, Indonesia and South Korea.

FURTHER UPWARD REVISION TO US CORN YIELDS EXPECTED

In recent years the high prices of corn stimulated production not only in the US, but also in the EU, Argentina, Brazil, China, Ukraine and Serbia. This year with corn yields well-above average in the US the crop is on track for a record c.356–380mt crop, and with better crops forecast for, China 222mt, the EU 67mt with a smaller crop in the Ukraine 27mt, are expected to lift global corn output to a record 985mt. USDA recently revised the estimate for US corn yields upwards to 167.4bu/acre, while some market analysts expect US corn yields to be well-over 170/bu/acre, which would imply an even larger crop. Both USDA and the International Grains Council (IGC) forecast a larger crop in China 222mt, and for its substantial corn stockpile to increase to 80mt, by the end of 2014/15; separately, Shanghai JC Intelligence Co, reported China’s corn crop being subject to drought, in the North China Plain, the country’s second-biggest producing region, with lower output in other provinces including Henan, Hebei, Shandong, Shanxi, Shaanxi and Inner Mongolia, fuelling rallies in grains traded on the Dalian Commodity Exchange–Corn September Futures Contract 2,517 yuan/t (\$409/t-Aug 13). Rising domestic corn prices in China, by contrast to the steep fall in international prices of corn, and the competitive price of corn relative to other grains, are expected to prompt animal-feed producers to use other feed ingredients that may frustrate the government’s efforts to curb cheaper imports.

With Brazil and Argentine corn crops, yet to be planted, output is forecast at 74mt and 26mt respectively, but farmers planting decisions likely to be affected by the significant fall in corn prices, and may switch to soybeans. Large corn supplies and much lower prices, are expected to increase corn demand for livestock feed by 18mt to 969mt mainly in China, South America, EU, US and CIS, the major producing countries, while

COARSE GRAIN SUPPLY & DEMAND 2010–2014/15 (MT)

	2010/11	2011/12	2012/13	2013/14	2014/15
Production	1,100	1,157	1,137	1,274	1,268
Consumption	1,130	1,156	1,136	1,236	1,253
Trade	116	133	132	154	148
Stocks	168	169	169	207	222
Key Exporters*	51	41	43	60	76

Source: IGC/USDA * Argentina, Brazil, Ukraine, US

food/industrial use is expected to fall by 1mt to 374mt (food 245mt, fuel 132mt).

EPA EXPECTED TO INCREASE THE RFS’S ETHANOL REQUIREMENTS FOR 2014

The EPA’s final rulemaking for the Renewable Fuels Standards (RFS) is not expected to have much impact on domestic ethanol consumption during the year ahead, other than a possible small increase in consumption of E15 and E85. Domestic ethanol production is forecast at 14.1bn gallons in 2013/14 (ending 31 August), and is expected to be maintained or slightly above that level in 2014/15 marketing year, pointing to corn consumption of 131mt-132mt. Upbeat comments from companies like Valero, Bunge and ADM confirm they remain optimistic on ethanol prospects helped by weak corn prices, rising crude oil prices and stable exports, which have allowed ethanol facilities to maintain sizeable production levels and good margins, Mr Juan Luciano ADM President said ADM achieved great margins and volumes so far and expects “sustained margins for the rest of the year”.

ROBUST DEMAND FOR US ETHANOL INCREASES SUPPLY OF DDGS

US ethanol production is expected to rise to 14.3bn gallons this year, and aside from the 13.5bn gallons or so expected to be used domestically, the balance will be available for export opportunities; this year US ethanol exports will be helped by reduced competition from Brazil, and estimated to increase to 850m–1bn gallons. Separately Macquarie highlighted stronger-than-expected growth in Brazilian ethanol consumption and uncharacteristically much weaker exports in 2014/15. With an increase in corn use production of Distillers Dried Grains and Solubles (DDGS) for feed use is expected to increase to over 40mt.

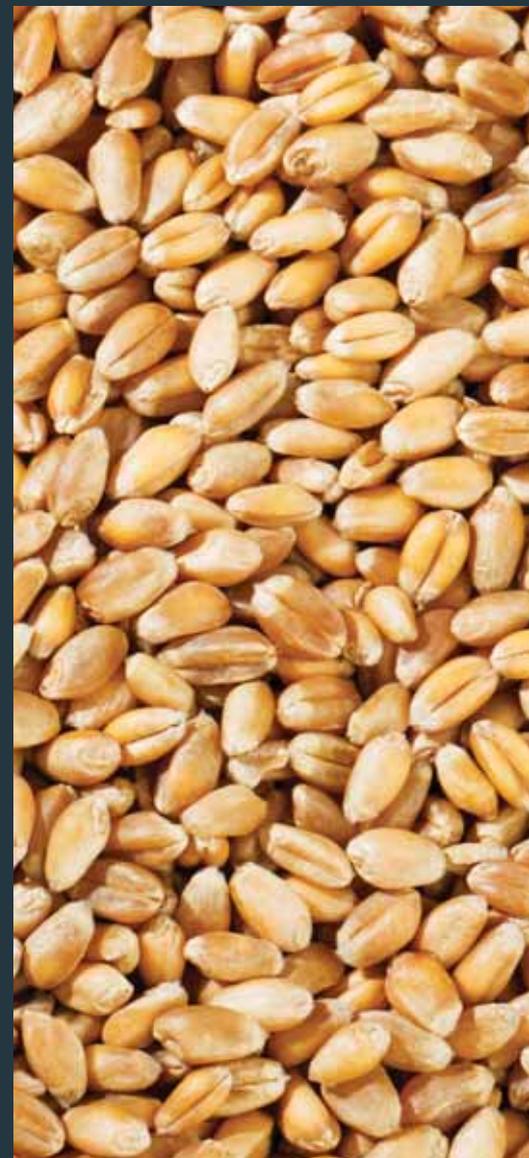
Last year US DDGS exports were close to 10mt, China and Mexico were top destinations for DDGS amongst several other importing countries; but China suspended imports of US DDGS amid concerns about contamination with MIR 162, a Syngenta corn variety cleared in Washington but not in Beijing, which has locked Chinese buyers out of the US market for DDGS–China’s trade accounting for 4–5mt almost half the total US exports, represents a significant loss, to Chinese feed producers and to ethanol producers as falling DDGS prices may become an anchor on ethanol producer returns–further sales of DDGS into the domestic market may already be at the limit in feed rations while any further tonnage would directly compete with huge supplies of domestic corn. US FOB (free on board) Gulf prices of DDGS have fallen since January from over \$300/t to \$181/t (8 Aug).

INTERNATIONAL MEAT PRICES BUCK THE TREND REMAINING AT HIGH LEVELS

By contrast to falling grain prices, meat prices — one of the

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components of the FAO's Food Price Index — rose for the fifth consecutive month; international prices of meat have remained at high levels during the last three years, although the price situation varies among the different types of meat. Global meat production is anticipated to grow by 1% in 2014 to almost 312mt (beef 68mt, pig meat 116mt, poultry 109mt) mainly concentrated in the centres (developing countries) of rising demand. Beef output is largely unchanged, while falling feed prices have helped to lower prices especially for poultry and pigmeat, both of which are expected to expand in 2014 — pigmeat output to grow by 1.1% to a record level of 115.5mt in 2014 — Asia is the leading pig meat producing region, accounting for more than half of the total. Strong consumer demand and government support policies are anticipated to boost China's output by 1.6% to almost 56mt, representing 48% of world output. After limited growth last year, global poultry production is anticipated to rise by 1.6% to 109mt in 2014. Large increases in the Russian Federation and India, with gains noted in the US, EU, Brazil and Mexico. In China, currently the second largest producer, the industry continues to suffer from the after-effects of outbreaks of H7N9 avian influenza—production is expected to fall by 1.7% in 2014; weaker Chinese demand continues to encourage consumers to substitute red meat and fish for poultry, resulting in financial loss for the industry.

RUSSIA'S ONE-YEAR BAN TO AFFECT TRADE IN LIVESTOCK PRODUCTS

While global meat trade is forecast to increase by 1.4% to reach over 31mt in 2014 mainly due to more beef and poultry meat—poultry remains the main product traded, representing 43% of the total, followed by beef, pig and sheep meat. The recent one-year retaliatory ban imposed by Russia (6 Aug) on agricultural products from the US, EU, Australia, Canada and Norway includes—beef, pork, poultry, fish and seafood products, fruits and nuts, vegetables, some sausages most prepared foods, milk, and dairy. With countries assessing the implications, FAO, confirm the ban will increase prices for Russian consumers, but will also affect exporting countries by increasing stocks and depressing prices. Aside from the Russian ban, US sales of pig meat are projected to fall, partly as a result of Porcine Epidemic Diarrhoea (PED) limiting production; while the EU is facing a separate ban from January on pig meat exports to the Russian Federation, its main market, following reports of four cases of African Swine Fever (ASF) occurring in Lithuania and Poland.

HUGE CORN SUPPLIES WEIGH ON PRICES

With corn prices pressured to their lowest levels in nearly four years in major exporting countries like the US, shipments from a delayed corn harvest in Argentina were expected to coincide with shipments from Brazil's near-record second crop intensifying competition with US and Ukrainian new-crop supplies. But recent chatter that Argentina was limiting corn exports or rejecting export licences until the value of the peso is more certain has had little effect, given the market is well-supplied with US or Black Sea feed grains; the corn market is still trending lower in futures and spreads. Since May 2014, corn futures fell by over 26% — CBOT December Corn contract closed up at \$3.70/bu (\$145.66/t — 13 Aug), as buyers from Mexico, South Korea, Japan, Central America, as well as US domestic corn processors watch the US market for signs that global prices have 'bottomed', and are unlikely to fall further, before securing supplies. Japan is forecast to import over 16mt of corn this season with feed data confirming that the use of

corn in animal feed production rose in preference to other grains such as sorghum, wheat and barley. Despite lower prices, global corn exports are expected to fall by 2mt to 117mt in 2014/15 down 6mt from last year, while stocks are forecast to rise to a fifteen-year-high of 188mt by the end of 2014/15.

ANALYSTS CUT FORECASTS FOR CORN PRICES BUT ACREAGE REMAINS HIGH

Goldman Sachs, cut their price forecast for corn to \$4.25/bu, while Rabobank cut its forecast to \$3.50/bu for the Oct-Dec period on the basis of a record turnout for corn. Since July, speculators turned bearish on the outlook for corn, for the first time since 2010, as bets on corn's decline rose. But, despite lower returns to growers, which for some are said to be below the cost of production, North American manufacturer and distributor of agricultural fertilizers, CF industries, "projects that 92m/acre of corn will be planted in 2014—lower than last year but still historically high" and above the 90m/acre USDA has forecast in their long-term projections. Corn futures gained after USDA's production and yield forecasts failed to meet analyst expectations Chicago Corn futures for December lot stood at \$3.70/bu (\$145.66/t — 13 Aug).

FEED USE TO FALL ON LOWER BARLEY CROP

Smaller harvest is expected in a number of barley producing areas EU 55mt, Canada, Argentina, Australia with output forecast at 137mt down by 5mt from last year. Feed use is forecast to fall by 6mt to 91mt, with global trade similar at 20mt; Middle Eastern and North African countries responsible for the bulk of imports especially Saudi Arabia forecast to import 7.5mt this year; Iran to double imports to 1mt and China's imports expected to fall to 3mt. Like other feed grains, barley values have fallen dramatically—Quotes for French barley FOB Rouen (\$203/t — 12 Aug); UK Feed Barley Merchant Nov £101–111/t (\$170–187/t — 7 Aug).

MAJOR OILSEED SUPPLY & DEMAND 2010–2014 (MT)

	2010/11	2011/12	2012/13	2013/14	2014/15
Production	461	446	475	504	522
Soybeans	264	240	268	284	305
Crush	378	395	397	416	427
Consumption*	247	258	260	271	280
Trade seeds	104	112	113	127	128
Trade meals*	74	77	73	79	81
Stocks	84	65	67	82	100
Key exporters	54	36	45	53	71
soya*					

Source: USDA/*excludes fishmeal—totals may not add up due to rounding

*Argentina, Brazil, US

SMALL INCREASE IN JAPAN'S IMPORTS TO 1.5MT

Increase in the planted area for sorghum, and better crops in the US 10mt, India 6mt, Argentina 5mt, Sudan 4mt and Australia 2mt, to boost global output to 64mt. Rising feed/food/industry demand, notably in Sudan, China, US, Japan, and Australia to increase consumption to over 63mt, with global trade expected to increase 7.7mt reflecting larger imports to Japan up by 500,000/t to 1.5mt and Mexico up by 100,000/t increased demand for imported feedstuffs—US sorghum — September delivery FOB Nola \$219.87/t (8 Aug).

HUGE SUPPLIES, LOWER PRICES, SUPPORT RECOVERING CRUSHING MARGINS

With a much larger US soy crop forecast at 113mt, by far the biggest in history, while preliminary estimates for Brazil and Argentina soy crops — still to be planted — are forecast at 95mt and 57mt respectively, suggests a record output for soybeans as well as better crops for groundnut 40mt and palm kernel 17mt expected to offset smaller crops of rapeseed 70mt, sunflower seed 41mt, cottonseed 44mt and Copra 6mt, lifting potential oilseed production by 9% to a record 522mt in 2014/15.

With an improving outlook for global oilseed supplies, lower prices and higher seasonal demand in the second half of the year, should further improve crush margins, according to Kuok Khoon Hong, Wilmar chairman and chief executive. Global oilseed crush is expected to rise by 11mt to 427mt, mainly driven by soybeans, the rise in crushings led by China and Argentina and also a number of other countries including, US, Brazil, Indonesia and Russia.

LARGER SOY IMPORTS EXPECTED IN 2014/15 AS LIVESTOCK PROFITABILITY IMPROVES

Oilseed trade is expected to rise by 1mt to 128mt, mostly due to increased imports of soybeans into China. And while USDA forecast Chinese imports of soya to rise to 73mt with domestic crush at 73.5mt in 2014/15, Shandong Sunrise Grain and Oil Trading, a large Chinese importer of the oilseed, forecast imports at 78mt, due to a sharp fall in the price of soybeans better livestock profitability and rising demand for feed. The improving situation with processing margins boosted by recovering profitability among Chinese livestock producers and

bolstered by timely arrival of imports.

RIISING DEMAND FOR PROTEIN MEALS

Ample global supplies of oilseeds in 2014/15 are anticipated to ease international prices for oilseed and oilseed products, while replenishing stock levels in major exporting countries especially the US. Trade in oilseed meals is strong, the heightened pace sparked by falling prices has continued into 2014/15 with early season sales running more than three times above historic norms attributed to a growing availability of exportable supplies of meal. Global consumption of protein meals is forecast at 280mt, due to rising demand in China and in other Asian countries, Europe, US and Brazil.

STRONG RECOVERY IN CHINA'S PORK PRICES

Rabobank forecast a "strong" recovery in prices of pork, China's staple meat, from later in the July-to-Sept quarter, lifted by seasonal demand at a time when herd numbers are low. China's pig herd, by far the world's biggest, was 4.4% lower in May than a year before, with sow inventories down 7.5%, indicating weak potential for rebuilding the herd. With prospects for China's pork producers "turning positive" after a very difficult first half of 2014, the bank said. China's, effective, ban on imports of US DDGS, adds extra support to margins. DDGS a by-product of corn ethanol manufacture offers an alternative to soymeal as a high protein feed ingredient. But the reduction in 4–5mt of DDGS is expected to benefit soymeal demand, the increased volume positive for crushing margins. Chicago Soybean futures closed at \$10.62/bu (\$390.21/t — 13 Aug), US export bids, FOB Gulf, in July averaged \$496/t — 11 Aug.



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India needs to raise farm productivity to meet domestic demand

Addressing the annual gathering of scientists of Indian Council of Agricultural Research, prime minister Narendra Modi bemoaned the growing supply demand gap in oilseeds and pulses, writes Kunal Bose. Annual imports of over 11mt (million tonnes) of edible oils, mostly palm oil from Malaysia and Indonesia are putting considerable pressure on India's balance of payments. Yet another point of concern for New Delhi is import requirement of around 3.5mt of pulses a year. The challenge for India, as Modi spelt it out, was to raise farm productivity sufficiently "when land is shrinking [a fall out of growing urbanization] and the population is rising" so that "in a few years" the country would be able to do without importing edible oils and pulses. His prescription for reaching that goal is by a skilful blend of "scientific intervention and traditional knowledge."

The fact, however, remains that governments in the past too were no less concerned about the cost of mounting imports of edible oils even when *per capita* consumption of oils was considerably below the world average raising concern about the nutrition level of common man. For example, the technology mission on oilseeds was first launched in 1986 with the objective of raising productivity principally by three ways. First, make available inputs and crop, region and climate specific technology packages to farmers. Second, produce sufficient quantities of breeder, foundation and certified seeds of different oilseeds crops. Third, help modernize oilseeds crushing and processing technologies to improve the quality and safety of oils.

No doubt, the mission, whose scope has been expanded from time to time, has yielded some modest results both in terms of productivity improvement and getting more land under various oilseeds, particularly soybean. Even then, the Indian oilseeds industry, points out sector specialist Govindbhai G. Patel, has got a lot of catching up to do. Indian productivity of groundnut is 64% of world average, 43% for soyabean, 53% for mustard, 39% for sunflower and 72% for sesame. Leading purveyor of the Indian farm scene Om Prakash Dhanuka says "the country already the world's largest importer of edible oils to bridge the gap between domestic supply and requirements of a population of over 1.2bn and growing at a rate of 1.2 to 1.3% is likely to remain so for many years. Major technology breakthroughs allowing oilseeds productivity to take major leaps could, however, somewhat change the outlook for the better."

Edible oil imports could not but be a major point of concern since these are up from less than 1mt till 1994-95 to an estimated 11.10mt during the season to end in October 2014. Patel says in a "normal scenario," Indian demand for edible oils will be 25.7mt in 2020/21, which will be met by domestic supply of 9.4mt and imports of 16.3mt. Indian Food ministry more or less agrees with Patel's projections. India remains a story of growing dependence on imports to take care of its requirements of oils. The dependence has risen from 44% in 2001-02 to 60% in 2013-14.

"What must not be lost sight of is that Indian imports surge is happening at a modest *per capita* oils consumption level of just over 14kg. The world average *per capita* use is 26kg, while in the US, it is close to 40kg. If 2001-02 is taken as the base year when Indian per capita use was 9.40 kg, the consumption rate is growing on the back of rapidly growing ranks of middle class which indulges out of home food consumption," says Dhanuka. The rapid blossoming of fast food industry in India will be booster for vegetable oils use. According to research firm Crisil, the country's quick service restaurant business a synonym for

fast food will double in three years from Rs34bn (\$550m) in 2012-13 to around Rs70bn in 2015-16. From McDonald to KFC and from Pizza Express to Pizza Hut, every global fast food major is rapidly opening outlets here going from tier one to tier two and three cities.

Indian demographics — over 60% of the population is below 30 years of age and number of households with annual earnings of over \$5,000 will spike from 81m in 2013 to 172m in 2017 — should lead to faster demand growth of edible oils than in the past. Like in developed economies, emerging countries like China and India have started experiencing faster rates of edible oils consumption growth in out of house sector than in households. Quoting from a research study, Patel says 80% of urban Indians eat out seven times a month, up from three times in 2003. Interestingly, *per capita* use of oils varies from a high of 22.4kg in Gujarat, the more developed among Indian states to 11.9kg in low income states like Bihar and Assam. One revealing set of statistics provided by Patel says between 2008-09 and 2013-14, Indian domestic production of oils rose by 0.93mt from 6.34mt to 7.27mt (14.7%), consumption by 4.22mt from 14.06mt to 18.28mt (30%) and imports by 2.92mt from 8.18mt to 11.10mt (36%). During this period, India's imports of palm oil were up from 6.54mt to 7.78mt. In the Indian import basket, the share of palm oil in a year will range from 70% to 80%. The last few years are, however, marked by growing imports of soya oil and sunflower oil — 1.74mt and 1.43mt, respectively in 2013-14.

The size of oilseeds production in two phases during summer-monsoon and winter of a season has an important bearing on the size of Indian imports of edible oils, says Dhanuka. Because of the poor start of the monsoon and continuing deficit in rains across parts of the country where summer-monsoon oilseeds are grown, production outlook does not look encouraging. The land coverage for major oilseeds till July end, according to official figures, was down nearly 19% to 13.7m hectares from last year's 16.9m hectares. Soyabean coverage shrank by 18.47% to 9.539 hectares and groundnut by 23.01% to 2.837 hectares. But there still remains scope for recovery if, by mid-August, north and western parts of the country receive adequate rains.

In the meantime, differential export duty pursued by Malaysia and Indonesia, which encourages export of refined, bleached, deodorized (RBD) palmolein at the cost of crude palm oil has become a major point of concern for palm oil refining industry in India. As imports of + RBD olein rose from 1.24mt in 2008-09 to 2.22mt in 2012-13, refinery capacity use in India is down to 37% on the basis of 300 working days. Indonesia is charging an export duty of 12% on crude palm oil, while it is 5% for RBD olein and nil if exported in packed form. Malaysia, the biggest source of import for India, allows duty free export of RBD olein, while it charges a duty of 5% on crude palm oil export.

This is yet another example of resource nationalism in practice which wants maximum local value addition to raw materials, in this instance palm oil. Seeing the extra money to be earned by importing RBD olein, merchants in India are increasingly shying away from imports of crude palm oil. Indian government could still provide relief to refineries by recalibrating customs duty in a way as to incentivize imports of crude palm oil. The target should be to create an import environment that will lift refinery capacity use to breakeven level of 55%.

Brazil is moving fast up the world league table of maize producers and exporters

In the past 30 years Brazil has emerged as one of the world's leading producers and exporters of soya beans and meal, with output increasing by up to 8% a year, writes Patrick Knight.

Now maize looks like it will follow the same pattern.

More maize is now planted each year in Mato Grosso and other states of the centre west immediately after the soya planted in the spring, is harvested.

In the past few years this 'winter' crop has become larger than what used to be the main, 'summer' maize crop.

Two or three million tonnes additional soya beans are now grown each year in Brazil, most planted in the centre west or north east of Brazil and most destined for export.

In some recent years, Brazil has exported more soya beans and meal than the United States.

Because of fast growth in demand for soya from China, which has long since ceased to be self-sufficient in the oilseed, two thirds of the 45mt (million tonnes) or so of the beans now exported by Brazil each year goes to China, which now buys ten times as much soya as it did a decade ago.

Until now, China has obtained up to 90% of the maize it imports from the United States.

But following the collapse of the US maize crop last year, many countries, including China, were forced to look elsewhere for supplies.

Fortuitously, Brazil's maize crop was extremely large in 2013, although only a few hundred tonnes of the record 26mt which were exported went to China, much of the rest going to other countries in Asia.

Brazil has now been given the official go-ahead to export more maize to China, although it is not clear whether genetically modified maize, which forms most of what is planted in Brazil, will be admitted.

If Brazil's exports of soya beans have been growing steadily for 30 years, maize was first exported in a big way only five years ago. Before that, Brazil often imported maize, most coming from neighbouring Argentina.

Maize exports have increased fourfold in the past five years, to exceed 20mt in three of the past four years and peaking at 26mt in 2013.

Winter maize has long been planted in Parana state in the south of the country. But only in the past decade have large areas been planted as a winter crop in Mato Grosso and other states in the centre west.

Farmers in these states now rush to get maize into the ground immediately after early soya has been harvested, as the weather often becomes either too dry, or frosts can damage plants, if sowing is delayed.

So far, only about half of the six million hectares planted to soya in Mato Grosso state, Brazil's leading soya producer, is also planted to maize in the winter, much more could be, if the demand were there.

Millions of tonnes more soya and maize will be needed by China each year from now on, much of it to be grown in Mato Grosso, one of the few states where large tracts of unused land still remain.

Maize is a far more bulky than soya, so while one truck can take up to 60 tonnes of soya to a port, it takes about 30% less maize.

A tonne of soya beans sells for about \$500, but a tonne of maize fetches only about half that, although it costs about \$150 to get a tonne of either grain to a port.



For the time being, exporting maize is far less profitable than soya. But because most of the farmers who plant maize as a winter crop, usually make large profits from the soya they grow in the summer, and with the same machines being used to plant and harvest both crops, fixed costs and overheads are reduced.

Improving Brazil's logistics has become more of a priority, with rivers being opened up, and new barge trains, terminals and storage built, while new stretches of rail track are opened to traffic. Both maize and soya, will soon benefit from lower transport costs, which are now far higher than in competitors the United States and Argentina.

The year 2013 was a big test for Brazilian maize, because the severe drought in the US, usually the world's leading supplier of the grain, meant the US had much less to sell.

Many important maize importing countries were forced to turn to Brazil as an alternative source of the grain for the first time last year.

Half a dozen countries in Asia, led by Japan, but also including South Korea, Indonesia, Malaysia, Taiwan and Vietnam bought large quantities of Brazilian maize in 2013, as did numerous countries in the Middle East. These included Saudi Arabia, the United Arab Republics, Kuwait, Algeria, Morocco, Egypt and Iran, already a leading importer of Brazilian soya. Several countries in Europe, notably the Netherlands, but also Italy and Ireland, all bought maize from Brazil in 2013.

Exporting maize was particularly profitable last year, not only because the shortage meant prices were high, but also because the Brazilian currency, the real, fell by about 18% against a basket of currencies during 2013.

The weaker real meant that Brazilian maize was more competitive than for many years, when the currency was overvalued, which prejudiced exporters.

Because of last year's bonanza, many farmers have been reluctant to export so fast as they did last year, while about 6mt less maize will be produced this year than last year's record crop.

Because the soya price has been very high, many farmers have preferred the oilseed to maize as a summer crop 2013/14.

For various complex financial reasons, largely the fact that the US economy has not grown as fast as had been anticipated in recent months, huge amounts of foreign capital has been flowing into Brazil this year. This has caused the currency to rise by 10% against the \$US dollar so far this year, which is eating into the competitiveness of Brazil's exports.

Many farmers hope that some problem with the climate will

PRODUCTION & EXPORT OF SOYA BEANS

Year	'000 tonnes	
	Production	Exports
2014	86,000	45,000 (est)
2013	81,593	43,000
2012	67,920	42,790
2011	75,248	32,986
2010	68,919	29,073
2009	57,383	28,560
2008	59,936	24,499
2007	58,726	23,734
2006	56,942	24,956
2005	53,053	22,435
2004	50,085	19,248
2003	51,875	19,926

damage US maize later in the year. But if the US maize crop is as large as is now expected, they may find themselves with an excess of unsold maize on their hands.

Brazil is the world's largest exporter of chicken, with almost 4mt exported each year, as well as being a major producer of pork. This means about 40mt of maize, as well as large quantities of soya meal is used in the country as animal feed.

Brazil's soya trade is very different from that in Argentina, again largely for financial reasons.

While Brazilian farmers and traders get no financial incentive for exporting soya meal rather than beans, the Argentine government gives a tax incentives to farmers to encourage them to export meal rather than beans.

As a result, Brazil crushes a far smaller proportion of its soya than its southern neighbour.

A total of 45% of the Brazilian crop is exported in unprocessed bean form, while only 8% of the smaller Argentine crop leaves unprocessed.

Although both countries produce about 28mt of feed, only 4% of the meal produced in Argentina is used locally, while just over half the meal produced in Brazil is used to feed the country's large chicken, pork and dairy industries.

While Argentina exported 27mt of meal in 2013, Brazil only exported 14mt last year.

Although Brazil is self-sufficient in most grains, the climate is only suitable for growing wheat in a small area of the country, so it is one of the world's leading importers of wheat. Half the

PRODUCTION, DOMESTIC CONSUMPTION & EXPORT OF SOYA MEAL

Year	Production	'000 tonnes	
		Domestic consumption	Exports
2014	37,000	14,500	14,000
2013	27,621	14,350	13,376
2012	27,767	14,051	13,333
2011	28,322	13,758	14,451
2010	26,998	12,944	13,849
2009	23,287	11,533	12,124
2008	24,502	11,930	12,699
2007	24,089	11,176	12,727
2006	21,696	9,987	12,275
2005	23,011	9,031	13,980
2004	22,065	8,228	14,113
2003	21,140	7,846	13,387



10mt consumed in Brazil each year, is imported.

In most years, most of this wheat comes from Argentina, and wheat from there pays less import duty than that from the United States, or other suppliers in Europe such as Ukraine. Because Argentine wheat production has been erratic in recent years, however, more has come from further afield.

Brazil is also a leading rice producer, and which 10–12mt are produced, grown on about four million hectares, the great majority in the state of Rio Grande do Sul.

Most of the rice is usually consumed in Brazil itself, and if any imports are needed, they come from Uruguay or Argentina. **DCi**

PRODUCTION & EXPORT OF MAIZE

Year	'000 tonnes	
	Production	Exports
2013/14	72.0	19.0 (est)
2012/13	81.5	26.0
2011/12	73.0	16.0
2010/11	57.4	9.3
2009/10	56.0	11.0
2008/09	53.0	7.3
2007/08	59.7	7.4
2006/07	51.4	10.9
2005/06	42.5	3.9
2004/05	35.0	1.1
2003/04	42.1	5.0
2002/03	47.4	3.6

EXPORT OF SOYA BEANS TO CHINA

Year	'000 tonnes
2013	32,351
2012	22,886
2011	21,231
2010	19,064
2009	15,940
2008	11,824
2007	9,800
2006	8,700
2005	6,500
2004	5,678
2003	6,101
2002	4,143
2001	3,192

Preparing for Ebola: keeping crews safe

Global maritime organizations have issued health guidance on the risks posed to ships' crews calling in countries affected by the Ebola virus.

Leading international ship supplier, Hutton's Group, is responding to requests for information and assistance from its maritime customers by highlighting the range of medical protective equipment available for use in pandemic situations.

Urgent guidance from the International Chamber of Shipping (ICS), International Maritime Employers' Council (IMEC), and the International Transport Workers' Federation (ITF) advises that on vessels in high risk areas:

- ❖ the Master should ensure crew are aware of Ebola risks, how the virus can be spread and how to reduce these risks;
- ❖ ISPS requirements on ensuring unauthorized personnel do not board vessels should be strictly enforced throughout the duration of port visit;
- ❖ Masters should give careful consideration to granting any shore leave while in impacted ports;
- ❖ shipowners and operators should avoid making crew changes in ports of an affected country; and
- ❖ after departure crew should be aware of Ebola symptoms and report any occurring symptoms immediately to the person in charge of medical care

John MacDonald, General Manager of Hutton's Medical, said: "Sensible precautions can be put into place immediately to

minimize risks to vessels transiting affected areas and we are able to provide a wide range of protective equipment as well as advise ship operators on what measures to take to prioritize the health of their crew."

Infection Containment Personal Protective Equipment kits, sometimes referred to as Pandemic Kits, are available for emergency use during pandemic outbreaks such as Ebola, SARS and Avian Influenza ('bird flu').

Hutton's Personal Protection Kit contains:

- 1 x CE Category 3, Types 4, 5 & 6 disposable coverall with integrated hood
 - 1 x FFP3 face mask
 - 1 x set of goggles
 - 1 x lightweight nitrile disinfectable examination gloves
 - 1 x pair overshoes
 - 1 x clinical waste disposal bag
 - 1 x pack of Trigene wipes
- Detailed illustrated instructions

In addition Hutton's offers a full range of personal protective products, including:

- ❖ hand sanitizers
- ❖ body fluid clean-up kits
- ❖ hard surface disinfectants



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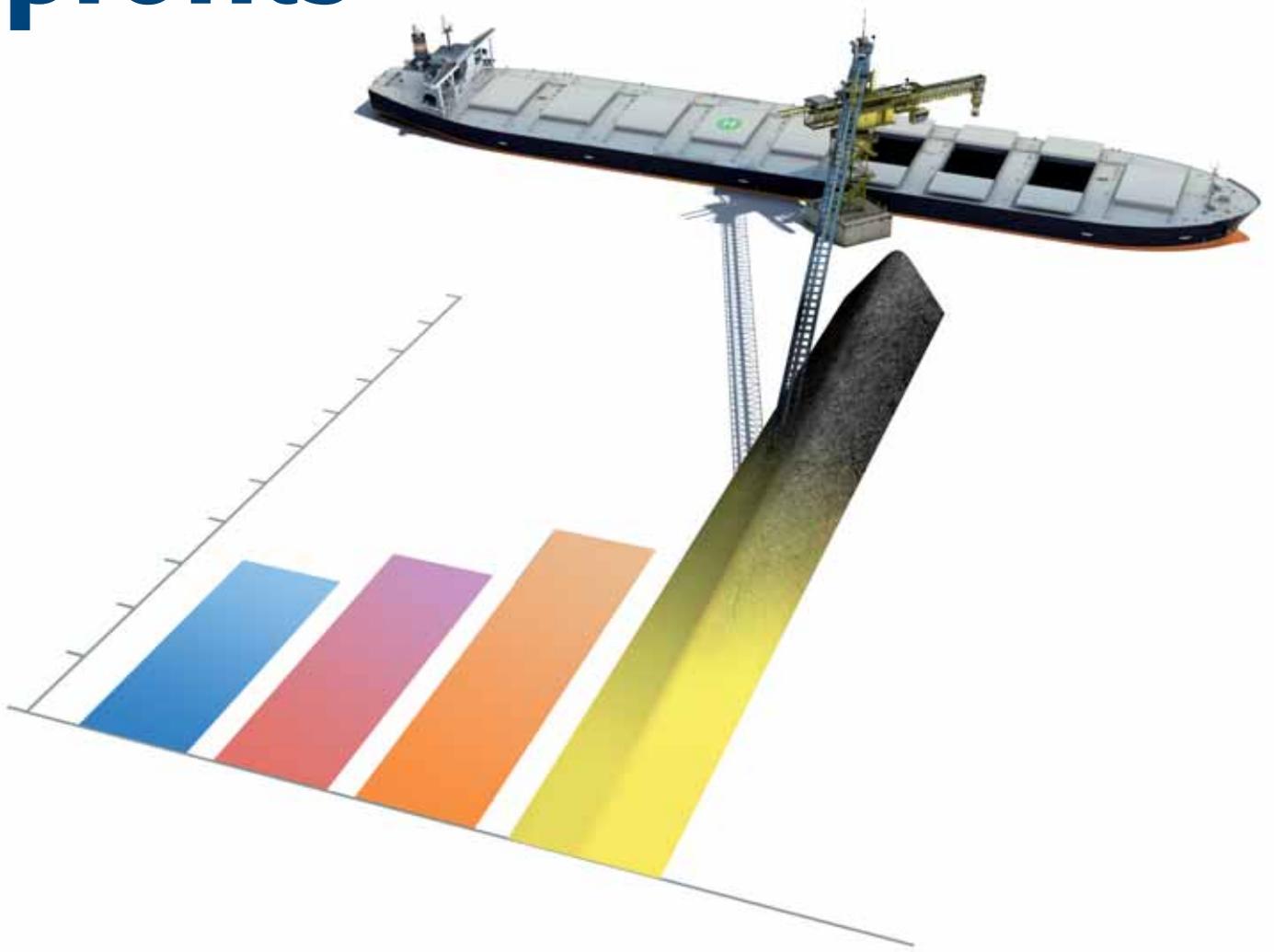
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Scrubber on 'Laura' receives class approval

On 17 July, Langh Ship received final class approval from Germanischer Lloyd for its exhaust gas cleaning system on the vessel *Laura*. "The technology had already been accepted earlier, but now the documentation is also finalized," says the clearly pleased Reino Verosaari, senior technical adviser. "In a way, this is like crossing the finish line."

Langh Ship is a shipping company that has developed its own closed loop scrubber. The system uses caustic soda to neutralize the SOx in the exhaust gas and cleans the process water so that it can be led to the sea. The residual is collected in such a dry form that the compact waste can be easily transported to the nearest waste treatment plant.

The scrubber was recently made available also to other shipping companies through DeltaLangh Ltd, a joint venture company owned by Deltamarin Ltd and Oy Langh Tech Ab, which is part of the Langh companies. Deltamarin provides engineering and consulting services for the shipping, shipbuilding, naval, marine and offshore industries worldwide.

"DeltaLangh has already begun installing similar exhaust gas cleaning systems on our other four vessels. The installations are expected to be fully operational on 1 January 2015, when the new regulation comes into force," says commercial manager Laura Langh-Lagerlöf, who herself has been actively involved in the development process.

Langh Ship is a Finnish family-owned company whose goal is to stay at the forefront of technological development in order to serve customers as effectively as possible. For us, high technology helps us bear our share of responsibility for the environment. Langh Ship's fleet comprises five multipurpose cargo vessels and the company has about 1,000 units of special containers mainly for steel carriage.



Langh's scrubber.



Langh Ship has received final class approval from Germanischer Lloyd for its exhaust gas cleaning system on the vessel Laura.

Improving efficiency through hull and propeller maintenance

Improving energy efficiency is among the primary concerns of bulk carrier fleet owners and operators today. Despite volatile fuel prices and the costs of compliance with pollution regulations, owners are able to take advantage of a number of measures that can help improve the efficiency of their vessel operations.



Performance of the ship's hull and propeller begins to deteriorate soon after the vessel leaves the shipyard and manifests itself in the form of increased resistance and loss of propulsion power. Owners are able to measure increases in resistance due to hull and propeller condition using a monitoring programme that also can drive decisions around in-service maintenance and dry-docking.

A planned hull maintenance schedule can be based on a variety of performance indicators, including information drawn from ship's particulars, engine shop test results, operational data and a list of major maintenance events including dry-docking and hull cleaning.

A full monitoring programme can monitor and report on:

- ❖ the effects of marine growth and roughness (resistance) caused by fouling, corrosion and coating defects;
- ❖ ship resistance as a function of ship type, main dimensions, anti-fouling paint, draught/trim and speed;
- ❖ propeller power and thrust as a function of diameter, number of blades, area ratio and pitch ratio; and
- ❖ wind and wave resistance as a function of wind speed and direction, and wave height and direction.

A performance indicator for a ship's propulsion efficiency can be derived from the additional power required to propel a vessel at a given reference speed in comparison to the newbuild sea trial situation, including information drawn from the vessel's noon report and automatic log.

The resistance increase (expressed as a percentage of the total resistance, design draft and speed) describes the changed condition of the hull and propeller and typically due to hull degradation, fouling and sliming.

In terms of mitigation, owners have an increasing range of options for cleaning critical hull and propeller components. These include:

- ❖ full or spot blast treatment of the ship's hull;
- ❖ upgrading/replacement of coatings systems; and
- ❖ propeller polishing.

Performance monitoring is necessary to improve the operational and technical efficiency of the vessel and is a prerequisite for condition-based maintenance of hull and propeller. To support clients in making their vessels as efficient as possible, ABS offers a hull and propeller monitoring service which provides a simple and robust method for continuous and consistent performance monitoring.

BETTER LIFECYCLE PERFORMANCE THROUGH RELIABILITY CENTRED MAINTENANCE

As a logical evolution from planned machinery maintenance routines, the application of reliability-centred maintenance (RCM) allows maintenance to be evaluated using a risk-based approach that provides the most value to an owner or operator.

RCM analysis allows an owner to optimize maintenance programs by first identifying functional failures within machinery

systems that have the highest risk and then determining the optimum maintenance tasks and strategies that mitigate such potential failures. In this way, maintenance programmes are created which focus on critical components and the proper maintenance strategies.

Bulk carrier operators already are adopting procedures that promote a life cycle integrity approach to vessel maintenance. By applying RCM principles, maintenance strategies also can be evaluated and applied in a rational and systematic manner.

ABS offers a variety of programs that provide a framework for maintaining the mechanical condition of the vessel and its machinery while leveraging the operator's program to support class maintenance towards approval for the ABS RCM program.

The ABS Guidance Notes on Reliability-Centered Maintenance provide the maintenance theory and philosophy of this approach, while the ABS Guide for Survey Based on Reliability-Centered Maintenance contains the RCM program requirements for obtaining a special RCM notation.

PREVENTATIVE MAINTENANCE

Planned maintenance and condition-based maintenance are two approaches utilized within the preventative maintenance program to assist owners with maintaining machinery on units. These techniques often are used concurrently. By applying either, or a combination of preventative maintenance approaches, credit can be earned towards the requirements of the continuous survey of machinery.

PLANNED MAINTENANCE

Planned maintenance involves setting formal schedules for maintenance and machinery overhaul. Running time or calendar time can be used to establish a schedule. Such schedules generally are established by the machinery manufacturer and include lubrication servicing, filters, bearing and seal replacements, as well as major overhauls.

CONDITION-BASED MAINTENANCE WITH CONDITION MONITORING

Using a condition-based maintenance program allows planned maintenance tasks to be dynamically driven based on the results obtained from condition monitoring routines. The use of condition monitoring techniques promotes cost-effective maintenance by reducing the number of breakdowns and extending operating periods. Maintenance is undertaken as a result of the knowledge of the condition of the equipment, not because a certain amount of time has elapsed since the last maintenance was carried out.

This results in better utilization of resources and the controlled replacement of wearing components. It also reduces the incidence of unplanned breakdown maintenance. Many maintenance procedures include condition monitoring — such as checking and recording of vibration levels, pressure, temperature, load current, running hours, lubricating oil analysis data and fuel consumption. Intelligent use of this equipment condition data delivers benefits such as eliminating the need to open up machinery, saving on human resources and expenditure on spare parts and reducing downtime and associated costs.



Safety at sea?



brighter prospects for today's mariners

The outlook for bulk carrier safety is finally brightening, writes Michael King.

In recent years it has been impossible to examine bulk carrier safety without spotlighting the tragic and frequent loss of life due to the liquefaction of cargoes such as iron ore fines and nickel ore. But now, at last, the convergence of reason and luck is offering cause for optimism.

On the one hand, regulators, insurers and bulk carrier owner representatives have been bolstering safety guidelines for dangerous cargoes. And, on the other, the danger posed by cargo liquefaction is receding due to changes in government policies in producer countries which are having the fortunate side-effect of reducing the volume of dangerous cargoes loaded. There are now early signs that the danger posed by liquefaction maybe lessening, although it is far too early to suggest it has entirely diminished and further mineral reform in exporting countries could rapidly alter the safety landscape for the worse.

To recap, five bulkers have been lost and 81 seafarers have perished since late 2010 after the vessels were loaded with nickel ore in Indonesia and set sail for China. The losses transformed this low-volume trade into the world's deadliest shipping lane, irrespective of ship type. Each of the losses on the trade was attributed to liquefaction of the cargo, a chemical process which effectively transforms minerals loaded with excessive moisture into sludge when subjected to the sort of vibrations that commonly occur at sea, and which can easily be prevented by following strict loading guidelines.

Indonesia is not the only liquefaction danger area. Numerous incidents of variable seriousness have occurred over the last decade after vessels loaded susceptible cargoes in India and the Philippines during the wet season. However, since the 49,675dwt Panama-flagged, Rina-classed, *Harita Bauxite* sank with the loss of 15 lives in February 2013 after loading nickel ore in Indonesia during heavy rain, there has been no loss of lives at sea linked to liquefaction.

Indeed, there seems some recent evidence that the bulk carrier sector is enjoying an upturn in its safety fortunes. Nine bulk carriers were lost in total during 2013 (see table) along with 25 lives — including those on the *Harita Bauxite*. But so far in 2014 the only bulk carrier loss recorded by Intercargo was the Panama-flagged *Rich Forest*, which lost propulsion 440 miles west of Guam earlier this year after flooding in the engine room. All the crew were saved.

The dangers of liquefaction have been recognized both at IMO, which has developed improved loading guidelines, as well as by insurers and responsible owners keen to avoid further losses. But the industry's safety record has also been given a boost by policy-makers acting in pursuit of other ends.

India, for example, has been limiting its iron ore exports, in part to feed its own steel industry but also to curb illegal mining. It also took steps to improve safety after a number of iron ore fines liquefaction incidents during the monsoon season culminated in the losses of the *Asian Forest* and the *Black Rose* in 2009.

Insurers have warned owners that any increase in India's iron ore fine exports should be treated as a serious cargo risk and all

INTERCARGO BULK CARRIER CASUALTY REPORT 2013

Name	IMO No.	Lives	Category I	Summary	Date	Flag
Harita Bauxite	8103664	15	Cargo	Liquefaction off Bolinao	17/2	Pan
Atlantik Confidence	9110341	0	Fire/explosion	Lat 19 36N/61.16E	30/3	Lib
Pirireis	7916727	10	Collision	With containership off Greece	29/4	Cook Is.
Rio Gold	8408521	0	Grounding	Drifted ashore, Myanmar	5/5	Malta
Fu Sheng Hai	9071703	0	Grounding	Busan	2/7	Pan
Kiani Satu	9149811	0	Grounding	South Africa. After losing propulsion.	8/8	Ant
Trans Summer	9615468	0	Cargo	Nickel Ore. Sank off Hong Kong in typhoon	14/8	HK
Smart	9137959	0	Grounding	South Africa. In rough seas	19/8	Pan
Achilleas	8308070	0	Fire/explosion	Off Western Sahara	2/12	Pan

Notes: This is the broad definition of the perceived underlying casualty reason using categories previously used in the Intercargo Benchmarking Report. This categorization may be amended in the light of any official casualty report from the Flag State, Coastal State or any other party submitting a report to the IMO GISIS database.

source: INTERCARGO

precautions taken, especially during heavy rains. However, Indian iron ore exports were down some 41% year-on-year in the quarter ended 30 June on the back of lower global spot prices and improving domestic prices, allied to ongoing bans in a number of states. As things stand, the danger of more casualties due to liquefaction of Indian iron ore fines remains low.

In Indonesia, meanwhile, succour has come from an export ban on a number of minerals including nickel ore, the major global cause of dry bulk carrier casualties in recent years due to its susceptibility to liquefaction and the fact that many of Indonesia's load ports are poorly run and located in remote locations where failures to follow cargo moisture testing regulations were common.

The ban on unprocessed mineral ore exports is designed to encourage miners to build smelters in Indonesia to boost economic growth and job creation rather than to improve bulk carrier ship safety, but exports of nickel ore have all but stopped. There have been suggestions that a new administration elected in July and led by President Joko Widodo — commonly known as Jokowi — could overturn the ban to boost Indonesia's balance of payments performance, a move that would once again turn Indonesia's island ore ports into places to fear for seafarers.

As *DCI* went to press, Jokowi had so far been non-committal on the export ban. However, it is worth noting that his popularity stems primarily from his common-sense approach to business and his status as an outsider — he is not part of Indonesia's traditional economic elites which have long-dominated both mining and political circles. The most recent evidence that the export ban is proving beneficial for economic policy could prove a blessing for maritime safety.

For example, after government back-downs during the tenure

of President Susilo Bambang Yudhoyono on a number of policies that impacted miners, a recent Morgan Stanley note hailed the export ban a major success because it had encouraged Chinese companies — the main consumers of Indonesia's mineral exports — to invest in downstream processing plants now they were convinced the ban would remain in place.

Indonesia's Investment Coordinating Board confirmed that since the ore export ban was enforced at least 50 planned smelter projects had been announced, investments worth US\$31.4 billion.

Xavier Jean, an analyst with ratings agency Standard & Poor's, said Indonesian policymakers' hard line stance on the export ban had forced all miners — even those not impacted by the ban — to reconsider their bargaining power with Indonesia's government. "Have the economic consequences in terms of employment, tax and royalty receipts and exports been worse than the government expected? I don't think so," he said.

Rajiv Biswas, Asia-Pacific Chief Economist at IHS, said that even though exporters of copper had reached agreements with government to allow some exports, this was not indicative of a change in policy on the overall export ban which would lead to a resumption of nickel ore exports.

"Freeport has come to a deal with the Indonesian government to resume copper concentrate exports and the first shipment to China was due to have been shipped on 6th August," he told *DCI*. "The deal agreed by Freeport is that it will pay a 7.5% export tax that will gradually decline as it begins spending on construction of a copper smelter.

BULK CARRIER CASUALTIES 1995–2013

	Average lives lost	Average ships lost
1995-2004	42	9.6
1996-2005	38	9.7
1997-2006	37	8.9
1998-2007	32	9.6
1999-2008	25	7.1
2000-2009	24	6.6
2001-2010	26	5.9
2002-2011	24	6.8
2003-2012	23	6.6
2004-2013	26	7.1

source: Intercargo

BULK CARRIER CASUALTIES 2004–2013
PERCEIVED REASONS

Perceived cause of loss	No of casualties	% of total
Cargo	8	12.12
Collision	10	15.15
Fire/Explosion	3	4.54
Flooding	8	12.12
Grounding	23	34.84
Propulsion engine and grounding	5	7.57
Propulsion steering and grounding	1	1.51
Structural	8	12.12
Sub total	66	100%
Unknown	5	—
Total	71	

source: Intercargo

OTHER BULK CARRIER INCIDENTS LEADING TO LOSS OF LIFE IN 2013 & 2012

Reported cause of loss	Lives lost in 2013	Lives lost in 2012	% of total
Cargo work	2	5	21.21
Crane operations	5	—	15.15
Entry into enclosed spaces	3	1	12.12
Fire/Explosion	1	—	3.03
Machinery, not otherwise specified	1	—	3.03
Person overboard	5	4	27.27
Slips, trips and falls	2	2	12.12
Winches, wires, ropes and capstans	3	—	9.09
Total	22	12	100

“Another big international copper mining company in Indonesia, Newmont, is still in discussions with the Indonesian government and had not yet restarted its copper concentrate exports as of early August.

“However, none of this alters the overall Indonesian mineral export ban policy and the Freeport deal is really an interim solution during a transition to downstream processing in Indonesia. Therefore it is likely that Jokowi will continue with the mineral export ban, which widens in scope in 2017.

“There is considerable domestic political pressure in Indonesia in favour of this policy to increase domestic downstream processing of minerals, including within his PDI-P party.”

All of which bodes well for bulk carrier safety.

Intercargo manager, David Jones, also sees additional cause for optimism, not least efforts his organization and others are

making to improve risk analysis of casualties and ensure investigation reports are more easily accessible.

Intercargo’s latest IMO Bulk Carrier Casualty Report was submitted to the IMO Sub-Committee on the Implementation of IMO Instruments which met in mid-July. It showed that over 2004–2013 the average number of bulkers and seafarers lost each year was 7.1 and 26, respectively, up from 6.6 vessels and 23 lives lost over 2003–2012.

However, Jones believes progress is being made despite the upturn. “Our paper to IMO suggests that 2013 marked a small upturn in the numbers of bulk carriers lost when compared with the longer term improvements recorded since the 1990s,” he told *DCI*. “This may be a statistical anomaly or it might mark an unfortunate turning point in ship safety which all parties — IMO, ship owners, insurers and industry associations etc — should discuss and work towards rectifying. We simply do not know at this stage ourselves whether this is start of a longer-term downturn.

“The good news is that 2014 accidents to date appear to have been low — just the one, and no loss of life.”

He said Intercargo sees its primary objective as improving bulk carrier safety and he insisted the IMO was providing an excellent platform for debate, helping improve the availability of casualty and quality data which could help reduce risk to vessels and seafarers.

“We perceive a supportable intention of working with Flag States and others to address the availability of information and underlying steps to be taken — post analysis and investigation — to improve the safety of shipping,” he added. “We feel that there are good reasons for analysing data from the perspective of individual types of ship as underlying causes may depend on specific reasons arising from the operational characteristics of that type of ship.”

One of the greatest criticisms of the maritime industry’s handling of liquefaction casualties and loss of life has been the



SUMMARY OF SAFETY ISSUES

	% bulk carrier casualties last decade	% bulk carrier incidents leading to loss of life 2012–2013	% PSC detainable deficiencies 3y average	%NPIs 5y average
Structural issues	12.12	—	4.64	4.98
Fire related issues	4.54	3.03	17.34	5.68
Safety of Navigation (collisions and grounding)	50	—	8.64	39.22
Propulsion issues	9.8	—	4.66	24.31

source: Intercargo

lack of transparency and urgency around making investigations into accidents publicly available, so that others may take steps to avoid the same fate. Jones said Intercargo had taken a number of initiatives to encourage Flag States to make this information available more speedily through the IMO's Global Integrated Shipping Information System. More work needs to be done, but Jones said Intercargo continues "to fully support the IMO GISIS database given its importance to relevant parties such as the UK-led Correspondence Group on casualty analysis".

He added: "A wider promulgation and sharing of experience will eventually mean that companies who are committed to quality and are working in accordance with the ISM Code can use the experience of previous casualties to reduce the risk to seafarers generally — this can only be a good thing."

To this end, Intercargo's latest IMO submission provides owners with plenty of data on the 'perceived' cause of casualties over 2004–13 (see table). This revealed that grounding was the most common perceived cause by some distance.

Jones said 'perceived causes' — rather than actual causes — was used to "stimulate debate without implying certainty of underlying causes in the expectation that any measures which the IMO itself wants to analyse can be done from a prioritization perspective".

He also said that Intercargo's analysis of 'Other bulk carrier incidents leading to loss of life in 2013 and 2012' had revealed some surprising information, most notably that crane operations

were 'perceived' to have accounted for the loss of five lives in 2013.

"Again, we think that responsible owners will want to view this data for possible use within their own risk assessment programmes," he said, adding that this is now an issue under discussion in the relevant IMO committee and was viewed as a high industry priority.

Detentions by Port State Control regimes have also been analysed by Intercargo based on deficiencies detected. "The data analysis over the last three years has been remarkably consistent," he said. "For example, fire related reasons account for about 17% of the detainable deficiencies and lifeboat related issues about 11%."

He also said that qualitative data analysis on negative performance indicators on bulk carriers over the last three years points out the perceived underlying causes for incidents remained statistically consistent when viewed over a fixed period. "For example, fire/explosions account for about 6% of all incidents and propulsion problems account for about 20% of the total of known incidents," said Jones.

"Our 'Summary of Safety Issues' contains a crude attempt to encourage debate on a possible correlation of casualties with IMO Conventions and their enforcement and the evidence of 'real world' statistical data relating to bulk carriers and their operations.

"Put at its crudest, we have found that about 5% of bulk carrier incidents could be linked to structural issues, whereas around 12% of actual losses could also be ascribed to this reason.

"We also note that nearly 40% of bulk carrier incidents are linked to collisions and groundings, whereas 50% of actual casualties are caused by this.

"Finally, we note that fires and explosions accounted for approximately 5% of the last ten years of bulk carrier casualties but over 17% of the enforcement reasons were for these reasons."

Speaking rhetorically, Jones asked if these findings meant more needs to be done to address bulk carrier structural issues and the safety of navigation, while less effort was needed on enforcement of fire-related issues through Port State Control?

He answered: "Well, no, not really, given that the techniques used to produce this report are statistically crude and we haven't proven any real correlation in a statistical sense. Nor have we addressed the reasons for cause and effect.

"But we nevertheless hope that the experiences of just one of the shipping sectors — bulk carriers — can stimulate a wider discussion in IMO leading to a consideration of the issues we have raised and in full support of IMO's existing efforts on safety and regulation generally."

Long may such admirable efforts continue.



TTS – global service solutions that set the standard

As sea transportation continues to be one of the most efficient methods of transporting goods around the globe, increasing focus on methods to improve vessel safety and equipment maintenance is becoming critically important. Maritime ‘incidents’ cost around \$1 million a day and whilst most don’t make the headlines, in many cases varying human failures and equipment issues have been reported as contributory factors.

The TTS Group ASA have built its reputation around the world for designing, supplying and servicing specialist onboard equipment and systems and is now one of the top three largest suppliers in its specialized market segments with a workforce of over 1,100 people. The Norwegian-headquartered group fully understands the importance of safety and maintenance and has been continually investing in its global Service network to enable customers swift support wherever and whenever they need it.

Tarjei Isaksen, VP, TTS Sales and Marketing, Services Division, explains how TTS has been developing its global reach to support customer needs.

“TTS is totally focused on increasing our customers’ profitability and competitiveness by improving productivity, quality and system capacity. And of course, the safe and efficient operation of any commercial vessel in operation is critical. Unforeseen problems can arise anywhere so we are continually increasing our global service network to ensure we are close by. Whilst TTS main services are centered around repairs, maintenance and spare parts supply, our portfolio now includes in-voyage repairs, training and technical support, modernization and refurbishment, inspections, surveys, certification and even remote access surveillance and diagnostics on some equipment”.

GLOBAL COVERAGE IMPROVES PRODUCTIVITY AND REDUCES DOWNTIME

Isaksen believes that TTS’s increasing global coverage is a key factor to helping clients reduce the costs of downtime. “We now have service stations along all the main shipping routes so we can respond quickly when a customer experiences a problem. TTS now has service operations located in Busan, Dalian, Shanghai, Haiphong, Singapore, Dubai, Pireus, Genova, Hamburg, Bremerhaven, Bremen, Gothenburg, Kristiansand, Bergen, Ft. Lauderdale and during 2014 offices in Houston and Rio have opened to services vessels in the Americas region. Of course, we can also have a service engineer dispatched to



anywhere in the world if there’s an emergency,” he added.

TTS’s commitment to worldwide customers is further evidenced by their investments in spare parts distribution. In addition to warehouses in Europe and China, a new distribution center has been established in Singapore, supplying vessels in the South East Asia region. As a result, fast moving and critical spares for cranes and winches, as an example, can be delivered quickly directly to the customer. A further spare parts distribution centre is planned for the US in the near future.

With SOLAS encouraging operators to think beyond minimum safety standards how does Isaksen see TTS responding? “Equipment inspections and certifications, to pre-determined schedules, are naturally an important factor in vessel safety and in this respect we provide our customers with a number of solutions. For example, our davit inspections are according to SOLAS NSC1206 and MSC1277. For hatch covers we offer ultrasonic weather tightness according to ICAS UR Z17 and for cranes and lifting appliances we provide testing and certification to ILO 152 standards.”

“We also offer a pre-drydocking inspection service and equipment reports, allowing customers to more effectively plan the service requirements in advance of the vessel going into dry-dock”.

BREMERHAVEN — CENTRE OF EXCELLENCE PROVIDING TTS WITH A UNIQUE ADVANTAGE

Not all service requirements are ‘off-the-shelf’ and some require a completely bespoke solution. That’s where TTS’s unique service station in Bremerhaven, Germany, really sets the standard. With their own mechanical, hydraulics and electrical workshop, high quality custom-made spares can be manufactured at very short notice. The Bremerhaven centre of excellence also manufactures rubber profiles and stainless steel structures, plus the specialist team provides expert boiler repair and maintenance services. TTS believe this provides a unique advantage, meaning a level of responsiveness that’s hard to equal in the industry, as Isaksen explains, “There’s no room for complacency in this industry. Whilst being competitive is a prerequisite for operators, safety and efficiency are exceptionally important factors in ensuring their expensive assets remain highly productive. We have built a global after sales service of highly qualified maintenance professionals that operate around the clock, wherever in the world. Our services have been developed through a deep understanding of the critical aspects of customers’ business operations and as such our brand has become widely trusted. Although TTS Services is primarily focused on servicing TTS equipment we are able to assist on other makes of equipment as well. Our specialists have extensive knowledge on cranes, hatch covers, winches, davits, RoRo equipment and sideloading systems,” he concluded.

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VIKING offers a choice of product packages and solutions – standard or tailor-made – that are certified to the latest requirements of IMO, SOLAS, the EU and USCG.

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KEEPING AHEAD OF THE COMPETITION

Fluctuating world trade volumes, an excess of shipping capacity, competitive freight rates, piracy, and increasingly complex international and flag state regulations have become everyday realities for the shipping industry. Cost savings and predictability are more important than ever — and shipowners need to proceed with care to avoid being locked into an inflexible solution in a changing market.

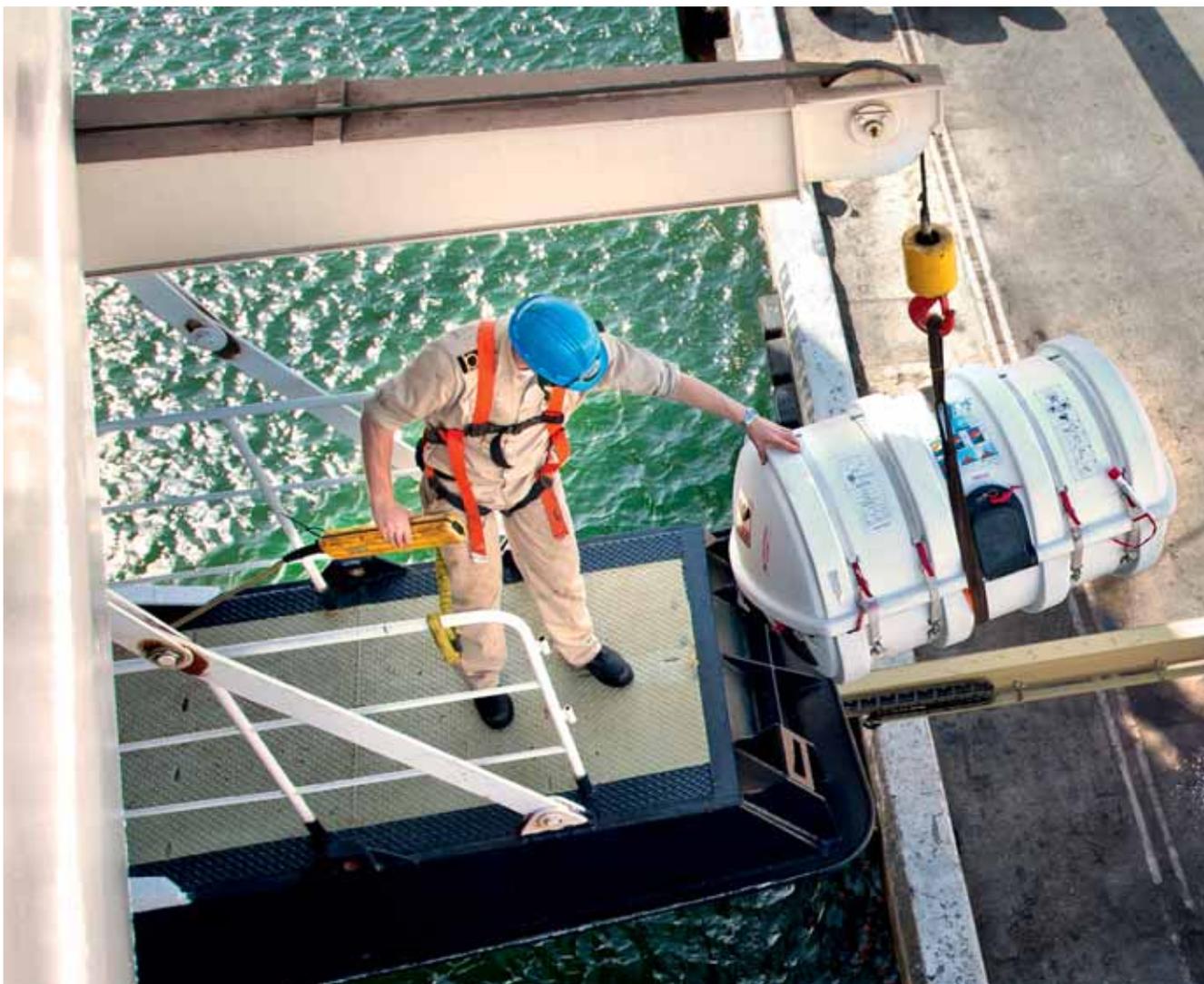
To meet these challenges, VIKING has developed a wide range of safety solutions that offer shipowners greater flexibility to cope with changes in their markets. Underlying these solutions is a steadily expanding global servicing infrastructure designed to remove the burden of administration for shipowners, enabling them to concentrate on the business of shipping. Multi-brand certified servicing, a single point of contact and international regulatory expertise are key elements of this infrastructure.

“We have been able to handle the worldwide market situation of recent years with a long-term approach to expanding our global market position, focusing on growth and making sure we are right where our customers are,” says VIKING CEO Henrik Uhd Christensen. “During the financial crisis years, we have continued to develop a competitive product portfolio based on concepts and services tailored to each customer's specific needs. The fact that we have the strongest network and the widest portfolio at competitive prices makes us an attractive partner for many shipping companies.”

RECENT DEVELOPMENTS

VIKING Shipowner Agreement

As VIKING is the largest provider of service agreements in operation with shipowners around the globe, the VIKING Shipowner Agreement is the fastest-growing solution in its broad servicing portfolio. The customizable concept incorporates



Keeping a lid on it: the importance of water-tight hatches

Cargo Care Solutions delivers hatch cover spare parts to operators globally. It produces safe, reliable and quality proven parts which can be used as spare parts when maintenance is required.

Cargo Care Solutions' experts used to be part of companies that are the original makers of hatch covers, so they have the expertise to produce parts that are of the same high quality as the originals. An independent service provider since 2010, the company supplies parts for different makers and is able to offer one solution for an operator's fleet.

While Cargo Care Solutions is not involved in the newbuilding of hatch cover systems, it does offer conversion or modernization to clients that wish to change their existings systems. Major clients are shipowners, ship managers and ship chandlers, trading companies and shipyards.

Cargo Care Solutions aims to deliver a cost-effective price, without compromising on quality. What sets it apart from its competitors is the depth of knowledge of its staff and expertise on all kinds of cargo access equipment. It offers parts and services for all brands of equipment, making it a one-stop-shop solution which is much appreciated by its customers. It also has short lead times for spare parts, and is available to its clients 24 hours a day. This, the company believes, is vital in the marine industry — especially in terms of the equipment it services, which is essential for a vessel's operations.

A global service, and presence in key positions worldwide, means that Cargo Care Solutions is available to its clients when it is needed, and can meet their needs. The company regularly flies people and parts out all over the world. It currently has operations in Denmark, The Netherlands, Germany, Singapore and the USA which are good strategic catchment zones for its clients. It also offers direct deliveries from its warehouse in China. Should its client base alter, then the company is more than willing to open more operations in different locations to meet their demands.

Bulk vessel loss is often attributable to water ingress, which can be through leaking hatch covers, back-flow through bilge systems or ballast tanks, including impact damage on structures, leaking manhole lids and inadequate monitoring. Cargo Care Solutions is therefore focused on how its customers can ensure that cargo access systems are weathertight, as this can prevent bulk vessel loss. Better maintenance and higher standards are key to saving shipowners a lot of money in the long term.

One of Cargo Care Solutions' recent innovations is its newly launched UltraPad, which is a hatch cover support pad. Hatch cover support pads are an important part to transfer the vertical forces of the hatch cover into the coaming structure of a vessel. Not replacing the support pads in time can cause an increase of these forces into the coaming structure which can cause severe damage to the coaming and



hatch cover. The UltraPad can be used as a replacement for traditional Bronze Teflon type support pads. The company's improved locking pin provides better securing of the UltraPad compared to pins with a standard thread. The head of the locking pin ensures better grip making mounting of the UltraPad faster. The UltraPad provides customers with the lowest wear rate available and improves support pad lifetime and lowers hatch cover maintenance.

Cargo Care Solutions can also offer tailor made programmes to help keep hatch covers in good condition.

It has also developed an innovative and exciting new emergency seal which will act as a replacement for hatch cover tape. Rubber tape is often used to seal the hatch covers when they are leaking. The shipyard will then put extra tape over the cross joints where the two covers meet to make it extra sturdy and safe. Unfortunately, though, the tape can only be used once and leaves residue. Cargo Care Solutions' emergency seal is marginally more expensive than the hatch cover tape but it can be used multiple times and it also leaves no residue.

Accountability is key, and Cargo Care Solutions ensures that it provides a detailed maintenance report to its customers. During a pre-docking inspection, it compiles a full pre-docking inspection report which shows the state of the cargo access equipment, issues found, actions needed to rectify the issues and general recommendations for maintenance. Everything is recorded, with accompanying pictures. Cargo Care Solutions also creates a proposal for spare parts needed, including the time required and the manpower and skills necessary to complete the jobs. It sends the document to the owner and discusses it, and can project manage the entire process by assisting from the inspection all the way through to doing the actual repairs on the yard. The company's engineers are trained and certified to test the weather tightness of the hatch covers with the class approved ultrasonic equipment made by SDT. Regular inspections can keep cargo access equipment in tip top shape and can reduce the overall maintenance cost of equipment during a vessel's lifetime.



safety products, global servicing, single-source management and financing in a variety of fixed price structures, servicing liferafts, immersion suits and lifejackets, lifeboats, release hooks and davits, and marine firefighting equipment.

According to VIKING CEO Henrik Uhd Christensen: "Key to the success of the Shipowner Agreement has proved to be the concept's flexibility coupled with the wide variety of fixed-price payment plans available. We believe that shipowners have a right to know exactly what to expect and how much it will cost. No other safety life-saving equipment provider can provide the same breadth of purchase, servicing and exchange options – or the same global resources."

VIKING SAFETY PRODUCTS

VIKING offers a full range of safety products designed for harsh environments, icy waters or extreme temperatures.

- ❖ **Immersion and work suits:** durable immersion and work suits – available with an extra layer of insulation - exceeding SOLAS regulations, protect against hypothermia. All suits are lightweight and comfortable for constant use, meeting ergonomic standards, making them the preferred choice of crew working in confined, complicated conditions.
- ❖ **Lifejackets:** made possible by a unique modular design, VIKING customers can tailor their own solutions for specific working conditions encountered in maritime environments with an extensive range of design-your-own inflatable SOLAS lifejackets.
- ❖ **Liferafts:** VIKING liferafts are available in a standard version and a top of the line automatically self-righting version. The proven self-righting liferafts ensure that no matter how the

liferaft inflates in the water it will always right itself ready for boarding.

LIFESAVING APPLIANCES

VIKING can supply full ship packages with products and related accessories incl. marine firefighting equipment, cabinets, pyrotechnics, lifebuoys, first aid kits etc.

RECENT CONTRACTS/CLIENTS

Deciding on marine safety equipment and servicing plans is no easy task. VIKING already manages 1,000 flexible safety servicing agreements for shipowners with some of the largest fleets in the world. It also has the widest choice of fixed price safety solutions and product packages on the market, and uses its expertise to work for its clients' business.

VIKING SAATSEA ONBOARD TRAINING

The latest addition to the VIKING portfolio is VIKING Saatsea, which addresses the need of shipowners and operators to continuously train their crew by offering a combined solution that manages planning and implementation of onboard training as well as the documentation. Through the online training system, the crew can complete and register module-based theoretical and practical assignments, with immediate, up-to-date competency assessments for marine and offshore inspections – without administrative hassles.

One example, is the mandatory requirement for annual onboard training of all Emergency Rescue and Recovery Vessel (ERRV) crew on vessels operating out of Denmark, Norway and the UK. But more importantly, the system is also designed to manage the coming regulatory requirements for documentation of STCW refresher courses for all IMO vessels.

Seagull leads bulk carrier and offshore learning initiatives

New titles addressing bulk carrier operations and cargo liquefaction are among a comprehensive series of new modules being introduced by computer-based training specialist, Seagull AS.

Introduction to bulk carriers and *Liquefying cargoes* are the first in a series of ten new titles Seagull is releasing this year and in 2015, each covering crucial aspects of bulk shipping operations.

Introduction to bulk carriers is directed at deck, STCW (Standards of Training, Certification and Watchkeeping) operational level and assists the learner in identifying bulk, ore and combination carriers, commonly used classifications, and the typical types of cargo carried by these vessels. It helps the learner recognize the key commercial aspects of the bulk carrier trade and identify the uses of equipment specific to these vessel types and relevant safety issues.

Liquefying cargoes addresses the dangers of carrying cargoes that might liquefy during the voyage, make the ship unstable and lead to the possible loss of the ship, cargo and crew. Cargo liquefaction has resulted in severe loss of crew life in recent years. The module is directed at deck, STCW and operational staff and it assists the learner in recognizing the particular hazards and precautions associated with the carriage of IMSBC Code Group A cargoes (cargoes which may liquefy).

"Intercargo has described nickel ore as the world's most dangerous and the liquefaction of nickel ore cargoes during transport was responsible for the loss of 66 lives in South East Asia from 2009 to 2011 alone," says Roger Ringstad, Seagull managing director.

"The module discusses the nature of liquefaction and explains the key definitions in the International Maritime Solid Bulk Cargoes (IMSBC) Code. The responsibilities of the cargo shipper to test the cargo and to demonstrate its safety to the Certifying Authority of the loading port if necessary are covered."

In addition to the two modules on bulk carriers, Seagull has made a significant contribution to the understanding of risks in the offshore industry with three new titles, *Working at height*, *Anchor handling operation* and *GOMO (Guidelines for Offshore Marine Operations) awareness*.

Working at height covers how to access elevated working places safely and the correct use of a waist belt safety harness and a full body safety harness when attached to a fall restraint or a fall arrest system. The module examines the use of cranes to transfer personnel between a vessel and installation and features high rescue techniques used for a disabled or unconscious person. This module is aimed at deck/engine STCW operational and support level personnel.

Anchor handling operation uses video recorded on an anchor handler blended with sound and additional images to achieve the learning objectives. It shows the vessel preparing in port and sailing to the rig location. The anchor is seen being received from the rig and decked to disconnect it from the chain which is then stowed in the vessel's anchor bins. With the required amount of chain stowed, the chain is broken to add a buoyed wire insert to clear a sub-sea obstruction.

Once this is completed the final operation of re-connecting the anchor and deploying it using a buoy pennant is seen.

As with the *Working at height* module, *Anchor handling operation* is directed at deck/engine STCW operational and support level personnel.

The objective of *GOMO awareness* is to provide guidance to



*Roger Ringstad, Seagull
managing director.*

the best practices to promote the safety on board all vessels servicing and supporting offshore facilities, and to reduce the risks associated with such operations including accidents and pollution incidents. The module identifies the crucial role of good communications for safe operations and also the action to be undertaken when an operation is not covered by GOMO Guidelines. This module is directed at all personnel involved in safety onboard ship.

Seagull has also released a number of modules covering a variety of topics including piracy and armed robbery, anchor handling, leadership and communication for maritime leaders, green passport (inventory of hazardous materials), engineering in cold environments and recovery of persons from water.

"Our continually expanding series of modules dedicated to the many various disciplines of the international maritime industry underscore our commitment to helping users achieve best practice and maintain safe and environmentally-friendly operations," says Ringstad.

ABOUT SEAGULL

Seagull AS is the leading provider of e-learning for the marine industry offering a comprehensive library of more than 200 titles for regulatory compliance and improved seafarer knowledge. Its STCW and ISM (International Safety Management) code compliant training is used by more than 350,000 seafarers every year on board 9000 ship and offices worldwide and it has issued over 50,000 approved onboard course certificates, making it the world's largest educational institution in the maritime industry. Founded in 1996 by experienced mariners, it has grown into a financially solid and dynamic company in partnership with leading shipping companies and ship managers to deliver a full range of assessment and management tools that ensure meeting and exceeding statutory requirements from IMO and other industry bodies.

Seagull's mission is to enhance maritime competence by effective training and assessment solutions and deliver value through quality and excellence in customer service.

WSS Welding Safety Campaign gets top marks from safety-conscious shipowners

Shipowners and operators are reaping the benefits of the Wilhelmsen Ships Service Welding Safety Campaign, which highlights the need for safe equipment and working practices, together with quality training onboard ship.

The campaign comprises inspections of onboard equipment to provide help and guidance to shipowners in complying with local and national standards and promoting crew competence.

Working with leading shipowners and managers, WSS has completed dozens of onboard inspections and produced reports that enable superintendents and crew to practise safe and efficient welding. The following are a selection of the comments received.

“The inspections have been very valuable to us as a general assessment of equipment on board and also to bring awareness to our crew on risks involved for user and equipment. The recommendations are valuable and we now have a good and documented understanding of which specifications on what machines to look for.” **Superintendent, Dredging International.**

“The inspection report is really comprehensive and has been forwarded to the vessel for action on improving the safety of the on-board welding installation in near future. Our crews have a very busy work schedule but at the end of the day, they understand that properly maintained and safe installation can prevent them from being injured.” **Milan Smrcek, TMA Monaco.**

Danny Ingemann, WSS Business Director, Marine Products says the response from owners validates the need to raise awareness among crews of the need for safe practice and high-quality equipment when carrying out welding.

“The strong link that the Unitor brand has with shipowners and seafarers means we can fulfil equipment needs while maintaining a central focus on the safety of welding practices. The safety inspection service provides a practical means for owners to assess their current outfit, identify where



improvements can be made and take steps to invest where needed.”

The core welding safety offer combines upgraded versions of Unitor-branded welding equipment, the provision of tailored solution packages, safety inspection services and improved logistics for fast and flexible supply of hardware and consumables. Additional training from WSS' marine products specialists will be teamed with improved customer service throughout the WSS global network.

WSS has produced a White Paper discussing the concept behind the Welding Safety Campaign and how WSS is supporting owners in improving welding practices onboard ship.

Wilhelmsen Ships Service is part of Wilhelmsen Maritime Services, a Wilh. Wilhelmsen group company. It has the world's largest maritime services network, with 4,500 marine professionals servicing 2,200 ports in 125 countries. Wilhelmsen Ships Service supplies safety products and services, Unitor products, Unicool refrigerants, Unitor and Nalfleet marine chemicals, maritime logistics and ships agency to the maritime industry. Last year the company made product deliveries to 24,000 vessels and handled 67,000 port calls.

A world class training system, with content to match

Since Seagull was founded in 1996, we have grown to become the leading provider of training and competence management tools for seafarers. We have more than 200 e-Learning titles and a selection of onboard courses readily available.



SAFETY THROUGH KNOWLEDGE

WWW.SEAGULL.NO

Staying safe in rough seas as well as calm waters: the Green Dolphin 575



Over the next decade, the bulk carrier industry is likely to experience significant change. With rising public concerns putting pressure on regulators and the growing cost of bunker fuel, owners will increasingly focus on energy efficiency and compliance with stricter requirements as to emissions to air and water. Managing these issues will encourage bulk carrier owners and operators to adopt new technologies that will have a lasting impact on the design, construction and operation of bulk carriers.

At Marintec in Shanghai, China, DNV GL and Shanghai Merchant Ship Design & Research Institute (SDARI) introduced the Green Dolphin 575 concept design for a Handymax bulk carrier. This is the second Green Dolphin design and builds on the success of the Handysize Green Dolphin 38. It uses technologies that are already available for commercial use, so it can meet ship owners' current needs in tight market conditions. The first order has already been placed with a Chinese shipyard.

SDARI and DNV GL have once again in collaboration applied combined and complementary expertise to deliver a new design in the Green Dolphin series. The Green Dolphin 575 is a 190m long Common Structural Rules (CSR)-compliant

Handymax bulk carrier with five cargo holds. It is available in single-hull standard or double-hull (open hatch) configurations.

Backed up by SDARI and DNV GL's long history and experience within the bulk carrier segment, the choice of ship size is based on extensive market analysis together with input from many ship owners and ship operators. Ship-owner and ship-operator input has also been considered when selecting design characteristics and design options. Like the Green Dolphin 38, the Green Dolphin 575 aims to offer maximum operational safety, be fuel- and energy-efficient, robust and reliable, operationally flexible and able to meet current and future environmental regulations.

New for this project is that the hull's performance in waves



has been addressed through model testing and numerical calculations of the added resistance in a given trade route. An operating profile consisting of full load and ballast conditions at service and slow-steaming speeds was evaluated.

Ship hulls have traditionally been designed for optimal performance in calm waters. In a realistic seagoing condition, however, ships will be exposed to additional forces resulting in motions and added resistance that will influence the ship speed and fuel consumption. The magnitude of added resistance for a bulk carrier can typically be up to 20% of the calm water resistance on average. The aim should always be to design a hull that performs well in both calm waters and waves.

Driven by today's strong market competition, there is more and more interest in assessing the added resistance in waves. The numerical evaluation of added resistance is, however, still considered challenging in the industry. DNV GL is involved in many added resistance initiatives and has extensive experience of using different tools, including advanced Computational Fluid Dynamics (CFD). Recently, two DNV GL in-house potential codes for added resistance analysis, SEAROS and GL Rankine, have been developed and validated through research and development and commercial projects. Both SEAROS and GL Rankine are fully three-dimensional programmes using state-of-the-art boundary element methods.



The Green Dolphin 575 was one of the projects where added resistance in waves has been evaluated in the early design phases. Here, the added resistance was calculated using SEAROS and the performance was compared to the existing SDARI Dolphin 57 design, which has similar main dimensions.

An operating profile consisting of two loading conditions and two speeds was considered — full load and ballast conditions at service and slow-steaming speeds. The performances of the two designs were compared along a typical triangular Handymax trade route. The averaged added resistance was first calculated for any possible sea state, followed by a calculation for all three legs in the trade route by implementing tailor-made omni-directional scatter diagrams. For the entire trade route, the new Green Dolphin 575 was shown to have a 14–17% reduction in added resistance compared to the Dolphin 57 design. The above procedure may easily be integrated into the hull design loop, enabling ship hulls to be optimized for more realistic conditions according to an intended trade route.

The engine configuration and emission reduction technologies have been carefully evaluated. The Green Dolphin 575 is fitted with an efficient Tier II long-stroke low-speed main engine and a large-diameter slow-rotating propeller. It is further designed to comply with current and future expected local and global emission regulations, such as those relevant for IMO Tier III, Emission Control Areas (ECAs) and California and EU ports, through different alternatives: a switch to low-sulphur fuels, the installation of exhaust-gas cleaning systems or dual-fuel operation with LNG.



PSM addresses threat of cargo liquefaction

Mark Jones, sales director of PSM looks at the potential hazards posed by liquefaction for bulk carriers and considers how modern technology can help not only to ensure regulatory compliance but also deliver operational benefits.

Recently passed, the 100th anniversary of the loss of the *Titanic*, an event which changed maritime history forever. Beyond the staggering loss of human lives and implications for ship design, the disaster pointed out sharply the necessity for proper safety procedures



and their potential to avert a crisis. Out of this recognition was born the Safety of Life at Sea (SOLAS) Treaty. Almost 100 years on, the treaty remains largely unchanged in respect of regulations governing passenger ships. In 1974 however, a major amendment was implemented introducing new regulations aimed at providing added protection for bulk carrier ships constructed to carry dry cargo — for example, metal and mineral ore — against the risk of liquefaction.

Liquefaction refers to the process by which saturated, unconsolidated metal ores are transformed into a substance that acts like a liquid. Left undetected, the presence of liquid may lead to disastrous consequences. SOLAS XII Regulation 12 required all bulk carriers to be fitted with water ingress and detection systems (WIAS) to provide advance warning of water layer formation in the bottom of cargo holds, a state widely acknowledged as being an early stage of liquefaction.

Subsequently in 1999, the regulations were extended (SOLAS Chapter 11-1) to include single-hold cargo ships and void spaces to ensure the protection of smaller cargo vessels. In addition to the requirement to install WIAS equipment in new ships, vessels currently in service are required to undergo periodic port inspections to ensure their WIAS systems are functioning adequately.

TIP OF THE ICEBERG

There are estimated to be as many as 500 bulk carriers in service today, with new vessels



the market altogether. The requirement for a more robust and reliable system has been the key driver for PSM in developing its BulkSafe water ingress detection and alarm system. Representing the vanguard of WIAS technology, BulkSafe

has been proven to detect the presence of water in bulk carriers and has been designed to ensure full compliance with the latest SOLAS regulations for bulk carriers. This new technology has found wide acceptance amongst shipyards and designers as a low-cost solution which is easy to install. As a retrofit solution, there are also considerable financial advantages. With many bulkers approaching the age where major refit and overhaul becomes a



coming on stream all the time. The earliest detection systems developed to meet the new WIAS requirements were poorly conceived, due to a lack of knowledge at that time about the severe service demands likely to be placed upon them in use. This has led to an emerging problem with performance issues and even system failures. Many vessel owners now also face legacy issues relating to service and spares, with some manufacturers since having left



consideration, the latest systems offer an easy way to update obsolete or malfunctioning WIAS systems, often at a lower cost than repairing the existing configuration.

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consideration, the latest systems offer an easy way to update obsolete or malfunctioning WIAS systems, often at a lower cost than repairing the existing configuration.

HOW DOES THE TECHNOLOGY WORK?

The latest systems offer maximum flexibility and ease of fitting for both new and retrofit applications, with a full range of mechanical and electrical installation options facilitating integration with other systems and allowing existing components e.g. clamps and conduits to be re-used. With no moving parts that will wear or foul with damp cargo, today's solutions offer proven reliability in use with fewer maintenance requirements.

Unlike systems based on mechanical switches and floats, PSM's modern water ingress detection and alarm systems use self-checking, active sensors to

monitor cargo holds, triggering an alarm if water is detected. PSM's BulkSafe system additionally features a 'check from deck' facility which allows mandatory Inspections to be completed with the cargo holds full or empty. Reducing the time spent in port clearance procedures can help improve fleet efficiency while maximizing available cargo capacity. A high safety integrity level is assured through the use of hydrostatic level transmitters with a 'live zero' function. Both features are designed to enable comprehensive testing of the ship's systems by the ship's Cargo Master prior to loading to ensure everything is in order.

Another important requisite for today's ship operators is a means to establish a safety audit trail, both to

the benefits of adopting the latest technology are clear. Installing modern systems of this type offer rapid payback in terms of cost savings and operational efficiency through the entire vessel. Advances in technology combined with the specialist instrumentation experience of suppliers like PSM has brought such systems within reach of ship owners and operators, making them a practical alternative to repair.

ABOUT PSM

Established for over 30 years, PSM Instrumentation is a specialist in the design, manufacture and supply of advanced marine control instrumentation and marine protection systems for the marine transportation industry. PSM offers a range of application solutions for designers, ship builders and end-users, to ensure vessels operate efficiently and reliably and are compliant with legal, safety and environmental regulations.

PSM products carry all required type approvals from the main leading marine societies, in addition to many country specific approval standards. PSM are approved to BS EN ISO 9001:2000.



protect staff in the event of an incident and to provide documented evidence in the event of an incident. PSM's BulkSafe application provides a solution in the form of an RS485 serial communications output which connects to the ship's voyage data recorder to provide a permanent and secure record that can be analysed offline.

AFFORDABLE AND PRACTICAL

Whilst the primary function of BulkSafe and similar systems is safety,





Are your hatch covers weather-tight?



Cygnus Hatch Sure Ultrasonic Leak Detector The Reliable Choice for Hatch Cover Testing

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6 selectable pre-set power levels enabling the unit to be used for testing watertight doors

Sea water ingress is a major source of damage to cargo resulting in expensive insurance claims
Cygnus Hatch Sure allows a rapid and thorough test of hatch cover tightness

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- Inspections can be carried out with cargo in place
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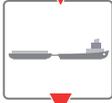
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Surveyor names Cygnus Hatch Sure as trusted choice for hatch cover integrity

Despite technological advances in shipbuilding, sea water ingress is one of the major sources of damage to cargo, resulting in expensive insurance claims and threatening the safety of the ship and crew. With the vast majority of P&I Clubs now stating that ultrasonic is the preferred method of testing hatch cover integrity, hundreds of marine surveyors around the world are now choosing to keep this type of equipment in their inventory.

P&I Clubs and surveyors are well aware of how ineffective hose testing can be, since water ingress that is visible from inside the hold may not appear at the point of the defective seal, whereas ultrasonic hatch testers can pinpoint the exact location. A traditional hose test involves testing the hatches prior to loading to ensure the vessel is cargo worthy, which results in large volumes of water needing to be cleared from the deck hold and hatch covers before the cargo can be loaded. This is time consuming and prevents other vessel activities, whereas ultrasonic testing does not interfere with any other ship operation which saves time and money. Environmentally, another factor to consider when evaluating hose testing, is that due to the unavoidable pollution caused via this method, it is often not an option due to various country or port regulations.

Marine surveyor Wagner Campagnaro, from Com e Servicos Maritimos, purchased a Cygnus Hatch Sure ultrasonic leak detector a year ago and has used the instrument to inspect more than 30 ships, varying in age. After carrying out an inspection on a ship at Praia Mole terminal in March 2011 which had been delivered December 2009, it was in good maintenance except that every hatch tested was found leaking in fwd and aft locations. "The master and chief officer were present in the inspection and were worried that my equipment was faulty, due to the ship being so new. I requested that the master ask his crew members to tighten hatches, sealing bolts and quick action cleats, and subsequently retested. All the holds and points previously found to be leaking had stopped, and it proved just how good the Cygnus Hatch Sure is. They asked me where I bought it."



Not only does this demonstrate the benefit of this type of instruments for locating faulty rubber seals, it aids the crew to ensure proper procedure is applied in accordance with the manufacturer's recommendations for making the hatches weather tight. In addition, many ports experience sub zero

temperatures for several months

each year, which makes hose testing either impossible or creates dangerous working conditions for the crew (as water from the hose test freezes on the deck and hatch covers); the Cygnus Hatch Sure will operate at temperatures down to -20°C .

Wagner Campagnaro believes that the use of ultrasonic hatch leak detectors is imperative to ensure the safety of cargo and crew members and on each and every loading operation. He commented, "Every inspection, I suggest ship masters try to request their owners to acquire an ultrasonic hatch leak detector. They are protecting their lives, their client's cargoes and avoiding claims against their principals." He added, "Cygnus' hatch leak detector is perfect, very easy to use, accurate and reliable. I recommend this leak detector for ship owners, charterers and company inspections because this equipment makes work safe and reliable. No other means of watertight test can compare, whether it's hose, chalk or light."

Dry bulk carrier safety and maintenance solutions

Cargo holds, as well as being the revenue-earning spaces of the vessel, are also the areas subject to the harshest of operating environments; without adequate protection they can suffer damage, significantly impacting the safety and profitability of the vessel.

Various forms of impact, abrasion and mechanical damage occur from the loading and carriage of dry cargoes. Notable problems include gouging as a result of cargo 'settlement' during sailing, which can cause severe damage at the cargo/coating interface, and 'shooting damage' which dry bulk vessels are

increasingly experiencing following the introduction of high-speed belt conveyors at major ports. High-speed conveyor belt loading may provide quick and efficient loading of cargo such as coal and iron ore; however, to achieve these benefits, the cargo is 'sprayed' at hold coatings, causing an abrasive impact likened to grit blasting. This loading technique has the potential to severely limit the lifespan of cargo coatings, causing coating detachment, exposure of steel and corrosion in worst-case scenarios.

In response to the increasing utilization of conveyor belt loading, AkzoNobel's Marine Coatings business, International®

spent several years developing an internal test method to stimulate the effect of shooting damage in cargo holds during loading. The data from the results culminated in the launch of Intershield®803Plus, specifically developed to offer improved resistance to impact damage from high-speed loading equipment and aggressive cargoes in cargo holds. In addition to providing protection against corrosion caused by cargo abrasion and shooting damage, Intershield®803Plus has a number of key benefits including: preservation of cargo hold integrity and promotion of asset protection, reduced downtime and maintenance spend, rapid curing, enabling fast return to service, high gloss for easy cleaning, low temperature application, high volume solids and FDA compliance.

Intershield®803Plus is part of a range of International® cargo hold coatings that meet all operator requirements in the very demanding and competitive market. The range includes Interbond 201, a surface tolerant, modified epoxy, cargo hold coating with a long in service history, new Intergard 7020 and Intershield 803, an abrasion-resistant pure epoxy coating with an excellent track record.

Intergard 7020 is the newest product to the range offering a dedicated cargo hold coating for all bulk carrier types. Specially designed for operators who don't need or cannot justify the protection afforded by the very best technology, it offers good abrasion resistance and long-term corrosion protection combined with many of the features normally associated with more expensive products.

Available in red and grey, Intergard 7020 is an aluminium-containing, low-VOC, pure epoxy coating that can be applied to surfaces prepared to a minimum of Sa2. Applicable at temperatures between -5°C and $+35^{\circ}\text{C}$, it has a smooth, glossy, easy-clean surface, is grain certified and is ready to carry even the harshest cargoes after only ten days' cure.

OTHER TECHNOLOGICAL/INDUSTRY DEVELOPMENTS

While the highest safety and maintenance standards are key factors for dry bulk carriers, the sector is not immune to the issues of the continued pressures to increase operational efficiencies, reduce rising fuel costs, as well as improve their sustainability. All in an industry, which continues to suffer from a lack of liquidity and capital.

To support ship owners with these challenges, in April 2014 International® and The Gold Standard Foundation, announced the development of the first marine-based methodology for generating carbon credits within the shipping industry.

Carbon credits are financial units of measurement where one credit represents the removal of a tonne of carbon dioxide equivalent from the atmosphere. They were created to provide ship owners and operators with a tangible incentive to invest in clean technologies through the generation of revenue by reducing greenhouse gas emissions.

Credits can be traded on the carbon markets in the same way as stocks and shares and therefore have intrinsic value.

The methodology is based on ship owners and operators converting existing vessels from a biocidal antifouling system to a premium, biocide-free advanced hull coating such as International®'s Intersleek®. A baseline emission level is determined for the vessel prior to the application of Intersleek® with the same data source then used to determine the emission savings after the application of Intersleek®. The carbon credits generated are directly related to reduced emissions as a result



of reduced fuel consumption.

International® spent more than two years developing the carbon credits methodology as part of its research into making eco-efficiency technologies more accessible for the wider shipping industry and providing tangible incentives for ship owners and operators to invest. The company developed the methodology with The Gold Standard Foundation because it is the highest quality and most trusted carbon certification standard with rigorous sustainability benchmarks.

The new carbon credit scheme is not only a first for shipping, but it is also a first in the global transportation business. It is the only carbon credit generating methodology that has been approved for assets that move — in other words, ships — across national boundaries. Other carbon credit initiatives, already established, fall within national jurisdictions. This significant landmark for sustainability within international shipping will act as a further incentive to drive an increase in the uptake of eco-efficient technologies, as ship owners and operators can benefit twice when they invest in Intersleek® technology. Firstly, they can increase operational, environmental and energy efficiencies, which reduces fuel costs and emissions and then they can reap the additional financial benefits of carbon credits, which International® will share with them. International® also handles all the administrative requirements, so customers don't have to invest time, capital or resource in generating the carbon credits.

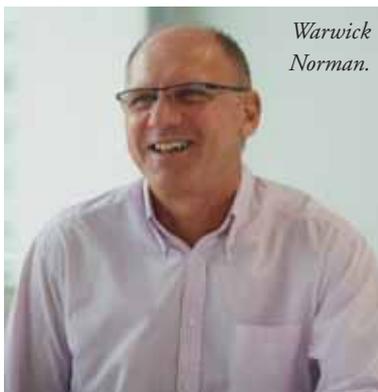
Following the public launch of the programme in April 2014 several International® customers are already going through the process of unlocking their carbon credits, with the first expected to be available at the start of 2015. There is effectively money already available for many owners and operator that is currently being generated by the Intersleek® technology that coats their vessels. In fact, based on the 100 existing ships already converted from a biocidal antifouling to Intersleek® there is an estimated \$3.6m worth of carbon credits potentially available to ship owners and operators.

Moving beyond compliance

UPDATING THE APPROACH TO MARITIME RISK MANAGEMENT AND EFFICIENCY

It's unfortunate that something has to go terribly wrong before industry is driven to establish or improve standards, writes *Warwick Norman*. The loss of 1,503 lives in the Titanic in 1912 led to the Convention of Safety of Life at Sea (SOLAS) in 1914, and current day best practice draws its origins from the *Torrey Canyon* oil spill in 1967.

Thankfully the maritime industry and the general availability of information have changed considerably since the 1960s. More recently, rapid fleet expansion means more and more ships satisfy the minimum compliance burden, and so too selection



Warwick Norman.

Using big data to predict casualties

In 2013 alone RightShip tracked around 71,000 vessels. Records show that there were 1,777 casualties in 2013, so there is a 98% chance of not having an accident — a testament to the quality of the industry. However when things go wrong, they can go very wrong; and this underlines the importance of a solid vetting programme.

Harnessing existing analytics with new factors such as the predictive importance of Port State Control, engine maintenance, ship scantling configurations, mooring and rope materials as well as the human element — all of which contribute variously depending on the interaction — have enabled us to develop a new system, *Qi*, that will now predict three quarters of casualties.

Quantifying the human element

A lot of work in recent years has focused on engine design and hull form optimization, but no research has tried to quantify and optimize the human element. Since 2008 we have seen a record delivery of ships, but not an equivalent delivery of people to man them: in fact there has been a push to reduce crew numbers. So we have a situation where we have more ships, but fewer people to run them.

In the tanker industry minimum standards of experience (as a proxy for competency) are understood and utilized through the 'Crew Experience Matrix': in theory, everyone with a Master's ticket is equally qualified. However this standard is not carried through to the bulk industry. Market pricing of a vessel is calculated on speed and consumption — the calibre of the crew doesn't factor in the costing model.

RightShip has done some preliminary work in quantifying the human element in bulk carriers, developing an understanding of



practices can evolve to consider other factors and deliver more meaningful outcomes. However traditional marine assurance practices focus on ensuring compliance with minimum standards.

Today's compliance focus personifies complacency, and risk management systems which rely solely on compliance have plateaued in their usefulness. Forward thinking companies who contemplate a broader definition of safety and suitability in vessel selection will realize significant advantages in efficiency, sustainability and (the ultimate game-changer) also economically.

Next generation vetting: harnessing 'big data' for predictive analysis

'Big data' refers to information that can't be processed or analysed using traditional methods and tools. In the context of risk management, it means that the systems developed in 2000 — which are structured around relational databases — are no longer appropriate to manage the volume, variety and velocity of information now available. They are simply not able to intelligently integrate and process all the information — or data — we have today, and so cannot use it to enhance decision-making.

It is in 2014 that big data goes mainstream. Organizations that don't invest in this will be at a competitive disadvantage.



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the nexus between crew experience and performance. The calibre and quality of a crew plays a big part in optimizing ship performance; so the same ship with a different crew will perform very differently. Our analytics tells us that — for up to ten years — each additional year of experience of the Master results in a productivity gain of 22 minutes at the terminal. This information can be provided in terms of time at the terminal, or tonnes per hour.

According to the UK's Marine Coastguard Agency, 80% of casualties at sea are a result of human error. So we know that having an experienced crew enhances both safety and efficiency.

Moving beyond compliance will enable charterers to select a safer, more efficient vessel and crew, and encourage owners to invest in people and assets. Early movers who take advantage of this intelligence and include minimum crew experience into their vessel selection will be able to do so without a cost premium attached — although it's only a matter of time before the market catches up.

About RightShip

Since inception in 2001 RightShip has helped to significantly improve global marine safety standards. RightShip is focused on helping industry avoid preventable incidents, whilst reducing the carbon dioxide emissions emitted by the world marine fleet. We do this by condensing information, providing rapid and consistent

analysis and advice, monitoring and complying with international standards, and bringing expert support and advice to our 240 customers and wider industry partnerships.

RightShip was formed to improve dry bulk safety and quality standards, drawing on the significant ship vetting expertise of global commodity companies, BHP Billiton and Rio Tinto. As major charterers and shippers, the founding businesses had developed vetting systems to manage their own marine risk. RightShip combined their expertise and resources to develop the Ship Vetting Information System™ (SVIS™), a comprehensive risk management tool. In 2006 international food, agriculture

and risk management company Cargill joined as an equal equity partner. RightShip currently maintains ISO 9001 & ISO 27001 certification and was awarded the 2013 Australian Prime Minister's Exporter of the Year.

RightShip's risk management tool is utilized by over 6,000 users and supported 24/7 by from RightShip's offices in Houston, London & Melbourne.

Qi (pronounced 'key') — an acronym for Quality Index — is the new RightShip risk management platform. *Qi* builds upon the incumbent system SVIS™ by embracing big data, predictive analytics and real time risk assessments to better target substandard marine performance and optimize safety. *Qi* will be used by RightShip subscribers from late 2014.

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Understanding and managing the liquefaction of bulk ores

Liquefaction of bulk ores has been identified as the root cause behind the loss at sea of five vessels and 80 lives in recent years. While all these cases have involved cargoes of nickel ore, there is a growing concern that other bulk cargoes including coal have the properties to cause liquefaction-related incidents. There is therefore a pressing need for better understanding of how different cargoes influence the phenomenon.

Phil Thompson, BMT Group Sector Director for Transport, outlines the problem of liquefaction and discusses how better understanding of the problem has led to improved risk mitigation strategies that can help deliver far greater levels of confidence and safety.

In recent years there has been a spate of bulk carrier-related casualties that have involved vessels either sinking or experiencing significant stability problems. There were 35 bulk carrier losses between 2010 and 2013 with the loss of 100 crew members. At least seven of the losses were due to liquefaction of the cargo. Within an infamous period of 39 days in 2010, three bulk carriers sank and 44 seafarers lost their lives. All three vessels involved were carrying bulk mineral ore and the liquefaction of the cargoes with the resulting free surface effects and loss of stability was identified as the root cause. So far this year there have been two losses but they were unrelated to cargo matters and mercifully, no crew members were killed.

Jian Fu Star, Nasco Diamond, Hong Wei, Harita Bauxite and Trans Summer were reportedly carrying nickel ore, loaded in the same country and were bound for China to deliver the cargo for use in the steel industry. Similar incidents have occurred in previous years with iron and nickel ore cargoes from India, The Philippines and Indonesia.

Ships have long carried liquid cargoes and consequently vessels dedicated to the transport of liquids are designed accordingly. The problem arises when a ship designed to carry a dry bulk cargo suddenly finds itself carrying a bulk liquid as well.

So how does an apparently dry cargo turn into a liquid?

Liquefaction of cargo can affect many types of material being transported in bulk. Iron ore, nickel ore, coal slurry, sand slurry, and other wet minerals or fines are all susceptible. Liquefaction is a particularly dangerous issue as it turns what appears to be an apparently safe cargo into something that can have a significantly detrimental effect on a vessel's stability. The mechanism that causes liquefaction is often triggered by a ship's motions. It can also be affected by other cyclical loads such as vibration. Bad weather will therefore exacerbate the effect.

Liquefaction occurs when the combination of cyclical



Phil Thompson, BMT Group Sector Director for Transport.

movement and vibration compacts the spaces between cargo particles. This causes the loss of inter-particle frictional force to the point where the cargo can behave like a liquid. The resultant cargo shift and free surface effect has a detrimental effect on ship stability which can lead to capsizing. Another issue that makes liquefaction of cargo so dangerous is the rapid change from the stable to the unstable condition with little warning, potentially giving crews very little time to abandon ship.

The cause of cargo liquefaction is not a new problem. Current regulations therefore reflect this in terms of transport, loading and shipping. The International Convention for the Safety of Life at Sea (SOLAS) provides general guidance on the carriage of all cargo types including dangerous cargoes. The International Maritime Solid Bulk Cargoes (IMSBC) Code which became mandatory on 1 January 2011, and was subsequently

A SELECTION OF INCIDENTS SINCE 2010

Vessel	Vessel details	Date of Loss	Loss of Life	Voyage
Jian Fu Star	1983	27/10/2010	12	Sank In The South China Sea 90 miles southwest of Cape Eluanbi, Taiwan
Nasco Diamond	2009	10/11/2010	20	Developed list to port, took water and sank in the Pacific Ocean.
Hong Wei	2001	03/12/2010	10	Capsized and sank in the South China Sea.
n/a	n/a	2011	7	n/a
Vinalines Queen	2005	25/12/2011	22	Developed 18° list and eventually sank in the Philippine Sea
Harita Bauxite	1983	17/02/2013	15	Sank off Cape Balinao in the South China Sea carrying 47,450 metric tonnes of nickel ore
Trans Summer	2012	14/08/2013	n/a	Sank en-route from Indonesia to China with a cargo of nickel ore

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1429.24	5.45	0.38%	1444.18	-2.42	-0.17%
1254.25	2.48	0.2%	253.08	6.57	2.6%

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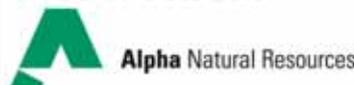
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The Taharoa Express, which narrowly avoided capsizing in 2007 as a result of failures during loading which led to an extra 5,000 tonnes of water being loaded.



amended on 1 January 2013, provides specific requirements for the carriage of a range of bulk cargoes.

The International Group of P&I clubs and the Association of Dry Cargo Ship owners (INTERCARGO) were both instrumental in ensuring that the International Maritime Organization (IMO) Maritime Safety Committee (MSC) was made aware of the risks associated with liquefaction. The result is that the shipper is obliged to provide information on the cargo in advance and the Master of the vessel is entitled to refuse the cargo if the certification is not adequate or if, he/she is not happy with the information provided. The IMSBC code specifies that Group A bulk cargoes that are liable to succumb to liquefaction must be accompanied by a certificate specifying the transportable moisture limit (TML), which is calculated as 90% of the flow moisture point (FMP). The reality of complying with this is that each cargo to be loaded should be subject to sampling and testing to identify key physical properties in a controlled environment such as a testing laboratory.

However, there is evidence that in some cases, the data shown on the cargo certificate may not be accurate for the actual physical properties of the material loaded into the hold. Errors might come from genuine mistakes in sampling, the fact that the cargo might originate from several places and it is not homogenous, or even that heavy rain between sampling and loading has changed its physical characteristics. There is also the possibility that the certificate provided has purposefully been produced to demonstrate compliance with the IMSBC Code but in reality is not from the cargo being loaded. The significant commercial pressure that the ship and her Master are under to ship the dangerous cargo without a proper certification has been widely reported, with anecdotal stories of crew's being threatened if they did not accept the cargo.

Clearly for a long term solution, it is better to treat the cause (cargo with too high a moisture level) rather than the symptoms (a dramatic loss of stability), but there is an incumbent responsibility to mitigate the risk whenever reasonably possible in order to ensure safe ship operations. Although many of these ships are well into their service lives, there is a responsibility from a naval architecture perspective to implement operational improvements as well as validating the initial vessel design.

Other risk mitigation strategies include:

- ❖ **a better understanding of cargo characteristics:** focused by a desire to maintain Australia's excellent safety record in exporting coal, the Australian Coal Industry's Research Program (ACARP) and the Minerals Council of Australia has funded a substantial R&D effort through Project C24001 Transportable Moisture Limit for Coal. According to the

Bureau of Resources and Energy Economics, Australia exported approximately 1.5 billion tonnes of black coal in the five years leading to 2012/2013 using the appropriate schedule previously contained in the BC Code and, from 1 January 2011, using the appropriate schedule contained in the IMSBC Code. This new project has been designed to develop fundamental understandings of coal cargo stability during shipping, including the potential for cargo liquefaction, and to use this knowledge to determine how best to assess the behaviour of coal cargoes during shipping. The ACARP project is investigating the behaviour of <50mm coal cargoes because this is the material sizing of typical Australian exported black coals. In cases where Australian-shipped black coal products are shown to have the potential to liquefy, the ACARP project will identify opportunities to modify the three existing Transportable Moisture Limit (TML) test methods specified in the IMSBC code, to ensure applicability to <50 mm coal products. The project will also investigate the potential for a new TML test. The outcomes will be compared to measurements using the cyclic tri-axial test used in soil mechanics studies to assess applicability.

- ❖ **a better understanding of stability:** ships' crew's are taught ship stability as it is critical to their safety, but how many really understand the implications of free surface effects? It is the author's view that a more rigorous programme of improving the understanding of ship stability and free surface would help. With the focus on the risk of free surface effects, the crew should be able to make the decision not to accept a cargo if they are concerned about its tendency to liquefy. This programme needs to be industry wide, worldwide and led by 'Class', P&I Clubs and nautical colleges.
- ❖ **longitudinal hold division:** as with grain cargoes, there may be possibilities to put longitudinal hold divisions in place to reduce the free surface effects. However, this needs careful consideration due to the trading nature of many bulk carriers where different cargoes may be carried and hence whether such division is permanent or temporary will need to account for the practicalities of loading and discharge.
- ❖ **hold pumping systems:** there are bulk carriers that trade loading slurries or water/mineral mixtures. The cargo is loaded and then the water is distilled down through the hold and pumped out to leave a dry cargo. It does not remove the free surface effect altogether but provides a means of removing the water once loaded. However it is not without its problems as evidenced by the *Taharoa Express* incident in New Zealand, June 2007.

There are of course, more operational solutions ranging from the simple (in theory) such as covering up of the cargo on the dockside to protect it from the elements, through to the more involved such as insistence on independent cargo surveys to verify and oversee the moisture testing of appropriate cargo samples.

The tragic loss of life that took place in late 2010 demonstrates how serious an issue cargo liquefaction is. Mineral ores and slurries can contribute to major stability problems and their transportation needs to be treated with special care. An enhanced regulatory framework is in place and ship's crews, ship owners, ship managers and the cargo shippers need to fully understand the risks and implications and each be strong enough to resist the commercial pressure that will, undoubtedly continue but must not be at the expense of seafarer's lives. DCi

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Rhenus Midgard breaks coal handling record

Rhenus Bulk Terminal Wilhelmshaven (BTW) handled 557,319 tonnes of coal in July. This is the best figure for one month at the long-standing bulk handling centre.

Rhenus Midgard modernized and expanded the business site between 2009 and 2013 so that it can handle larger volumes.

The bulk carrier *Lord Star* was the last vessel handled at the BTW in July and it helped increase the terminal's record for one month to more than half a million tonnes of coal. The volume handled roughly corresponds

to the empty weight of the Burj Khalifa skyscraper in Dubai, the highest building in the world.

The fossil fuel unloaded from the Panamax class bulk carrier, came from Russia. The coal imported during the record-breaking month also came from Columbia and the United States.

"We set ourselves ambitious targets for our monthly and annual figures after expanding our terminal. The 557,319 tonnes, which were handled in July, show that we're on the right path," says Matthias Schrell, managing director of Rhenus Midgard in Wilhelmshaven.



The business site unloaded more than three million tonnes for the first time last year. "At the moment, it looks as if we'll be able to increase our end-of-year results in 2014 once again," says Schrell.

The seaport logistics specialist Rhenus Midgard extensively modernized and expanded the terminal formerly known as the Niedersachsenbrücke jetty between 2009 and 2013. More powerful conveyor belts, fully automatic stackers/reclaimers and the new train loading station have improved the range of services available.

The capacity of the BTW has also been extended through deepening the berth to allow it to handle fully laden Capesize vessels with a draught of as much as 18.50 metres and extending the storage areas away from the quay's edge.

ABOUT RHENUS

The Rhenus Group provides logistics services around the globe and has annual turnover amounting to €4.1 billion. Rhenus employs over 24,000 people at more than 390 locations worldwide. The Rhenus business areas — Contract Logistics, Freight Logistics, Port Logistics and Public Transport — manage complex supply chains and provide a wealth of innovative value-added services.



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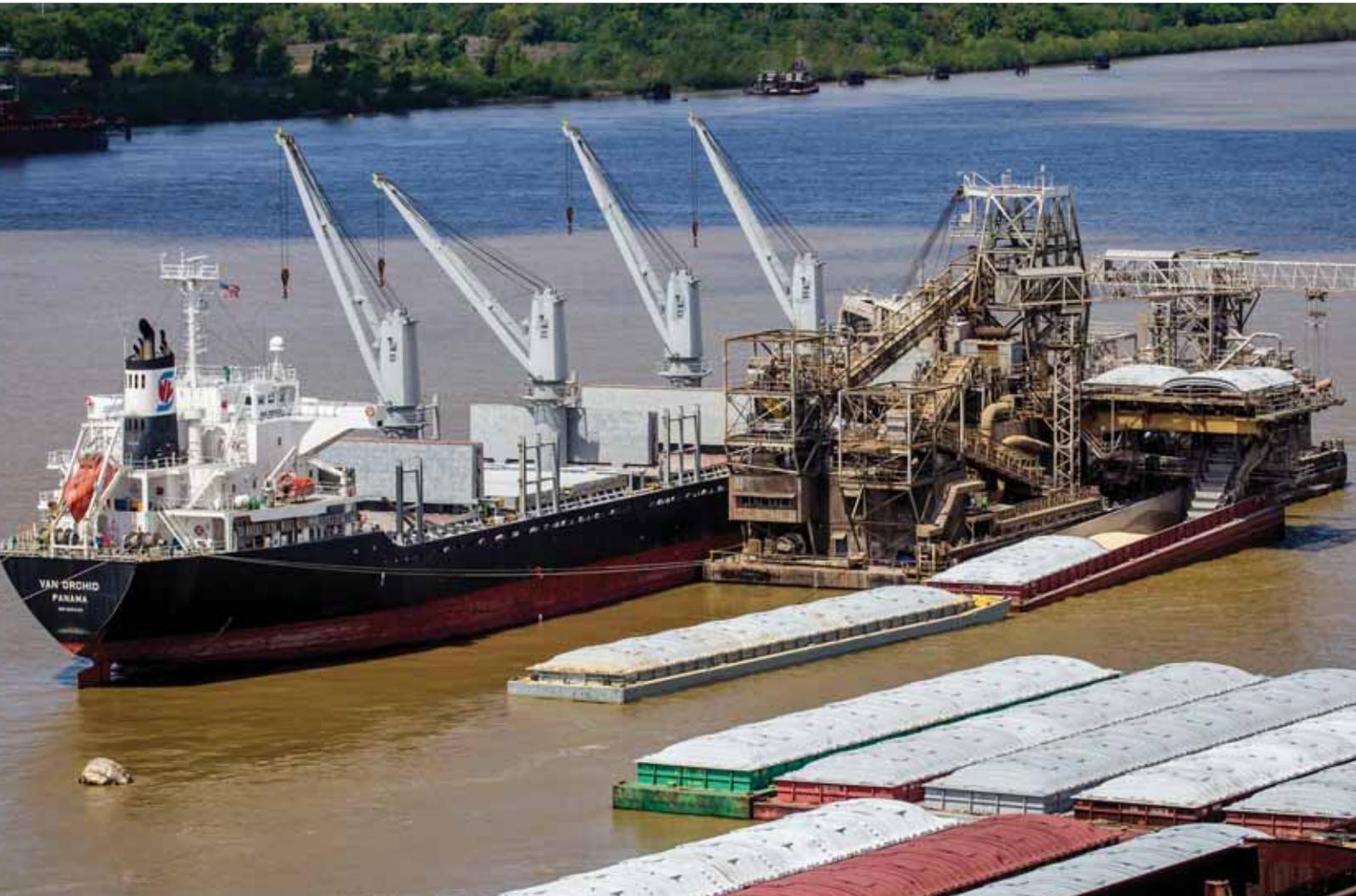
LOOK TO THE FUTURE AND PLAN AHEAD

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.

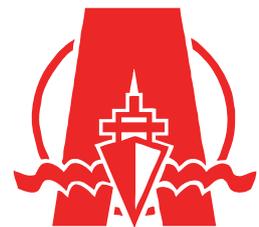
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ASSOCIATED TERMINALS

Port of Hamburg Marketing opens representative office in North Rhine-Westphalia

With the opening of a representative office in North-Rhine-Westphalia (NRW), the second most important region of the German market for Hamburg, the Port of Hamburg's internationally active marketing organization is making a point. Since 18 July, Port of Hamburg Marketing's Representative Office (West) has been located in Dortmunder Hafen AG's head office. This on-the-spot presence will enable Port of Hamburg Marketing to cover the NRW region even more promptly and intensively. Heading the new representative office will be Volker Hahn, who has until now looked after the region from Hamburg.



At the opening of the new representative office, Volker Hahn together with the Port of Hamburg executive board members Axel Mattern and Ingo Egloff thanked Uwe Büscher, chairman of the Port of Dortmund, for its excellent co-operation and support. "With its proximity to the economically active regions of East Westphalia, Münsterland, South Westphalia, the Dortmund area and the rest of North Rhine-Westphalia, the new location of our port's representative office in the headquarters of our member, the Port of Dortmund, represents the optimal choice," said Axel Mattern, CEO of Port of Hamburg Marketing at the opening of the office. "Opening of a port representative office in NRW is the right move and a clear signal of the Port of Hamburg's wish to reinforce and extend its presence in NRW. As Gateway to the World, Hamburg with its liner services offers importers and exporters in NRW the finest transport connections to all parts of the globe," continued Mattern. Büscher added: "I am delighted about the Port of Hamburg's Representative Office. This serves as a practical example of the desired intensification of co-operation between German seaports and inland ports."

For Hamburg as Germany's largest universal port, the state of North Rhine Westphalia with its industry being such a notable exporter is of immense importance on both the import and export sides. With around 500,000 TEU (20ft standard containers), NRW ranks second after Bavaria for Hamburg's container hinterland traffic.

For inbound and outbound rail traffic, Europe's largest rail port offers rapid and high-performance transport links to and from NRW. "For NRW, Hamburg is a fine alternative to the competing ports situated farther west that rely mainly on truck and inland waterway craft transport. In addition, as part of our marketing and information work we champion transport solutions that wherever possible preferably shift container shipments from the roads to more environmentally friendly rail. For cargoes and heavy project shipments, where time is a less critical factor, this also increasingly applies to inland waterway shipping," continued Axel Mattern.

Especially against the background of the new terminal for multimodal transport to be completed in Dortmund by the end of 2015 or the beginning of 2016, Port of Hamburg Marketing and the Port of Dortmund anticipate an increase of railborne cargo shipments between the ports of Hamburg and Dortmund. The new facility for multimodal traffic could also lead to an expansion of railborne traffic between the ports of Hamburg and Dortmund, HHM and the Port of Dortmund anticipate. An expansion of container train links between Dortmund and Hamburg will also mean that even more export and import cargo can move between NRW and Germany's largest universal port without hitting traffic jams en route.

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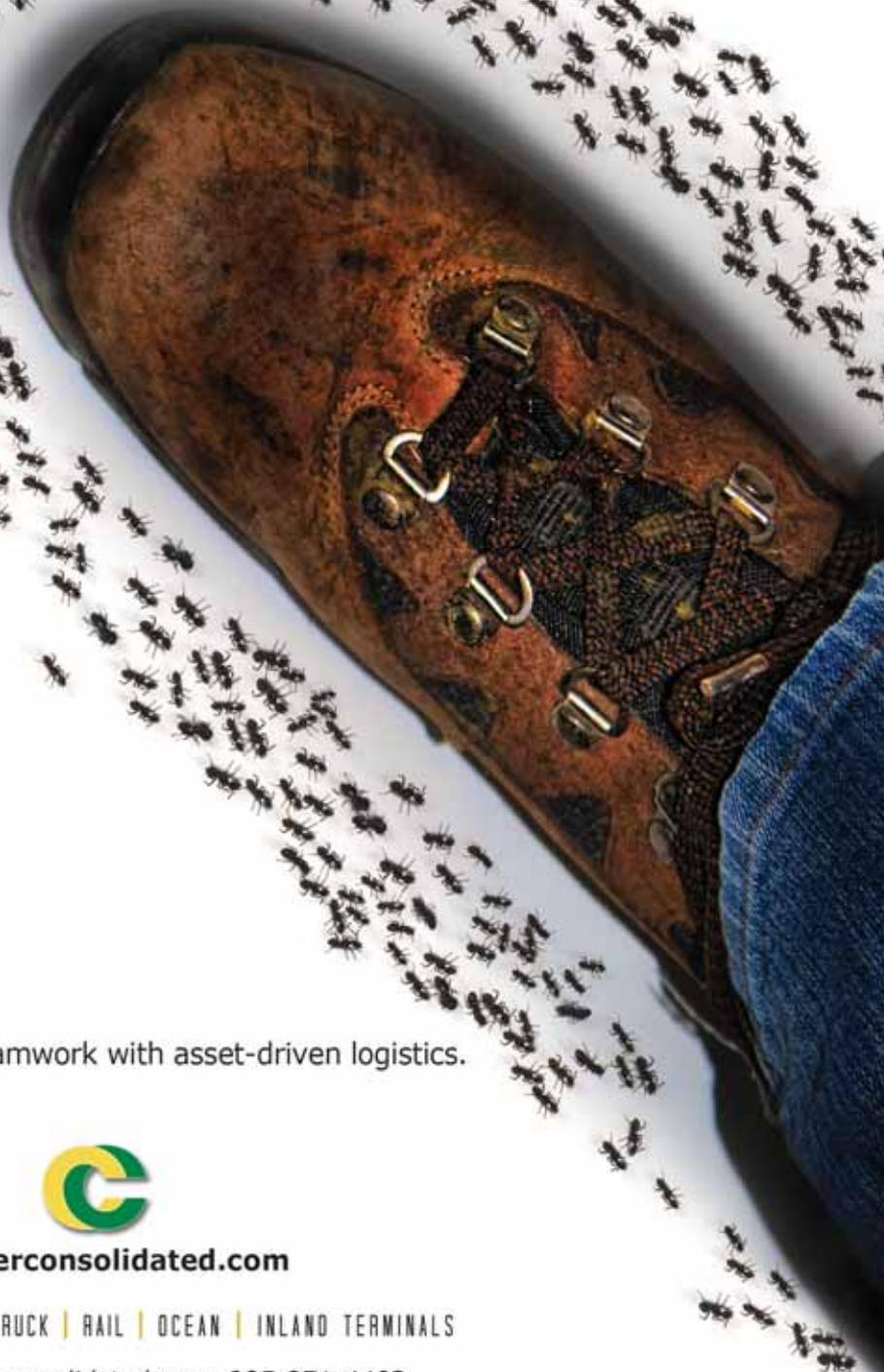
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Liberia to build alternative to Port of Greenville

In Liberia, the Putu Iron Ore Mining (PIOM) company, which is located at Putu Petrokon, is to build an alternative port at Grand Butal Point, close to the town of Kponkpo Mongar. However, this is dependent upon the government granting an iron ore mining licence.

The existing Port of Greenville at Sinoe, which was built in the 1960s and is now considered relatively obsolete, is unable to accommodate new mining equipment that will be deployed in new operations.

PIOM has also announced that it has discovered iron ore reserves of 4.4 billion tonnes as opposed to the 2.2 billion tonnes it had originally estimated. *Barry Cross*

New dry bulk terminal for Maputo

The Port of Maputo, in Mozambique, is to invest \$110 million in a new dry bulk terminal. This will boost capacity from the existing 2mt (million tonnes) to more than 8mt, of which cereals will form a major element. The two-year plan announced by the port authority will also see the renovation of three other quays, allowing dry bulk consignments to be better handled and also to overcome the present lack of space within the port. *BC*

Argentina to reinforce use of locally flagged vessels

Argentina is to introduce a new series of measures to make it difficult for Paraguayan traffic to make effective use of the Paraguay-Paraná inland waterway system. This could come in the form of specifying that cargo has to move by Argentinian built and flagged vessels, adding to the fact that Argentina is already making it virtually impossible for barges using the waterway network to transship cargo in Uruguay, something that has already benefited the port of Buenos Aires.

The government in Argentina is already suggesting that other countries will be asked to contribute to the development of the inland waterway system, which already handles grain and mineral traffic from Paraguay, Bolivia and central Brazil. It will also introduce measures that ensure Argentina benefits from the movement of barges. In its defence, Argentina points out that it already undertakes strategy, provides signalling and other control of equipment, which benefits both Paraguayan and Brazilian waterborne traffic. *BC*

Venice receiving larger bulk carriers

The Port of Venice has recently unloaded 100,000 tonnes of soya bean seeds and soya bean meal for the Italian market. These were imported by Nidera, which is represented by freight forwarder Sagem.

This traffic represents a record for Terminal Rinfuse Italia (TRI), which belongs to the Euroports group. Consignments were brought in by twin vessels operated by Leopardo. The two bulk carriers were 238m long and had a gross tonnage of 97,000 tonnes.

The *Van Gogh* arrived from Brazil, conveying 8,000 tonnes of soya beans and 17,000 tonnes of soya bean meal. The *Vermeer* initially transhipped 10,000 tonnes of Brazilian soya beans as part of a lightning operation at Chioggia, before moving onto the terminal in Venice, where it offloaded a further 64,000 tonnes of soya beans from the same source.

According to TRI, deepening of the draught by the port authority and the partnership with the port of Chioggia made it possible for the two sister ships to commercially dock at the terminal.

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APPA introduces RFID tags for fertilizer trucks

In Brazil, the Paranaguá and Antonina Port Authority (APPA) has introduced a new system to monitor fertilizer trucks. The new technology will make it possible to organize flows of these vehicles, thereby reducing the impact they have on the city centre. In addition, it will ensure more security and productivity when handling consignments at the Port of Paranaguá.

Radio-Frequency Identification (RFID) tags will be fitted to almost 500 trucks that regularly transport consignments from the key to back port warehousing. Work will be under seen by Prof Caio Fontana of the Institute of the Sea at São Paulo Federal University (Unifesp).

This will initially operate as a pilot project, with the port of Paranaguá chosen because of its high level of computerization. According to the professor, the use of tags to track trucks will produce numerous benefits, principally

cutting the time it takes to discharge consignments, increasing the number of journeys undertaken by the driver and also increasing reliability in the logistics chain.

Tags will be fitted to the windscreens of the trucks, using a substance that makes it impossible for them to be adulterated. Antennas will then be placed at the access to the quays, at the loading funnel, at the exit to the quays and at the warehouse receiving the fertilizer at the back area of the port.

APPA will know the exact position of each vehicle, thereby reducing the amount of time spent on correcting errors, when, for example, trucks are in the wrong queue, use the wrong loading funnel or take the wrong product to the warehouses.

The system will not require batteries and should last for seven years. *BC*

Rocha deepwater port under analysis

The parliament of the Mercosur is to analyse the viability of building the deepwater port in Uruguay at Rocha. This is viewed as being of particular interest by neighbouring — and landlocked — Paraguay. The project is being put before an extraordinary session of the Interministerial Commission of Uruguay for analysis. The project for the port will eventually be put out for international tender. *BC*

Draught reduced on Tietê-Paraná waterway

In Brazil, in May, drought cut the minimum draught on the Tietê-Paraná inland waterway from 2.7m to 2.2m. Because of this, barge convoys had to reduce loads from 6,000 tonnes to 4,000 tonnes, adding a further 140 road trips to carry outstanding cargo. As a result, just 90% of traffic carried in 2013 used the system in early 2014.

Since then, the draught has been further reduced to 1.7m, meaning that only seven of 21 barge trains that work the waterway have been able to continue transporting cargo. The stretch experiencing levels of low water carries significant soya, millet and soya pellets from Mato Grosso and Goiás to Pederneiras in São Paulo state, from where it goes by rail to the port of Santos. *BC*

Santa Catarina builds grain warehouses

The government of Santa Catarina state, in Brazil, is to contribute towards the construction of 11 grain warehouses, with a combined capacity of 110,000 tonnes. Overall, these are going to cost in the region of \$40 million. *BC*

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Spanish dry bulk traffic shows growth

For the first quarter of 2014, Spain's 28 centrally owned ports reported a combined 20.81 mt of dry bulk traffic, up 13.89%. Gijón, with 3.5mt (million tonnes), remains Spain's main dry bulk port, experiencing growth of 16.28%. Tarragona, Málaga and Las Palmas all did well in the first three months. Tarragona handled 2.4mt, up nearly 30%; Malaga reported an increase of nearly 80%; while Las Palmas reported growth of 78% in dry bulk.

BC

Valencia performs well in dry bulk

The Port of Valencia reported a 48.88% increase in dry bulk traffic during the first three months of 2014. During this period, a total of 664,410 tonnes was handled. Cereals and flour grew by 115.5% compared to the previous year, reaching 222,000 tonnes for the quarter. These now account for 33%

of all dry bulk. Both cement and clinker increased, too, practically doubling their volume compared to the previous year. In total, 167,000 tonnes of these products passed through the port, now accounting for 25.15% of all dry bulk. Scrap metal also did well, increasing by 100%.

BC

Two illegal iron ore shipments found at Manzanillo

In the Mexican port of Manzanillo, authorities have twice intercepted iron ore carriers trying to leave the country with 100,000 tonnes of this product, which was being moved illegally. An analysis of the paperwork showed that the permits did not correspond to iron ore from the mine generating the consignment. As a result, the company involved in moving this shipment has lost all future rights to do so.

To date, authorities have seized up to 300,000 tonnes of illegally transported iron ore.

BC

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The draft of 13 m allows Panamax class vessels to load full loads of 75,000 ton, and larger vessels (120,000 DWT) have loads of more than 100,000 ton.



New dry bulk quay at Ingeniero White

At the Argentinian port of Ingeniero White, in Bahia Blanca, Toepfer International has opened a new 282m dry bulk quay with alongside draught of 13m. This doubles the company's existing capacity, whilst increasing that of the port by up to 9%.

The new facility, which cost \$32 million, will mainly handle cereals and fuel oil. It is equipped with two continuous unloaders, each of which can handle around 2,400 tonnes of cereals per hour. *BC*

Navigability of Magdalena River to be improved

In Colombia, \$1.3 billion is to be invested in improving the navigability of the Magdalena River. Work will take place along a distance of 700km from the centrally located Puerto Salgar to the coast at Barranquilla. This should cut transport costs

by up to 50%. An award to undertake the work is to be made in July, with phase I to be completed within nine months. This will consist of dredging 500km of the River from Barrancabermeja to the River mouth. *BC*

Go ahead given for new terminal at São João da Barra

In Brazil, the Ports Secretariat (SEP) has given the go-ahead for the installation of a third private use terminal at São João da Barra, in the state of Rio de Janeiro. Investment will be \$241 million, which will be undertaken by NOV Flexibles Equipamentos e Servicos.

This will bring to 19 the number of privately authorized operations given the go-ahead since changes to the ports law were made in 2013. Privately run terminals accounted for 931 million tonnes of cargo in 2013, including dry bulk, liquid bulk and general cargo. *BC*

Vale to invest in southern port complex

The Brazilian transport and mining company Vale is to invest \$150 million in modernizing and increasing capacity of its southern ports, which is a hub formed by Terminal da Ilha Guaíba (TIG) and also by the mining terminal the company has at Companhia Portuária Baía de Sepetiba, both of which are located on Rio de Janeiro's Costa Verde.

TIG, which is considered the third major loading terminal for iron ore in Brazil, is to have a replacement wagon dumper and upgrades undertaken on the 1.7km railway bridge connecting the land with the loading pier, which will allow it to receive higher capacity block trains. The terminal covers an area of 515,000m² and can handle up to 45mt per year, although handled just 39.8 million tonnes in 2013. *BC*

New Beira fertilizer terminal

Work is to begin shortly on a new fertilizer terminal at the port of Beira, in Mozambique, which will have a daily capacity of between 6,000 tonnes and 8,000 tonnes. It will cost an estimated \$35 million to implement and is needed given the paucity of storage for fertilizer in the port, where presently only a single 2,000 tonne capacity warehouse is available.

Fertilizer traffic at Beira has increased significantly in recent years. In 1998, it handled 50,000 tonnes, whereas now this has reached 600,000 tonnes, serving customers in Zambia, Zimbabwe, Malawi and the Democratic Republic of Congo, which will require between 1.2mt (million tonnes) and 1.5mt a year in the near future. *BC*

Nacala to start Tete coal exports

In December, the port of Nacala, in Mozambique, will begin exporting coal extracted in Tete (Nampula province). Trains of 1,500 metres long, consisting of up to 120 wagons and pulled by four locomotives, will shift coal from the mine to the port. This is requiring the acquisition of fleet of 80 locomotives to ensure regular coal supplies.

The line, which is under construction, will be available for use by any of the Tete province coal producers. Forecasts suggest that 11mt (million tonnes) of coal will be transported in 2015, rising to 13mt in 2016 and 18mt by 2017. In total, Nacala port will be able to stockpile 1.45mt of coal. *BC*



Floating cranes

Jay Venter

'Craneship' shipyards officially delivers self-propelled crane 'Atlas Double'

A new self-propelled crane *Atlas Double* has successfully passed the sea trials on 25 July 2014.

Technical information:

Length:	78.4m
Beam:	23m
Depth:	5.1m
Displacement:	5,180t
Speed:	7kn

Atlas Double is the next-generation crane vessel specially designed for the extreme conditions of open seas transshipment of bulk cargoes. This innovation project was carried out by the Transship Group, a leader of roadstead transshipment in the Black Sea region, in its own Craneship shipyard. It was designed by the 'Transship-design' engineering department. When the vessel was constructed, a number of revolutionary solutions were applied using the company's extensive experience in roadstead transshipment.

THE EIGHT KEY FEATURES OF THE PROJECT

- 1 The reduction of wave resistance.** This was achieved by significant dimensions and displacement reducing the effect of wave loads to acceptable values.
- 2 The decrease of wind resistance by**

applying small cross-sectional area of the topsides of floating crane, compact fore and aft superstructure, relatively low freeboard. This also minimizes the pitching and rolling of the ship.

- 3 Stabilization** by using anti-rolling ballast system.
- 4 Optimal propulsion.** *Atlas Double* has an unprecedented manoeuvrability due to azimuth thrusters mounted in the bow and a stern of the vessel. It can perform sea passages,





operate in confined waters and moor without tug boat assistance.

- 5 **High performance.** The vessel is equipped with two Liebherr cranes with capacity of 35 tonnes each and outreach up to 46m (including 10m ex-centre platform). This allows it to handle any vessels with deadweight up to 300,000 metric tonnes with high capacity up to 40,000 metric tonnes per day.
- 6 **Positioning of cranes.** The installation of cranes on swing arms with length of 10 metres allowed good positioning according to cargo plan of vessel under cargo operations. It is enough just to turn the swing arm to handle the next hold. This reduces the number of shiftings, thereby saving time.
- 7 **Automatic mooring winches.** The installed Rolls-Royce mooring winches allows the operator to move the crane vessel simultaneously along the sides of both bulk carriers involved in the cargo operations, and

even to shift along with discharged vessel.

- 8 **High righting moment.** The absence of crane counterweights, as well as increased thickness of the steel plates of crane vessel's bottom, made it possible to set metacentric height, ensuring optimal stability and righting moment.
- 9 **Developed fender protection system** allowing to work safe between two bulk carriers in conditions of heavy sea.



TTS signs contract for offshore cranes worth approximately 60 MNOK

TTS Group ASA has, through its subsidiary TTS Offshore Handling Equipment AS (OHE) in Norway, signed a contract for delivery of two offshore cranes worth approximately 60 MNOK. The contract is with a shipyard in China, and concerns the

delivery of two cranes for an offshore vessel. The vessel has been ordered by a Thailand registered ship owner. The delivery will take place in first quarter of 2016. The contract is the second contract with the yard with identical scope.

E-Crane: barge-mounted and mid-stream solutions for the bulk industry

ABOUT E-CRANE

Specifically designed for barge-unloading processes, the E-Crane is able to handle anything from coal to limestone to fertilizer to grain to scrap steel. The E-Crane is a truly versatile machine in that it can easily switch between commodities and still offer the high production required at many ports and industrial facilities. Built for 24/7 duty cycle operation, E-Cranes have unprecedented life cycles, high efficiency, and low maintenance costs.

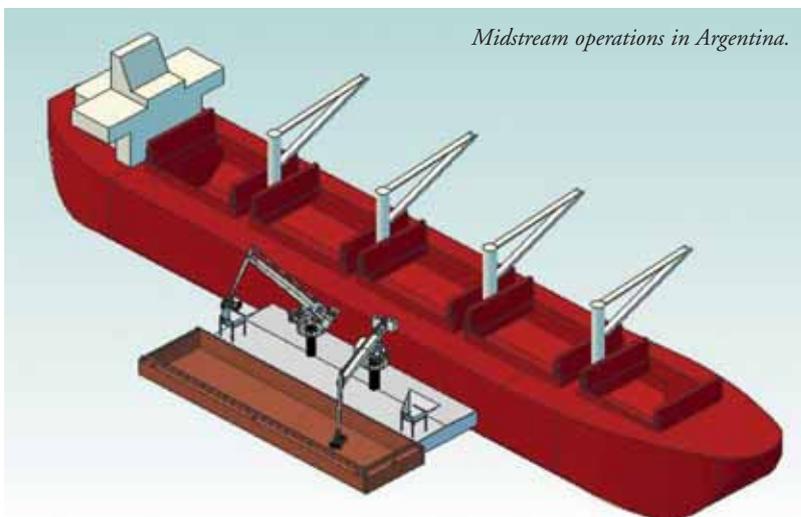
The standard E-Crane product line consists of five series of balanced hydraulic cranes (Equilibrium Cranes): 700 Series, 1000 Series, 1500 Series, 2000 Series, and 3000 Series. E-Cranes provide longer outreach and higher duty cycle capacities than typical material handlers.

Outreach ranges from 24.8 to 47.8 metres (82 to 157 feet) and duty cycle capacity ranges from 5.5 to 39 metric tonnes (6 to 42.9 US tons).

E-Cranes are regularly supplied in barge-mounted configurations, and are used to handle a wide range of bulk commodities.

BENEFITS OF E-CRANE MIDSTREAM TRANSFER OPERATIONS

In 2013 and 2014, E-Crane provided several solutions for grain handling with barge-mounted E-Cranes. The E-Crane's balanced design makes it ideal for barge mounting. The E-Crane design is based on a parallelogram style boom which provides a direct mechanical connection between the counterweight and the load. Because of this, the E-Crane remains in a near perfectly balanced state throughout its entire working range. The E-Crane allows gravity to work for you, instead of against you, reducing horsepower requirements and power consumption by up to 50% and reducing maintenance and operating costs significantly. However, along with the significant energy savings that a balanced design provides, it also makes the E-Crane ideal for mounting on a floating barge. Because the E-Crane is balanced,



Midstream operations in Argentina.

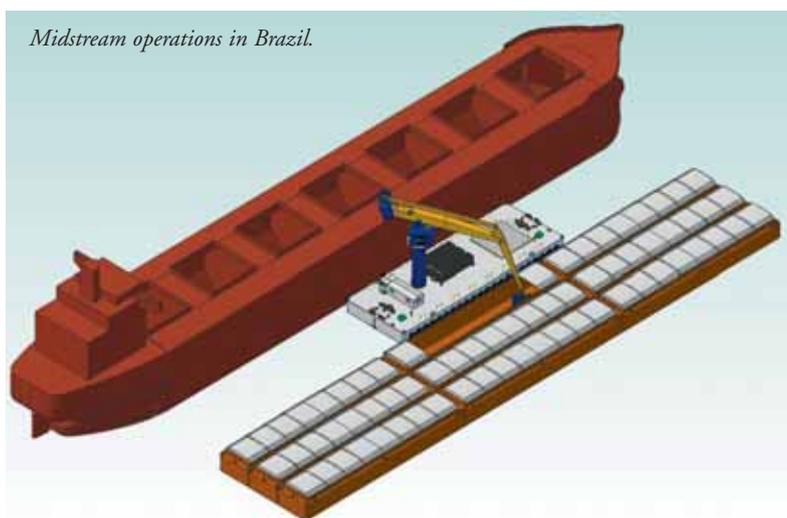
the movement of the E-Crane causes very minimal listing and movement of the barge. A barge-mounted E-Crane is also beneficial because it floats up and down along with the material barges when the water elevation changes. This means that the cycle of picking material out of the barge is never affected by water fluctuation.

BARGE-MOUNTED E-CRANES TO HANDLE GRAIN IN ARGENTINA

Once again, a company in Argentina realized the great benefits of the E-Crane for grain handling as well as barge mounting. In early 2014, an order was placed for two E-Cranes to be mounted together on a single barge. The first crane is a 700 Series/Model 4264 PD-E with 26.4m (86.5ft) outreach and a duty cycle capacity of 5.5 metric tonnes (6.0 US tons). The second E-Crane, a 700 Series/Model 4290 PD-E has the same duty cycle capacity, but a longer outreach of 29.0m (95ft). Both E-Cranes work together to unload grain from a Paraná-sized barge into two separate hoppers also located on the barge. The hopper outputs the material onto a conveyor/shiploader system which transfers the material into a Handymax sized vessel on the other side of the crane barge.

BARGE-MOUNTED E-CRANE TO HANDLE GRAIN IN BRAZIL

An E-Crane is also to be used for a similar operation in Brazil. In 2013, an order for a large 3000 Series/Model 30382 PD-E E-Crane was placed. The E-Crane will be barge-mounted and will be used to unload material barges. The material will then be directly transferred by the E-Crane to a Panamax-sized ship on the other side of the crane barge. The midstream transfer will occur along the Amazon river and will be the largest midstream transfer operation ever accomplished for E-Crane. The E-Crane will be equipped with a 30 cubic metre hydraulic clamshell grab which will be able to transfer 24 metric tons of grain in a single cycle.



Midstream operations in Brazil.



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LD Ports & Logistics newbuilt FCTU operating non-stop in West Africa

FCTU MIRAMAR, LDPL's 32 tonne Floating Crane Transshipment Unit.



LD Ports & Logistics (LDPL) celebrates its first year of operation in West Africa with a floating crane transshipment unit, achieving 'zero down time' since commencement in June last year. "Performance is not only a target it has to be an achievement," recalls Emmanuel Dür, General Manager of LDPL.

LDPL's last built FCTU MIRAMAR, a 32t (Floating Crane Transshipment Unit) delivered in 2011, and built under internal design has successfully completed its first year of operation loading iron ore from barges into Panamax in Sierra Leone. FCTU MIRAMAR is the last generation of floating crane developed and built by the company, designed to operate in full autonomy, with 100% power redundancy. She is an unrivalled tool to operate in remote areas and ensure reliable supply even in difficult environment in a cost efficient manner.

The vessel is operated smoothly by a multi-cultural team including local crewmembers trained on site, all living around the clock onboard and working in shifts. "The key to that long run success is to define regular and well planned maintenance, animate a team spirit onboard, and indeed at first carefully select: design, equipment and component." says Lucian Viorel



Pop, leading LDPL technical dept.

The absence of complicated conveyor systems combined with the full ban of hydraulic systems on board dramatically simplify maintenance procedures and reduce breakdown risk, whatever the constraints of specific minerals are. FCTU MIRAMAR has been exceeding expectations by far in terms of performance, demonstrating capabilities to reach up to 1,565tph (tonnes per hour) (37,560 tonnes per day) top rate recorded during a full loading sequence barge/hatch on a Panamax in May.

Such performance has called into question the legitimacy of using sophisticated transshipment vessels equipped with complex conveyors systems, which can barely reach similar rates handling various quality materials, while having proved very limited reliability in remote and difficult environments.

Built with a meticulous selection of highly reliable technology and equipment FCTU MIRAMAR has demonstrated this year that the concept of a 100% self-sufficient and easy to operate transshipment vessel is achievable. The FCTU is self-propelled by the means of two azimuthal propulsion systems (no need of assist tug for berthing or coming alongside vessels) and is fitted with its 'on-board' maintenance workshop and equipment so as to realize most of the regular works autonomously. Simplicity and efficiency have proven to be two major ingredients to excel in the art of transshipment and ensure continuous performance.

COMPANY PROFILE

LD Ports & Logistics is part of Louis Dreyfus Armateurs group, a French family business founded in 1851 which has continuously been a leader in the field of maritime bulk transportation and logistics.

LDPL is the specialized subsidiary focusing on Mining sector and Energy industry, proposing a wide range of integrated services in floating terminal and transportations, forging long term partnerships with leading industrial groups around the world.

LDPL has also acquired an extensive experience in development of shallow water solutions in order to 'feed' its floating terminals.

PT Mitrahaftera Segara Sejati Tbk floating cranes active in Indonesia

In the search for dry bulk transshipment solutions, it is best to be pragmatic and systematic in evaluating options. It is common for equipment descriptions to use subjective terms and phrases, such as 'innovative features', 'high performance', 'environmentally friendly', and 'latest generation'. This marketing language combined with industry jargon sounds impressive, but distorts what should be an objective selection process.

Transshipment solutions should be analysed and judged based on:

1. Buyer's requirements,
2. Operating conditions, and
3. Properties of the material.

In general, buyer requirements are related to mother vessel size, hatch cover type, and laycan period for loading or discharge of cargo. In some cases, specific requirements such as metal detector/separator and take-up sampling are stipulated. To prevent demurrage/detention damages and cargo contamination/rejection, equipment loading or discharge speeds and features must be matched to meet these requirements.

Operating conditions are both shipper controlled, i.e. transshipment fleet size and distance to anchorage point and external/uncontrolled, i.e. wind speed and wave height. It is important keep in mind that many external operation conditions vary not only by location, but also by season. While shipper controlled conditions can be adjusted, external conditions must be catered to through the selection of specific equipment, e.g. heavy-duty and cargo handling design, e.g. for open sea operation.

Different types of dry bulk, e.g. bauxite, coal, and iron ore because of varying densities and other characteristics require different type's of transshipment equipment or at a minimum key modifications, e.g. type of grab utilized. Failure to address this properly significantly decreases productivity and negativity impacts the project's economics.

'PRINCESS RACHEL' MAIN FEATURES

Class:	RINA/BKI
Flag:	Indonesia
Length:	60 metres
Breadth:	22.6 metres
Depth:	5 metres
Operative draft:	2.5 – 3.5 metres
Light ship weight:	450 tonnes
Crane:	CBG 35t swl x 35m Liebherr
Grabs:	2 x 24.3m ³
Designed daily loading capacity:	28,000 tonnes



Floating crane Princess Rachel commenced coal transshipment operations on April 2010 at Adang Bay anchorage in Makassar Strait, East Kalimantan, Indonesia.



'PRINCESS RACHEL'

Floating crane *Princess Rachel* commenced coal transshipment operations on April 2010 at Adang Bay anchorage in Makassar Strait, East Kalimantan, Indonesia.

Since beginning operation, *Princess Rachel* has loaded 217 vessels of Panamax and Capesize or total volume of over 11mt (million tonnes) with an average loading rate of 28,000 tonnes per day.

Princess Rachel's hull structure is made by duly reinforced longitudinal frame with spoon bow, inclined sterns and two skegs aft. Bilge keels are fitted on each side to the extent of about three quarters of the length of the pontoon; structural anti-rolling fins are also fitted in way of the stern skegs. It is equipped with movement damping devices and suitable dynamic factors to bear stress and fatigue resulting from continued heavy duty work in open seas have been developed and incorporated in *Princess Rachel's* design, making it less sensitive to adverse weather conditions as compared with standard floating cranes.

The crane, designed and supplied by Liebherr incorporates specific features for open water and heavy duty conditions such as: duly designed heavy duty hoisting winches, strengthened



Floating crane Vittoria started coal transshipment operations on November 2012 at Adang Bay anchorage in Makassar Strait, East Kalimantan, Indonesia.



boom, the slew bearings conceived with triple roller and four equally distributed slewing motors, four-rope grab configuration, heel and trim alarm systems, thus ensuring high turnover, efficient and effortless loading/unloading from most types of vessels up to modern Capesizes.

'VITTORIA' MAIN FEATURES

Class:	RINA/BKI
Flag:	Indonesia
Length:	94 metres
Breath:	27 metres
Depth:	6 metres
Operative draft:	4 metres
Light ship weight:	450 tonnes
Crane:	CBG 30 (25) / 28 (30)
Grabs:	20.5m ³ Peiner Smag
Designed daily loading capacity:	>50,000 tonnes

'VITTORIA'

Vittoria started coal transshipment operations on November 2012 at Adang Bay anchorage in Makassar Strait, East Kalimantan, Indonesia.

Floating crane *Vittoria* has loaded 103 vessels between Panamax and Capesize, handling approximately 9mt. Her loading rate averages 47,000 tonnes per day, with a best performance rate of about 56,000 tonnes per day. It has an annual capacity of exceeding 9.5mt. *Vittoria* is equipped with two Liebherr cranes of heavy duty offshore rope type, each with a capacity of 30 tonnes. They have beams fitted with Peiner Smag grabs of

20.5m³ capacity. The cranes are strategically placed in such a way with respect to the hoppers so as to minimize the slewing movement, thereby increasing the cycle time and efficiency. These heavy duty cranes are specifically designed for offshore operations, which mean they are more robust in construction and are able to perform even in adverse weather conditions. They are guaranteed to operate up to two metres of wave height and 25 knots wind speed.

The cargo handling system consists of two duly designed hoppers and an array of conveyor systems leading to a telescopic/shuttle shiploader. The hoppers are of 50m³ volume with a top opening sufficient to accommodate the footprint of the large grabs in use. The trunk-pyramidal shaped hoppers have asymmetrical walls to ensure the smooth flow of coal through the hoppers into the transfer chute. The hoppers are fitted with vibrators to ensure free flow of sticky coal, in order to maintain the required flow rate. The inclinations of all the conveyors have been designed in accordance to the grade of coal to be handle to achieve smooth flow of cargo and avoid back flow.

The shiploader is of shuttle/telescopic boom type with a 19-metre air draught; the shiploader is capable of swiveling by means of geared slewing rings and luffing by means of hydraulic mechanism. The shuttle length movement in excess of 11 metres gives the flexibility to deliver the cargo uniformly in to the holds of the ocean going vessels. This is crucial while loading barges with large stowages factors like coal, when it becomes important to fill in all the areas of the holds, thus avoid dead freight charges.

ABOUT THE COMPANY

PT Mitrabahtera Segara Sejati Tbk (MBSS) is a major Indonesian provider of integrated one-stop sea logistics and transportation solutions for bulk materials, particularly coal. Drawing on 20 years of experience in the business, MBSS has earned a reputation for high quality, reliable service. In 2011, MBSS successfully listed on the Indonesia Stock Exchange. In the same year, MBSS also became a member of the Indika Energy Group.

In addition to its large tug and barge fleet, MBSS has a fleet of seven transshipment vessels: five floating cranes consisting of single and double cranes, as well as two floating loading facilities with a conveyor belt system and a metal detector using a double crane. This fleet carries out transshipment of bulk materials from barges and transfers them to the anchored mother vessel for transshipment. The entire MBSS floating cranes fleet fulfills Indonesian Classification Bureau requirements, and the majority also meets the requirements of global classification societies namely Registro Italiano Navale (RINA), Bureau Veritas (BV), Nipon Kaiji Kyokai (NK), ABS (American Bureau of Shipping) dan Germanischer Lloyd (GL).

Hitachi ZW330-5 proves a profitable investment

The Colas Group has invested in a new Hitachi ZW330-5 wheel loader for its Socavi limestone quarry in Savoie, in the Rhône-Alpes region of France. The quarry in Commune de Villette, near Moûtiers, produces 200,000 tonnes of aggregates per year, which are predominantly used for construction and public works.

Since it arrived on site in July 2013, the ZW330-5 has been used for transporting the limestone materials, reshaping stockpiles and loading trucks. Approximately 70% of the material is allocated to Socavi's customers, which are largely public works contractors.

Delivered by local dealer Teramat, the Hitachi wheel loader has a three-year/5,000-hour Hitachi Extended Life Program (HELP) warranty, which includes the supply of Hitachi Parts. Colas decided to invest in the new machine following a positive experience with Teramat's after-sales support team.

Quarry manager Renaud Hatton explains: "We have two Hitachi excavators working on the quarry floor — an EX800 delivered in 2000 with 13,000 hours and a ZX650 delivered in 2002 with 12,000 hours. When we needed some technical assistance with the EX800 a couple of years ago, Teramat was able to satisfy our immediate and longer-term requirements."

This helped to establish the relationship between the two companies and ultimately led to the delivery of the ZW330-5. Operator Thierry Ougier, who has worked at the



quarry for four years, is enthused by his first experience with a Hitachi wheel loader. "I'm impressed by the visibility from the cab, especially with the help of the rear-view camera," he says. "The display is easy to read and highly visible, even on sunny days — it's the most advanced I have seen."

He finds the cab easy to access thanks to the pop-up steering column and the interior provides a comfortable working environment: "There are many storage



compartments and the climate control also allows me to work through the hot summer days without feeling tired."

In terms of performance, Ougier feels he can use the Hitachi ZW330-5 without compromise, even when fully loaded and travelling up steep inclines. "The high breakout force enables me to fill the bucket easily," he explains.

"The transmission is very smooth and, in combination with the auto ride control, it allows the wheel loader to travel fully loaded without losing any materials, even when I change gear. I can move easily and quickly around the site when loading trucks thanks to the fast acceleration."

Compared to the previous wheel loader he used at the site, Ougier has noted a reduction in fuel consumption with the ZW330-5: "The fuel efficiency is much better, but it has also greater productivity at the same time. This highlights the lower running costs of the new Hitachi wheel loader."



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Doosan launches Stage IV/Tier 4 Final articulated dump trucks

Doosan Construction Equipment has launched new versions of the company's DA30 and DA40 articulated dump trucks (ADTs) meeting Stage IV/Tier 4 Final engine emission regulations. The design of the new DA30 and DA40 ADTs goes far beyond just meeting the latest emission standards and incorporates many additional features and product improvements to establish a new benchmark in load carrying performance, fuel efficiency, enhanced controllability and high operator comfort, together with improved reliability, durability and reduced maintenance and servicing costs.



Like all Doosan ADTs, the new DA30 and DA40 models feature an articulation hinge positioned behind the turning ring to provide equal weight distribution to the front axle even during maximum steer articulation. This together with a free-swinging rear tandem bogie ensures equal distribution of weight to each wheel and guarantees permanent six-wheel contact and drive for equal power distribution and excellent performance on difficult terrain. Collectively, the forward turning point, the unique tandem bogie and the sloping rear frame results in 'best in class' rough and soft terrain capabilities and avoids the need for electronic aids such as traction control.

'BEST-IN-CLASS' FUEL CONSUMPTION

The 'best-in-class' fuel consumption of the new Doosan ADTs is down to a combination of features including new Scania Selective Catalytic Reduction (SCR) and Exhaust Gas Recirculation (ECR) diesel engines and a new ZF EP transmission, improving the transfer of power from the engine to the wheels for outstanding traction. When this is coupled with the enhanced rear differential system which reduces engine rpm and further increases machine durability, customers are ensured of an improved cost per tonne carried with the new Doosan ADT range.

The new Doosan DA30 and DA40 ADTs are powered by Scania DC9 276 kW (370 HP) and DC13 368 kW (493 HP) diesel engines, respectively, meeting the Stage IV/Tier 4 Final emission regulations through the use of both SCR and EGR technologies, with an electronic engine brake system, one of four brake systems on the trucks. The new Stage IV/Tier 4 Final ADTs do not need a diesel particle filter (DPF) to meet the emission regulations.

Specifically designed by ZF for use on ADTs, the new ZF EP countershaft transmission provides eight forward speeds [with a top speed of 55 km/h (34 mph)] and four reverse speeds. In the DA30 and DA40 models, the front differential is mounted directly onto the transmission, so there is no driveline that needs greasing and reducing the overall length of the machine for better weight distribution and a tighter turning circle. With smaller equal gear steps between gears, and a higher overall gear

spread (eight forward gears), the transmission works optimally with the engine for better fuel efficiency.

The DA30 and DA40 Stage IV/Tier 4 Final ADTs have been tested with a new tracking and management system to be launched in the near future by Doosan and have been shown to deliver outstanding fuel consumption figures to provide an excellent cost per tonne transported. This is an improvement on the already excellent figures for the Stage IIIB/T4i machines in operation around the world, which are claimed to have outperformed other machines on the market by up to 15% and, in some cases, have carried up to 10% more load.

For the DA40 model, for example, the body capacity has been increased to 24.4m³ and the payload has been boosted to 40 metric tonne without tailgate, an increase of more than 15% over the payload of the previous MT41 model from Doosan. In both the new DA30 and DA40 models, the higher speeds and payloads contribute to reduced cost per tonne rates, allowing customers to increase profits from their mining, quarrying or earthmoving operations.

In response to requests from ADT users, Doosan will be supporting the high performance of the DA30 and DA40 Stage IV/Tier 4 Final machines with a new (optional) tracking system designed specifically for use on Doosan ADTs, providing full information on payloads, fuel consumption and cycle times. In addition, the company recognizes that fuel efficiency is very much dependent on the skill and experience of the operators and for this reason, Doosan has a team of trained demonstrators available to visit customers' sites in Europe to train up drivers in the most fuel efficient way to operate units.

Other new features on the Stage IV/Tier 4 Final machines include an upgraded display with an integrated gradient meter that shows the gradient of the dump truck's trailer, helping to ensure that drivers can safely dump their loads in all conditions. There have also been changes to the displays for the time and outside temperature.

Together with a new grill with larger cooling vents, the new DA30 and DA40 ADTs both feature increased cooling capacities, allowing the trucks to be operated in the most punishing outside temperatures, as high as 60 °C and above.

HIGH OPERATOR COMFORT

The ROPS/FOPS cab has been designed with simplicity of use and operator comfort in mind. One of the most spacious on the market, it has ample room for a trainer seat, cool box and cup holder. With a noise level of only 72 dBA, it is also one of the quietest cabs on the market. In addition, the easy-to-use power steering with orbitrol valve amplifies oil flow to both steering cylinders, reducing operator fatigue by making steering light, reactive and easy.

For reduced maintenance, as well as better stability, the turning ring mounted on the front part of the truck also results in less wear on tyres and driveline. The unique driveline concept, with only two differentials, also limits component wear. Other aspects that contribute to the reduced cost of ownership include just three wear parts on the rear frame — one tandem bearing on each side of the frame and one articulation point bearing.

The new DA30 and DA40 ADTs also have only one rear differential compared to two on all

other comparable machines on the market and have only one hydraulic pump for steering, hoist and servo pressure functionality, compared to the two and sometimes three hydraulic pumps used on other trucks on the market.

Installed in the factory as standard equipment, the auto lube system is managed by the machines' VCU so that it pumps grease to all sections of the trucks only when required. A new 'one-key solution' gives operators access to all compartments of their machine via a single key.



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Metso develops works with University of Queensland and mining companies in Chile

METSO AND UNIVERSITY OF QUEENSLAND TO DEVELOP NEXT-GENERATION ENERGY-EFFICIENT MINERALS PROCESSING TECHNOLOGIES IN COOPERATION WITH THE LEADING MINING COMPANIES IN CHILE

Metso has signed a five-year strategic research agreement with The University of Queensland's JKTech division to develop next-generation technologies and services for energy-efficient minerals concentration. The agreement is part of a programme where Metso and JKTech SPA will co-operate with the leading Chilean mining companies to develop Chile as a regional innovation hub for minerals processing. The research work will be conducted at the existing mines in Chile with a very clear focus on customer strategic needs. The programme's four principal research themes are primary grinding, ball mill grinding, classification and coarse particle flotation; the main operational targets are productivity, energy and water efficiency.

"The goal of this unique research programme is to take some serious steps forward in the development of equipment and methods that will enable the construction of the next-generation mineral concentrator. A very attractive feature of the programme is that each technology offers a retrofit possibility to improve existing plant performance and can be utilized at other mines around the world as well. For Metso, the programme offers a way to strengthen both our relationship with the leading Chilean mining companies as well as our industry-leading position as the supplier of energy-efficient minerals processing technology and services," says João Ney Colagrossi, President of Metso's Mining and Construction (as of 1 October 2014 President, Minerals, Metso).

Dr. Ben Adair from The University of Queensland will lead the initiative. He has a long-standing relationship with Metso, particularly in the areas of process control and equipment application in concentrators.

Pursuing solutions to efficiently exploit the ore bodies of the future

JKTech SPA and Metso are now in discussions with the Chilean mining companies that have expressed strong interest in the research programme and the co-creation model for technology development. In addition to resources in Metso, JKTech and the participating mining companies, several experts in the various fields of study have been identified and will participate in the programme on a consultancy basis.

"We are delighted to partner with Metso in this exciting programme. The 'Next-Generation Concentrator' will provide a step change in the energy, capital efficiency and production signatures of process plants for the global minerals industry. This

initiative builds on a long-standing relationship with The University of Queensland, specifically with the Sustainable Minerals Institute, SMI-JKMRC and JKTech. Our alliance with Metso will place us on the forefront of genuine sustainability in minerals processing for the mining sector. Our time frames for implementation are aggressive and we look forward to a suite of innovation outcomes for our co-creation industry partners," states Dr. Ben Adair, deputy director of the Sustainable Minerals Institute.

"The industry is talking about energy, water and sustainability, but, so far as we can tell, most of the activity is around incremental developments and fall well short of what is needed to efficiently exploit the ore bodies of the future (e.g. lower grades, higher hardness, finer grains). The University of Queensland is an ideal partner for us, as they have been working with the industry for many years and have assembled a kind of road map to the future, which is a very compelling vision and one that we feel is within reach.

The current programme embodies a number of these concepts and simultaneously aims at reducing the cash cost of production and improving capital effectiveness," comments Kenneth Brame, president of Minerals Processing Solutions business line, Mining and Construction, Metso.

"The rising energy costs, falling ore grades, use of water, and productivity are particularly important operational issues for Chilean mines. The potential of this research programme to impact these areas in real-life cases is very exciting. The new programme also offers Metso a great opportunity to develop an even better relationship with peers in the customer organizations and to enhance the technical capabilities of Metso in Chile," says Aldo Cermentati, SVP, Pacific Rim market area, Mining and Construction, Metso.

JKTech is the technology transfer company for the Sustainable Minerals Institute (SMI) of The University of Queensland (UQ). JKTech SPA is involved in SMI-ICE Chile, which is an International Center of Excellence in Mining. The centre is one of the 12 centers established by the Chilean Ministry of Economy and the Chilean Economic Development Agency (CORFO) to develop Chile as a regional innovation hub across a broad range of industries.

Metso is a leading process performance provider, with customers in the mining, oil and gas, and aggregates industries. Metso's cutting-edge services and solutions improve availability and reliability in minerals processing and flow control, providing sustainable process and profit improvements. Metso is listed on the NASDAQ OMX Helsinki, Finland. In 2013, Metso's net sales totalled €3.8 billion. Metso employs approximately 16,000 industry experts in 50 countries.

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AUMUND belt bucket elevators move minerals at Kwale Mineral Sands in Kenya

At the end of 2013 AUMUND Fördertechnik delivered eight belt bucket elevators to the end-customer Base Titanium Ltd. via the global engineering and project management contractor AUSENCO Ltd. in Kenya. Here, Base provides the titanium mining with the Kwale Mineral Sands Project.

Operation of the complex has successfully commenced at Kwale, an area in Kenya of 56km², about 50km south of the port of Mombasa and 10km from the Indian Ocean.

The mined ore contain amongst others ilmenite, rutile, and zircon. The beneficiated materials are being lifted to the process plant by the AUMUND belt bucket elevators. The belt bucket elevators with axis-centre distances between 26m and 32m have a capacity of 6tph (tonnes per hour) to 90tph.

AUMUND is a world market leader in conveying solutions in the international cement industry and specialist in the transport of hot and abrasive bulk materials. AUMUND produces high-performance bucket elevators with conveyor heights up to 170m. In the Kwale project the challenge was less to achieve high conveying capacities or maximum lifting heights: the German machinery builder succeeded in equipping the belt bucket elevators with belts suitable for



AUMUND bucket elevator (BWG).

high material temperatures up to 140°C. "The project at Kwale demonstrates that AUMUND products provide accepted solutions outside of the cement industry as well", stresses Dr. Michael Mutz, general manager at AUMUND.

ABOUT THE AUMUND GROUP

The AUMUND Group is active worldwide. The conveying and storage

specialists have special expertise at their disposal when dealing with bulk materials. With their high degree of individuality, both its technically sophisticated as well as innovative products have contributed to the AUMUND Group today being a market leader in many areas of conveying and storage technology. The manufacturing companies AUMUND Fördertechnik GmbH (Rheinberg, Germany), SCHADE Lagertechnik GmbH (Gelsenkirchen, Germany), SAMSON Materials Handling Ltd. (Ely, England), as well as AUMUND Logistic GmbH (Rheinberg, Germany) are consolidated under the umbrella of the AUMUND Group. In conjunction with the headquarters of the manufacturing companies, the global conveying and storage technology business is spearheaded through a total of eight locations in Asia, Europe, North and South America.

AUMUND delivers conveyor for transport of hot sinter material

A steel plant in the Netherlands has ordered another conveyor for transporting of hot sinter from AUMUND Fördertechnik, Germany. The metallic plate conveyor, type KZB-S 1500/250, is conveying up to 140tph (tonnes per hour) of hot sinter material from the sintering furnace to the circularly arranged coolers. Consequently, already the second line of the steel plant will be equipped with an AUMUND pan conveyor. AUMUND is a worldwide famous supplier of hot material conveyors suitable for hot sinter.

The experience with the AUMUND conveyor operative since November 2012 gave the plant managers the reliability to convert the next line. As with the first line, the existing vibrating feeders will be replaced by metallic plate conveyors. The advantages are compelling: wear on the metallic plate conveyor is significantly lower than on vibrating feeders. Also maintenance efforts could be reduced. Thus, the operator is faced with less operating expenses and less downtime.

The new transport mode effects on the quality of the sinter as well. Since there is no more vibration as caused by the old vibrating feeder, the new conveyor creates less fines and cracks with the sinter material. Thus, the material has better cooling properties and is more suitable for the subsequent cooler. Finally the improved air flow in the burden guarantees a better usability of this sinter within the blast furnace.

In this specific case, the space available for installation of the new AUMUND conveyor was a challenge. Only a very small



The compact design of the conveyor allows a transport on a flat-bed truck as a whole. (photo: ©AUMUND 2014)

opening of the platform was available. Through this small out cut, the pre-assembled conveyor could be time savingly mounted on site. The AUMUND engineers fitted the entire conveyor into a torsion-resistant frame. This frame can be divided into five sections. As a result, each of these individual sections can be threaded through the opening provided. This approach had already proven itself during installation of the first AUMUND conveyor in the steel plant.

Delivery is scheduled for December 2014. Start of operation is expected for first quarter of 2015 after completion of the entire conversion.

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Heyl & Patterson relocates to new headquarters

In late July, Heyl & Patterson Inc., a world-renowned supplier of thermal processing and bulk materials handling equipment, announced its relocation to a new base of operations in Carnegie, PA, USA, in a move to accommodate growth.

Heyl & Patterson's new four-storey office building is 30,000ft², and is a marked increase from the single office floor it previously occupied. Built in 2000, the high-tech facility originally housed a dot-com company. It will be home to the company's administrative, sales, marketing and engineering teams.

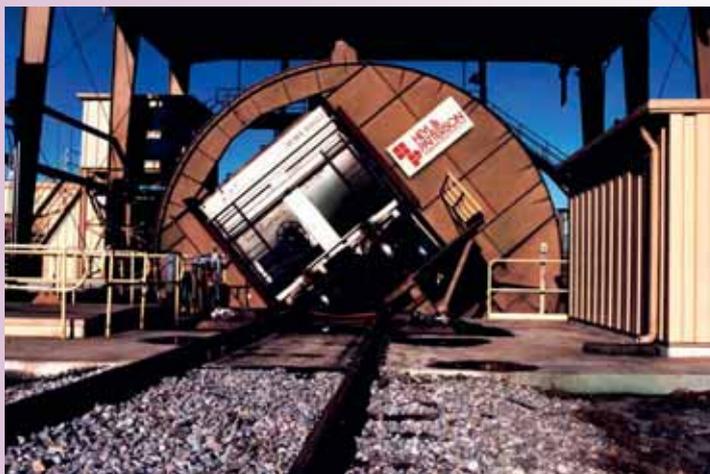
"This transition matches up with Heyl & Patterson's culture of sustainability and satisfies our near-term growth requirements," said John Edelman, President and CEO. "We plan to embrace and display the modern features of the building and deliver an open and creative environment that will match our brand as an innovative engineering company."

"We are tremendously excited to join the Carnegie business community," said Harry Edelman IV, executive vice president. "The relocation of Heyl & Patterson's headquarters to Carnegie will allow for a central proximity to our employees, faster access to our testing laboratory in Greentree and more space and flexibility for future corporate events."

A pioneer in bulk materials handling equipment, Heyl & Patterson was founded in 1887 in Pittsburgh. The company has been based at a variety of locations in the downtown and surrounding areas over the decades, and has been committed to the area for 127 years.

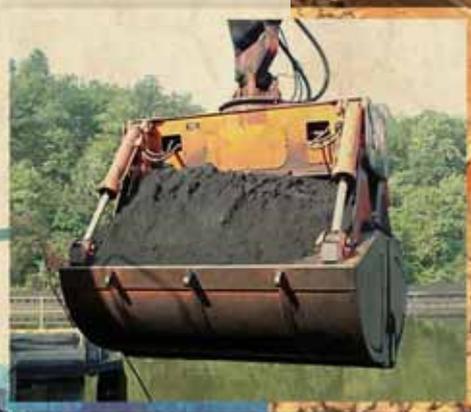
ABOUT HEYL & PATTERSON INC.

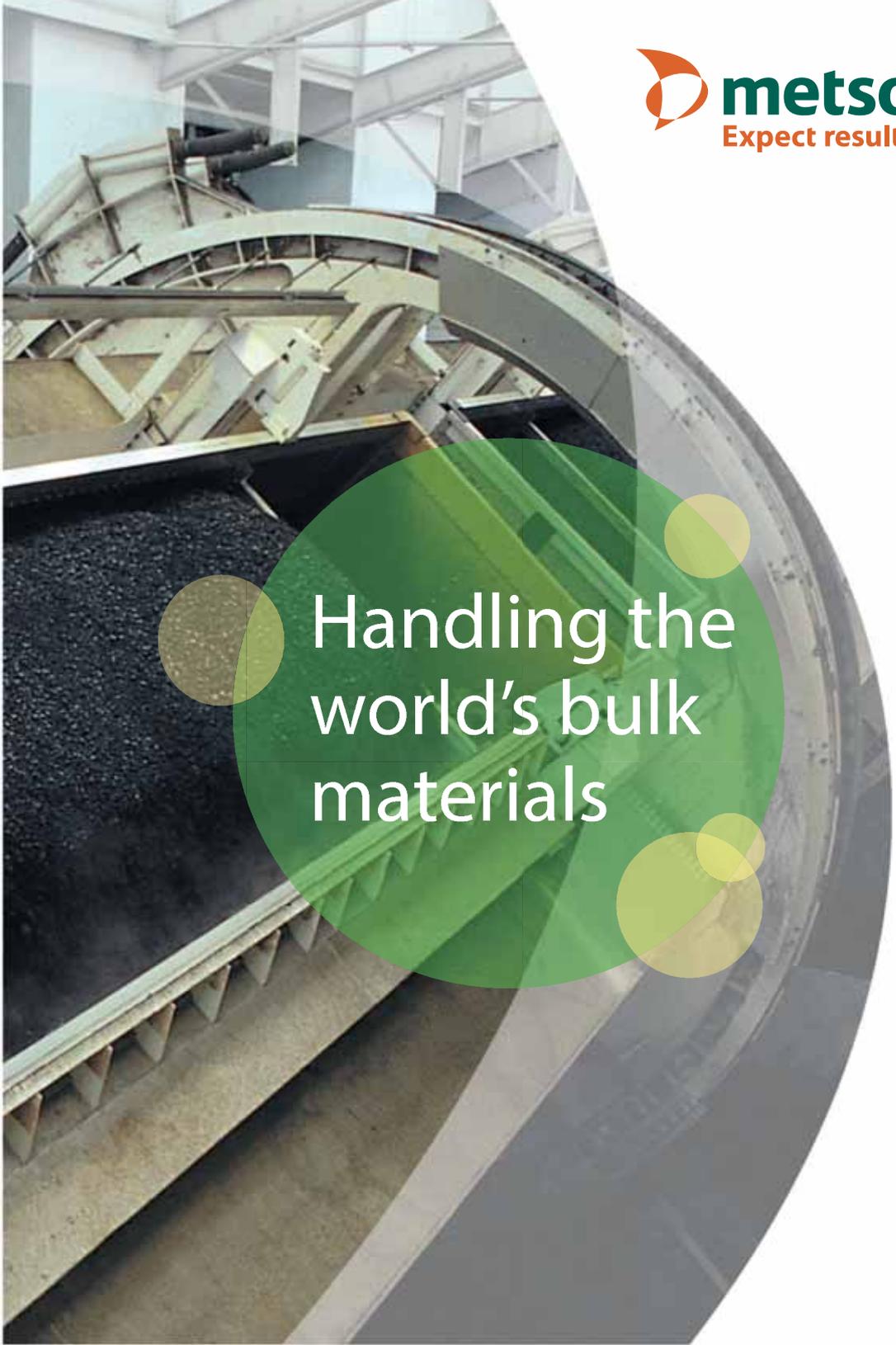
Founded in 1887 in Pittsburgh, PA, Heyl & Patterson Inc. provides high quality, custom engineered solutions for thermal processing and bulk material handling applications around the globe. Thermal processing products and services include some of the largest high-efficiency dryers and coolers in the world, as well as calciners, bulk material processors and pilot plant laboratory testing systems. Heyl & Patterson is the innovator the rotary railcar dumper and offers a wide range of bulk material handling equipment, including railcar & barge movers and barge unloaders.



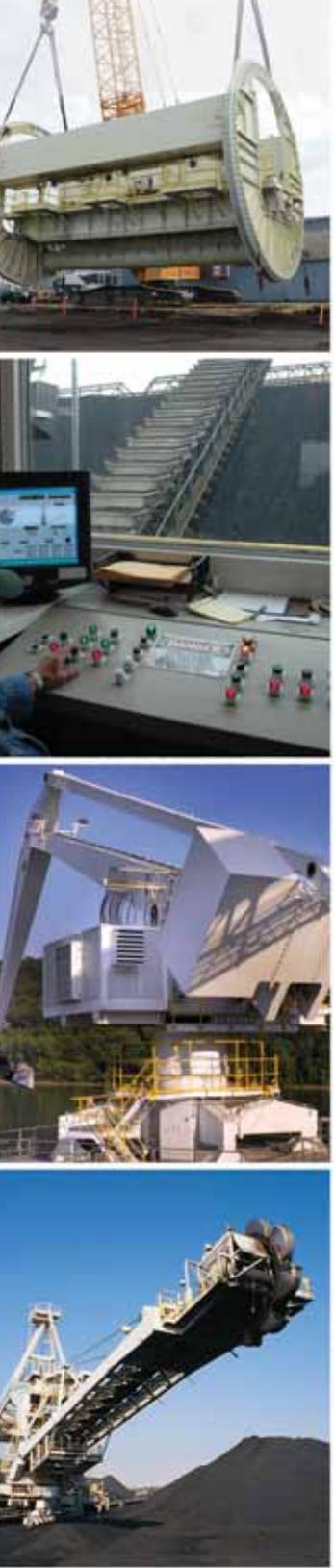
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Brazilian company benefits from Terex Port Solutions' unloading system

Terex Port Solutions (TPS) will supply the Brazilian fertilizer manufacturer Yara Brasil Fertilizantes S.A. (Yara) with a system solution for unloading raw materials for fertilizer manufacture. Two Terex® Gottwald Model 6 portal harbour cranes in the G HSK 6448 B four-rope-grab variant and two Terex® HSH 1200 DS hoppers will start work in April and May 2015 on an existing factory pier in Rio Grande (southern Brazil). They will operate in pairs consisting of one of each device for simultaneous handling on two bulk ships up to the Panama class.

PROVIDER OF A COMPLETE RANGE OF INTEGRATED SYSTEMS FOR BULK AND CONTAINER HANDLING

"With the help of such a system solution, the cargo-handling capacities can be more than doubled and use of the ship's own handling equipment avoided," explains Giuseppe Di Lisa, vice president of Sales & Service at Terex Port Solutions. From the point of view of Di Lisa, the solution also represents a milestone that speaks for TPS as a supplier of integrated systems in the bulk handling sector: "Terminal operators now not only have confidence in TPS integrated solutions for container handling, they are also impressed by our system competence in the bulk material sector. This applies all the more if special conditions prevail on the site, as is the case in Rio Grande." He goes on to say that, in particular, anti-corrosion protection measures, among other things, are provided for the new cargo-handling equipment: "This is to protect against the maritime climate and the aggressive properties of the raw materials to be unloaded, which include nitrogenous, potassium-based and phosphorous substances. TPS also uses components made from stainless steel and only paints the steel and connecting components with paints that have been proven in offshore applications."

TEREX® GOTTWALD G HSK 6448 B PORTAL HARBOUR CRANES

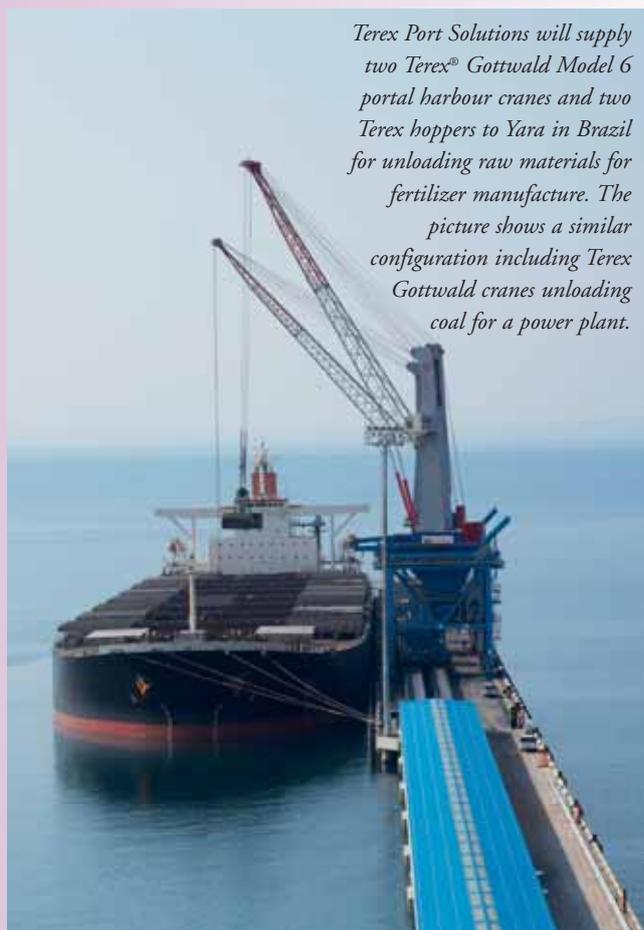
The two Terex Gottwald G HSK 6448 B portal harbour cranes for Yara, derived from the mobile harbour crane, with four-rope-grabs are equipped with portals for a track gauge of 10m and a clearance height of 7m. The permissible rail loading of 22t/m requires a total of 48 wheels (12 wheels per crane corner), which also represents an innovation for TPS after previous designs had a maximum of 32 wheels. The cranes, which feature a maximum lifting capacity of 100t, a radius of up to 51m and a powerful 50t grab curve, obtain their drive energy from the external power supply system on the pier.

TEREX® HSH 1200 DS HOPPER

The two Terex HSH 1200 DS hoppers have a capacity of 1,200tph (tonnes per hour) and run on the same pair of rails as the two portal harbour cranes, with which they are each connected via coupling rods. Thus, the hoppers do not require drive units of their own. The units, which are equipped with four pairs of wheels and a total of 16 individual wheels, have an effective dust protection system, which virtually eliminates any spilling. This also prevents raw fertilizer material being deposited on the cargo handling systems and initiating or accelerating the corrosion processes.

TEREX PORT SOLUTIONS AS A PROVIDER OF INTEGRATED SYSTEMS FOR BULK MATERIAL

Terex Port Solutions is highly experienced in developing and constructing machinery for handling bulk material. Based on its mobile harbour crane technology, TPS has successively developed



Terex Port Solutions will supply two Terex® Gottwald Model 6 portal harbour cranes and two Terex hoppers to Yara in Brazil for unloading raw materials for fertilizer manufacture. The picture shows a similar configuration including Terex Gottwald cranes unloading coal for a power plant.

various crane types, from portal harbor cranes to floating cranes on barges, and integrated them into numerous terminal structures. TPS responds to customers' needs in the global bulk market with an integrated strategy. Not only have new crane types been developed, but the product portfolio is enhanced to include complementary equipment such as hoppers. Terex Port Solutions can also provide bulk material terminals with terminal management software to help increase productivity.

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.

ContiTech opens new sales office in Peru

As a leading manufacturer of conveyor belts, the ContiTech Conveyor Belt Group offers flexible, qualified, and customer-oriented service worldwide. On 1 August this year, this business unit of ContiTech opened a sales office in Lima, the capital city of Peru. The goal is to build up a local service team that supervises projects on location.

"Peru's mining sector is the fastest growing mining sector in South America.

Many investments are being planned for the coming years. Furthermore, Peru has a large number of mineral resources that have not yet been tapped into," reports Silvia Braatz, Director of Peru Operations, and continues, saying, "Our target groups are therefore primarily mining companies and the mining industry." The team will focus on the high-quality



textile and steel cord conveyor belts made by ContiTech.

The sales office will mainly be operated by the ContiTech production location in Santiago de Chile in Chile. "With the company strategy 'ContiTech Conveyor Belts First Choice,' we manufacture according to German quality standards and our products profit worldwide from the know-how of our engineers. Furthermore, we are able to guarantee short transport routes this way," explained

Braatz, head of the sales team in Lima. In addition to the sale of textile and steel cord conveyor belts, like the ContiTech STAHLCORD® for example, the development of a service team is also being planned. Among other things, the employees will handle assembly work as well as repairs directly at the mine operators in Peru.



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AVAILABLE SENSOR APPROVALS -



BETTER BY DESIGN

Seinfra places first order for Tenova TAKRAF CSU

Open pit mining and underground solutions provider, Tenova TAKRAF, has been awarded a major turnkey contract by Secretaria Da Infraestrutura (Seinfra) — Governo Do Estado Do Ceara, for a continuous ship unloader (CSU) to handle iron ore at the Port of Pecem, Brazil. Tenova TAKRAF is part of the global total technology solutions provider, Tenova Mining & Minerals.

The CSU will have a nominal capacity of 2,400tph (tonnes per hour) and will be able to download vessels up to 125,000dwt.

The CSU will be equipped with a bucket chain elevator approximately 34.5m in height and with a slewing/lifting boom, which includes the transfer conveyor, of a total length of 42m. Discharge on the conveyor jetty will be via a vibrating feeder, a solution that has proven highly successful on other machines, and which offers a number of advantages. These include being more compact and enabling the height of the machine to be limited, considering that the jetty conveyors are more elevated than usual.

The contract was awarded in March 2014, and is due for completion in September 2016. Design and construction of the CSU is being carried out by Tenova TAKRAF's office in Italy, while its office in Brazil will be responsible for all local project activities until commissioning. The machine will be fully manufactured and assembled in China and transported to Brazil by means of special geared vessels. Transportation of the CSU fully erected from China to Brazil is one of the largest challenges of this project, considering that only a few ships in the world can accommodate the CSU's total weight of approximately 1,750 tonnes.

This major contract is the first to be received from Seinfra and is a result of a number of factors. As it will be installed in an area close to a city, the client selected the CSU particularly for its lower environmental impact. Material flow is totally enclosed with the digging foot operating in the ship hold and discharging the material through transfer chutes, maximizing dust suppression and noise reduction.

"Furthermore, the excellent collaborative effort and synergies between Tenova TAKRAF's offices in Italy and Brazil in putting together the bid were underpinned by our extensive experience and success with this technology, as well as our competitive pricing," says Alberto Dardano, managing director of Tenova TAKRAF Italy.

Tenova TAKRAF developed the bucket chain CSU in the 1980s. Since then, with ongoing enhancement to the technology, the company has supplied 15 machines worldwide. The most sophisticated part is the articulated type digging foot, for which Tenova TAKRAF Italy owns the patent.

Through the co-ordinated movement of dedicated hydraulic cylinders, the digging foot can modify its geometrical configuration to obtain the best bucket filling and reach the walls to remove material residual. Recent contracts for bucket chain continuous ship-unloaders from, for example, ENEL, the main Italian power station in Brindisi, Italy, and Civitavecchia, Italy, have once again highlighted the excellent performances that are achieved with this technology.

Tenova TAKRAF is a key supplier of equipment and systems for open pit mining & underground solutions and bulk handling, having provided hundreds of complete systems, as well as individual machines to clients all over the world in all climatic conditions. Globally sourced air pollution control, specialized handling equipment, and technology for the cement and fly ash industries ensure selection of optimal processing options.

Tenova Mining & Minerals is a total integrated solutions provider to the global mining, bulk materials handling and minerals beneficiation and processing sectors, offering innovative technological solutions and full process and commodity knowledge across the mining industry value chain.

Tenova is a worldwide supplier of advanced technologies, products, and engineering services for the metals and mining and minerals industries.

Pontchâteau plant produces 20,000th Bobcat telehandler

The Pontchâteau plant in Loire Atlantique in France has just manufactured its 20,000th Bobcat telehandler. The Pontchâteau plant produces all the Bobcat telehandlers for the world market, with telehandler design, development, production and sales organizations all based at the plant.

During an official ceremony attended by the site's 200 strong workforce, Xavier Larroque, Telehandler Products Manager and Laurent Gicquel, Pontchâteau Plant Manager, presented the keys of the 20,000th machine to roll off the production line (a new Bobcat T40180 model) to its purchaser, the Manuco dealership from the suburbs of Rouen.

The ceremony provided Bobcat management with an opportunity to emphasise how, after the difficult times experienced towards the end of the last decade, the Pontchâteau plant continues to be a successful production facility for Bobcat. Laurent Gicquel commented: "We foresee growth of around 15% in sales and 17% in turnover this year compared to 2013. This growth is largely due to good results from the agricultural sector, which represents some 49% of

Bobcat telehandler sales. The remaining 51% of sales come from the rental and construction sectors and general industry."

To underline the optimism felt by Bobcat management, various investments are planned for the Pontchâteau site in 2014 to boost production and take advantage of the strong demand for Bobcat's French-made telehandlers.

"Eighty per cent of our production is exported. Apart from France, we have a strong presence in Eastern Europe, Germany and the Middle East," Larroque added.

Currently, the Pontchâteau site produces 12 different Bobcat telehandler models, with lifting heights from 5 to 18m. But a new generation of machines is being introduced, continuing the trend set by the TL360 and TL470 models with Stage IIIB engines and the top-of-the-range T40140 and T40180 construction industry models launched last year.

Since Bobcat acquired Pontchâteau from Sambron, the plant has gone on to celebrate its 50th anniversary in 2013 and is a model of industrial evolution, driven by a passion for its products and continuous investment in its workforce.

Eurodeck weighbridges play vital role in biomass transportation in Hull

Three surface mount Eurodeck weighbridges installed by Weightron Bilanciai are playing a small yet crucial role in the transportation of biomass to Drax Power Station in North Yorkshire*. The 18-metre, 50-tonne-capacity weighbridges have been installed at King George Dock, at the Port of Hull as part of a £100m investment in biomass handling facilities at the Humber Ports, owned and managed by Associated British Ports (ABP).

The weighbridges are used to weigh vehicles transporting the biomass from ships unloaded at the quayside to the new biomass bulk handling facility within the port. Designed and built by Hull-based Spencer Engineering, this facility incorporates a 3,000m³ storage silo, conveyor system and high-speed rail loading system, capable of loading up to 30 supersize biomass rail wagons in just 45 minutes.

The Eurodeck weighbridges are fitted with Weightron's CPD digital load cells, which have established a reputation for long-term reliability and precision. The weighing process is controlled via the company's innovative DD2050 touch screen driver terminals, installed with the Weightron's powerful Winweigh weighbridge integration software.

The DD2050 terminals, which also incorporate intercoms, provide a simple, yet comprehensive touchscreen interface that guides drivers through the weighing process. This optimizes vehicle throughput and weight data collection/management. Satellite D410 weight terminals are located in the site office for local weight reading. The Weightron system also incorporates incoming vehicle card readers, card swallowers, traffic lights and control barriers. Vehicle position sensors at each end of the weighbridges ensure correct vehicle positioning prior to weighing.

Two of the weighbridges operate in one direction only with single DD2050 terminals, whilst the third has DD2050 driver



terminals and controls at both ends, allowing it to be used in either direction. This third weighbridge has been installed adjacent to one of storage sheds and provides a 'safety net' back-up for use under extraordinary operational conditions.

Weightron has extensive experience in supplying weighbridge systems to the biomass and energy-from-waste industries. A key benefit for its customers is that the company designs and manufactures all the key components, instrumentation and software within the measuring chain, thereby ensuring optimized system reliability and performance. The Winweigh software manages the weighbridge operation and peripheral equipment to streamline the weighing process, whilst providing seamless integration with the external ABP management system.

Once the conversion of three of Drax Power Station's generating units to biomass is complete, the vehicle throughput at this site is expected to be the highest for any weighbridge installation in the UK.

Paul Holland, ABP Head of Operations Hull & Goole, is pleased with the operation of the weighbridges: "Accurate and reliable weighing is an essential part of the biomass handling facility at Hull docks. The weighbridge systems ensure efficient vehicle flow and provide essential weight data. It is important to ensure ships can be off-loaded as quickly as possible and that biomass is transported efficiently to the storage discharge silo for onward transportation to Drax Power Station."

**Drax is set to become the UK's largest single renewable electricity generator through the operation of the new biomass facilities. The biomass conversion will ultimately see three of the six generating units at the power station converted to burn sustainable biomass in place of coal. Each unit has the capacity to burn around 2.3 million tonnes of biomass per annum. The first unit has been running successfully on sustainable biomass since the spring of 2013. Associated British Ports has signed a 15-year contract with Drax Power Limited to handle biomass shipments destined for the Selby-based power station.*



The Dust Assassins



keeping today's bulk handling activities clean and safe

Jay Venter

Dust control demonstration with the dbd global demo team

When a solution for dust control is needed, Den Bakker Dustcrusting technology b.v. (dbd global), is an expert in dust control and prevention. The company now has a demonstration team available. This makes it possible to show the many advantages of Dustcruster® technology at a customer's own site.

With a special self-supporting demo kit, consisting of: a tractor with a smaller 8,000-litre tank trailer, potential customers can experience the many advantages of Dustcruster®. That way, they will know what Dustcruster® can do for them, in their own working environment with the actual circumstances. Another advantage of the demo team is that the solution of dust problems can be demonstrated to the local environmental services. The correct water canon fitted to the demo trailer will be able to lay a tough and long lasting crust on every possible coal/iron ore stock pile. Also part of this demo kit is a smaller version of dbd global's mixing container which it uses to mix Dustcruster dry®. The water needed for mixing is to be supplied by the customer to create the sprayable Dustcruster liquid®.

dbd global's products are inexpensive and an environmentally friendly (natural) product.

dbd global has developed a range of solutions to help with dust control, including a range of specially designed water spraying vehicles, each having particular capacities and performances to suit the needs of a specific site or condition. The constant desire to improve led to the development of a very effective method to control dust on most of the sites where it is needed: the Dustcruster® technology.

DUSTCRUSTER LIQUID®

Dustcruster liquid® is an inexpensive and environmentally friendly (natural) product. After spraying onto coal and iron ore stacks, it forms a real 'crust'.

This crust safeguards the stockpiled product from being lifted by the wind and transporting dust, and lasts for a very long period. Rain hardly affects its effectiveness.

Only after digging into stockpiles is it necessary to repair the crust by spraying on a new layer at the disrupted area. Dustcruster liquid® has also proven to be a very effective means to settle large sand areas around infrastructural projects and has successfully been used to prevent the escape of dangerous fumes during soil cleaning operations. Dustcruster liquid® has been proven to be a better solution than many other products because of its longer setting time.

DUSTCRUSTER DRY®

In order to reduce transport charges and to allow the use of the technology on a world scale, Den Bakker Dustcrusting b.v. has created Dustcruster dry®.

Dustcruster dry® is a mixture of different fibres which are crushed into pellets and are transported in FIBC's or containers. On location, the Dustcruster dry® pellets are dropped in a special mixing tank with clean water where they transform into a liquid suspension, Dustcruster liquid®, ready for use.

Here also, the special spraying trucks are required to successfully cover the coal/iron ore stock piles creating a tough and long-lasting crust.



SPRAY SYSTEMS

Water plays an important role in controlling dust. Humidity helps dust to settle making it more controllable. Den Bakker Dustcrusting technology b.v. has also developed several systems for stationary spraying equipment.

Best known are large-capacity, far-reaching water spraying guns. These are most suitable along places where there are frequent loading and unloading activities. It is, of course, most efficient to use as little water as possible to settle dust, so the company has developed a special system to prevent forming of dust along coal and iron ore conveyer belts. These jets create a very fine water spray resulting in maximum dust settling with minimal water. An added bonus is that the road alongside the conveyer is sprayed at the same time.

CONTROLLING DUST WITH FOAM **dbd FO 312®**

Dust control when handling/crushing wood and stone is particularly problematic, as using water can cause humidity problems. Den Bakker Dustcrusting has created a system where only a small amount of water is needed to create a large amount of foam. This larger foam surface is an excellent dust collector, and results in a better dust-free working environment.

The foam is created using special equipment that requires only 98 litres of water for a maximum of 2 litres of foaming agent to make a staggering 5,000 litres of foam. The foam is quite tough and long lasting. Depending on the actual activities performed the foam can last anything from 3 to 12 days.

Apart from the benefit of less humidity problems there is a huge saving on water.

WIDE EXPERIENCE

Den Bakker Dustcrusting technology has gained vast experience in the control of outdoor dust and uses very advanced systems, stationary as well as mobile, with natural fibre and/or with polymers or other products, which can operate under the most severe conditions, including frost and strong wind.

The dbd global demo team is ready to go to any site in the world in order to analyse specific conditions and offer a valuable solution.

We will be at the
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The ACT Group designs SUPPRESSION systems for fugitive dust control

The cement, mineral and coal processing Industries are currently experiencing immense pressures to greatly reduce and eliminate their pollutants, especially their uncontrolled fugitive dust emissions. Environmental groups and public opinion are consistently championing the need to increase control over industry. Maintaining clean air and water are the driving forces that currently mobilize plant personnel to maintain vigilance.

During the past several decades, the two main weapons employed in restricting dust from escaping the plant's domain have been containment and collection. Containment has involved shrouding the product from air currents and spillage, keeping the fugitive dust encapsulated within purposely-designed chutes and steel tunnels. Collection draws errant dust into steel suction ducts, depositing the material into bins in preparation for returning it to the process flow. Both systems have made significant technical advances and they still play an important part in the ongoing fight against dust pollution.

Applied Conveyor Technology Inc., The ACT Group, has been manufacturing dust suppression high and low pressure, fog or spray systems for over 20 years.



Dust Suppression inside a container.



Stainless steel dust suppression system.

An efficient dust suppression system is usually designed to both prevent dust from leaving the main product body and act quickly to return dust to the product if it becomes airborne. There is no single solution for every fugitive dust problem; each situation brings with it its own particular set of conditions that need to be evaluated prior to resolving the matter. The vast majority of suppression problems are resolved by utilizing plain water as the medium, however in exceptional cases, the addition of chemicals to the water flow may be required.

Water is by far the most common medium used in suppression systems. It has the ability of 'wetting' extremely fine particles of dust while they are still in the body of the product increasing particle weight reducing its ability to become airborne. This effect also applies to dust that has become airborne; particles encountering wetness increase in weight and drop back onto their source. The addition of water to individual dust particles also creates a 'cohesive force', causing each particle to adhere to adjacent particles, resulting in an increase in weight promoting them to fall back to the dust source.

Low pressure spray is a form of suppression consisting of a pump capable of providing a water pressure of between 50 to 150PSI, typically driven by an electric motor (general rule of thumb — the lower the pressure, the larger the volume of water used). The water is filtered through a 100-mesh strainer in order to eliminate solids prior to being delivered to the spray heads to prevent clogging and premature wear. The unit is normally housed within a steel frame, which provides mechanical protection while on site and is easily transportable without the need of a forklift.

The system can be utilized as a temporary form of suppression or it can be a permanent fixture. Due to the operating size of the pump and motor, the unit has limitations with regard to deliverable water capacity, attaining a maximum flow rate of approximately 6 GPM. It is not unusual to see several of these units together, and each focused on a particular area of the locality, thus jointly providing an overall suppression system (Figure 1).

Systems are often customized to suit the application and



Figure 1.

location. Raw water is usually drawn from a main supply or storage tank by a booster pump; this will aid the water's passage through a series of specially designed filters, removing harmful solids prior to reaching the pressure pump and spray nozzles.

A pump (Figure 2) driven by a selected motor provides between 500 to 800 PSI of water pressure, which is then directed via suitably selected nozzles forming flat sprays over the product. The sprays are normally arranged to overlap in order to provide complete curtain coverage. Although this form of suppression system can be designed to provide a temporary solution to mobile plant, it is usually more applicable to base the



Figure 2. A pump (Figure 2) driven by a selected motor provides between 500 to 800PSI of water pressure, which is then directed via suitably selected nozzles forming flat sprays over the product.

system as a permanent dust suppression source.

High pressure fog sprays are basically systems that provide water droplets that have been generated using water under extreme pressures along with highly engineered nozzles, and need to be effective while utilizing minimum volumes of water. The atomized droplets are normally less than 10 micron in diameter.

In areas such as conveyor transfer points where dust will become air borne, it is necessary to utilize a system that will grab the fugitive dust and drag it back down onto the product. Such a system requires high-pressure sprays that form a water mist. The high-pressure system delivers filtered water between 800 to 1,200PSI, creating a mist type curtain preventing the dust escaping (Figure 3).

A simple change of nozzles allows the high pressure spray system to convert its effect from mist to actual water spray; however the water usage is increased slightly.

Fog should only be used in confined or contained areas since it is small and light. Spray, on the other hand can withstand air movement and is effective in such areas as truck dumps, open hoppers, open head chutes crushers, train dumps and ship unloading. Nozzles are spaced on the spray lines according to the intensity of the dust generation and natural air velocities.

Water sprays with foams are created by maintaining the dosing method and utilizing a

suitable surfactant, then adding pressurized air, 'foam' is produced, which can provide a blanketing effect, thus holding the product to the conveyor. The foam has an excellent residual effect, enabling the number of spray points to be reduced. An established foam system can expand the surface area of a given volume of water 60 to 80 times, thus allowing far much lower rate of moisture addition to the product.

Additional applications of the high-pressure fog system are in odour control and its ability to provide humidity in arid locations.



Figure 3: The high-pressure system delivers filtered water between 800 to 1,200 PSI, creating a mist-type curtain preventing the dust escaping.

Cost effective & sustainable solutions for dust problems using advanced technologies from The Netherlands

Today, many industrial companies try to combat dust using water or other dated methods. Wuvio Chemicals is active in combating dust using three biodegradable chemicals. Besides combatting dust, these products will generate savings on water, minimize losing the product itself and helps companies across the world in maintaining the vitality of their work environment.

Wuvio Chemicals has developed three products which solve all available dust problems;

FREKO CRUST

Freko Crust is a solution using biodegradable chemicals which forms a thin, hardened layer or crust on dust emitting goods in storage (for instance coal, iron ore, limestone, waste, phosphor or woodchips).

The crust can last up to three months and it is unaffected by harsh weather conditions (strong wind, heavy rain, hail and snow). Based on the client's need, crust duration can be adjusted to achieve cost saving. One litre of Freko Crust requires 10–20 litres of water to be distributed over the commodities.

Freko Crust has proven to work longer and better than, for example paper pulp. Freko Crust will be active for three months regardless of any type of weather. Where paper pulp loses its effect after rain, Freko Crust will be reactivated.

Freko Crust has undergone profound developments before getting to its current shape. The Crust has developed according to the demand of clients who wanted a clearly visible crust. This visible aspect appears to be very important to the (immediate) area. In there last few years, there has been a noticeable shift of emphasis from actually combating dust to showing the surroundings and local residents that action is being taken regarding dust nuisance. The best way is to combine the visible aspect with the actual function of combating dust. That is why Freko Crust is given a colour. At the moment multiple colours are available, depending on the demands of the client.

FREKO FOAM

Freko Foam is a solution using biodegradable chemicals which forms a foam layer on dust emitting goods in transit (for instance, coal on conveyor belts in a harbour). The Foam sticks to the dust particles occurring in transport and makes them stick together. Stuck together, the particles are too heavy to float. As such, the Foam prevents dust emissions for up to three days.

FREKO HUMIDIFIER

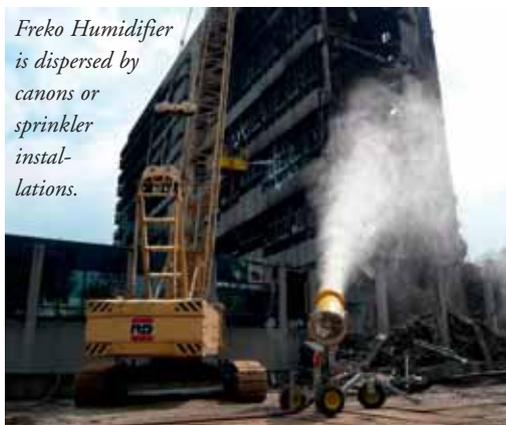
Freko Humidifier is a solution using biodegradable chemicals



Freko Crust forms a thin, hardened layer or crust on dust emitting goods and is active for 3 months.



Freko Foam forms a foam layer on dust emitting goods in transit.



Freko Humidifier is dispersed by canons or sprinkler installations.

which are dispersed by canons or sprinkler installations in industrial processes where dust particles are emitted. Examples are waste installations and discharging sites, building sites and drilling sites.

In normal situations dust particles do not absorb water due to differences in surface tension. Freko Humidifier breaks the surface tension of water, causing the dust to absorb the water, making it too heavy and more effective than untreated pure water.

BACKGROUND

Wuvio Chemicals was founded in 2003 in the Netherlands and engages in dust and odour control and sanitization in industrial environments. The company develops dust solutions by utilizing biodegradable chemicals and proprietary technologies in innovative ways.

Wuvio Chemicals started out by solving immediate dust problems in the waste processing industry. Currently it is mainly serving sectors such as storage and transshipment of coal, recycling, power generation, mining and hospitals.

Since 2008, Wuvio Chemicals has strategically started to shift its attention to Asia's booming industrial markets and the massive environmental problems it causes.

In September 2012, Wuvio Asia was launched in Hong Kong and Beijing to serve the Asian market. In China, air pollution and smog are huge problems. China recognizes these problems and they now get the attention they need so much. Wuvio Chemicals participates in solving these problems by supplying its products and giving advice to industrial companies.

This summer Wuvio Chemicals started a division in France in order to serve and operate better in the south of Europe. Besides the activities in Europe and Asia, Wuvio Chemicals will start operating in South Africa by the end of this year.



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Forged Link Chains

Florida power supplier's dust management improves safety and reduces maintenance



The new support system under the skirt board better supports the edges of the belt and helps eliminate sagging.

A key Florida power supplier has adopted a series of innovative dust containment measures on its coal handling system, helping the facility reduce potential hazards from fugitive material accumulations and significantly cut down the number of man-hours spent on clean-up. By limiting dust and spillage from one of its primary conveyors, the energy provider has reduced airborne particles and virtually eliminated a potential source of trips and falls, while allowing critical manpower to be deployed on core business activities. Preventing coal dust spillage also helps minimize wear on rollers and other moving components, saving on replacement part costs and labour.

Orlando Utilities Commission — Stanton Energy Center (SEC) is one of Central Florida's leading environmental stewards, meeting or exceeding all air permit limits with advanced pollution control equipment, while generating electricity to serve more than 342,000 residents. The company also follows a well-structured housekeeping policy with respect to its working environment, cleaning the entire coal yard and all handling equipment every day.

"Typically each day after we finish filling or bunkering the silos, the whole system is cleaned," explained Material Handling Supervisor Stuart Cason. "That includes the yard, all the conveyors, chutes, floors, impact zones and rollers. In some places, it's a wet washdown, while in others we sweep. It's seven days a week, every week of the year."

As engineers planned the upgrades, SEC contacted Martin Engineering (Neponset, IL) to review the conveyor system. The team started by looking at the areas which could benefit most from new containment technology on the 36-inch conveyor, which travels at about 700 feet per minute. "We were looking

for a better method of sealing the transfer zone, for starters," explained SEC Plant Engineer Brian Moore. "We had skirt blocks and seals in place, but they were getting old, and some of them were leaking or repeatedly coming loose."

"Coal dust is pretty abrasive, and when it got down into the impact rollers, idlers and troughers, it would pretty much eat them up," remembers Cason. "We tried everything we could think of to improve the service life, but we were constantly replacing them."

To address the situation, Martin Engineering supplied and installed a number of upgraded components, including Double Apron Seal™ Skirting, which employs two wear surfaces on a single elastomer sealing strip installed along the bottom of the skirtboard in the loading zone. When the bottom side of the sealing strip is worn, it can be inverted to deliver a second service life.

The skirtboard sealing system is installed on the sides of the loading zone to contain dust, eliminate spillage and reduce cleanup expenses. Believed to be the first dual-sealing system of its type, it incorporates a primary seal clamped to the steel skirtboard to keep lumps on the belt and a secondary or "outrigger" strip to capture any fines or dust particles that might pass beneath the primary seal.

Next, Martin Engineering technicians installed an impact cradle to better absorb the force of the falling material and protect the belt and structure. The cradle stabilizes the belt's line of travel to help prevent the escape of fugitive material. In addition, a belt support system was added to better support the edges and eliminate sagging. To maintain precise centring in the loading zone, a belt tracking system was also installed for



The high-efficiency insertable air cleaner is a self-cleaning design with filter elements approx. one-eighth the size of conventional filter envelopes.

immediate, precise adjustment. Comprised of upper and lower components, the tracker works to reduce belt edge damage, prevent spillage and extend belt life.

A key element in the material handling system upgrade was addressing the large, under-performing dust collector. “We wanted to upgrade our dust collection equipment, because we knew technology had advanced since ours was installed,” said Maintenance Supervisor Jon Janis. “Even when it was functioning properly, the old unit was a high-maintenance item,” he added.

The Martin Engineering team installed a high-efficiency insertable air cleaner with an explosion-proof motor. The automatic, self-cleaning design employs filter elements approximately one-eighth the size of conventional filter envelopes, allowing a significant reduction in the dust collector’s space requirements, so it can be installed in tight quarters.

“The old unit had a large footprint, and it was too close to the emergency reclaim area,” added Cason. “A smaller integrated unit gives us back that space and actually does a better job of filtering the air.”

The mesh-like material not only filters better, but lasts longer — while consuming less energy — than conventional filter bags. Further, the new filters allow a smaller size fan to move air through the elements, helping

to reduce the overall power consumption of the collection system. The new design features a pulse cleaning system, which uses a short burst of air sent back through the filter to dislodge accumulated material. Filter changes are a no-tool procedure from the clean side of the dust collector.

Asked to summarize the results of the upgrades, Stuart said, “For me, not having those clean-up and repair battles is a huge relief. And the whole area is a cleaner, safer working environment.”

Janis was unequivocal. “No question that the system has paid for itself. We used to spend a lot of time making adjustments and repairs, but since the install, the system has been essentially maintenance-free. It doesn’t matter what kind of coal we run, or whether the coal is damp from rain or completely dry. The fines are contained.”

“We could see the improvement right away,” Cason added. “It’s not just the savings in cleanup time, but also in preventing the idlers from wearing out prematurely. Now I don’t have to send my guys out there to replace those failed components, so it saves on labor and replacement parts, as well as the housekeeping time.”

He added that continued service excellence has helped to make OUC a repeat customer.

“Manpower is at a premium right now, and every expenditure is closely scrutinized. Martin Engineering has proven its value repeatedly. They have advanced technology, but their approach is to provide application-specific solutions, not just try and sell us the latest product.”

OUC is a municipal utility owned by the citizens of Orlando, providing electricity and water services to customers in Orlando, St. Cloud and parts of Orange and Osceola counties.

Founded in 1944, Martin Engineering works tirelessly at making bulk materials handling cleaner, safer and more productive. The company supplies flow aids and conveyor products around the world for a wide variety of bulk material applications, including coal, cement/clinker, rock/aggregate, biomass, grain, pharmaceuticals, food and other materials. 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 and the UK, and under exclusive licence with ESS Australia.



Installed at the bottom of the loading zone skirtboard, Martin Double Apron Seal™ Skirting employs two wear surfaces on each sealing strip for twice the service life.

PEBCO® introduces new Self-Contained Dustless Loading System



PEBCO® recently introduced the patent-pending, Self-Contained Dustless Loading System, or SCDLS. The SCDLS incorporates a dust collector integral with the loading spout. The system provides an innovative and extremely low profile design; and offers highly effective dust control for environmentally responsible loading of dry, dusty materials into trucks, railcars, ships, barges, and stockpiles.

An essential advantage of the SCDLS design is the fugitive dust captured is re-entrained into the product being loaded, minimizing product loss. Additionally, handling of the captured dust by ancillary equipment is not required. This design provides a complete and integrated dust control solution for loading trucks, railcars, ships, and material stockpiles.

The clean air fan includes a damper system for tuning the airflow through the SCDLS. The ability to easily tune the airflow allows application with a wide variety of products. The adjustable damper system permits the operator to capture fugitive dust without capturing the product being loaded.

Controls are available to operate both the loading spout and the dust collection functions of the SCDLS. Controls can be custom engineered for each user's specific loading requirements.

The dust collection feature on PEBCO's SCDLS-22 adds only about 20.5" to the overall equipment stack-up, making it possible to replace almost any

existing loading system with a PEBCO® SCDLS.

Also, in new projects, the reduced height of the SCDLS reduces the costs associated with steel structure and material transport systems by decreasing overall structure height.

The PEBCO® SCDLS was developed in collaboration with Donaldson/Torit utilizing their proprietary Power Core filter media and pulse system. Power Core filter cartridges are available in both conventional and static dissipating materials of construction. Cartridges are easily replaceable through large access panels located on the side of the SCDLS (with no special tools required) and all wear components are bolt in for ease of replacement.

FEATURES OF THE SCDLS INCLUDE:

- ❖ Environmentally-responsible loading of dry, dusty materials
- ❖ Innovative, and extremely low profile
- ❖ Industry minimum overall height
- ❖ Field replacement possible for almost any existing loading system that does not currently include a dust collection feature
- ❖ Power Core Filter cartridges available in conventional and static dissipating
- ❖ Donaldson/Torit's proprietary Power Core filter media and pulse system
- ❖ Dust collection cartridges easily replaced through side access panels with no special tools required
- ❖ All wear components are bolt in for ease of replacement

Seeking solutions for its customers' unique material handling problems has led to the development of several patented products, features, and options for equipment used in the dry bulk solids handling industry. It has proven PEBCO's experience, versatility, and innovation.

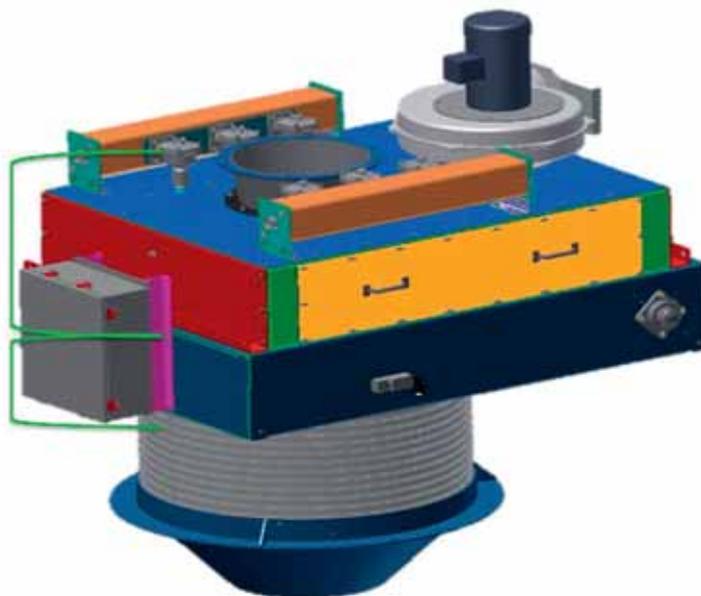
To enhance our drive for complete customer satisfaction, PEBCO's quality management system has been certified to ISO 9001:2008.

PEBCO® is recognized worldwide as a preferred manufacturer of powder and dry bulk solids handling equipment. PEBCO®, the 'Material Handling Problem Solvers'.

*16.5" Top of
inlet
Flange to Top of
DLS Body*

DLS Body +4"

*Total height
of 20.5"*



DUSTEX® – effective dust suppression – with only water and air



Example of the DUSTEX® water spraying system:



Stockpile encrustation at a coal stacker/reclaimer.

Dust is not only disturbing, but even dangerous to health. For this reason, there are legal rules in most countries for a reduction of dust emissions.

BUT HOW CAN DUST BE REDUCED EFFECTIVELY?

It is known that water is principally suitable for reducing dust emissions, as can be seen in typically dusty places after any rain shower. Unlike rain or sprinkling units that wet material completely and silt it up to eliminate the dust, a well-designed water spraying system achieves optimal dust suppression with possible low water consumption. This is the essential advantage of such systems; dust is only bound and the material is not silted up.

However, the degree of effectiveness of dust suppression with water depends on many parameters.

Beside the affinity of the material to generate dust, plant conditions such as conveying speed, fall height of the material, as well as ambient conditions have a considerable influence on the effectiveness of a dust suppression system.

When designing a water spraying system for dust suppression, this means by far more than only placing some nozzles elsewhere. The expertise of the supplier of such solutions is the crucial factor for the effectiveness of the dust suppression system.

Since 1975, VSR Industrietechnik GmbH, Germany has been supplying reliable and cost-saving solutions for the handling of

bulk materials. The product group DUSTEX® as a solution for dust suppression completed the product programme since the middle of the eighties.

Since that time, DUSTEX® dispersion and water spraying systems for dust suppression have been successful in practical applications all over the world.

Beside the actual systems for dust suppression, VSR INDUSTRIE TECHNIK GMBH also offers engineering work for encapsulation and air guide plates. These may considerably increase the effectiveness of spraying systems as they guide the dust-laden air directly to the spraying unit so that the dust can be prevented from becoming airborne.

From simple belt transfers up to complete bulk handling facilities, beginning with ship unloading and further via belt transfers up to stockpile irrigation. VSR supplies, on request, turnkey solutions from engineering up to taking into operation.

As the requirements of each customer are as individual as the bulk goods he is working with, it is very important that each solution is adapted to the specific problems of the customer.

In order to match the problem and to offer an optimal solution for dust suppression to each customer, VSR uses several systems enabling it to offer solutions specified for the requirements, even in combination of the several systems.

The DUSTEX® water spraying system works with water only. With a working pressure of up to 16 bar the water is finely atomized. The droplet spectrum is between 50–150µm as per

Examples for the DUSTEX® dispersion system:



Dumping hopper in a port near Bremen.



Railcar dumping hopper in Slovenia.



DUSTEX® fog blower at a movable belt transfer to a crusher.

nozzle type and working pressure. Among others, it is applied when it is not possible to encapsulate the site, when slightly higher water consumption does not interfere or the material humidity should be increased.

The DUSTEX® dispersion system works with water and compressed air. The centrepieces are the air atomizing nozzles with resonance head, developed by VSR, which are designed to atomize water with compressed air. The droplet spectrum of these nozzles is between 10–50µm depending on the pressure. VSR offers three nozzle types that cover a water flow rate per nozzle of 10 litres/h up to 185 litres/h. Thus it is easily possible to atomize more or less water only by a simple nozzle exchange, even after installation.

The DUSTEX® dispersion system is always applied when it is not desired to increase the humidity of the material, only airborne dust should be bound, water has to be used



DUSTEX® fog blower.

economically, or very low emission values have to be observed.

The DUSTEX® fog blower is the newest product of the DUSTEX® group. It works the same as the DUSTEX® water spraying system, only with water with a maximum pressure of 16 bar. It guarantees maximum flexibility to the user thanks to its variable applicability.

The fog blower is always applied in areas where permanently changing conditions require a flexible solution. Here dust can be bound in larger areas or material can be kept humid on changing stockpiles.

All three DUSTEX® systems have one crucial point in common. With all units, it is possible to comply with the legal regulations for dust emissions valid in Germany. In different projects where measurements have been made, the dust emissions could be reduced by more than 90%.

A short project story may illustrate the possibilities of the DUSTEX® Systems:

In a bifid longitudinal limestone storage in Romania, both conveying routes should be dedusted. The points to be

dedusted are the transfer from the inlet belt conveyor to the movable, reversible belt and the discharge of the movable reversible belt to the storage.

The chosen solution was the DUSTEX® dispersion system.

The control of the DUSTEX® system was realized by SPS that transmitted all relevant operating information of the spraying system such as pressures and flow rates to the main control room.

A main valve cabinet included all essential fittings for control and regulation of the spraying points. Two further valve cabinets were installed onto the reversing belts in order to execute the



Movable reversible belt with valve cabinet and media supply by hose drums.

changeover of the discharge side of the belt.

The supply of the media water, compressed air, electric to the movable reversing belt was carried out by means of hose and cable drums.

After the unit has been taken into operation and an optimal adjustment, it shows that the dust suppression results completely fulfilled all expectations of the customer.



Belt discharge from movable reversing belt with activated DUSTEX® dispersion system.



With DUSTEX® = no visible dust in the impact area.



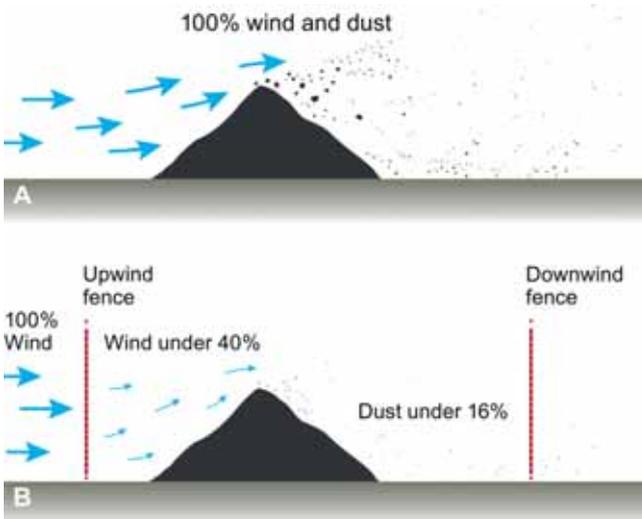
Without DUSTEX® = visible dust in the impact area.

WeatherSolve wind fences control wind, fugitive dust



Wind blows the dust, so control the wind and you control the dust. It is as simple as that. A typical wind fence dust control system is 80% efficient, and it works 24 hours a day. That is a lot of control.

WeatherSolve Structures works to solve customers' dust issues. So how does this fence work?



- A. Wind accelerates up the side of a pile eroding dust off the surface. Smaller particles rise in the air, larger ones bounce down the other side and along the ground. With a wind fence in front of the pile, wind speed is reduced so only smaller particles erode. Some of these rise in the air; others bounce down along the ground.
- B. With both downwind and upwind wind fences, particles moving along the ground stop at the fence. Many airborne particles are filtered out by the fence. Others go through and some go over. Most going over drop in the sheltered area behind the fence.

WeatherSolve has created a specialized clip for the overload release system. Poles and foundations represent the most significant portion of the structural cost; the WeatherSolve release system provides security in extreme storms. Extensively

tested in the 200mph winds of *Hurricane Andrew* and many hurricanes since then, WeatherSolve Structures allow fabric to be released from the bottom of panels and later re-clipped into place. Fabric always stays connected at the top of each panel so it never becomes a safety hazard.

WeatherSolve wind fences are among the world's largest and most durable fence systems. Features include:

- ❖ **Size:** fences over 30m tall and as long or short as needed. The largest are many kilometres long and completely surround troublesome stockpiles. The shortest are a few tens of metres long and block off key wind (and dust) acceleration zones. The poles are able to be 30m apart which helps lower the overall cost of the structure
- ❖ **Reliable:** functional in extreme weather conditions with minimal maintenance. Over 35 years of experience and engineering development has gone into the design and components. They stand up and WeatherSolve stands behind the capabilities of the structure. The structures have proven successful in a wide range of extreme environments — from marine, to northern cold to Middle Eastern deserts.
- ❖ **Flexible:** able to accommodate a wide range of equipment

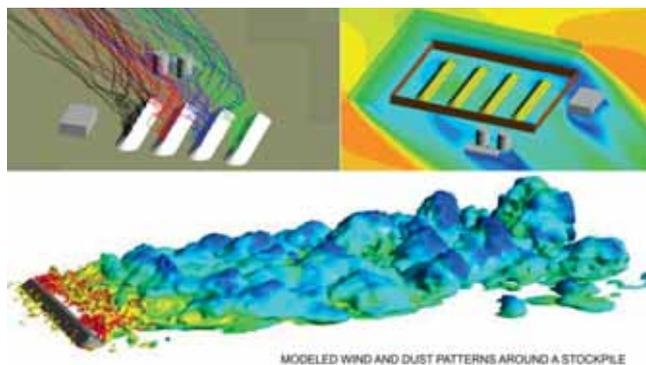
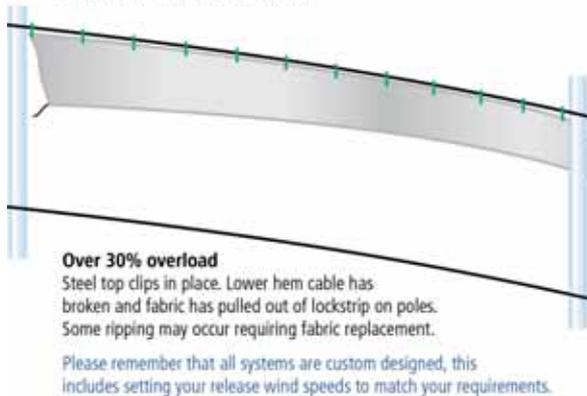
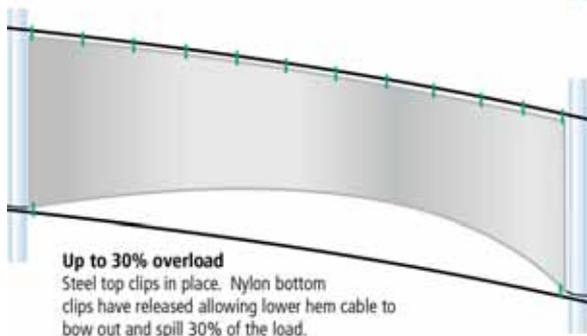
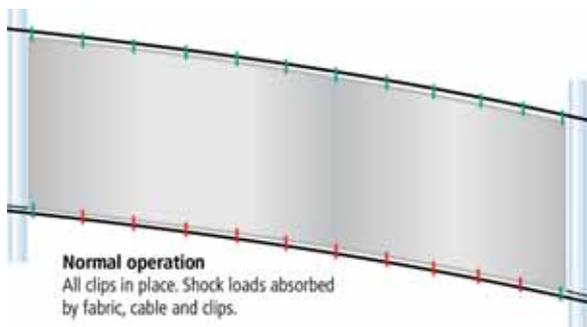




access requirements. All of WeatherSolve's fences are custom designed to suit the individual needs of the customer. The company is able to accommodate conveyors or any other equipment, doorways and gates for people or vehicles. It also has retractable systems for areas requiring regular access.

- ❖ **Convenient:** can be constructed with minimal operational disruption. This is achieved because the systems have few poles or other obstructions.
- ❖ **Portable:** for sites such as gravel crushing or sifting of small stockpiles with portable conveyors, the company has a range of portable (towable) wind fences typically 20–30ft high.
- ❖ **Adaptable:** can be adapted to suit available construction materials and equipment. The fences are custom designed to match the customer's requirements, both structurally and aerodynamically.
- ❖ **Economics:** installing a wind fence is good for the environment, but it's good for the bottom line too. For example, ore dust assays many times higher than ROM material so it makes economic sense to keep it on the pile.

WeatherSolve wind fence designs are optimized by considering turbulent wind flows and dust particle tracking results obtained from detailed large-scale virtual models. The models are solved using computational fluid dynamics run on high performance computers that can take as long as 24 hours to run a single set of computations! The modelling work is performed by Midwest Research Institute Global, a not-for-profit, independent research organization internationally recognized as an expert in the field of fugitive dust emissions.



TMSA: dust control technology is no longer an option but a requirement



Truck unloading at a port terminal in Argentina.



Truck reception pit with aspiration (TMSA, Brazil).

Environmental management and pollution control pose major concern to all sectors of mining, steel, power, cement, agro-commodities and other core industries.

Each time products are elevated, transferred or handled, they generate dust in high-volume. Dust control is a significant means of preventing explosions in bulk storage units, mainly grains and reduces environmental contamination.

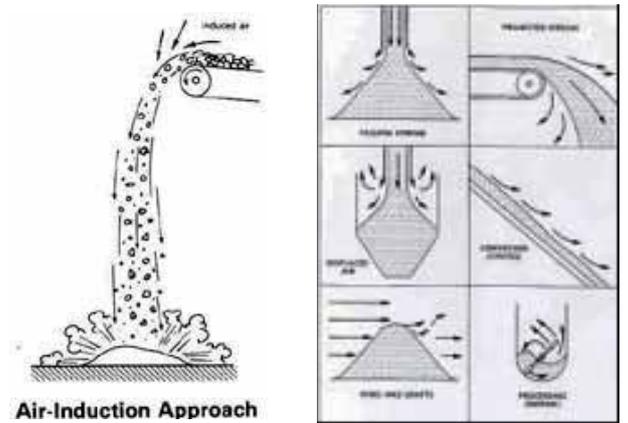
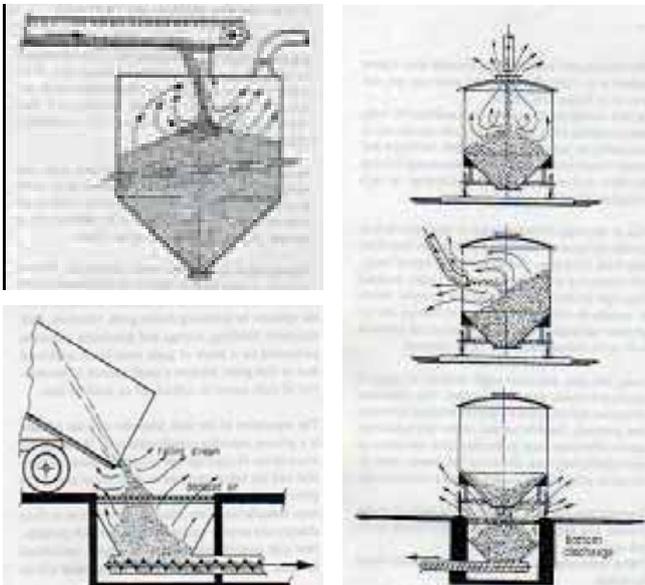
With the increase in awareness of the problems related to pollution, a challenge has arisen to solve and control the spread of air pollution. Strict environmental regulations as well as the sensitivity with respect to air pollution has motivated TMSA (Tecnologia em Movimentação SA), from Brazil, to adopt new approaches in engineering with an emphasis also on waste reduction for controlling the airborne dust emitted due to transport, transfer, storage and distribution of bulk materials.

Areas generating dust

Loading and unloading of railcars and trucks

To reduce dust emissions to the environment, to minimize explosions and fire risks, TMSA installs de-dusting systems at the emission source where the dust is aspirated, collected and treated or is controlled with very low or negligible emissions, maintaining the dust in the product flow. It contributes to reduce maintenance costs, preserve cleaner environments which improve health care, operational efficiency, and good neighbour relations.

Conveyor design also plays an important role in dust control.



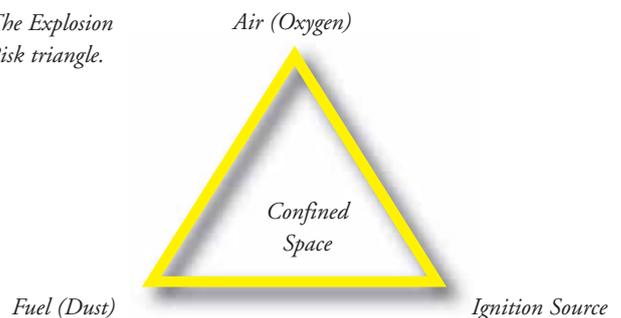
TMSA, as a strong conveyor specialist, reduces dust emission with special engineering and careful manufacturing, by:

- ❖ Conveyor designs with low belt speed / control of air flows / eliminating bumps between idlers / covered conveyors / optimal chute designs / minimizing transfer points.
- ❖ Use of enclosed conveyors: screws, redlers, specially designed belt conveyors as Manutubes (belt conveyor inside a plastic tube) and Pipe-Conveyors.
- ❖ Tight bucket elevators with good boot and head designs with no back legging and moderate belt speeds.
- ❖ Avoiding long chutes with high angles and installing speed reducers.
- ❖ Avoiding dust accumulations and dust turbulences inside conveyors.

Energy efficiency, work safety and reliability are no longer a wish list for dust control systems.

Dust can be explosive and its explosiveness depends on multiple factors. In order to assure that an explosion is not produced, the Risk Triangle with its equation 'dust + oxygen + ignition' must be altered.

The Explosion Risk triangle.





The elimination of any one of these requirements will prevent the reaction. This can be done by neutralizing ignition sources or eliminating or reducing the emissions of dust. Dust is eliminated by controlling its generation or installing vacuum systems that collect the dust in filter bags at each point of emission.

Dusts are particles with a diameter size between 1 to 100 microns, each particle type and composition influences its explosive risk. A concentration greater than 30gr/m³ of air shows explosion risk, with dust of less than 60 microns. Most grain dust is a mixture of fine and larger particles. The size of dust particles in suspension appears to be less than 63 microns in diameter. Larger particles will not normally remain in suspension without some kind of external assistance.

The explosiveness of dust generally tends to increase as the particle size becomes smaller. Dust of 40 microns particles and less is the most dangerous and should preferably not be returned to the grain stream, but taken from the collectors and stored in a bin remote from the grain storage facility.

Dust control systems

TMSA offers different tools to control the dust: conventional with aspiration/innovative with no aspiration.

For any type of dust suppression system the principle is to

suppress the dust at the source and thereby preventing it from becoming air borne. Dust suppression systems are tailor made depending upon the application and behaviour of the dust generation and requires equipment sizing and selection considerations for capturing, conveying and collecting, plus hood and ductwork design options, system balancing and testing, fans or pulse-jet or compressors and exhaust stacks.

TMSA's dust collection systems are engineered to each application offering a complete range of bag houses and styles ranging from round and square configurations.

The compact filters collect dust in each source and returns the dust to the product flow, are an alternative to centralized aspiration systems. The big advantage is their reduced size, low energy and that the collected dust is discharged directly on the dust generation point, continuing the product flow and making unnecessary the installation of dust containers and long collection tubes.

Dust control systems for truck or wagon reception pits

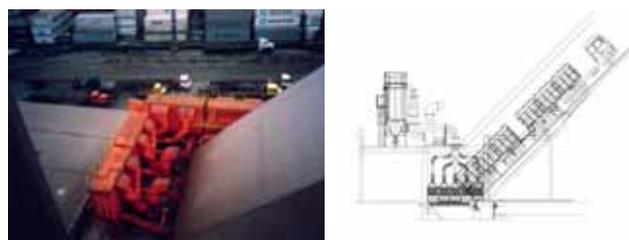
TMSA offers solutions related to hopper assemblies for receiving from a wagon or truck granular and/or grains dumped into a pit for storage or removal from the base of the pit while controlling and containing the dust during dumping.

TMSA's 'Aspiration Systems' have gravity baffles that pivot with the weight of the falling material. When unloading in the intake pit, the system only opens in the spot where the product falls into the pit while the remaining pit area stays closed. At the same time, the generated dust quantity is collected through dust collectors and sucked down through the pit by means of a fan upon which the dust is separated through a filter.

The 'DustMaster System' used in truck dumping stations,



Railcar reception with lateral dust collectors alongside the unloading area and filters.



Truck reception in dumping station with back dust collectors and gravity baffles below the hopper grid. (TMSA, Brazil)



Rectangular and round filters in centralized systems.



Vertical compact filters in individual systems.



Port terminal truck dumping station before and after installation of the DustMaster system with confined cabin (Bulktech Argentina).

provides the unique method of controlling the emission dust from a pit into which granular or grains are being dumped, with no aspiration. Control of the dust is provided by the use of controlled metering sections of louvers and dumping sections which constitute a part of the cover for the pit.

The DustMaster offers a cleaner work environment; direct payback comes in the form of lower cost installation, energy savings and savings from the reduced shrinkage.

Dust control for loading trucks, wagons, silos, ships and barges

TMSA uses conventional solutions for loading trucks, wagons or vessels as retractable or telescopic loading spouts, and has also developed and patented a special dust control system for loading vessels: the 'Dust Trap' and recently has incorporated the DSH-Dust Suppression Hopper from New Zealand.

The "Dust Trap" combines dust suppression and trimming. It reduces the dust emissions by straitening the space for product to go through the pipe, controlled by a PID circuit and sensors, makes the product itself to act like a seal against dust releasing,



DSH Hopper loading 1,500tph sugar in Santos, (TMSA, Brazil).



"Dust Trap" suppression system (TMSA, Brazil).

without strangulating its flow.

The DSH-Dust Suppression Hopper, from New Zealand, which requires no air, no moving parts nor energy, has been incorporated with great success, having interesting and successful applications in Argentina and Brazil.

This dust-free loading spout ingeniously contains the dust within the product stream when discharging dry bulk materials. Thus, it cleverly avoids the need for the more complicated retractable or telescopic loading spouts.

Traditional applications are for loading trucks and railcars, but in Argentina the DSH is solving a chronic problem in big flat storage facilities at huge soya processing plants. While loading 50,000 to 100,000 tonnes soya or soya meal silos, the dust generated during the loading is so abundant that the front loaders that work inside during unloading, are incapable of operating. The installation of DSH hoppers has solved this problem, making the environment inside the silos a workable area.

In Brazil it has been implemented in ship loaders in the port of Santos, having achieved 1,500tph (tonnes per hour) with great satisfaction and now, TMSA has received orders for DSH's loading vessels at 2,000tph and 3,000tph.

TMSA Tecnologia em Movimentação S/A, is one of the big suppliers in the South American market for bulk solids material handling, especially in port terminals and heavy duty and long distance conveyors, together with its dust control systems. The head office is in Porto Alegre, Brazil, where the company has an important manufacturing shop of 35,000m² with large and highly integrated engineering capabilities, with in-house mechanical, civil, structural, electrical, automation and de-dusting specialists; all under ISO 9001:2000 certification.

DSH SYSTEMS – WE CARE ABOUT YOUR AIR!

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

At the loading point, the DSH System concentrates the discharge of dry goods as a solid column through free air into any target repository including trucks, rail wagons, storage containers, bags or stockpiles.

The standard DSH Dust Suppression System uses no utilities and has no internal moving parts. PFC (computer controlled) model available.

Winner (joint) of the Inaugural Innovative Technology Award at BulkEx 2006.

Winner of the Dust Control Technology "Application or Practice" at BulkEx 2007.

The DSH System gives you:

- Cleaner, safer working environments
- Dust explosion risk mitigation
- Reduced maintenance, cleaning and dust handling
- Faster, continuous, cleaner loading of trucks and rail wagons
- Enables operation in closer proximity to urban areas
- Reduced product shrinkage.
- Reduced environmental agency concerns

Clients include companies handling fertilizers, grains, stock-foods, salt, sugar, sand, etc in Australasia, USA, Canada, South Africa, South America, and France.



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The practicalities and economics of dust suppression

Dust is a widely recognized industrial hazard, writes Peter Guttridge, Guttridge Ltd and Ian Walton, DSH Systems Ltd.

Capable of forming an explosive cloud, it also presents an inhalation danger for operational personnel, and can create visibility problems. Controlling dust is crucial for health, safety and environmental reasons and may also be driven by economics. Dust spreading through an operating area is lost product and has an associated value.

One of the routine operations capable of creating problematic clouds of dust is bulk material intake or outloading, from a lorry into a storage building, for example, or vice versa as product is released from a factory for distribution. During this operation even granular products such as grain, fertilizer, sand and salt can release significant quantities of dust, inhibiting the efficient and safe progress of the task. Such dust release can be especially problematic in certain areas — close to urban centres, for example — where there is particular sensitivity to air pollution.

In this paper, Peter Guttridge, Chairman of Guttridge Ltd, and Ian Walton, CEO, DSH Systems Ltd, examine the issue of dust release during bulk material loading, why it happens and the problems it creates. The limitations of conventional equipment are considered within this context alongside the potential benefits of adopting alternative, more modern dust suppression technology. Example data illustrate the cost savings associated with dust suppression and the factors that should be taken into account when evaluating an associated investment.

THE ISSUE OF DUST RELEASE

Transferring and transporting granular products is a daily task for many processors but the associated release of dust, typically defined as particles in the 1–100 micron size range, can be problematic. Figure 1 provides a clear illustration of why.



Figure 1: The release of dust during bulk outloading can present a major health, safety or environmental hazard.

The dust cloud visible here consists of fine particles that are escaping from the bulk material flow. These may originate from the 'as manufactured' product, which may have a defined fines content, or may result from attrition during transit. Many grain feeds may be transported in an 'as harvested' state that includes significant quantities of fine dusty dirt. In each case, as the material flows, these fine particles escape from the bulk, spreading into the surrounding environment on air currents induced by the bulk flow, and any prevailing wind. The result is a dust cloud that can present difficulties for a number of reasons:

Environmental contamination

From an environmental perspective the release of dust is, most

immediately, an issue of air contamination. This is an important and growing problem as the potential hazards of respirable dust are recognized, and population centres develop around facilities that may, in the past, have been some distance from a community of any size. However, fugitive dust emissions are also a potential source of watercourse degradation and their monitoring is becoming increasingly stringent for this reason too. Tackling environmental issues is becoming critical for facilities anxious to secure good community relationships and an on-going licence to operate in the face of tightening legislation.

Explosion hazard:

The fine nature of particles present in a dust can, under certain circumstances, promote very rapid reaction/combustion, which is why dust clouds formed from flammable materials have explosive potential. The lowest concentration of dust in air that is capable of supporting an explosion¹ (the 'lower explosive limit') varies from material to material but typically lies in the range 10 to 500g/m³. While this figure may seem quite low, it represents a relatively dense fog of particles and so, in practice, is relatively rarely exceeded during routine loading operations.

Operator safety

Certain dusts are known to have a direct effect on health and consequently have well-defined exposure limits. Silicosis, for example, is an occupational lung disease attributed to the inhalation of crystalline silica which, as a result, carries a NIOSH recommended exposure limit of 50µg/m³ (TWA (time weighted average) for a working day of up to 10 hours, 40 hour working week).²

More broadly however, even non-toxic dusts may be associated with a decline in lung function³ making it essential for bulk material handlers to install appropriate control and exposure prevention strategies.

Damage to machinery

Machinery that has to operate in a dusty environment may be prone to low reliability caused by, for example, inhibited lubrication and enhanced wear. The frequent change out of filters designed to protect equipment is also a time-consuming task in dusty environments. One way to prevent such problems, and to simultaneously improve the operating environment, is to adopt an effective clean-up policy, but this too is manually intensive, adding to the overall cost of operation.

Loss of product

Especially for a valuable product, the amount of material lost through fugitive dust emissions can be surprisingly high, and may justify expenditure in superior bulk handling equipment. Most bulk materials are relatively low cost but even with these products the annualized overall cost of losses can be significant.

When it comes to tackling a potential dust control problem there are three possible strategies: prevention, isolation and/or control. Conventional technology is typically based on the second and third approaches while more modern, dust suppression systems tackle the problem at source.

CONVENTIONAL BULK LOADING EQUIPMENT

Retractable or telescopic bellows are the traditional choice when it comes to loading operations. The mode of operation of this technology is relatively simple and illustrated in figure 2.

Telescopic bellows provide an enclosed route from the source of the material to its destination via a series of conical shaped ducting elements that slot into one another. These allow the length of the overall ducting to be varied to fit the application, and during loading. Bellows, around the central duct, minimize material loss.

With telescopic bellows, emptying cannot take place with the assembly fully up. The outlet is lowered as close as possible to the receiving vessel, to control material flow, but there remains a gap that is sufficient to allow dust release.



Figure 2: Conventional telescopic bellows have inherent limitations when it comes to limiting dust release.

Telescopic bellows are well established and relatively inexpensive, despite having a complex mechanical design to allow for the lifting up and down involved with their use. However, cables, pulleys and associated electrics are required for operational control and these, in addition to the number of moving mechanical parts, impose a substantial maintenance burden.

From a practical perspective, telescopic bellows are a flexible choice for different loading operations, but troublesome for lorries with cross members, since these bars can inhibit optimal positioning. Furthermore, as product emerges from telescopic bellows in an aerated state, air-induced segregation, the separation of dissimilarly sized particles, is also a potential problem. This can compromise the homogeneity, and value, of a product, and cause flow problems during discharge.

For many the biggest drawback of telescopic bellows, though, is the issue of dust release. In some installations this is tackled with integral dust extraction systems, others employ air extraction to minimize dust generation, or filter out fines ahead of transport. Stringent clean-up procedures are an important control measure in many facilities. But all these complexities add to the overall cost of operation and highlight the multiple advantages of applying a solution based on prevention, rather than isolation and control.

INTRODUCING THE DUST SUPPRESSION HOPPER (DSH)

The Dust Suppression Hopper (DSH) prevents the formation of dust clouds during the transfer of granular solids. Figure 3 shows a DSH operating in the exact same environment as the telescopic bellows shown in figure 1, demonstrating its performance.

Originally developed to tackle dust emissions at a fertilizer plant, the DSH is now used for a range of materials including:

- ❖ Foodstuffs — salt, sugar
- ❖ Minerals and quarry products — bauxite, gravel, kaolin,



Figure 3: With a Dust Suppression Hopper (DSH) the clouds of dust visible in figure 1 are simply eliminated at source.

sands, soda ash

- ❖ Grains and stock foods — corn, barley, sorghum, soya beans, wheat
- ❖ Fertilizers— superphosphates, lime, potash

This list is far from exhaustive and recent additions include compressed wood pellets and other pelleted products for the biomass industry. In general suitable materials are dry, granular and free-flowing, as fine, sticky powders do not perform so well.

The design of the DSH marks a radical departure from conventional telescopic bellows (see figure 4) and produces a denser, less aerated flowing material phase.

A conical outer hopper is suspended from the top frame of the unit by a number of springs, and a safety chain. Within the hopper is a central plug which remains stationary at all times. As material flows into the DSH its weight causes extension of the springs and the outer hopper lowers relative to the stationary central plug. This opens up an annulus, allowing the material to discharge. However, flow is maintained only if there is a sufficient head of material to provide the downward force necessary to extend the springs. If not then the annulus will close. In practice the outer cone gently oscillates up and down during discharge, as the balance of forces between the non-linear springs and weight of material fluctuates. This action maintains the characteristic solid-looking stream of product.

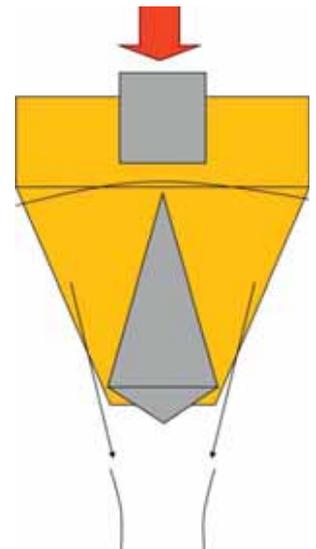


Figure 4: Schematic showing the operating principle of the DSH.

Unlike a telescopic bellows a DSH is installed directly beneath a feed point, suspended at some height above a target, such as a lorry filling bay. Aside from the constrained up and down movement of the hopper this height is maintained throughout discharge. Most of the complexities associated with the telescopic bellows design are therefore eliminated. The DSH has no internal moving parts and requires no utilities for operation.

The way in which the DSH operates leads to material discharge in the form of a densified, almost solid stream containing very little air. As material flows into the hopper, from

the feed silo, natural agitation and settling lead to limited air release. Then, because the material is pushed out of the annulus against the opposing pressure of the springs it undergoes a further 'squeezing' action. The result is a 'condensed' stream of material that is extremely tolerant of fall height. During transfer any dust present is entrained, and drawn down into the material column, and there is minimal dust emission when the product hits the ground. The squeezing out of air also largely eliminates segregation.

The simplicity of the DSH translates into low maintenance costs and the almost complete prevention of dust release for a many industrially significant bulk materials. However, the DSH, like many newer technologies, carries a higher upfront capital cost. This raises the question of how to financially assess different options for bulk materials loading and how to put a value against the potential benefits afforded by alternative systems.

PUTTING A VALUE ON DUST SUPPRESSION

Right at the beginning of this paper we discussed the reasons why dust control is important. Returning to this list of reasons helps to formulate a strategy for assessing the value of dust suppression technology and to highlight areas where value might accrue. Where dust suppression measures make the difference between a site maintaining its licence to operate, or not, then their value is clearly very high. The need to meet regulatory controls is similarly non-negotiable. In other instances though the arguments are more nuanced, creating a requirement to quantify the value of mitigation measures against their costs. The following simple calculations illustrate how savings can be calculated for some of the potential benefits.

Reducing clean-up costs

A daily discharge operation results in two hours of clean-up for one operator.

Assuming an hourly rate of £10.00 per hour and weekday operation this equates to £5,200 per year.

If the dust suppression technology can reduce the amount of cleaning effort required by 85% then this equates to an annual saving of £4,420.

Eliminating fugitive fines

An operator handling product in 26-tonne loads estimates that each load contains 50kg of fugitive fines. 10 trucks are loaded each day, for five days a week, for 48 weeks of the year.

In the course of the year the total amount of fugitive fines potentially lost is therefore 120 tonnes.

The cost of the product is £100 per tonne so if dust suppression technology reduces this figure by 90% that equates to an annual saving of £10,800

Overall product loss

A potash manufacturer transports product by truck, rail and container. The scale of the operation is 35,000 tpa of product which has a sale price of around £300 per tonne. Estimates suggest that across the operation product losses may be reduced from 0.1% to 0.05 with the installation of dust suppression technology.

Halving the product loss reduces the cost associated with it from 35 to 17.5 tonnes per year, producing an annualized saving of £5,250

IN CONCLUSION

For many bulk material handlers dust control is a critical issue, especially during loading operations. Being a 'good neighbour' is increasingly important for companies with strong ethical policies and on a more pragmatic basis can play a crucial role in operational longevity. Stringent health, safety and environmental laws are a powerful driver for improvement in many countries.

The Dust Suppression Hopper (DSH) prevents the formation of dust during loading operations tackling this potential problem at its source. Experience suggests that this technology not only solves critical HSE issues but also pays its way with economic benefits accruing in the form of reduction in clean-up, maintenance and product loss.

References:

¹ <http://www.dustexplosion.info/dust%20explosions%20-%20the%20basics.htm>

² <http://www.silicosis.com/niosh/>

³ http://www.iom-world.org/media/93355/ioms_position_on_oels.pdf





Rope Grabs

THE LEADER IN DRY CARGO GRABS



Diesel Hydraulic Grapples

Diesel Hydraulic Buckets



Radio Remote Controlled Single Line

Dust suppression via remote control: breakthrough at US scrap recycler

The 29-acre PADNOS facility in Holland, MI primarily handles metals, such as scrap from stamping plants and other metalworking operations.



PADNOS has been re-purposing recyclable materials for more than 100 years, serving industrial and commercial accounts throughout the US, as well as consumers in and around Michigan. With 21 locations, the company accepts a wide range of materials, including paper, plastics, ferrous and non-ferrous metals, such as iron, steel, stainless, copper, aluminium and brass. Among

its primary customers are foundries and mills that re-use the valuable materials as feedstock for new products.

The firm has also made a significant investment in the processes and technology to recycle paper and plastics — and more recently, electronics — continuously building relationships with scrap dealers, logistics providers and buyers across the

PADNOS selected a DustBoss® DB-60 to deliver suppression over three processing centres, covering about three acres in all.





Rugged Energy & Data Transmission Systems

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!

www.conductix.com



Motor Driven Reels

- Monospiral and Level-Wind configurations
- Rugged and dependable magnetic coupler for dusty environments



Cable Festoon

- Corrosion-resistant, long-life rollers; precision sealed bearings
- Systems customized for the application
- Preassembled option, for easy installation

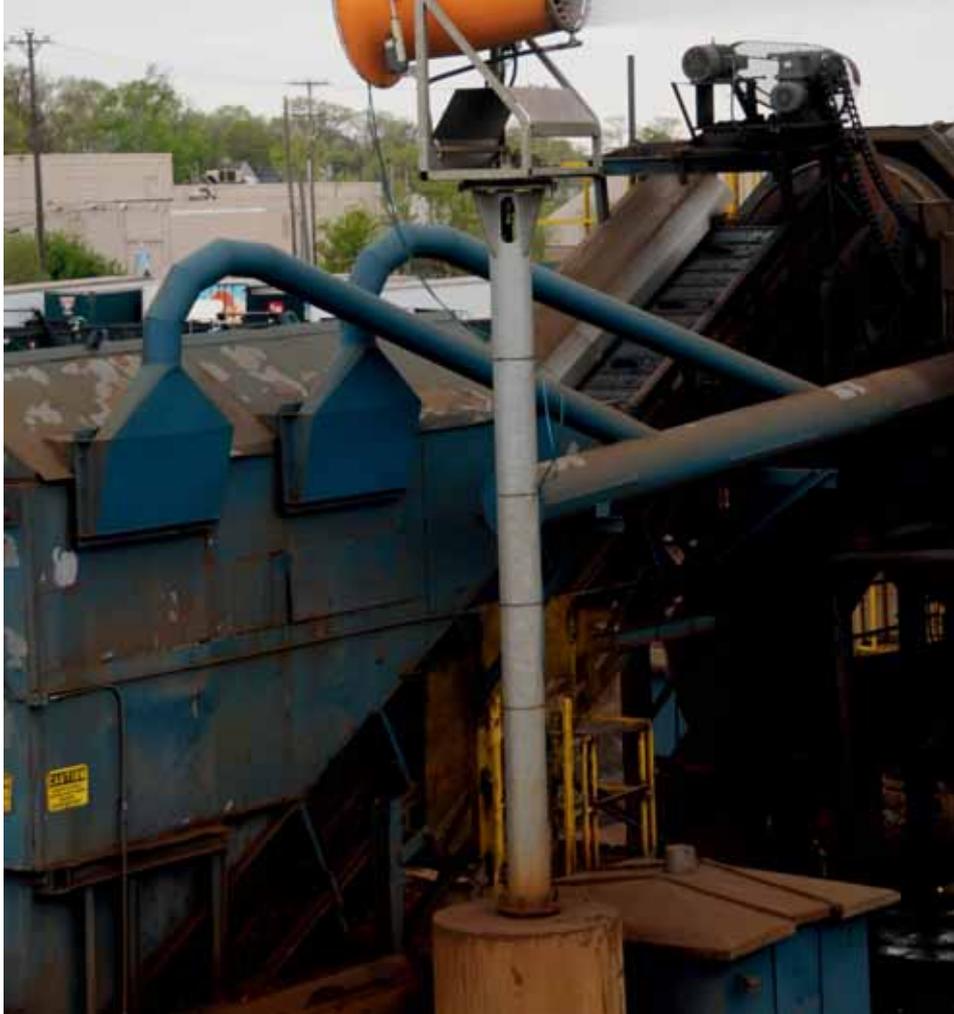


Cable Chain

- Rugged design for demanding environments
- Long operating life
- Custom-configured

CONDUCTIX
wampfler
DELACHAUX GROUP

Supplied with a 20ft (6m) mounting tower, the DB-60 was installed atop a 10ft (3m) concrete pedestal to increase its range and aiming ability even further.



company officials wanted to take proactive measures to ensure that dust would not create a nuisance for the surrounding community or create a workplace hazard.

SEARCHING FOR THE RIGHT DESIGN

After investigating several manufacturers and reviewing its equipment choices, PADNOS selected a DustBoss® DB-60 to deliver suppression over three processing centres, covering about three acres in all. “Other than basic material handling, the main dust-generating activities are shearing, shredding and bricking,” Karger continued. “Our goal is to ensure that airborne particles don’t leave the property.”

The DB-60 is supplied by Dust Control Technology (Peoria, IL). The atomized misting unit generates millions of droplets specifically sized to maximize dust suppression, and then launches them over large distances in an engineered air plume created by a powerful ducted fan.

A 25 HP electric motor gives the machine a reach of nearly 200 feet (about 60 meters), allowing the oscillating unit to cover an area as large as 125,000ft² (more than 11,600m²) with a virtual dust blanket. Supplied with a 20ft (6m) mounting tower, the DB-60 was installed atop a 10ft (3m) concrete pedestal to increase its range and

aiming ability even further. The control panel, booster pump and three-way valve are located inside a shed for protection.

country. Now in its fourth generation of family management, the firm strives to leverage a century of scrap management expertise, implementing industry best practices for optimal efficiency, while maintaining the highest level of environmental stewardship.

As part of that philosophy, PADNOS is constantly developing and refining its approach to fugitive material management, with a goal of preventing the escape of any dust or spillage that may be generated by its activities. In late 2012, the company researched equipment to deliver open-area dust suppression at its downtown location in Holland, MI.

“The site is about 29 acres,” explained purchasing director Bruce Karger. “We handle primarily metals at this facility, such as scrap from stamping plants and other metalworking operations, as well as peddler scrap from our smaller yards,” he said. “Most of it comes in by truck, and it’s moved by front loaders and cranes, though we also have rail and barge service.”

The loaders feed a shredder and a large shear, one built by Metso Texas and one supplied by Universal. Both have integrated dust suppression, but the outflow dries fairly quickly, especially in hot weather. Subsequent handling of the shredded material inevitably creates dust, which can migrate long distances if left unchecked. Surrounded by businesses and neighbourhoods,

aiming ability even further. The control panel, booster pump and three-way valve are located inside a shed for protection.

“We’ve used hoses and sprinklers in the past, and at times we’ve had our own water trucks on-site,” commented superintendent Tim Driesenga. “But the suppression performance wasn’t what we had hoped for. We’ve also tried dust suppression equipment from other suppliers,” he said. “But when we compared results from the machines we had to the DustBoss, the DB-60 was far more effective, clearly a higher-quality design. It does a much better job of knocking down the dust and keeping it down.”

From the time of its initial arrival, the PADNOS team was pleased with the results of using the DustBoss. “The performance of this design is better than any method we’d tried in the past, and eliminating the manual spraying presented immediate labour savings for us,” Driesenga said. Though it’s one of the largest models DCT offers, the DB-60 uses less than 24 gallons (90.85 litres) of water per minute, even with the booster pump raising pressure to 160 PSI (11 bar).

REMOTE CONTROLS

The unit was originally supplied with four optional remote controls, giving loader operators the ability to turn the unit and

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the oscillation on or off at any time. The oscillation range, however, was only programmable at the panel. Although the system performed well, operators noticed an opportunity to even better serve the unique layout and work flow at the Holland plant, so they contacted DCT to discuss some possible modifications to the system.

“We felt that we could make dust control even easier and more efficient for the operators who are moving our material,” said Driesenga. “The easier the equipment is to operate, and the more efficiency we can build into the dust management process, the more likely that the equipment will be used, and used correctly,” he added.

During the initial meeting, Driesenga explained that loading and unloading could take place at nearly any point within the roughly three-acre area, and the 359° oscillation was a key to reaching those activities. But the relatively slow oscillation speed prevented a quick rotation of the barrel to focus on an arriving truck. Operators had to wait for the machine to oscillate to the required spot.

The big question was whether DCT could redesign the unit to reach any point on the oscillation arc in 30 seconds or less, AND build the control capability into the remotes that the company already had. Adding the ability to set the arc remotely would also be a huge bonus, relieving operators from having to visit the control panel.

“The first reaction we got was ‘We’ve never done that before,’” recalled Karger. “But no sooner was that said, then the DCT team got busy with us to figure out exactly what features we needed and how it could be done. We were extremely impressed with the technical assistance they provided in developing the concept and turning it into a working reality.”

Engineers from DCT decided that they could achieve the desired repositioning speed by replacing the fixed-speed oscillation motor with one that turned approximately 4x faster, coupled to a variable-frequency drive (VFD). To avoid having to ship the unit back to IL for the revisions, DCT personnel performed the gear motor change-out, panel modifications and VFD installation on-site.

While maintaining all existing controls on the remotes, DCT technicians also added the ability to select from eight pre-set oscillation ranges, which could be programmed by operators from the modified panel with its touch-screen display. Finally, they added a ‘Jog Left/Right’ switch and a ‘Home’ button to the remotes for quick repositioning.

“With the modified remotes, we have much more versatility in aiming the DustBoss and quickly bringing it to the exact location needed at any given time,” observed Driesenga. “And the oscillation arc can be changed even while the oscillator is running.”

Constant air monitoring at the PADNOS site have confirmed the machine’s effectiveness, helping the company to remain in full compliance with air quality regulations. “We recently had an inspector review our operations this past summer, and he commended us on our dust control measures,” Driesenga concluded. “The results were better than he expected.”

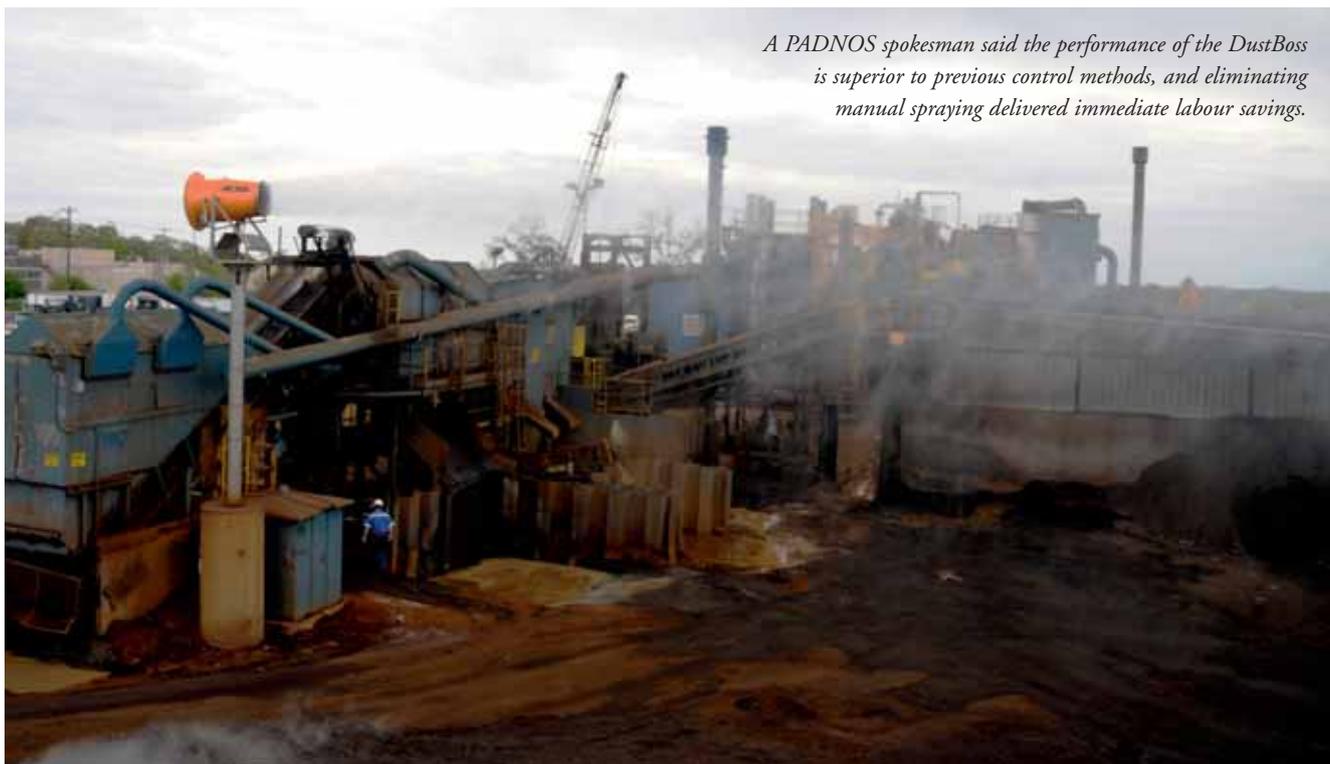
Added Karger: “I feel like these are the tools that enable us to do a better job of preventing dust from leaving our property. For us, it’s taking our dust management to the next level. In fact, we have plans in place for another unit.”

PADNOS handles recyclables for industrial and commercial accounts in the US. From California to the far Northeast of Canada, the firm actively manages scrap for clients with accuracy, efficiency and control. The company prides itself on developing efficient, environmentally-responsible processes for all phases of its business, with a culture that fosters collaboration, creative problem-solving and continuous improvement.

Dust Control Technology is a global leader in dust and odour control solutions for scrap handling, recycling, demolition, mining and rock/aggregate processing.

The company’s DustBoss® product line delivers both airborne and ground-level dust suppression, helping to reduce labour costs vs. manual sprays and free up manpower for core business activities. The automated units also use less water than hoses and sprinklers, with some customers realizing payback in less than six months and netting an annual cost savings of more than \$50,000.

A PADNOS spokesman said the performance of the DustBoss is superior to previous control methods, and eliminating manual spraying delivered immediate labour savings.



Loading bulk using containers eliminates dust emissions: ISG shows the way

*Dust emissions can be a real issue during the bulk handling process.
(photo: ©Mercator Media 2014)*



ISG Pit to Ship Solutions has designed a dust free logistic system to transport products from the mine site into the ship's hull using sealed containers and a tippler. The product is not handled again until it is tipped into the ship's hull, says Garry Pinder, Managing Director of ISG Pit To Ship solutions.

The system involves the use of sealed containers and current port infrastructure in either bulk or container ports. Moreover, the system can be set up and running in six months, compared to the five years with other current systems. When looking at the benefits of this system, we can see that there is no product loss, no pollution out of the container or into the sampled product, there is no need for expensive and labour-intensive storage sheds or conveyor belt systems.

Containers are loaded at the mine site and then taken to the port either by road or rail. Then, at the port, whether it's bulk or containerized, the containers are block stacked awaiting the ship's arrival. Once the ship has arrived, the containers are taken around to the key side, using a tippler attached to either a land-based crane, ships crane or overhead crane. The containers are lifted into the ship's hull where once inside the hull the ISG patented lid lifter lifts the lid off the container, the container is then turned 360 ° and the product unloaded. The lid is then returned to the container inside the ship's hull and the container goes back to the stack ready to be transported back to the mine site to continue the process all over again. The containers never leave the country and are used in a round loop process from pit to ship.

This system is environmentally friendly and provides ports with another string to their bow by using current port equipment. The only additional equipment the port needs is a

tippler. Mining companies have no more environmental dust issues, their product is not lost during the transport and loading process, and they can move the containers to their next project when finished.

In Australia, copper concentrate class 9 dangerous goods are being loaded next to pristine white beaches and yacht clubs, without dust residual located outside the ship's hull. Mineral sands and iron ore are also loaded at the same port using containers and tipplers, and all are given the tick of approval by the Environmental Protection Authority (EPA).

SHIP BLENDING

The beauty of this system with copper and mineral sands is that you can sample at the mine site knowing that no pollution can get into your product. You can also block stack your product, so when you are blending in the ship, you have different classes of your product already sampled to blend in the ship. For example, you can advise port operators to use 200 of one stack, 50 of another stack and another 100 of a third stack to provide the required blend you need.

ISG containers have been tested to BK2 and ADG7 ISO codes, we also cycle test our container and have full Finite Element Analysis (FEA) reports with all containers. ISG has the patent on the tippler lid and lid lifter, and a patent pending on other features including our corner casting design that stop product from flowing into the corner castings. This feature reduces crane down time and product spill on the quay side. Furthermore, ISG has produced a bulk 20ft container for iron ore in the Congo with EXXARO that has a payload of 40 tonnes, most bulk containers have a payload of 32 tonnes. Our internal

Containers are loaded at the mine site and then taken to the port either by road or rail. (photo: ©Mercator Media 2014)



bath tub design also stops product hang up.

There is no standard container for all commodities, each product type has a different Specific Gravity (SG) and this determines the container height. The tippler is designed to use gravity to assist in the turning cycle and product height is critical to this operation.

The pride of the fleet is the copper and mineral sands containers as these commodities are at the high end of the mineral value price. We have designed our containers to be sift-proof and the lid is an automatic design that is locked when the lid is placed on them at the mine site and is only opened inside the ship's hull with the tippler, this is an automated system with no manual labour required.

Our iron ore container can also have the lid option to stop dust and the container being filled with water in high rain fall areas. Furthermore, our nickel and coal container design allows for high cubic loads.

Once government officials and environmental advocates understand this system and see the green potential, there will be a domino effect. Port authorities with low export rates will also perceive a new opportunity to gather business that was previously out of their reach.

IS THIS PROCESS COST EFFECTIVE?

If you were building a green field port, setting aside the traditional infrastructure you need like the quay side, roads etc., you would need another US\$30–50 million for storage sheds. Containers cost around US\$10 million depending on the amount, a

conveyor belt system costs around US\$100 million, tipplers costs around US\$450,000 each, and normally three tipplers are purchased by the port and the containers are purchased by the mining companies. So, when making the comparison, you would need US\$150 million including a dust problem or else around US\$13 million and no dust problem.

If you currently have a container port, you only need the containers and tipplers, all the other infrastructure is in place. An overloaded bulk terminal can store the container several miles away and road them in when the ship arrives, using the ship cranes to load them into the ship's hull. Currently, there are different good practice examples of this system in Chile, Argentina, Africa and Australia. At present, the benchmark is in Australia but the other locations are catching up.



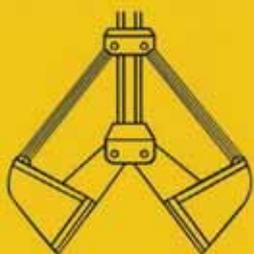
The tippler uses gravity to assist in the turning cycle. (photo: ©Mercator Media 2014)



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SWAP technology for bag cleaning: dust control in action

NEW FRONTIER IN GAS FILTRATION TECHNOLOGY

With a history stretching back over 44 years, CTP Team Srl (part of the Bedeschi Group) is an engineering and manufacturing company, highly specialized and well-referenced in gas filtration technology, writes Roberto Binago, Sales & Projects Director CTP Team Srl - Bedeschi Group.

Mainly devoted to cement industry applications, CTP can apply its expertise in different and complementary markets, such as metals, minerals, chemical in general, waste-to-energy and glass.

The continuous improvement in air filtration techniques and consequent enhanced bag cleaning efficiency, have enabled CTP to develop technologies that allow for progressively longer bags. This process, which has been ongoing for 30 years, still continues today.

All CTP bag filters for process applications are equipped with the specific SWAP technology (Sonic Wave Acceleration Pulse) for bag cleaning, offering superior efficiency and increased bag lifetimes while reducing energy consumption thanks to a new generation of high-performance components.

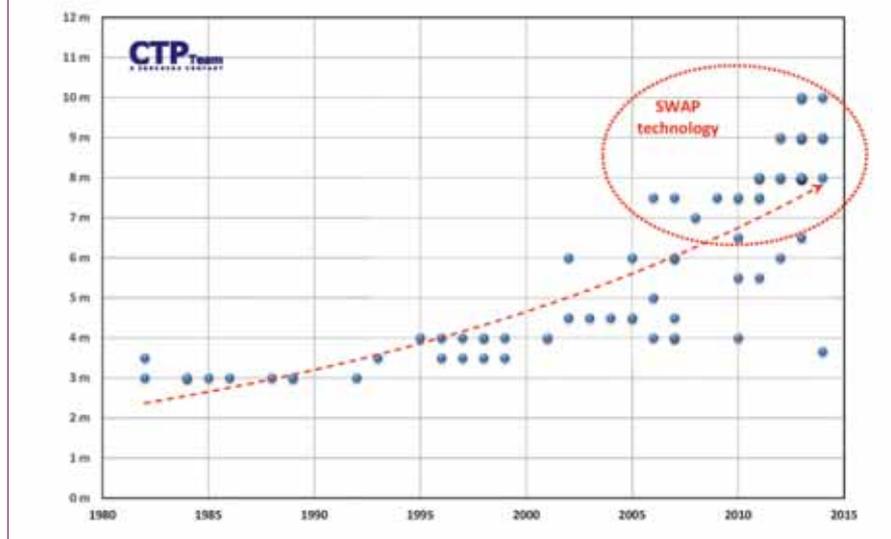
CTP has successfully commissioned plants worldwide — either converting existing electrostatic precipitators into bag filters or installing completely new equipment — and these plants are evidence of the excellent results that CTP's technology achieves. The technology is both extremely powerful and very simple.

The new projects that CTP has been awarded, mainly in the cement industry, confirm the company's prominent position as a reliable partner for gas filtration and cleaning plants.

MARKET TREND IN PROCESS BAG FILTER DESIGN

Process filtration has shown dynamic developments in recent years, particularly in the cement industry. A quick overview of

Image 1: Trend of bag length for process bag filters



CTP's improvements in researching a continuous enhanced efficiency in the regeneration of progressively increased bag lengths, shows how in the past 30 years a completely different design concept of baghouses has been possible (see Image 1, above). Bag length has been more than trebled in that time, particularly for process units in cement applications. In this image, each point represents a cumulative number of plants designed by CTP with the same bag length.

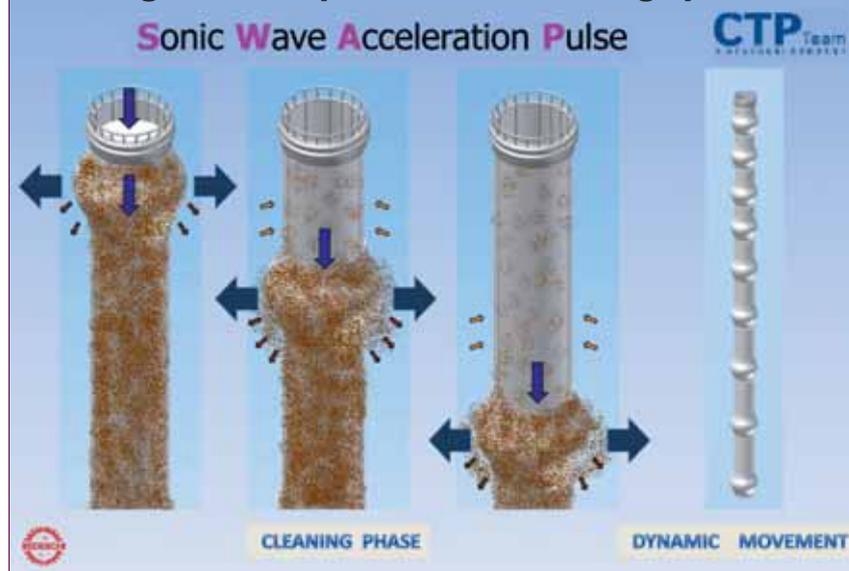
This picture reflects a market trend which made it possible to reduce the equipment footprint with increased flexibility in the layout arrangement of new plants.

In the case of upgrades of existing lines — and particularly during the design of old precipitators conversion into bag filters — the installation of longer bags increases the ability to re-use the existing structures and make it possible to maximize the capacity of the modified unit once in operation.

SWAP CLEANING SYSTEM AND ADVANCED FEATURES

The SWAP (Sonic Wave Acceleration Pulse) technology developed by CTP Team is a unique bag cleaning system working at low air pressure, designed to remove dust from several bags of extended length at the same time, with one single shot of compressed air at best efficiency and minimum stress of the filtering elements. In comparison with the traditional high-pressure bag cleaning method, with SWAP technology the bag is not blown with primary air (from the tank) with the addition of much more secondary air (from filter plenum) due to Venturi effect. The special design of the cleaning valve, operating at very high speed and fast response, creates a travelling wave starting from bag top line down to the bottom with the same profile and efficiency, independently from the bag length (see Image 2, left). With special powerful piston type valves, rather than the more traditional membrane-type ones, installed directly onto the pulse header tank, the very fast action of

Image 2: Principle of SWAP cleaning system



the valve and the elimination of Venturi, normally located at the mouth of the bag, a short and very fast pulse acts as a wave and travels along the entire bag at sonic velocity regardless of its length.

The innovation is related to a much shorter valve opening time and reduced inertia of the valve elements which lead to significant improvements in terms of cleaning efficiency, energy consumption and long-term reliability thanks to a lower compressed air pressure but enhanced pressure induced inside the bag up to the very bottom area.

The final result is a shape of the pulse which is such that the required acceleration of the filter fabric is achieved over a much greater length of the filter bags than with any other cleaning system available today in the market. Besides, a highly reduced consumption of compressed air required from the compressor is able to clean an increased quantity of long bags at the same time, extending the expected lifetime even more.

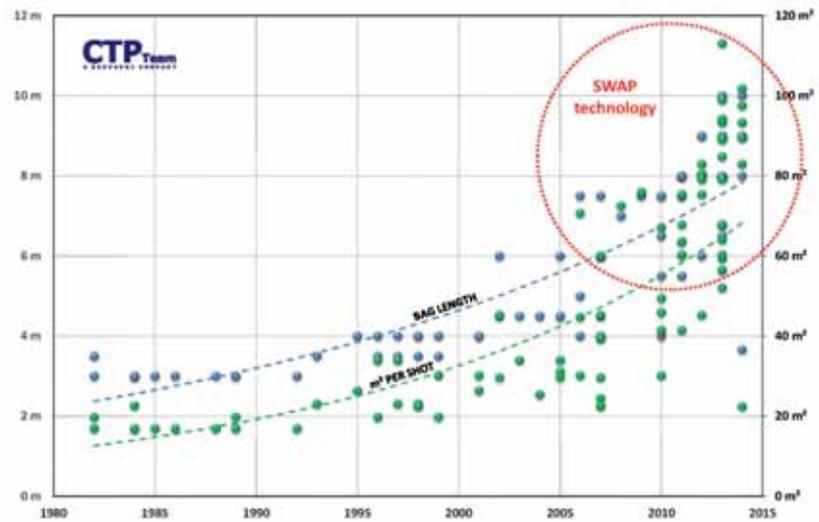
Depending on the size of the blow pipe, bag and pneumatic valve, this system is able to clean more than 30 bags at the same time with length up to 14m which is currently under testing in CTP laboratories.

It is worth mentioning that CTP dedusting units, thanks to their superior cleaning efficiency, can operate with on-line cleaning procedures. This means there is no need to isolate the filter section during the cleaning cycle, and results in mechanical simplification, reduced installation and maintenance cost and maximum reliability of the system.



Image 4: CTP filter for kiln bypass line 6 in NCC Tabbin (Egypt).

Image 3: Trend of bag length & cleaning capability



SWAP APPLICATIONS

The first installation featuring the SWAP system was commissioned in 2007 and up to now 21 plants have been commissioned with this technology, whilst a further 25 projects are under erection or during the engineering phase.

It is also interesting to point out another aspect of this powerful technology: it deals with the combination of extreme cleaning efficiency and reduced energy consumption which has been reached. In other words, the continuous increase of bag length has been followed by CTP together with a huge increment of the number of bags cleaned by the same pulse-jet valve. Image 3 shows this development started more than 30 years ago. Thanks to SWAP technology, up to now, the result has been that a higher number of longer bags cleaned at the same time with a unique valve, led to an increase of the cleaning area by more than six times performing bag filter units to restore almost 120m² of filtering area at a time with one single shot of compressed air at low pressure lasting just few milliseconds.

The good performance of many bag filters successfully commissioned by CTP, confirm this positive trend and more and more users are updating their guidelines concerning the use of longer bags opening a new scenario for the design of baghouses for cement applications where dust loads of the gas to be filtered are extremely severe and plants must comply with the latest regulations in terms of emissions.

Once 12m and 14m long bags shall be completed, even more compact filters' size shall be in operation in the near future equipped with SWAP cleaning system.

A list of new projects featuring SWAP technology, confirms the leadership of CTP Team as reliable partner for the major cement producers.

ONGOING PROJECTS

CTP Team has proved once more that it is a reliable partner, winning other important contracts for new cement production lines and the upgrade of existing ones. These include:

- ❖ **Client:** EREN HOLDING — Medcem plant in Silifke (Turkey).
Project: No.2 new kiln/raw mill bag filters for new 10,000tpd kiln line — 8m bag length — capacity 2 × 785,000 Am³/h.
- ❖ **Client:** CATIC Beijing Co., LTD for SÖNMEZ ÇIMENTO A. . — Adana plant (Turkey).
Project: kiln/raw mill bag filter — 8m bag length — capacity

Image 5: CTP filter for kiln/raw mill line in Jazan (KSA).



900,000Am³/h and clinker cooler bag filter — 8m bag length — capacity 600,000Am³/h for new 5,000tpd kiln line.

❖ **Client:** ÇİMSA ÇİMENTO — Eskisehir plant (Turkey).

Project: kiln/raw mill bag filter for kiln line 1—8m bag length — capacity 443,000Am³/h.

❖ **Client:** ÇİMSA ÇİMENTO — Mersin plant (Turkey).

Project: kiln/raw mill bag filter for kiln line 3—8m bag length — capacity 379,500Am³/h.

❖ **Client:** OMAN CEMENT CO. — Muscat plant (Oman).

Project: Alkali Bypass Bag Filter for 3,000tpd kiln line — 6.5m bag length — capacity 250,000m³/h.

❖ **Client:** SINOMA INTERNATIONAL ENGINEERING CO., LTD for Southern Province Cement Company — Tahamah Plant (KSA).

Project: kiln/raw mill bag filter — 9m bag length — capacity 1,260,000Am³/h and clinker cooler bag filter — 9m bag length — (capacity 600,000Am³/h) for new 5,000tpd kiln line.

❖ **Client:** NATIONAL CEMENT COMPANY— Tabbin Plant (Egypt) — see Image 4 on p104.

Project: No.2 Kiln Alkali Bypass Bag Filters — 8m bag length — (capacity 2 × 664,000Am³/h), and No.2 clinker cooler bag filters — 8m bag length — (capacity 2 × 490,000 Am³/h) for 5,700tpd kiln line 3 & 4.

❖ **Client:** LOESCHE GmbH — Taean Project (Korea).

Project: No.2 coal mill bag filters for 2 × 95tph VRM — 6m bag length — total capacity 800,000Am³/h.

❖ **Client:** GÖLTA ÇİMENTO A. — Isparta Plant (Turkey).

Project: cement mill bag filter for 300tph VRM — 10m bag length — capacity 725,000Am³/h.

❖ **Client:** A KALE Ç İMENTO — Erzurum Plant (Turkey) — see Image 6 below.



Image 6 – CTP filter for clinker cooler new line in A kale Van (Turkey).

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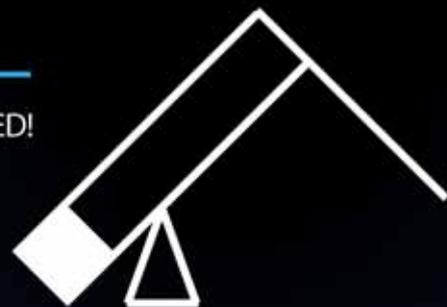
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Image 7 — CTP filter for cement mill in Maros (Indonesia).



Project: clinker cooler bag filter for kiln line 1 & 2 — 7.5m bag length - capacity 750,000Am³/h.

❖ **Client:** LOESCHE GmbH - Xuan Thanh Project (Vietnam).

Project: cement mill bag filter for 250tph VRM — 10m bag length — capacity 750,000Am³/h.

❖ **Client:** ÇİMENTAS ÇİMENTO — Kars Plant (Turkey).

Project: kiln/raw mill bag filter — 10m bag length — capacity 330,400Am³/h and clinker cooler bag filter — 9m bag length — capacity 130,300Am³/h for 1,250tpd kiln line.

❖ **Client:** CNBM for SPCC — Bisha plant (KSA).

Project: kiln/raw mill bag filter — 9m bag length — capacity 1,530,000Am³/h, clinker cooler bag filter — 9m bag length — capacity 672,000Am³/h and No.2 cement mill bag filters — 9m bag length — capacity 735,000Am³/h for 5,000tpd kiln line.

❖ **Client:** LOESCHE GmbH — Rembang Project (Indonesia).

Project: No.2 cement mill bag filter for 250tph VRM — 8m bag length — (capacity 760,000Am³/h).

Image 8 — CTP filter in OYAK Bolu (Turkey).



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Keeping bulk moving

The Dutch materials handling specialist, E.Drost B.V, successfully implements three new, recently acquired SENNEBOGEN 835 M E-Series machines for demanding materials handling applications.

mobile harbour equipment



Louise Dodds-Ely

Three SENNEBOGEN 835s for handling bulk goods at Drost B.V.

In the middle of this year, SENNEBOGEN's Dutch sales and service partner Kuiken N.V. was able to transfer three new SENNEBOGEN 835 M machines from the company's new E-Series to the materials handling service provider, E. Drost B.V. The machines, which are needed for demanding material handling applications, transferring material from ship to truck and for logistics at the storage depot, have replaced their reliable C-Series predecessors.

As a long-standing customer, the company was convinced of the quality and reliability of the SENNEBOGEN material handling machines early on, explains owner Ger Drost, who leads the family-run business in the second generation. Consequently a delegation was pleased to come to Bavaria to pick up the machines directly in the plant. The three new, SENNEBOGEN 835 M machines were produced in the plant in close coordination with the customer. Drost, was able to experience the high quality and the know-how of the Lower-Bavarian manufacturer for itself at the factory visit and the delegation was enthusiastic.

The enterprise, founded in 1963 today is involved with handling of bulk goods. In this regard, the

machines must frequently be deployed at different locations. Thanks to a maximum transport width of 3m, the mobile SENNEBOGEN machines can be quickly loaded onto flat-bed trucks and deployed at any location. Currently the machines are working in material handling applications at the inland ports in Drachten, Westerbroek, and Kootstertille, and daily unload





tonnes of gravel and chemical fertilizer from the arriving ships and barges.

Delivered in the meantime; the new E-Series machines have powerful 9-litre, 224kW Cummins diesel engines. Operators Marco, Martin, and Arjan report that in direct comparison with the predecessor C-Series machines, the material handling capacity has significantly increased. And at the same time, the 835 E-Series saves a lot of fuel, thanks to optimized engine settings, ECO-Mode and idle stop automation. In the combination of 10.1m boom and 7.9m grapple stick, with the new 835 M more than enough reach is available for unloading even larger ships, and to charge the high bulk goods hopper in Kootstertille. In the area of cargo transfer, in particular, the comfortable maXcab, which can be elevated to 5.70m, together with an extensive camera system, offer an optimal overview of

the work area and the highest level of work safety.

Because the three new 835 M machines will be primarily deployed at ports, they have been equipped with biologically degradable oil. The machines delivered in mid-2014 by the Dutch Sales and Service Partner, Kuiken N.V., were factory painted in the blue corporate colours. Under a full-service contract, Kuiken takes care of regular maintenance and can be reached by Drost around the clock.

“With the current machine generation, SENNEBOGEN offers perfection in series production. Designed especially for demanding shoreside cargo handling, again we are relying on the SENNEBOGEN 835 M machines of the current E-Series. Thanks to the high quality and the full-service contract with the Dutch dealer, Kuiken, the machines are always available, this is something we can depend on,” says owner Ger Drost, Drost B.V.

Machine handover: owner Ger Drost and Ingrid van der Berg at the SENNEBOGEN works.



First GreenTech robot with hybrid drive

Vollert's new GreenTech robot promises impressive 'e-power' high-torque output right from the start, and greater efficiency. At InnoTrans in Berlin (September 23–26, 2014, hall 23b, booth 304), the experts from Weinsberg will be presenting not only new stationary solutions for in-plant shunting and loading but also, for the first time, an exceptionally environmentally friendly generation of hybrid drives for independently operating shunting robots.

As a provider of innovation, Vollert has been developing economical shunting and loading systems for in-plant and connecting railway systems for decades. These include stationary rope conveyors, heavy-duty transfer carriages, travelling platforms, as well as independently operating shunting solutions. Vollert shunting systems ensure that logistics processes in refineries, mines, ports, steel and cement works are reliable and efficient. With the new generation of robot drives, an exceptionally economical and environmentally friendly technology will be showcased at this year's InnoTrans.

LESS DIESEL, NOISE, AND SOOT

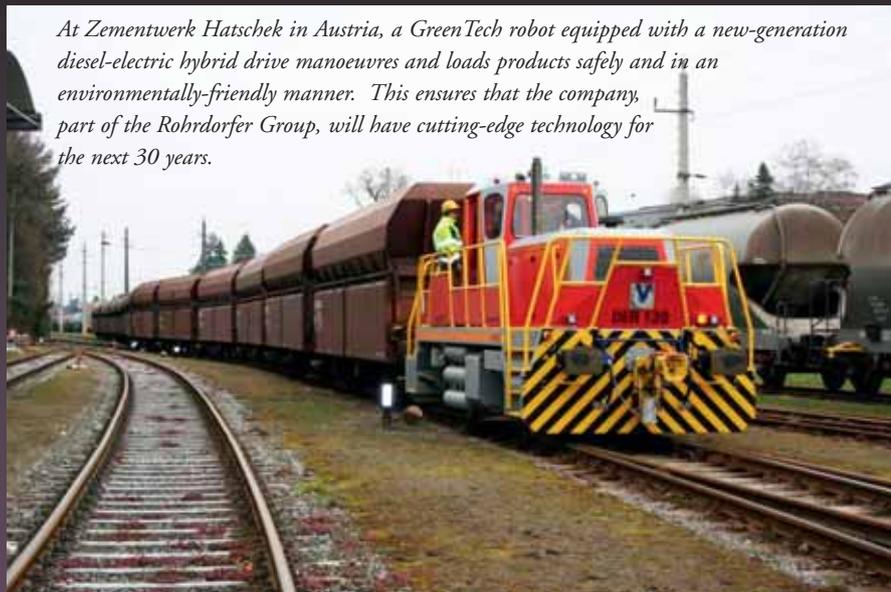
The new diesel-electric drive system with automotive operation promises to considerably reduce fuel consumption. The operating speed of the diesel engine continually adapts to the power required at a given moment thanks to the combined alternating and direct current setup. The electric drives are designed with four-quadrant operation and can be used as generators or motors. With this design, the generator is linked to the diesel engine via a transfer case and the electric motor is combined as an axle drive with spur gear unit. This makes it possible to fit smaller diesel engines without compromising performance while at the same time further lowering fuel consumption.

The electric drive not only has an exceptionally high level of efficiency but also guarantees consistently high torque. The power is available immediately at lower speeds and gives the shunting robot a completely new driving feel with incredible thrust from standstill. The high efficiency reduces fuel consumption as well as NO_x and CO₂ emissions. In conjunction with a particle filter, 99% fewer soot particles are also emitted.

NEW TECHNOLOGY PROVES EFFECTIVE IN DAILY OPERATION

Zementwerk Hatschek in Gmunden, Austria is now home to a DER 120 shunting robot with the new drive technology that loads products safely and in an environmentally-friendly manner. With a tractive force of 120kN, the 180kW diesel engine delivers ample manoeuvring capability. The water-cooled, six-cylinder, in-line engine with turbo charger, charge-

At Zementwerk Hatschek in Austria, a GreenTech robot equipped with a new-generation diesel-electric hybrid drive manoeuvres and loads products safely and in an environmentally-friendly manner. This ensures that the company, part of the Rohrdorfer Group, will have cutting-edge technology for the next 30 years.



air cooling, and external exhaust gas recirculation ensures compliance with the exhaust emission standard EU Stage III B or Tier 4 with particle filter, with the option of EU Stage IV. The solid frame is a robust welded construction that complies with the applicable DIN and railway standards. The comfortable cab has ergonomically arranged controls, air conditioning, and effective sound insulation.

WIDE RANGE OF AUTOMATED SHUNTING SYSTEMS

Vollert's independent shunting solutions range from a powerful, compact, all-wheel drive vehicle with a towing capacity of up to 750 t through to two-, four-, and six-axle versions with a towing capacity of up to 8,000 tonnes. Manoeuvring and driving speeds of 5cm/s to 40km/h can be selected as required, as can other equipment options such as track width, suspension, bogie, radio remote control, compressed air supply, sanding, and shunting couplings of all kinds. Vollert offers ATEX-certified technology packages for shunting and loading procedures in explosion protection work areas, for example, when loading highly explosive hazardous materials.

ABOUT VOLLERT ANLAGENBAU GMBH

As a provider of innovation, Vollert has developed economical shunting systems for in-plant and connecting railway systems. Stationary, rope-mounted shunting systems from Vollert have been used for manoeuvring railway carriages and trains ever since the 1950s. As a technology leader, Vollert also offers independently operating shunting systems (shunting robots), heavy-duty transfer carriages, and travelling platforms for reliable and efficient processes in refineries, mines, ports, steel and cement works, explosion protection areas, railway washing facilities, and maintenance centres.

System solutions from Vollert are used in over 80 countries, with subsidiaries in Asia, South America, and Russia further increasing sales activities in those parts of the world. The company employs some 250 personnel at its headquarters in Weinsberg.

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



TMSA
Tecnologia em Movimentação

Porto Alegre/RS - Brazil
Phone: +55 51 2131-3333
E-mail: comercial@tmsa.ind.br
Website: www.tmsa.ind.br



Mobile harbour equipment: TMSA the integrator port specialist



Movable hopper with mobile belt feeder for coal (TMSA, Brazil).



Mobile stacker for 1,200tph iron ore (TMSA, Brazil).



Travelling gantry shiploader; luffing and slewing boom for loading 3,000tph of sugar in Santos Port (TMSA, Brazil).



Absam dustless truck mobile unloading hopper and conveyor linked to a fix pipe long distance conveyor installation conveying coal from the import port terminal to a power plant (TMSA, Brazil).

When confronted with solving a difficult lay-out, in a multi-purpose port terminal — with limitations due to its dimensions, or the use of the quay — the use of mobile continuous bulk handling systems can be the answer.

TMSA Tecnologia em Movimentação S/A, is one of the big suppliers in the South American market for bulk solids material handling. Its equipment is especially popular in port terminals that use heavy-duty and long-distance conveyors. TMSA's main focus is the design and manufacture of shiploaders and belt conveyors, with their associated dust control systems, which it delivers as EPC contracts.

Based in Porto Alegre, RS, Brazil, with a manufacturing area of 32,000m², TMSA has large and highly integrated fabrication and engineering capabilities; all under ISO 9001:2000 certification. With a working team of 500, branch offices in Belo Horizonte, Sao Paulo and Buenos Aires, the company is well integrated in the Mercosur countries.

TMSA is a leading company providing bulk loading solutions for port terminals. It has a large range of different shiploader and unloader designs, as well as other material handling equipment — both fixed and mobile. It also has a wide portfolio with technological partner companies, with local integration.

TMSA has supplied conveyors with capacities ranging up to 20,000tph (tonnes per hour) and shiploaders up to 4,000tph.

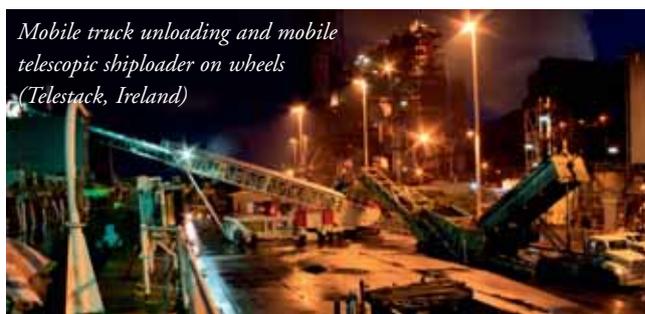
When working in tight dock constraints, port operators need highly flexible material handling equipment. One solution is the combination of mobile units for stacking or shipping and mobile telescopic link conveyors, without the need of civil works, reducing capital needs.

Handling different commodities at different rates and ship sizes requires great flexibility. An ideal solution is mobile handling equipment that does not need civil works and can be quickly deployed, and also easily parked after use.

Performance levels of mobile equipment are similar to fixed installations. These combinations can take or load material from or to a fixed conveyor system.

Mobile systems can operate on any suitable existing berth using existing infrastructure that significantly reduces the capital investment that would be required at a new export facility. Selection is usually driven by lower operational costs, as opposed to discontinuous systems such as trucks which present relatively lower capital expenditure, but much larger operational costs.

In port terminals, TMSA offers a truck unloading unit consisting of a surface hopper with a low profile feeder and a Manutube conveyor which is a totally dustless technology, designed by Absam Engineering, from France. The Manutube is an enclosed belt conveyor with a belt sliding inside a plastic tube



Mobile truck unloading and mobile telescopic shiploader on wheels (Telestack, Ireland)



Telestack telescopic mobile shiploader loading to Panamax vessel.



All Travel mobile radial telescopic shiploader loading to coaster vessel being fed directly from a mobile hopper feeder (Telestack, Ireland).

with no idlers, fully enclosed.

TELESTACK from Ireland has a range of very interesting mobile solutions for conveying bulk solids materials: radial telescopic conveyors, stackers, ship and barge loaders, link conveyors on wheels, rails or caterpillar, as well as mobile feeding hoppers, truck un-loaders, railcar loading and unloading systems with references in Brazil, Bolivia and Chile.

and/or a storage facility by means of either gravity or a mechanical conveyor.

Also at small quays where the infrastructure does not exist, due to their low weight and low investment cost, the mobile pneumatic unloaders are an excellent choice.



Pneumatic unloading tower type NIV 500tph on mobile gantry, boom length: 28 metres (VIGAN).



Mobile type 200 with diesel engine, 9m front boom and transfer conveyor capacity up to 270tph (cereals) (VIGAN).

Mobile feed shiploaders allow the operator to directly feed the equipment from wheel loaders in the port/inland terminal to eliminate the double handling of material. The fully mobile units can be used to load barges and coaster vessels directly from trucks to maximize production rates and minimize labour on site.

The mobile hopper feeder range allows the operator to directly discharge from wheel loaders/grab cranes to eliminate the double handling of material on site. The fully mobile units are used to allow for a 'controlled' feed of material into other Telestack equipment or auxiliary units.

VIGAN from Belgium has a range of fixed and mobile pneumatic ship and barge unloaders, continuous pneumatic unloaders for ships and barges that can operate in three different modes: suction + blowing; suction only and blowing only, fixed and mobile units with capacities ranging from 160tph to 600tph.

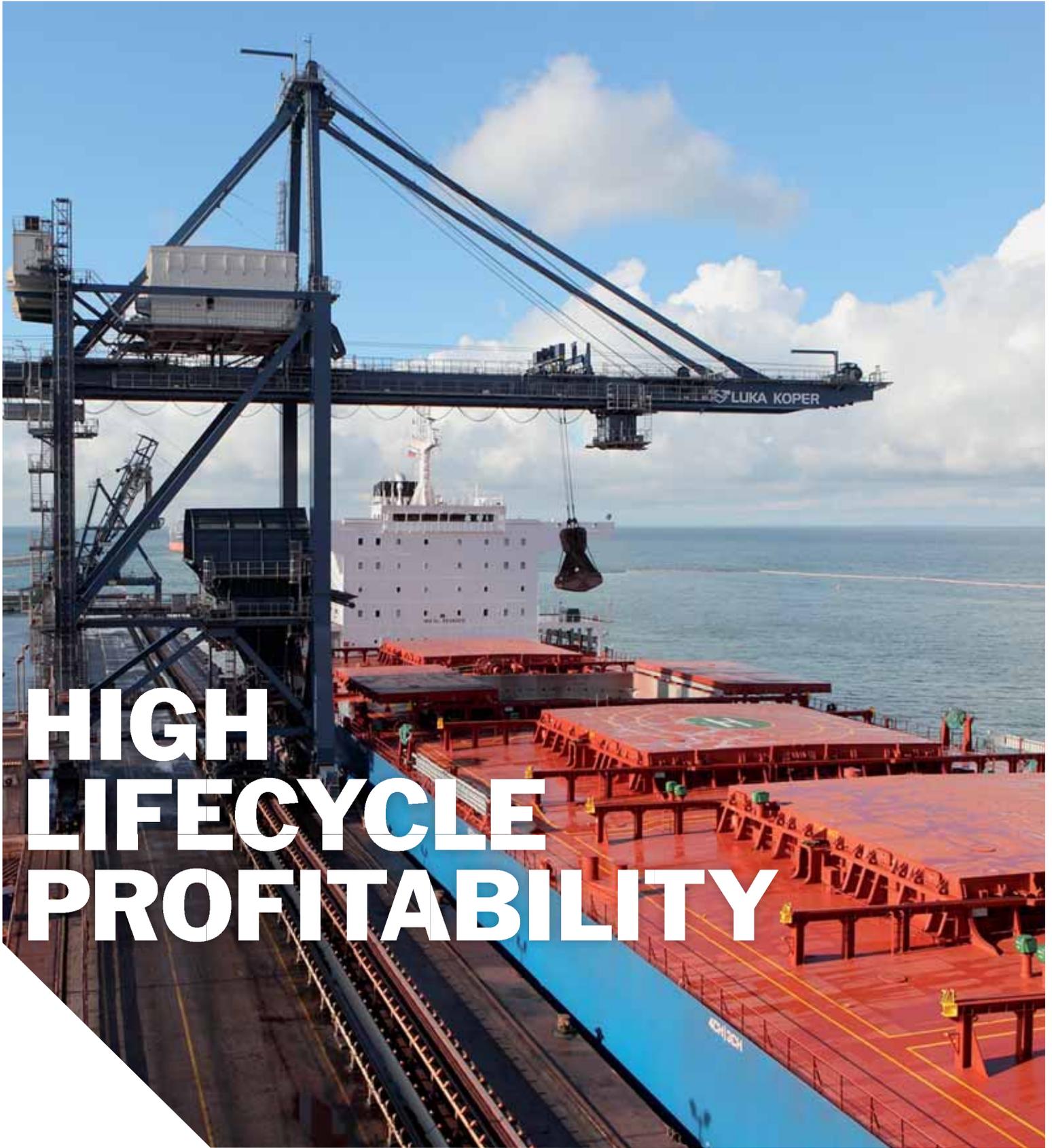
Pneumatic machines suck in the grains just like a vacuum cleaner and move the products to trucks, wagons

MOBILE LOADING FACILITY ON PONTOON

TMSA has reference on supplying a floating loading/unloading transshipper on a pontoon for Petrosul in Porto Alegre, RS, Brazil, but today the company has developed a very specialized



Floating loading/unloading transshipper (TMSA, Brazil)



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.

bulk material handling portfolio based on partnerships with world-class technological leaders.

Ravestein from The Netherlands has developed mobile loading facilities which can provide a, plug-and-play, permanent solution, for putting up a complete loading facility into a port quickly and cost effectively. The berth can be put up anywhere in the world and can accept various material handling systems for example for bulks and ores but also for crude oil or even container cranes.

The facility consists of a large jack-up platform, ensuring safe operations. It is fitted with a berthing line of series of ship fenders to receive specific ship types, shiploaders and the shore connections. A series of monopoles or triangle piles are hammered into the soil to keep the facility in position. The jack-up platform arrangements ensure a proper loading height at all times. The facility remains mobile always allowing an option to relocate the facility if operations are stopped.

Currently there is a very interesting berthing/loading facility under construction, at Santana Macapá in Brazil for Anglo American, consisting of two pontoons each with five standard jacking systems. The facility is delivered self-supporting, including piling, ship fenders, shiploaders and conveyor systems.



The main dimensions of the loading quay are: length 120m; width 32m; depth 3.5m; maximum deck load 10t/m².

The loading quay carries and supports two Telesstack mobile and telescopic shiploaders and conveyor lines of total 2 x 2,000tph of iron ore.



SYSTEMS SELECTION

It is difficult to make a simple comparison between alternative technologies, as the factors that influence their performance are extremely dependent on each application.

The proper selection of a mobile conveying system has to be done by a proper analysis on a case-by-case basis, which involves far more than prices only concerned on mechanical/structural aspects of the project, they must also consider operational costs, environmental and social issues, civil works and land access.

As a strong specialist in bulk material handling, TMSA offers these different mobile solutions for the conveying of the bulk material from the ship-unloaders to the silos or from the silos to the shiploaders.

TMSA has the knowledge and experience for the proper selection of a shiploader and a conveying system which will better fit the needs and budget of each project.

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LIEBHERR

The Group

Drammen's Liebherr container crane also ideal for handling bulk and heavy lift

The Norwegian Port of Drammen opted for a new Liebherr mobile harbour crane, type LHM 550, which started operation in June 2014. This investment in the future represents the second mobile harbour crane for the port, which has been operating an LHM 400 since 2008.

Thanks to this new investment, Port of Drammen has doubled its container handling capacity. Additionally, the versatile LHM 550 is also capable of efficient bulk, general cargo and heavy lift operation. The crane provides a lifting capacity of 144 tonnes, which means over 40 tonnes more than the strongest of the existing machines in the port.

LIEBHERR PACTRONIC® ALLOWS FOR ECO-FRIENDLY PERFORMANCE BOOST

The new crane is equipped with Liebherr's Pactronic® hybrid drive system. Awarded with the State Prize Clean Technology Austria, this cutting-edge hydraulic hybrid drive for cranes is the first to achieve increased handling performance with reduced fuel consumption. By adding an accumulator as a secondary energy source instead of a bigger or additional prime mover, Pactronic® is regenerating the reverse power while lowering the load. In addition, the surplus power of the primary energy source is also used for charging the accumulator. The stored energy is transferred back to the system when the crane requires peak power during hoisting. In terms of turnover capacity, that means a plus of 30% compared to a conventional machine with equal power rating of the primary energy source. In addition, Pactronic® leads to a reduction of fuel/energy consumption (litre/ton) as well as CO₂ and exhaust emissions in the range of 30% depending on the operation. The hybrid drive system is virtually maintenance free as it just needs visible inspection every ten years. Additional eco-friendly benefits of the system include 100% recyclability as well as less noise exposure.

SETTING THE COURSE FOR FUTURE GROWTH

Located southwest of the Norwegian capital Oslo, the Port of Drammen required more capacity as it saw a 30% container volume increase between 2012 and 2013. In 2013, more than 30,000 containers were handled throughout the year. This

Liebherr LHM 550 allows for highly efficient container handling in Port of Drammen, and is also suitable for handling bulk, project cargo and general cargo.



investment in additional cargo handling capacity is important for the regional economy. Goods handled in the port include spares, furniture, electronics, wine and food.

"We are experiencing a significant container traffic increase in Drammen. Due to the LHM 550 we have sufficient capacity to smoothly handle current container volumes. Moreover, we have capacity available for future growth," says Einar Olsen, Port Director.

The new mobile harbour crane is also expected to attract new business, as Port of Drammen has expanded its heavy cargo portfolio to lifts of up to 144 tonnes. High lifting capacity is of special importance to the subsea industry and due to the new crane Port of Drammen has boosted its competitiveness in this regard.



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Mobile harbour equipment can automatically generate commercial information

Harbour sides are busy places, with ships docking, unloading one cargo, loading another and departing again as quickly as possible. Keeping track of all this activity and of their various and valuable cargoes is demanding yet vital, so it is best to automate as much as possible. *Mark Ingham of Sensor Technology Ltd* in the UK explains how the drive shafts of the various machines and mobile plant can instantly generate much of the information needed.

Modern commercial docks are usual awash with machinery, both mobile and static, for loading and unloading ships. The fundamental objective is to handle the cargoes as quickly and efficiently as possible, so that each ship can get back out to sea and its next port of call, and another ship can come in behind it.

In the midst of all this frenetic activity, safety must be



TorqSense with separate control electronics.



TorqSense with integral control electronics. Forged in fire.

(rotational strain) in the shaft you can calculate the weight of cargo being transferred.

This information is useful for several things, such as:

- ❖ **safety:** an overloaded machine can be dangerous to personnel or could break down and bring operations to a halt
- ❖ **operational:** live load data will allow you to calculate the amount of cargo moved, the time to completion of each operation, the number of trucks required for onward shipment, etc.
- ❖ **commercial:** the value of many cargoes, especially dry bulk materials, is often calculated from its weight, which can be derived from torque figures.

In the past measuring torque has been difficult in the harsh and frantic environment of a busy port, but Sensor Technology has developed a solution that overcomes all the main problems and commercialized it as TorqSense.

The measuring element of TorqSense comprises two small piezoelectric combs called Surface Acoustic Wave devices (SAWs). In use they are simply glued to a drive shaft at 90° to one another and at ±45° to the axis of the shaft. When the shaft rotates, one comb expands and the other contracts in proportion to the torque being experienced by the shaft, which alters their resonant frequency.

Thus, if you can measure their resonant frequency, you can calculate the torque. To do this it is natural to think that you would need to wire the combs into a circuit. But because the wires would snap when the shaft rotates another solution is required.

maintained, while cargoes must be delivered to the correct location. And of course, the cargoes are valuable so must be protected and precisely accounted for.

The sort of machinery found on quaysides includes wheel loaders, mobile ship unloaders, conveyors, and multiple variants on the humble crane. All of these machines will have one or more rotating drive shafts that transfer power from an electric motor or diesel engine to the working equipment. Each turn of the shaft will progress the equipment's operation forward or backward a small but consistent amount, and if you can measure the torque

The wireless link from rotating shaft to signal processor puts TorqSense in a class of its own.

**Accurate
Sensitive
Compact
Non Contact
High Reliability**

SAWS

**Torque Out
Speed Out
Power Out**

**High Bandwidth
High Resolution
Integral Electronics
Digital Outputs, USB, RS232
Analog Outputs, Voltage & Current**

Traditionally this would be done using slip rings, but Sensor Technology has developed a wireless alternative based on radio wave transmissions. A pickup head is mounted near the combs and transmits waves towards them. The waves provide power the combs (wirelessly!), which reflect the waves back to a receiver in the pickup head. The returning waves have had their frequency altered by the combs – the expanded comb reduces the frequency and the compressed comb increases it.

From these differential signals some TorqSense electronics can calculate the torque.

TorqSense is robust, reliable and accurate. It is easy to install, operate and maintain and has built up a loyal following of users. While most people use it in demanding environments, it has many other advantages too; for instance laboratory researchers favour small sized units because they often need to install and remove a sensor multiple times during a series of experiments. With wireless TorqSense this is easy, especially as it does not need to be re-tuned each time it is re-installed. Larger units proved popular with marine applications because they are largely unaffected by the salty atmosphere and constant motion. It can be tuned to measure large or small amounts, so is equally at home measuring coal on a conveyor or metering microscopic amounts of active ingredients into pharmaceuticals.

A variation on the concept is used for measuring load – a straight line equivalent to torque. This is ideal for use on cranes



TorqSense has been used in many bulk handling and conveying applications.

and other dockside equipment where cargo is lifted rather than conveyed. Like its sister technology, LoadSense uses a wireless radio frequency pickup to collect data signals from the sensing head, which can be a variation on piezoelectric combs or a conventional load cell.

Portside operations are increasingly becoming automated. Technologies like TorqSense and LoadSense, while almost completely unobtrusive, are making a vital contribution to improving productivity in line with increasing demand for world trade.

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RDS excavator bucket scale: LOADEX 100



The LOADEX 100 is a retrofittable scale installed on both tracked and wheeled 360° excavators and material handling machines to weigh the amount of material in the bucket, grab or clamshell.

A minimum of two pressure sensors is installed into the hydraulic lift system.

The pressure signals are captured, filtered and corrected by measurements taken by an inclinometer. Slope corrections are made from another inclination sensor on the chassis.

When used dynamically, the pressures are captured through a set weighing zone. The system may also be used in static weighing mode; the boom can either be lifted to a set weighing position where the pressure is captured, or measuring constantly in a 'live' mode at any required boom height. Both dynamic and static weighing positions are adjustable by the operator to suit any job required, which will enable the machine to be used at its most efficient output.

Dipper arm position is established by a mechanical angle sensor mounted on the boom to dipper arm pivot. This provides fast and precise dipper arm angle measurement that is not affected by inertia G-forces or acceleration effects.

As an added option, oil temperature compensation can be provided by a clamp-on temperature sensor. Ultrasonic technology provides accurate bucket position compensation.

The final calculation is sent via CAN protocol to the LOADEX 100 cabin terminal. Load and store information is saved in the terminal where it can be distributed to an in-cab printer, modem or internal SD flash card.

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Manoeuvrability: DOCKSOLID mobile equipment for versatile terminals

Sean O'Sullivan, senior design engineer for DOCKSOLID equipment — a brand of mobile and static bulk handling hoppers, ship loading and unloading equipment produced by Buttimer Group — painstakingly describes his innovative wheel-steering mechanism design. The system, used on DOCKSOLID's wheel-mounted mobile hoppers, is an extendable mechanical axle design, which allows the equipment an extremely tight turning radius and nimble driving capabilities. The hoppers have a surprising agility which belies their considerable size and 'chunky' aesthetic. O'Sullivan's mechanical steering system gives the mobile grab-to-truck bulk loading units considerable flexibility of use. Buttimer claims that the DOCKSOLID units are the most manoeuvrable mobile hoppers on the market. Two units delivered to the Port of Hull earlier this year have a mean turning radius of 10.16 metres. The self-drive units are powered by a 200kVA generator capacity engine and travel at 3.5km/h.

Mobile bulk port equipment has become increasingly used by smaller bulk terminals, non-permanent facilities and at multi-purpose ports, where quays may be used for handling a number of different types of commodities and cargoes. Changing supply chains, shifting trade flows of bulk commodities and the connection of new regions and geographies to international markets makes low capex port facilities, easily relocated equipment and flexible operations increasingly attractive. For example, new mining regions in remote sub-Saharan Africa, where port infrastructure is famously underdeveloped, are seeking faster access to international hubs and trade routes, making mobile handling equipment a risk-friendly investment. Mixed-use terminals necessitate getting equipment to and from the quayside quickly and effectively, in order to facilitate a variety of cargoes — containers, dry bulk, breakbulk — where quay space is limited and required throughput is high. Highly manoeuvrable dry bulk handling equipment will substantially contribute to this flexibility of use and versatility of port operations.

DOCKSOLID hopper steering mechanism.



The mechanical steering design used on the DOCKSOLID hoppers is somewhat unusual; for vehicles with such a gap between wheels on the same axle, computerized steering



The hopper 'pad' for loading.



DOCKSOLID BESPOKE BULK PORT EQUIPMENT

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DOCKSOLID Patented Steering and Suspension Innovations for Highly Manoeuvrable Mobile Units.

DOCKSOLID Built for Reliability and Longevity: Structure Designed for Dynamic and Static Loads.

DOCKSOLID Low Carbon Emissions.

DOCKSOLID Engineered in Ireland.



Iron ore shiploader.

mechanisms are commonplace. O'Sullivan, however, asserts that a mechanical steering system makes the units much more reliable, accurate and agile. The proprietary design is also part of the innovative suspension system used on DOCKSOLID hoppers; the suspension system balances the static and dynamic loads exerted during the bulk unloading process across the structure and frame of the hopper. This design feature ensures the DOCKSOLID units are structurally sound and also protects the quay wall from damage; the hopper sits on large ground pads during the loading process ensuring that its weight — and the weight of the handled product — is spread evenly over a large area of the quay surface. With its mechanical steering mechanism, balancing of dynamic loads while handling dry bulk,

and robust structural design, the DOCKSOLID mobile hopper units are built to last.

Manoeuvrability has been a consistent theme in Buttimer's design innovations in recent years. In 2012 Buttimer designed an innovative chassis and steering system for an iron ore shiploader for use by ArcelorMittal in Liberia. The six-wheeled shiploader, developed in partnership with Telestack Ltd., is capable of driving in straight, parallel (crab) and radial modes, and shifting rapidly between them with Buttimer's patented wheel-drive design. The shiploader is thus capable of the fastest hatch-change times on the market, cutting hours off the time required to load a full vessel. Manoeuvrability of mobile bulk equipment is not just for ease of operations, when deployed correctly it can be a significant competitive advantage.

'Flexibility' is a core attribute of the DOCKSOLID bulk handling equipment range, the slogan 'Clean. Flexible. Robust.' is intended to identify the salient features of the equipment and its benefits for bulk port operators. Manoeuvrability is part of what makes DOCKSOLID mobile units flexible, allowing quick repositioning, use when required and swift removal from the quay area when not.

They can be transported between terminals with ease and even relocated to new ports with relative simplicity. They are also flexible in the types of bulk materials they can handle, and their customizable design — each unit is reconfigured in order to meet the specific needs of clients and bulk terminals. Coupled with state-of-the-art dust suppression and environmental control features, as well as DOCKSOLID's strong structural engineering and robust design, Buttimer's mobile port equipment is built for manoeuvrability and flexibility of use. These core strengths make DOCKSOLID equipment particularly effective unloading and loading solutions for remote, multi-purpose and versatile port environments.



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New £3m plus A-Plant order for Doosan compressors

A-Plant, the leading plant, tools and equipment hire company, has placed a major order worth well over £3 million for new portable compressors from Doosan Portable Power. The new A-Plant order comprises over 300 Doosan machines, including 7/20, 7/26E, 7/41, 7/72, 7/125-10/110 and 7/170 models. This is the first order in the UK for the innovative new 7/125-10/110 'Dual Mode' portable compressor.

The new Doosan compressors have been delivered to A-Plant Service Centres throughout the UK and form part of one of the largest and most diverse ranges of hire equipment available today, meeting virtually every rental need from telehandlers and power tools to accommodation units and generators. The Doosan compressors join new Bobcat and Montabert products from Doosan Construction Equipment that also form part of the latest A-Plant fleet investment.

A-Plant prides itself on having the most robust and intrinsically developed quality and safety management system in the industry. As the first national rental company in Europe to achieve complete certification to ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007 standards, A-Plant can ensure customers have complete confidence, backed by an ongoing commitment to improving quality and health and safety.

Andrew Winlow, director of purchasing and fleet management from A-Plant, said: "The Doosan range of portable compressors is acknowledged as the market leader worldwide and we are

pleased to offer our rental customers these best-in-class products. We also chose Doosan because of the outstanding local aftermarket support the company provides for the portable power range throughout the UK."

Steve Hallam, UK sales manager for Doosan Portable Power, said: "We are delighted with this very important order from A-Plant which is a great testament to the high performance and durability that the Doosan range of portable power products offers for applications in plant and tool rental, construction and utilities. This is complemented by our customer centric approach, offering unmatched experience and expertise to provide an added value service to the customer."



COMPREHENSIVE SELECTION

Providing free air deliveries from 2.0 to 17.0 m³/min (65 to 600 cfm), the 7/20, 7/26, 7/41, 7/72, 7/125 and 7/170 portable compressors all operate at a working pressure of 7 bar and are aimed at standard pressure applications such as powering breakers and tools in road repair, demolition and refurbishment.

The 7/125-10/110 model has a new 'Dual Mode' feature as standard, with a choice of two pressure and flow ratings on the same machine. By pushing a button on the keypad, the operator can switch between 'LO' (low pressure mode: rated pressure 6.9 bar/free air delivery 12m³/min) and 'HI' (high pressure mode: rated pressure 10.3 bar/free air delivery 10.6m³/min).

This provides a 'two-for-one' solution covering a wide range of applications, from standard pressure uses found in construction and utility markets to more specialist high pressure applications such as abrasive blasting, spray painting and optical fibre blowing.

Doosan offers a complete line of CE compliant portable compressors comprising 24 different models, with free air deliveries between 2m³/min and 45m³/min and operating pressures between 7 and 25 bar.

Each Doosan compressor is 'built to be used' providing the highest level of durability, productivity and serviceability. Well-positioned fuel tanks featuring large size fillers limit the risk of fuel spillage. Security features include a lockable canopy and lockable steel instrument panel cover. In addition, a folding lift bail reduces the risk of theft by keeping the lifting eye within the compressor enclosure.

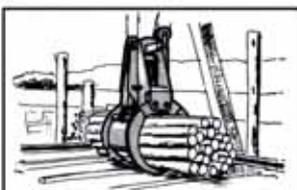
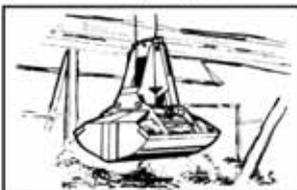
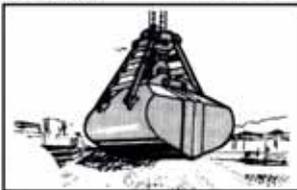
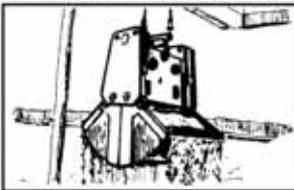
The compressors have an intuitive, simple key-start sequence, ideal for rental companies because of the reduced risk of machine abuse by untrained operators. The user-friendly control panel offers an open layout of instruments and warning indicators.

Serviceability is also excellent, with easy access to all maintenance points. All areas have been carefully designed for ease of inspection, maintenance and repair. Service intervals for different compressor components have been rationalized to reduce associated costs for the customer and to increase utilization in the rental industry.

Complementing the company's very popular compressor range is a comprehensive choice of generator, light tower and construction tool products.

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The technological choice

A large Hitachi ZW-5 wheel loader is shown in a dark environment, illuminated by spotlights. The loader is orange and black, with its bucket raised. The bucket is filled with a dark material, and the loader's body is tilted upwards. The text "QUICK POWER SWITCH" is overlaid on the image. The loader has "HITACHI" written on its arm and "ZW-5" on its side.

QUICK
POWER SWITCH

Hitachi is renowned for the reliability and versatility of its wheel loader range. The new ZW-5 models benefit from several technologically advanced features that deliver unrivalled levels of availability and efficiency. Take the quick power switch: it boosts the machine when travelling uphill with a full load or when greater digging force is required. This has a huge impact on productivity to prove that Hitachi is the technological choice.

HITACHI

Reliable solutions

Hitachi presents the new ZW180-5 wheel loader

Hitachi Construction Machinery (Europe) NV (HCME) has launched its ZW180-5 wheel loader. The new model has been designed to meet the requirements of its European customers, who are seeking highly productive yet fuel-efficient machines, with a smaller impact on the environment and a lower total cost of ownership. Operator comfort and safety, and easy maintenance features, have also been considered in its design.

HIGH PRODUCTIVITY

The 6.7-litre six-cylinder water-cooled turbo engine contributes to high productivity levels by enabling a powerful digging performance and impressive travel speeds, as well as excellent fuel consumption. The ZW180-5 is equipped with a maintenance-free Diesel Oxidation Catalyst (DOC), which reduces particulate matter from the engine exhaust without the need for a Diesel Particulate Filter (DPF). A chemical reaction occurs at normal system temperatures, allowing a reduction of particulate matter in the exhaust without compromising the wheel loader's performance or reliability. Fuel consumption is

SPECIFICATIONS ZW180-5

Engine rated power:	126kW
Operating weight:	14,400–15,000kg
Bucket capacity:	2.4-2.8m ³
Breakout force:	129kN
Equipped with:	2.7m ³ general purpose bucket with weld-on teeth

reduced by up to 10% compared to the previous model, thanks to the five-gear transmission and the new fully electronic controlled engine, which combines a high-pressure common rail system and the DOC.

FUEL EFFICIENT

Reduced fuel consumption means lower running costs for owners of the new ZW180-5, as well as a smaller environmental impact. Examples of the machine's advanced technology also





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influence the wheel loader's environmental performance. It has two simple work modes, suitable for particular tasks. In Standard mode, the engine speed is controlled, which allows for smooth and efficient acceleration during loading, regular operations and travelling on level terrain. The P mode is useful when greater traction force is required for heavy-duty excavation and travelling quickly uphill. When changing work modes, the ZW180-5 has a quick power switch, which boosts the power when required.

The ZW180-5 also has a new clutch cut-off system, which controls the timing of the clutch for smooth operation when loading, regardless of the terrain. When travelling at high speed on flat terrain, the clutch can be released early so the wheel loader slows down smoothly by applying the brake pedal. When travelling slowly uphill, the clutch is released by pressing the pedal firmly to allow for easy unloading.

Further ways to minimize fuel consumption are using: the ECO display, which shows the operator when the wheel loader is operating economically in ECO drive; and the optional auto-engine shutdown, which avoids fuel wastage while the wheel loader is long idling.



ENHANCED COMFORT AND SAFETY

Operator comfort is evident from the spacious cab of the new ZW180-5. The heated air-suspension seat can slide further back, providing ample legroom. The tilting telescopic pop-up steering column has also been repositioned to create additional space.

To enhance safety on the job site, the ZW180-5 offers greater visibility from the operator's seat thanks to a pillar-less windshield, optional rear-view camera and large sun visor. The counterweight is also now visible from both sides of the machine. The shift-up delay to third gear makes this wheel loader safer to operate in confined spaces, because it can perform excavating and unloading tasks more safely in first and second gears.

EASY TO MAINTAIN

A variety of easy maintenance features has been incorporated into the design of the ZW180-5 to ensure maximum availability and low total cost of ownership. For example, the redesigned engine and radiator cover can be opened fully, providing quick and convenient access for daily inspection. The greasing points, oil levels and fuel filters can all be accessed at ground level.

For operation in dust-filled environments, the ZW180-5 can be equipped with an optional wide-pitch fin radiator to prevent clogging. Another useful feature for quick routine maintenance is the automatic reversible cooling fan, which allows for easy cleaning of the radiator with its one-minute automatic reverse rotation every 30 operating minutes.

HCME's wheel loader product specialist Vasilis Drougkas says: "The ZW180-5 belongs to one of the most popular classes of wheel loaders in Europe, so this highlights its importance to the Hitachi product line-up. We believe this durable new model will be ideal for material handling, agriculture and waste management applications among others. Its fuel-efficient and low-maintenance qualities will also make it particularly appealing for rental companies."

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The intricacies of handling grain

Louise Dodds-Ely

What does the grain bulk handling site of the future look like?

As global agricultural production ramps up in order to meet the needs of a ballooning world population, bulk handling sites will need to look for ways to optimize their operations and cut inefficiency if they are to cope with increasing volumes, and stay ahead of rivals. *Alan Hurdsmann, Chief Strategy Officer at Eka*, explores how automation will be central to this process, and what we can expect the grain bulk handling sites of the future to look like.

Bulk materials handling sites play a central role in our agricultural supply chains. Sites and terminals buy grain from growers in their country and then ship or export it as it is sold. They face a complex task: sites store many different agri-commodities, which must be separated according to specific quality parameters. For instance wheat is sold in nearly 100 different quality levels based on protein content, moisture, and screening (dust and other materials).

Sites must also manage fluctuating needs depending on when different agricultural products — such as wheat, barley, beans and canola — are harvested in that country. This can vary from region to region: for example in the US various agri-commodities are harvested throughout the year, whereas in Australia there is a peak harvest period between November and January. The process can also vary: in the US growers store commodities on the farm until a handling site requests a shipment, whereas in Australia there is no farm storage, meaning that growers deliver their agri-commodities to sites as they are harvested. What is common across the board, however, is that these sites typically require a lot of infrastructure and real estate — as well as a small army of personnel — to run.

THE GRAIN BULK HANDLING SITE OF TODAY

Broadly speaking, the typical receival process at bulk handling

sites involves four steps, or 'stations'. Trucks will arrive at the site to deliver agricultural products from the growers. At station one, site workers will take a sample of the product from the truck and test it to determine a) which type of commodity it is and b) its quality level.

The truck will then continue to station two, where the truck and its cargo are weighed. The combined information of quality and weight allows the operator to determine where on the site the truck should deliver its cargo. Once at the location (station three) the cargo is then unloaded into the appropriate pit, grid or silo.

From there the truck continues to station four, where it is weighed again. Subtracting this weight from the original weight measured at station two confirms the total quantity of cargo delivered. The driver is then given a receipt for said delivery, and can exit the site.

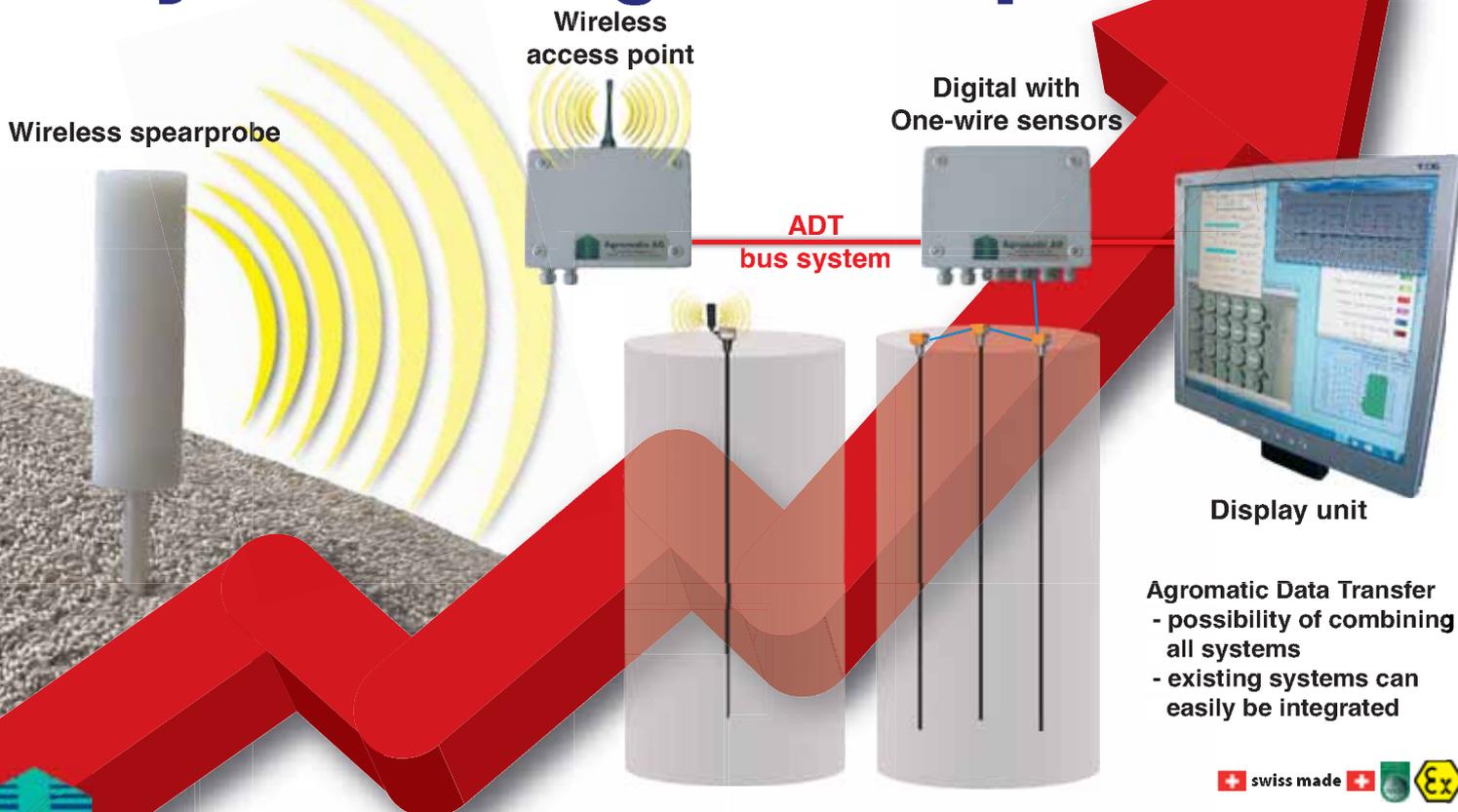
CURRENT INEFFICIENCIES AND RISKS IN THE FACE OF GROWING PRODUCTION NEEDS

As might be expected, delays in the receival process described above can hurt a site's profits, as can equipment failure.

One risk sites face is that of long queue times. This is a particular challenge for sites in countries with peak harvest seasons, during which the flow of product through the site will increase substantially, potentially causing congestion. Sites that have long lines of trucks waiting to enter the site will lose business to other, more efficient sites. There is a health and safety element risk here too; a long queue can mean an unsafe environment for idle truck drivers. Depending on the country this can result in costly fines for site operators.

Another risk relates to temporary workers. In countries with peak harvest times, sites will often hire additional workers

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for three to four months in order to cope with the increase of traffic. These temporary workers may be inexperienced, leading to training and safety issues.

The big challenge facing all bulk handling sites, however — and one that will only exacerbate the above risks — is the continued increase in world population. More hungry mouths means a greater need for food, which in turn leads to increased agricultural production. Since 1960 the global population has risen from around three billion to over seven billion. Global wheat and rice production has tripled over the same period, and corn production is almost five times higher. The UN predicts that by 2040 we could be looking at a world population of nearly 10 billion, with the attendant further rise in agricultural production this implies.

This means that bulk handling sites will need to manage a far greater volume of commodities in the future than they do today. In order to do that, they will need to become more efficient, at the risk of losing business to rivals in their geographic area.

HOW TO INCREASE EFFICIENCY?

There are several ways for sites to increase efficiency. One way is to use better, faster, more efficient equipment. However the sort of equipment used at these sites is very expensive, often costing millions of dollars. For many sites swapping out equipment for new models is simply not commercially viable. A booking system for incoming trucks — assigning specific time slots to this and that driver — can also help eliminate or lessen queuing times. However in some countries with peak harvest seasons the sheer volume of deliveries during these periods can render such a system impractical.

The real key to efficiency, however, lies in the use of smart new technologies to replace manual processes with automated ones. It is automation that will give sites the biggest efficiency bang for their buck, so to speak. The typical receive process described above requires substantial manpower at every step. Automating these steps means that sites can free up resources for use at other tasks and locations.

THE GRAIN BULK HANDLING SITE OF THE FUTURE POWERED BY EKA

Site owners have begun to embrace automation to certain extent (for instance, RFID and scanners), but there is still much, much more that can be done — and at relatively low cost — with current technology. Let's return to the typical receive process of today as described above, and consider what a fully automated version might look like:

As before, a truck arrives at the site to deliver its cargo. The site is using a commodity site management software system, which includes an integrated booking system to schedule incoming trucks, meaning the truck has an assigned time of arrival. The truck driver then logs on to a smartphone app and checks in, which automatically creates a transaction on the system. The transaction is now tied to the location of the phone via its GPS, which means the software can track the truck's movements through the site. This allows the system to provide complete visibility on stock information (quality, type, location etc.) across the entire enterprise via a web interface. The operators can use the system to define quality parameters and raise orders for the movement of product, including billing. This affords decision makers the ability to, if necessary, adjust and regrade site stock levels — all from the palm of their hands.

At station one, camera technology is used to determine the truck's side and top profiles (e.g. is there a tarp or metal bars on

top?) before a fully automated smart probe (similar to a vacuum cleaner) takes multiple samples of the product to be evaluated by a sampling analyser machine in order to determine product type and quality.

The truck then continues to station two, where it is weighed on an automated truck scale or weighbridge. The driver's smartphone tells them precisely where to go, and camera technology is used to determine if an axle and its tires are positioned properly on the scale. The smartphone then directs the driver backward or forwards to get a proper reading. Once the quality and weight reading have been confirmed by the driver, the system will then know where to direct the truck.

At station three the truck delivers its load to the designated pit, grid, or silo. Site automation control software provides operators with real-time visibility of what is where, and what's coming up. This can allow for a more efficient use of equipment such as belts, elevators, valves and fans — the software will only power equipment when needed, meaning the site doesn't have to power its belts all day long.

The truck then continues to station four in order to be re-weighed using the same automated system as before. Once the delivered quantity has been confirmed, the driver is sent a receipt on their smartphone and can continue on their way.

The site described above may be the site of the future, but it is entirely achievable in the present day. This combination of technologies has the potential to deliver substantial efficiencies. The commodity site manager can substantially reduce or even eliminate queues to enter the site. In concert with the GPS tracking system, it also eliminates the need for a lot of on-site hardware and infrastructure typically used to direct trucks. It also makes the system a paperless one. The automation of sampling and weighing means that stations one, two, and four needn't be manned at all, freeing up personnel for use elsewhere. The sampling step is more accurate, and software eliminates the need for a lot of hardware that is otherwise required to run the weighing stations. Finally, the site automation system delivers considerable energy and maintenance cost savings thanks to a more prudent use of machinery, and allows for the remote monitoring of far-flung sites from a central location, minimizing on-site staff requirements. Since bulk handling sites are often located in rural locations, this can be a big benefit.

Looking even further ahead, it is not inconceivable that the receive process will eventually become almost completely automated. Regardless, by taking advantage of modern technologies, sites can gain a competitive edge and increase their bottom line — now.



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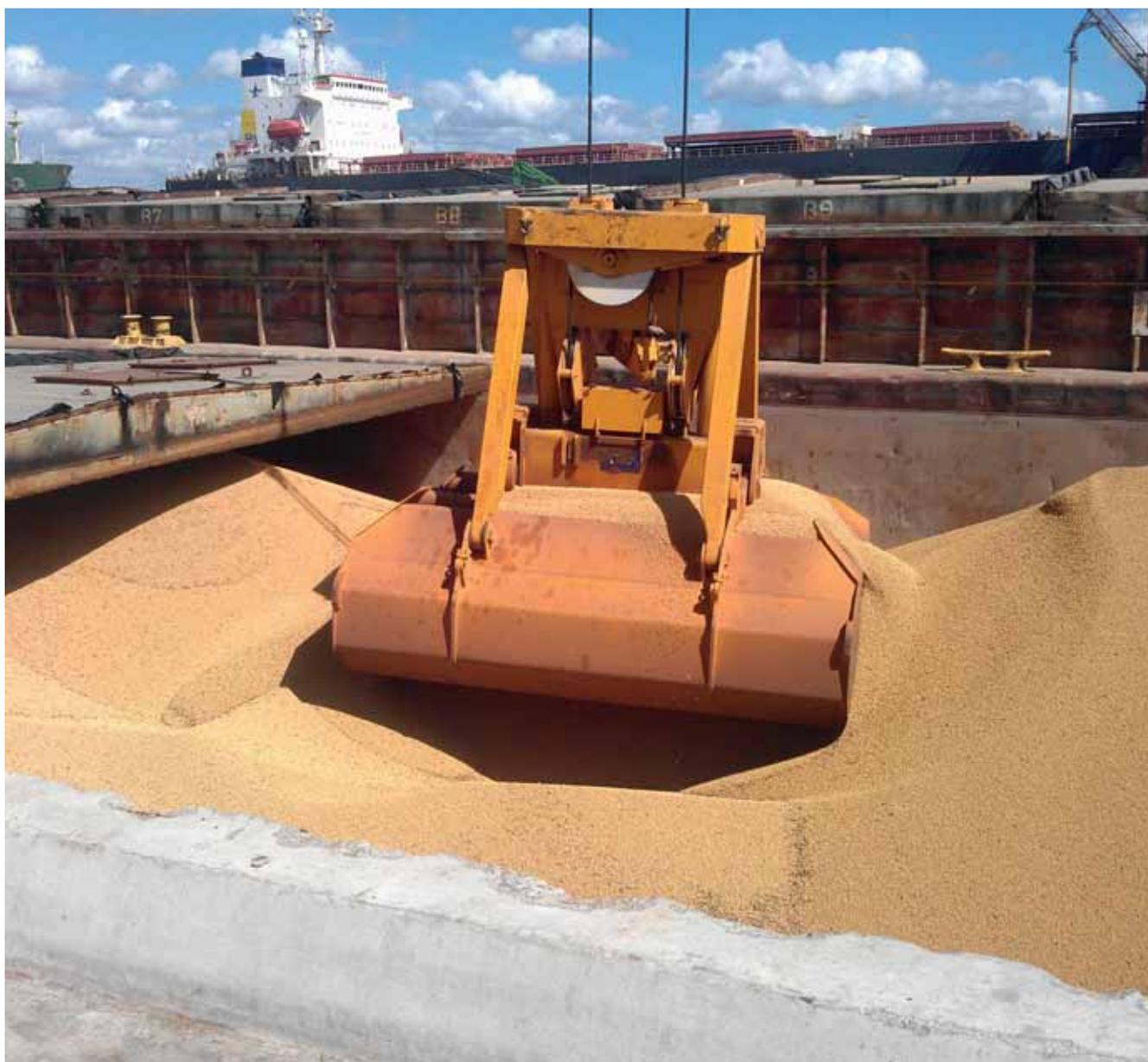
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PSLT grabs offer environmentally friendly grain handling



For more than 60 years, PEINER SMAG Lifting Technologies GmbH — PSST for short — with its product, PEINER grabs, has stood for quality and customer satisfaction in the field of bulk goods handling. The company's wide range of products allows PSST to provide the right solutions for the needs of all of its customers in the field of bulk material handling.

PSST's many decades of experience in the development and construction of grabs means that its customers have been able to put their trust in, and rely on, PEINER grabs. To further develop this expertise, the company makes above-average investments in the research and development of products. Thus new designs and alternative materials are continuously being brought into serial production.

PSST's goal is to continuously improve its products while taking into account the requirements of the market.

At PSST, the customer is always the main focus. The size, shape and dead weight of grabs can vary and can therefore be tailored in every respect to the needs of its customers. PEINER grabs are adapted both for lifting devices and for each application to always find an optimal solution.

Low initial and maintenance costs and the mobility of grabs are the key advantages compared to continuous ship unloaders.

GRAIN HANDLING EXPERTISE

PSST offers a wide range of grabs suitable for grain handling. Ideal for loading and unloading grain of ships are PEINER four-rope dual scoop grabs (VSG). PEINER four-rope grabs achieve maximum efficiency through the optimum balance between dead weight and crane capacity and also require low maintenance. It goes without saying that electro-hydraulic grabs from PSST are a good choice when it comes to grain handling as well. Last year PSST manufactured various grabs for grain handling projects in Asia, Europe and South America.

A well-proven alternative to motor grabs, especially for countries with weak infrastructure, is the PEINER radio-controlled single rope grab. It is particularly suitable in this case because it is not only compatible with many lifting devices (a simple crane hook is enough), but also impresses with its user-friendliness and versatility. Using spill and kick plates, the grab can be adapted for a variety of bulk materials and therefore is suitable for handling grain, too.

The maintenance is reduced to a minimum thanks to the use of high-quality materials such as HARDOX and WELDOX in combination with an optimized design. It keeps the life-cycle costs as low as possible. A modular design allows the use of

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Ronin GMS and the Southern African grain/food processing industries

THE COMPANY AND PRODUCTS

Ronin Grain Management Solutions was formed in 2002 in response to a need in the South African grain handling and storage industry for systems that would enable the industry to effectively manage commodities during handling and storage.

As the company grew various distributor agreements were entered into with international companies that manufactured equipment complementing Ronin's unique product basket in order to reinforce its mission statement of 'Mitigating a risk and enhancing profitability'.

Ronin GMS manufactures its own proprietary hardware and software solutions specifically for bulk inventory management. These solutions encompass both automated fixed systems and moment in time volume surveying services. Ronin solutions are offered to the hard and soft commodity markets. Ronin has developed automated installed solutions for numerous types of storage vessels including bins, warehouses, bunkers and open-to-air stockpiles. Each system installation is tailor made to a customers' method of storage and requirements.

In addition to its own systems, Ronin GMS also supplies a variety of equipment to the Southern African grain handling, milling and food processing industries for correct product sampling, grading, quality control and assurance functions.

Ronin's product basket includes the following:

- ❖ manual & automatic sampling equipment;
- ❖ general grading equipment;
- ❖ moisture analysers;
- ❖ near-infrared analysers;
- ❖ advanced FT-NIR systems;
- ❖ in-line NIR systems;
- ❖ equipment for MycoToxin Analysis; and
- ❖ temperature cables.

Ronin GMS is actively involved in the industry through regular sales trips, product demonstrations, electronic media as well as participation in Industry related events such as GOSA, CSTSA and IAOM. Ronin GMS is well known in this industry for the systems and solutions it provides.

MARKET SUCCESSES

Over the years Ronin GMS has achieved great success in the grain industry with both its own proprietary systems as well as the range of analytical equipment it supplies. These successes have been experienced locally and internationally.

In the last two years Ronin GMS experience elevated interest in its Proprietary Inventory Management Solutions and Systems. Ronin currently has offices in South America and representation in Europe, the Middle-East, India and in the UK.

Recently Ronin GMS concluded a direct sale of its ARTEMIS Inventory Management System into East Europe and the company looks forward to commissioning the system in the near future.

Within its local market environment, Ronin GMS has IMS installations with some of the major grain handling and storage companies as well as some of the local food processors. One of the largest grain handlers in South Africa utilizes its ART Inventory Management System at all its grain storage facilities with a 'Head-office Awareness' element included to monitor the entire handling value chain from a single office.

The analytical solutions Ronin GMS provides have been

adopted by numerous role players within the industry and the equipment it supplies, such as its range of moisture analysers, are widely used throughout Southern Africa.

COMPETITION:

In its local market space, Ronin competes with other OEM suppliers of grading, sampling and analytical instrumentation. Comparing the different types of instrument available in the market today, most of them are of similar technology and capabilities. Successful sales as well as customer retention is achieved through product presentation as well as the service and support element presented.

Locally as well as internationally, Ronin is unique regarding the inventory management package offered. There are companies that manufacture various types of level measurement technologies utilizing either contact measurement, ultrasound, radar and laser systems, but most of these manufacturers are focused on a certain type of industry or type of storage vessels. Ronin GMS has positioned itself to offer bulk commodity inventory management solutions to all commodity handlers locally and internationally regardless if hard or soft and the storage method employed.

SUMMARY

Ronin GMS strives to always be aware of changes in the market place, available technologies and the customers' needs to ensure that the company offers relevant solutions to an ever-changing industry.

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standard parts in different grab models, which greatly simplifies the storage and results in faster response times in the production of new machines and after-sales management. Thanks to the intelligent design, PSLT is also able to match up high grab capacities with low dead weight.

In addition, PSLT strives to keep the environmental impact associated with the use of grabs as small as possible. Especially when it comes to grain handling, an environmental friendly solution is very important. A number of features allows to

minimize the loss of bulk materials and dust. In addition to dust covers, they include special sealing systems on the side and bottom lips. The use of steel sealing strips, rubber-sealed lips, overlapping bottom and side lips or special side toothing prevents bulk materials from trickling down. In contrast to the competitors, PSLT's four-rope dual scoop grabs are also designed with just one, rather than two scoop pivot points. This results in such movement of scoops that ensures a synchronous closing and excludes any offset between scoops.

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Grain handling and storage systems explained by River Consulting

Bulk grains and oilseeds have several unique properties that separate them from other dry bulk commodities, and an understanding of these properties is important in proper design of their material handling equipment and systems, writes Bob Klare.

There are a wide variety of grains and oilseeds that are handled in bulk. These include corn, wheat, soybeans, sorghum, canola, and rice, along with byproduct materials from grain processing, such as soybean meal, corn gluten feed pellets, and distillers dried grains. The material properties such as density, particle size, friability, and angle of repose vary widely among these materials. Design factors such as conveyor incline, transfer spout size and slope, and even wear liner material should take into account the most extreme properties among the grains that a facility expects to handle.

Grain is relatively valuable, currently worth \$200 to \$500 per tonne. In the United States and several other countries, when grain is exported, its quantity and quality is certified by a government agency. For both of these reasons the integrity of the material handling and storage system is a must.

Most agricultural production areas yield more than one type of grain, so many ocean-going vessels are loaded with more than one type of grain or oilseed. Due to this, it is beneficial to be able to load different commodities in different holds simultaneously. It is good practice to design grain ship loading facilities with multiple parallel shipping conveyor arrangements as well as multiple fixed ship loading spouts. It is common to have ship loading rates of 1,000tph (metric tonnes per hour) to 1,500tph per loading spout, or 2,000tph to 3,000tph for a facility.

A unique aspect of loading plans for grain ships is the potential necessity to load more than one cargo in a single hold.



Segregation of the commodities is always necessary and can be accomplished by loading one type of grain in the bottom of the hold, then levelling the grain and installing a physical barrier of plastic and wood on top of the leveled grain. A different type of grain is then loaded on top of the separation.

Accordingly, because grain ships are frequently loaded with multiple separate commodities, clamshell buckets are frequently used to unload grains and oilseeds, but there are other technologies that are used as well. Pneumatic unloader spouts, with capacities of 200tph to 600tph, work very well with the small particle size of grains and oilseeds. Mechanical bucket elevators or drag conveyors are gentle on friable grains and are also used for unloading grain vessels.

Whether moving commodities for loading or unloading, a variety of specialized conveying equipment is commonly used for handling grains and oilseeds, each with its own benefits. Standard troughed belt conveyors are common inside facilities, but it is

necessary to protect grain from inclement weather when conveying outside by utilizing fully enclosed belt conveyors.

Due to grain fragility and spoilage if it gets wet, it is common to see either enclosed belt conveyors or standard belt conveyors in fully-enclosed galleries to transfer grains from storage to ship, or vice-versa. These conveyors are built with a cross-section resembling a box and use idlers to support the top carrying side of the conveyor while the belt slides along a plastic liner along the return side. In addition to protecting the grain from the elements, it also keeps any dust generated from escaping into the environment. Grains also work well with air-supported belt conveyors, where a



thin layer of air supports both the carrying and return sides of the belt.

Vertical conveyors, or bucket elevators, are another type of equipment that are not often used for other bulk commodities, but are common in grain handling facilities. Constructed of a vertical conveyor belt with plastic buckets attached to the belt, bucket elevators are fully enclosed in sheet metal panels and well suited for external locations. The plastic buckets incur negligible damage to grains and oilseeds, and advances in material properties allow modern buckets to last several years before needing replacement.

Just as important as the handling systems, is the storage. The two most common types of storage structures for large grain handling facilities are slip-form concrete silos and steel bins. Slip-form concrete silos have conical bottoms and are arranged in a regular pattern of rows so that they can be filled from above or emptied from below by a few parallel conveyors that extend the length of the slip-form silo group. This is a common arrangement in facilities where multiple commodities need to be stored



simultaneously or where blending different grades of the same commodity is desired. Properly designed and constructed concrete silos have a very long life-span, and the concrete also acts as an insulator, protecting the grain inside from potential condensation that may result from daily ambient temperature changes.

Steel grain bins are typically built with corrugated, galvanized steel panel sections that are bolted together on site. They frequently have a flat bottom and require either a rotating screw conveyor called a bin sweep or multiple discharge gates and manual cleanout to discharge. While steel bins are less expensive and quicker to construct than slip-form concrete silos, they also typically have slower discharge rates and provide less flexibility in segregating different commodities.



Overall, the design of a grain and oilseed storage and handling systems should be driven by the unique operational needs of a facility. The correct selection and arrangement of the specialized components will have a significant impact on the productivity and flexibility needs of a modern facility operator.

Bob Klare has more than 20 years of experience serving the grain industry with both export operation experience and providing expertise as a consulting engineer. He currently serves as the Director of Operations for the New Orleans office and the Associates Board President of the Grain Elevator and Processing Society (GEAPS).

River Consulting is a multidiscipline engineering, project and construction management firm founded to serve the Lower Mississippi River grain facilities in New Orleans, Louisiana. With more than three decades of experience, the firm has provided solutions for clients in more than 57 countries on projects of all sizes.



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'CSL Innovator' self-unloader handles grain and other commodities efficiently

Jenike & Johanson is a leading company in powder and bulk solids handling, processing, and storage technology. Over the past 55 years, it has tested over 11,000 unique powders and bulk solids and worked on more than 7,500 projects, giving its team broad real-world and in-depth experience in the industry to address a wide variety of bulk material handling and engineering needs. Its mission is to create value by assisting clients improve the efficiency, reliability, and safety of their operations by preventing, eliminating, or reducing problems related to bulk material flow, storage, conveying, or processing.

One of Jenike & Johanson's many complex projects involving grain handling was for Canada Steamship Lines in Toronto, Canada and involved a vessel that can carry a variety of difficult cargoes, including grain.

THE NEED

Built for world-wide ocean trade by Canada Steamship Lines (CSL), the *CSL Innovator* is a Panamax-class self-unloading vessel. (Panamax-class refers to a ship that has a dead weight of between 60,000 and 70,000 tonnes and is capable of traversing the Panama Canal.)

CSL's new vessel had to be capable of transporting and discharging a wide range of materials. Typical free-flowing products include grain, iron ore pellets, and aggregates. Cohesive products include wet ores, concentrates, and cohesive coals. Fine, dry, dusty products include alumina and possibly cement. Products that cake include salt, potash, and sugar.

Many products are single sized, but others, like gypsum, can



The CSL Innovator.

contain large, slabby lumps.

The configuration of holds and hoppers had to maximize the useable volume in a Panamax-class vessel. In order to maximize usable volume, it was necessary to use a three-belt withdrawal configuration rather than a conventional two-belt system. Also, the hopper slopes had to be kept as shallow as possible, yet be capable of handling cohesive/adhesive cargoes.

The vessel was designated with 240 gates. Gate configurations had to take minimal headroom. In addition, each gate had to provide good flow control for a wide range of free-flowing and non free-flowing cargoes. Finally, it had to be cost effective, easy to construct, and mechanically robust.

THE SOLUTION

Personnel in Jenike & Johanson's office in Toronto, Canada, worked closely with CSL designing viable hopper and gate configurations.

Flow property results obtained for a very cohesive iron ore concentrate were used as the design basis material. Jenike & Johanson considered many gate design concepts, constructed working models and performed flow pattern tests. Eventually, a new gate of the 'basket' or 'swing' gate type was developed in conjunction with Consilium CMH Marine AB.

THE RESULT

The new ship, aptly named the *CSL Innovator*, has been in continuous service since its development. To date, the performance of the new hold configuration and gate design has been exceptionally good and has far exceeded industry expectations.

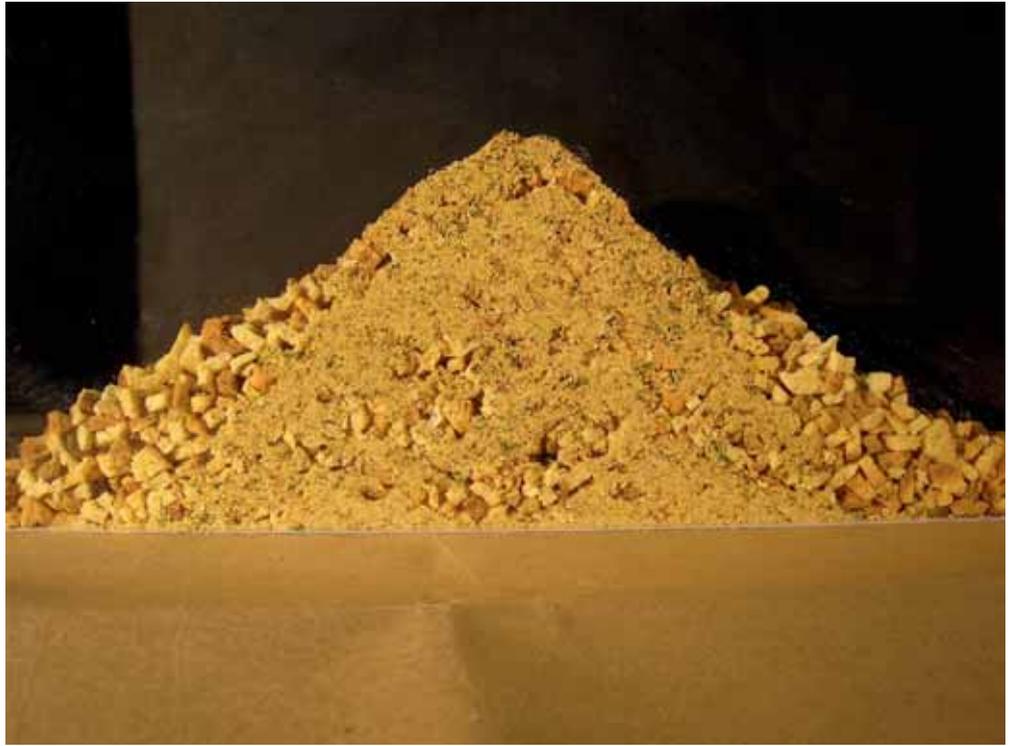


PREVENTING GRAIN HANDLING PROBLEMS

During handling of raw grains, shelled ingredients, or finished products, manufacturers frequently encounter poor flow. These problems can lead to process upsets, down time, and require frequent operator intervention. Product quality problems can be triggered by spoilage or powder caking, both of which are often the result of material stagnation in storage bins. Other problems may include attrition, poor distribution, and segregation of substances.

Jenike & Johanson offers a wide array of services to help prevent and solve grain handling problems:

- ❖ on-site review of flow, segregation problems;
- ❖ powder characterization;
- ❖ silo and feeder design for finished goods, ingredients;
- ❖ pneumatic conveying testing of powders;
- ❖ anti-segregation equipment supply; and
- ❖ mixing/blending testing to evaluate blenders.



Whether a project involves feeding sticky ingredients into a mixer, conveying powders from a storage silo to a weigh bin, or high-speed packaging of a dry powder or raw grain, Jenike & Johanson can help achieve reliable material flow and maintain product quality.

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Grain: a growing market for Cleveland Cascades' loading systems

Cleveland Cascades Ltd, renowned for its global supply of bulk material loading chutes for shiploaders and silo loaders to name a few, has seen an increased demand for grain-loading solutions across its range of products.

Since 1992 the company has been involved in the design and manufacture of loading chutes, with its unique 'Cascade' system being at the forefront of the industry. Loading material through oppositely-inclined cones at low velocity yet high volume results in minimized dust emissions and removes the requirement for expensive dust-extraction systems.

Since becoming private in 2005, the company has experienced rapid growth and has expanded its product range to include the Cascade technology in vehicle loading and conveyor transfer point applications. The company also designs and manufactures conventional loading systems, where dust emissions and product degradation and segregation are not of such high importance.

With over 500 systems operating worldwide with applications in ship, silo, road, rail and tanker loading, the company's key to success is its proven ability to provide a well-engineered solution with professional and committed support.

Cleveland Cascades Ltd approaches every project with the same attention to detail, thorough engineering process and high standards of quality, believing that every system produced is a direct reflection of the company and the best possible form of advertisement to potential new customers.

Grain loading has always been a significant part of Cleveland Cascades, with the company providing its first loading system in 1997. That particular project involved a conveyor transfer point and stockpile loading chute handling 600 tonnes per hour in the UK.

To date, Cleveland attributes almost 10% of its supplied systems to grain loading, a significant share considering the vast array of materials that the company effectively handles. The grain loading systems are across the complete range of products also. This is ship loading, silo/stockpile loading, conveyor transfer points, road vehicle loading and also tanker loading.

Most recently, the company has been involved in grain shiploading in particular, at quantities as high as 2,000tph (tonnes per hour), the highest loading rate of grain that the company has provided.

Using the Cascade Shiploader, recent projects include a project for ISKAR in Derince Port, Turkey. This 18m length application is to load ships at 1,000tph with an annual tonnage just short of 1,000,000 tonnes. Another project for 2014 has recently been cold-commissioned with Telestack for use on one



Fig. 1 – Cleveland Cascades free fall shiploader with carrier-mounted extraction



Fig. 2 – Model image of Free Fall Chute for Cargotec Loader in Ukraine.

of its mobile shiploaders. The 16.5m-length system is going into service imminently, and will handle up to 650tph in Ukraine, with an annual tonnage again just short of 1,000,000 tonnes.

The most recent grain-handling application for the company is for three conventional free fall systems, a project for Cargotec for use in Ukraine (see Fig. 2). The systems, handling 2,000tph each, are due for dispatch in September 2014 for installing onto the Cargotec loaders. The chutes are 30 metres in extended length, and also feature four carrier-mounted extraction units per chute for the effective collecting of dust-laden air during loading. Utilizing a double-skirted arrangement which allows for effective loading and precise dust-channelling, the extraction units are specified exactly to the requirements of the project and are placed in the most effective position, at the source of the dust creation, to ensure the most effective levels of dust extraction. Because the units are situated on the carrier outlet of the system, they extend and retract with the chute meaning that the levels of extraction do not waver, which is often the case with fixed units that are positioned away from the systems.

Due to the required length, careful consideration needed to be made in regards to the weight of the system. As a result, Cleveland has developed GRP cones with polyethylene liners as

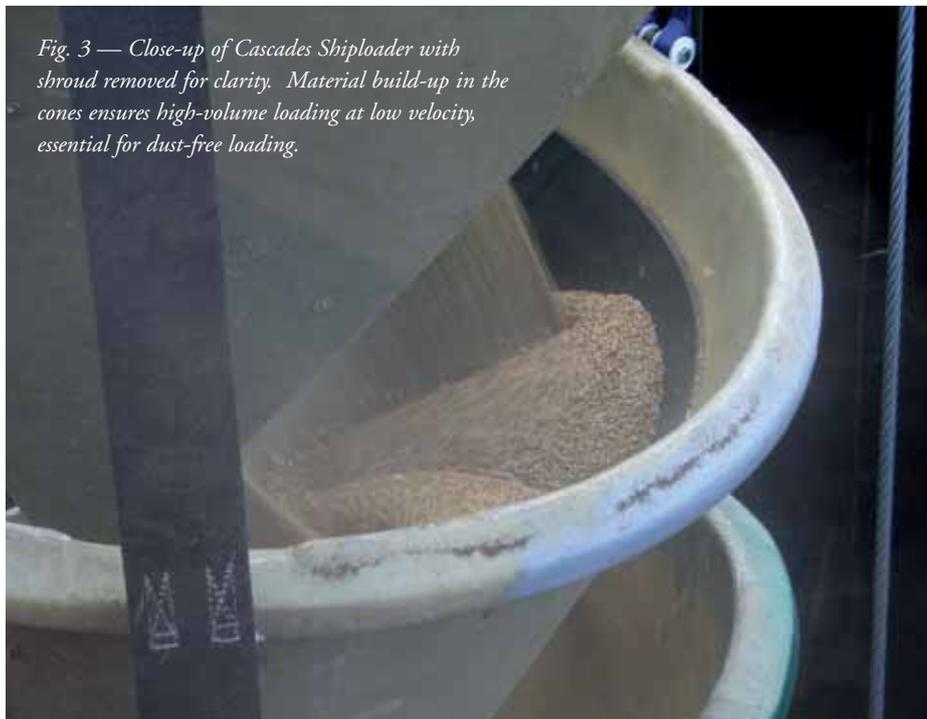


Fig. 3 — Close-up of Cascades Shiploader with shroud removed for clarity. Material build-up in the cones ensures high-volume loading at low velocity, essential for dust-free loading.

opposed to the original steel cones, which in turn provide a huge saving on both weight and cost.

Cleveland Cascades Ltd hopes to remain at the forefront of innovative design within the bulk industry, taking our technology and experience and applying it where possible to solve dust and material degradation issues.

With this ethos of continual improvement and expansion, CCL hopes to further develop itself into and continue to be a well-established figure within the bulk industry.

Cleveland Cascades Ltd

Setting the industry standard for loading solutions



World Leader in the design & manufacture of bespoke retractable loading chutes for the handling of dry bulk materials.

- Based in the UK, Cleveland Cascades Ltd has a dedicated team of experts in the design, assembly and commissioning of loading chutes and materials handling equipment.
- With a growing range of bespoke solutions for the handling of difficult dry bulk materials, our product range includes the unique 'cascade' concept, dust-controlled conveyor transfer points and dust-controlled hoppers.
- With over 600 reference installations operating worldwide, with applications in ship, silo, road, rail & tanker loading, the company's key to success is its proven ability to provide a well-engineered solution with professional and committed support.
- Winners of prestigious Queens Awards for Environmental Achievement, Export Achievement, and Enterprise in International Trades.



Contact Cleveland Cascades Ltd

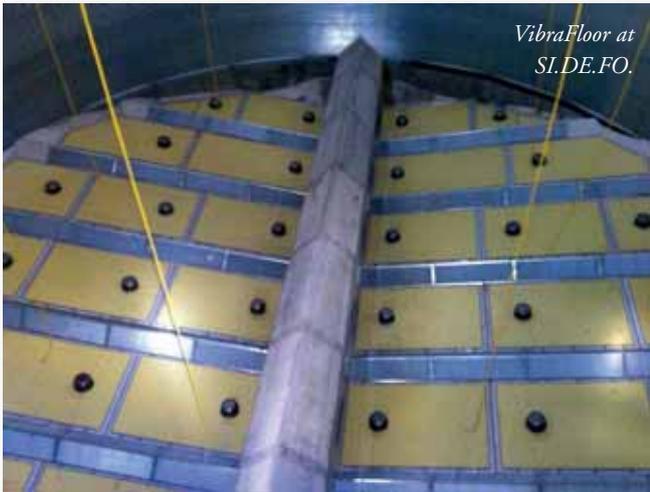
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Intelligent choice: VibraFloor reclaim system

Getting hold of large quantities of agricultural products, and ensuring that their handling process is high-quality, is a growing challenge for many of VibraFloor's customers, writes *Ivanny Salinas of VibraFloor*. Populations are growing, and it is a priority to obtain healthy and safe food.

One of the greatest concerns is the efficient and correct handling of cereals. This can be a headache in the agricultural chain, not only because different types of crops are handled in the same area in sequential seasons, but also because of the time needed to improve the speed of discharge from enclosed storage facilities.

VibraFloor's customers are always asking for simple, effective solutions. There is a range of options on the marketplace that allow for partial emptying of enclosed storage systems like silos. However, many of these only allow for partial emptying, and are



*VibraFloor at
SI.DE.FO.*

not all safe. They can also cause production stoppages.

Since 1996, VibraFloor has been offering its design for an adjustable and efficient reclaim system, which achieves economies of scale and cost-savings for the company's customers all over the world.

SINGLE MODE OF OPERATION FOR MULTIPLE APPLICATIONS

VibraFloor's method of moving bulk material is to destabilize piles of bulk products, and move these towards conveyors, by means of vibrating modules laid on slightly inclined floors in the bottom of a silo.

This undermines and collapses the leading edge of cohesive and free-flowing material through a low-pressure zone, creating a progressive 'avalanche' of the stored material.



*VibraFloor at
SI.DE.FO.*



SI.DE.FO. silo.

ADVANTAGES

- ❖ full traceability of unloaded batches;
- ❖ ability to handle different types of products;
- ❖ **high rate of discharge:** the system is adapted to numerous configurations of silos, and ensures optimum flow;
- ❖ **low energy cost:** the VibraFloor technology provides one low-power (690W) motor for the module. For this reason, it can be used in large and small structures. In a recent project, the Drax biomass power station in England, there are for 63m domes.
- ❖ **automatic, safe and secure:** from the outset, during project evaluation, VibraFloor takes into account all technical requirements. It adapts the design and carefully analyses the product to be handled. All parameters are set to ensure



*Close-up of vibrating
module at SI.DE.FO.*

100% successful discharge, from the control room. No human intervention is required inside the silo. There is no risk of explosion — all electrical components are ATEX-certified.

- ❖ **the vibration is not transmitted to the product.** The system works by creating a wave in the flexible surface plate of each module, which is instigated by a low-energy motor. This means that the system can also be used on ships and barges.
- ❖ **system redundancy:** each installed module has its own motor, so reclaiming can continue even if one motor has to be disconnected, stopped or reset, so production remains uninterrupted.

VibraFloor works by increasing the volume of discharge

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Over 20 years of research, development and successful projects

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according to the requirements of the production chain. It also allows further optimization in product turnover throughout the year.

The following is a sample of projects completed in recent years involving some of the world's biggest producers of grain/cereals:

Company: Cap Seine, France 2013
Project: ten silos
Dimensions: 13.45m x 13.45m
Product: cereals

Company: Norea, France 2013
Project: eight silos
Dimensions: 6.5m x 6.5m
Product: grain

Company: SI.DE.FO., France 2013
Project: one silo
Dimensions: 21.26m
Product: grain for animalfeed

Company: Malteurop, Germany 2011–2013
Project: 16 silos
Dimensions: 11m
Product: cereals

All of this has resulted in a significant reduction in total investment.

VibraFloor is also working on a range of projects for 2014/15 for the cereals sector.

Thanks to constant evolution and improvement of its systems, in terms of components and system operations, VibraFloor remains at the forefront of the bulk material discharge market. The VibraFloor discharge system was originally developed for a cereal application; the company now works with a range of other products including sugar, flour, animalfeed, grain/seeds, minerals and fertilizers.

VibraFloor focuses on the real needs of its clients, ensuring the correct evaluation in terms of structural installation, processes and technical specifications of the products. This allows it to guarantee a constant flow of material, and 100%



discharge of its clients' materials. Its main objective is to simplify the unloading process and help its customers to improve their production costs.



Reliability and speed: key to successful grain unloading

Unloading a ship with maximum performances in both technical and financial terms is challenging. Two factors are vital when managing conveying operations out of ship holds — reliability, with limited unwanted stoppages; and overall speed from hatch opening to final closing at the end.

The greatest determinant in achieving these aims is the choice of unloading method or equipment.

It should be pointed out that good performances can only be

achieved with the adequate motivation of the human resources — the operators of the equipment.

Environmental concerns are a significant driver, and are often a major factor when selecting continuous ship unloaders (CSUs).

RELIABILITY

The reliability of most CSU equipment will be guaranteed by good conceptual design and the use of state-of-the-art

Two large size NIV 300tph ship unloaders delivered to the port of Skidda in Algeria end of June 2014.





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manufacturing processes with the latest generation of components and materials.

Pneumatic CSUs have incorporated up-to-date technologies. With significantly fewer moving parts than mechanical systems, high reliability is achieved with low maintenance costs (also thanks to the use of very high resistance alloys). It is, for example, quite simple to repair suction parts — especially in comparison with other CSU technologies.

SPEED

Any CSU user will tell you that a major concern is the cleaning of the vessel holds. The amount of remaining material to be quickly unloaded will vary according to the hold dimensions and characteristics: for this reason, the volume to be cleaned during barge unloading is more important than for ocean vessels. This can be a headache when using grabs, for example, unless it is possible to use auxiliary equipment and several unqualified workers for final brushing.

Mechanical CSUs require a minimum height of the remaining product above the bottom to enable the intake device on the vertical arm — a screw, for instance — to properly catch and lift the cargo out of the hold.

This means that there is a higher percentage of the hold volume that will need to be cleaned out, leading to lower overall performance.

Pneumatic CSUs are able to suck right down to the bottom of the hold, even thin layers, so this ability leads to the most efficient and fastest cleaning of the hold.

The pictures below clearly illustrate how easily and efficiently cleaning can be performed with a pneumatic CSU with a minimum of manpower cost: one single operator for the entire barge unloading period. Similar cleaning performances and working abilities are also very commonly achieved with larger vessels.

It should be noted that, for high unloading targets (above 1,000tph [tonnes per hour]), the use of both types of equipment, one mechanical CSU and one pneumatic CSU, can enable reliability and speed by combining the specific advantages of both technologies, especially when the whole unloading operation is wisely managed.

With more than 1,250 items of equipment around the world, and 45 years of experience, VIGAN has sharpened its expertise in reliability and for advising its customers to efficient unloading operations.

Hold cleaning



The driver of the skid steer loader type of auxiliary equipment has a control box in his hands, which allows him to guide all the movement of the horizontal and vertical telescopic suction pipes. Therefore he will be able to ensure that the suction intake nozzle is always in an optimum position ('in full heap') with large amount of grains to be seized into the pneumatic CSU.



By continuous pushing of the grains towards this suction nozzle with his small size loader, the same driver will guarantee an optimum use of the pneumatic CSU handling capability.



Thanks to the brush (carried on the top of his driver cabin !), the same worker will also take care of the final brushing.

VLE the new elevator belt: keeping grain and other cargo on the right track



THE ELEVATOR BELT OF FUTURE: INTRODUCTION

All users of conveyor belts — including those that handle grain — are routinely confronted with the problem of having to re-tension belts with a textile carcass after a few days or weeks of use, writes *JC Mougeot, product manager at Cobra Europe*. In some cases, it is necessary to repeat this several times.

This work requires a systematic plant stop and overlapping or shortening of the belt where the stroke of the tensioning drum becomes insufficient.

In addition when a belt is not correctly tensioned it can cause slippage of the belt on the drive drum, the risk of friction between the belt and the drive drum being a heat source and a fire hazard to the elevator.

THE DIFFERENT ELONGATIONS OF AN ELEVATOR BELT

The total elongation of an elevator belt consists of two separate elongations: permanent elongation and elastic elongation. The total elongation of the belt is the sum of these two.

The permanent elongation is due to the type of construction of the carcass, while the elastic elongation is due to the type of yarn used to make the fabric warp.

The problem — the need to re-tension for textile belts — is due to the permanent elongation of the carcass. Most textile belts are constructed with a carcass of polyester warp yarn with a corrugated profile. During the first hours of operation, permanent elongation of the elevator belt takes place.

When the permanent elongation has taken place and the system continues to work, elastic elongation of the elevator belt slowly takes place.

NEW RANGE OF ELEVATOR BELTS

To overcome the problem of having to re-tension the belt due to permanent elongation, Cobra/Transco has developed a new range of elevator belts called VLE (Very Low Elongation) that do not require re-tensioning after installation.

They are constructed on the basis of a straight warp carcass using yarns without corrugation.



The Cobra/Transco weaving workshop has developed and produced a totally new fabric for elevator belts.

The tensile breaking strength of VLE belts ranges from 400N/mm in one-ply to 1,800N/mm in two-ply.

VLE belts are available with different rubber covers adapted to the needs of the end user, such as anti-abrasive, oil and fat resistant, fire resistant, food compatibility, or a combination of these properties.

VLE belts are manufactured in Cobra/Transco's production facility at Luxeuil les Bains (France).

In comparison with conventional elevator belts, VLE belts offer:

- ❖ **operational safety:** the belt is well stretched at all times without the risk of low tension and slipping;
- ❖ **time savings:** it prevents one or many visits to the elevator to re-tension the belt; and
- ❖ **smaller-diameter drums:** offering a potential gain on drum selection (the carcass thickness is less than a traditional belt at an equal breaking strength).

VLE BELT INSTALLATION

There are two methods of tensioning VLE belts:

- ❖ controlling and setting the starting elongation of the belt by using a tape measure; and
- ❖ controlling and setting the pre-determined tension of the belt by using belt clamping plates and a tension meter.

The first tensioning solution is the easiest to use; the second solution is preferred but requires a system of control of the stretching force of the belt.

EXPERIENCE

Cobra/Transco has installed several VLE elevator belts, which are in successful operation. For example the first was in an Italian factory of a large group manufacturing animal feeds. In this project, 125m of BLAK VLE 1250/2 465 3+1 GS was fitted to a grain elevator

The VLE belt tension was established by Cobra/Transco technicians to control the elongation of the belt. The belt was



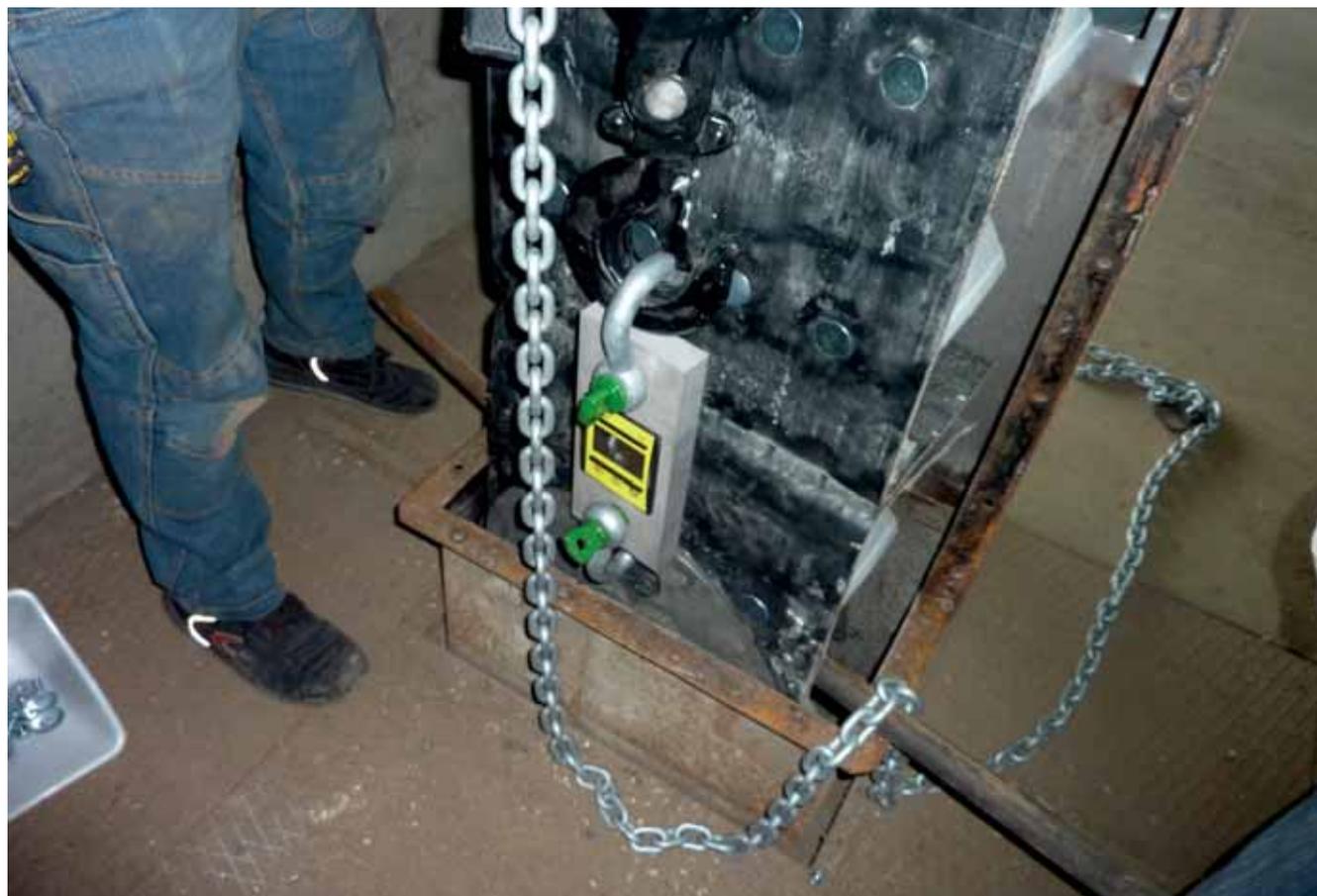
then installed and tensioned using belt clamps and a tension meter.

The value of this tensile force was derived through a laboratory test to determine the force/elongation curve and transmitted to the installation crew in order to set the belt at the correct tension for instant continuous running.

As soon as installation was complete, the elevator was started and allowed to unload a wagon of wheat.

To date, this VLE belt is still working to the complete satisfaction of the client. The end-user has not found the need to monitor the pre-set tension of the belt or intervene again to re-tension the elevator.

VLE belts are part of Transco's range. Transco is a European leader in the manufacture of conveyor and elevator belts uniquely designed to handle bulk products in both agriculture and food processing industries. Transco is part of the Cobra Group.





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Ausenco: heavily involved in major grain handling projects

Ausenco is a diversified engineering company operating worldwide in the marine, bulk handling, mining infrastructure, oil & gas, power and energy industrial sectors. Ausenco provides unbiased, independent engineering and management services for projects of all sizes. From mines to pipelines, ports, bulk terminals and infrastructure, Ausenco delivers ingenious solutions to optimize our clients' resources.

Ausenco is dedicated to delivering practical, fit-for-purpose solutions to complex problems that provide value to its clients, wherever they may be located. With 30 offices in 18 countries, it has the capability to deliver results for exciting projects in some of the world's most remote locations.

Ausenco has a long history in the design and development of bulk cargo and grain handling marine terminal facilities dating back to 1925 through its legacy companies, Swan Wooster Engineering and Sandwell Engineering Inc. Its experience includes work on over 10,000 terminal and transportation projects and work on over 500 marine terminals. Over the past 35 years it has been consistently performing work on existing grain terminal facility upgrades, or major additions and/or new facilities on the west coast of Canada, the USA and in Brazil. It has a proven track record of designing and implementing both major facilities and also modest capital cost and operationally efficient facilities both in traditional types of systems and also innovative solutions that may provide even greater CAPEX savings such as transshipment operations where appropriate.

A selected list of completed project examples highlighting Ausenco's grain handling experience include the following:

GRAIN TERMINAL SIMULATION ANALYSIS, VANCOUVER, BC

Client: Viterra (formerly Alberta Wheat Pool)

Scope: Modelling of detailed operations and modifications

Services: Computer modelling, conceptual design, cost estimates



This study assessed the extent of plant modifications required to attain maximum throughput at an existing grain export terminal.

Swan Wooster Engineering (now Ausenco) created a unique, state-of-the-art Grain Terminal Simulator (GTS) which can be adapted readily to model any grain terminal.

This complex project required modelling of detailed operations and undefined modifications. A structured approach

to the model design was taken by using techniques developed for writing efficient computer systems software.

The model was designed to read the physical characteristics of the terminal from an input file. This data-driven feature allowed modelling of modifications simply by changing the input data.

Conceptual design and capital cost estimates were prepared for the upgrades having the most significant impact on throughput. A subsequent analysis of throughput versus cost enabled the client to develop a staged expansion programme.

MAJOR FACILITIES UPGRADE FOR GRAIN EXPORT TERMINAL

Client: Viterra (formerly Alberta Wheat Pool)

Scope: Upgrade to 3,200tph (tonnes per hour)

Services: Marine, civil, structural, mechanical design; comprehensive shop and site inspection.



In 1991, Ausenco was commissioned by Alberta Wheat Pool to provide all engineering services for a shipping system upgrade project at its Vancouver marine terminal.

The primary goal of the project was to replace the 1926-vintage timber ramp gallery structures with a high-capacity shiploading system.

Many portions of the project required replacement of vital equipment in congested areas without interruption to ongoing activity including: modifications to existing shipping silos to access the new shiploading system; addition of 125,000cfm new distributed dust control facilities; staged replacement of conveyor gallery structures, 18 conveyors, 12 trippers and four bulk weigh scale discharge systems. The upgrade provided Alberta Wheat Pool with a cost-effective design for a new 3,200tph facility, a 60% increase in capacity.

VITERRA, PACIFIC TERMINAL REMEDIATION AND REPAIR (PREVIOUSLY PACIFIC ELEVATORS), VANCOUVER, BC

Client: Viterra

Scope: Condition inspection, remediation planning, and repair design

Services: Site inspection, capital cost estimates



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Speakers

• Susan Oatway, Senior Consultant, Drewry Shipping Consultants Ltd • Jeffrey Landsberg, President, Commodore Research & Consultancy • RA Dr. Erich Schmitz - Managing Director - Verein der Kohlenimporteure e.V. • Jonathan Challacombe, Associate Professor in Maritime Studies & International Logistics Plymouth Business School • Peter Sand, Chief Shipping Analyst, BIMCO • Christian Ingerslev, Vice President, Head of Business Development Desk, NORDEN A/S • David Peel, European Manager, RightShip • Ulrich Koester, Managing Owner, Maritime Tecnet GmbH • Capt. Giordano Scotto d'Aniello, Commercial Director, Coeclerici S.P.A. • Ian Adams, Executive Director, International Dry Bulk Terminals Group • David Trueman, DBIS • Marcel Gorris, Cluster Manager Agribulk, Minerals & Recycling, Port of Amsterdam • Johan Pruisken, Director Advisory Group Heavy Industry & Logistics, Royal HaskoningDHV • Teus van Vianen, Delft University of Technology • Brian Pittenger, Director Business Development, Jenike & Johanson, Inc. • Dr. Dirk Rother, Perex Port Solutions • Micha de Jong, General Manager, Wuvio Chemicals • Professor Mike Bradley, Greenwich University • Ian Atkinson, Engineering Director, C Spencer Ltd • Fergal Buttimer, Director, Buttimer Group



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Pacific Terminal is an existing grain handling facility comprising a finger pier jetty and adjacent wharf structure. Ausenco completed a visual survey of the jetty and wharf structures, including above and below water inspections.

The inspection findings were incorporated in a proposed remediation plan for the rehabilitation work.

Subsequently, Ausenco provided engineering for rehabilitation of the wharf structures. The scope of work included development of the repair design, as well as tendering and contracting for the rehabilitation work.

The first phase of a five year programme included a remediation plan of the terminal jetty, repair design methodology and design drawings to tender the work.

The repair work of the first phase was planned for execution in 2009 and 2010.

VITERRA PACIFIC TERMINAL, BERTH 2 EXPANSION, VANCOUVER, BC

Client: Viterra (formerly Pacific Elevators Ltd)

Scope: Dredging and modifications to berth and shipping system

Services: Preliminary investigation, capital cost estimate, detailed design, contract documents, shop inspections, project management, site supervision, commissioning.



Berth 2 at the Pacific Elevators grain export terminal was upgraded to accommodate and load larger bulk carriers up to 50,000dwt.

The project required deepening of the berth, extension of the wharf, installation of new shiploading spouts, and substantial redesign of the entire shipping system.

The scope of work included: stabilizing the seabed below the existing wharf caisson structure; blasting and dredging the 10m berth depth to -14m; extending the existing wharf with a berthing/mooring dolphin capable of supporting a future

extension to the shipping gallery; replacing three of the seven existing shiploading spouts with longer, raised spouts capable of operating during extreme tide conditions; automated, fixed trippers and metering gates; redesign of the dust control system in the shipping gallery to accommodate the new trippers and reloaders; addition of automated bin gates, a conveyor control system and central control room, and upgrade of the conveyor-drive systems for the shiploading section.

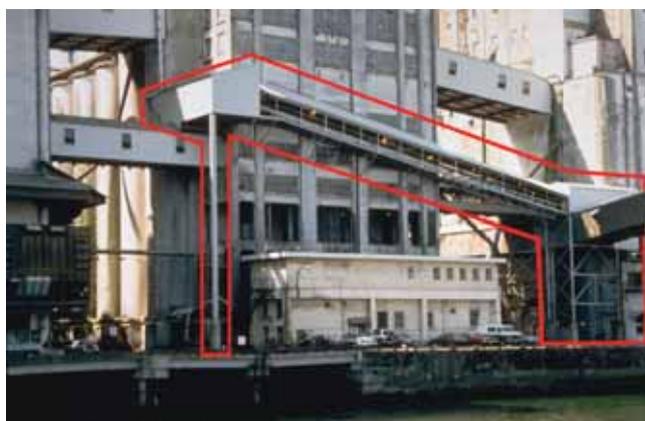
Modifications of the Berth 2 spouts and conveyor system, and the dredging, were scheduled simultaneously and without interruption to an adjacent berth.

VITERRA PACIFIC TERMINAL, PE3 LINK TO MAIN BERTH, VANCOUVER, BC

Client: Viterra (formerly Pacific Elevators Ltd)

Scope: Major retrofit

Services: Design (except for proprietary controls package), field services during construction



Pacific Elevators consists of two once independent adjacent grain terminals now operating as a single entity. For many years, one portion of the terminal, PE3, could only access the combined main shiploading facilities at Berth 2 through a series of slow and awkward transfers.

Ausenco was commissioned to design a direct link from PE3 to the main berth to increase the throughput potential of the terminal.

As is usual in retrofit projects, a minimum of space was available for the equipment, and most of the work had to be designed and installed next to operating shiploading conveyors. The transfer area at the discharge of the new link onto existing conveyors was especially confined, yet had to accommodate the full flow rate.

NEPTUNE BULK TERMINALS, AGRI PRODUCTS, NORTH VANCOUVER, BC

Client: Neptune Bulk Terminals (Canada) Ltd.

Timeframe: 1999

Scope: Design of materials handling system to enable the shiploading of agricultural products and potash over Berth 3
Services: Feasibility study, detailed engineering, preparation of technical specifications and bid documents, shop and site inspection services, commissioning

Berth 3 at Neptune Bulk Terminals was originally constructed to unload phosphate rock from vessels to onshore storage.

Ausenco was retained to develop a system to load agricultural products and potash onto Panamax vessels while retaining the ability to unload phosphate rock. The Berth 3 development project included a new conveying system and shiploader capable



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of exporting 1,100tph of agricultural products or 2,100tph of potash.

The new conveying system includes belt conveyors to receive product which is conveyed from either of the two storage sheds or the two railcar unloaders. The belt conveyor system feeds the product to a pipe conveyor which carries the product over the rail to a sampler and garner weigh bin system, prior to shiploading.

The pipe conveyor completely encloses the product protecting the contents from rain and preventing fugitive dusting and cross-contamination. The pipe conveyor is designed to open into a troughed belt configuration at the tail and head ends to permit loading and discharge by conventional means.

The shiploader is a travelling type machine with a shuttle boom and telescoping discharge spout. The shiploader travels the full length of Berth 3 on new rails mounted on the existing marine structures that were upgraded to meet current seismic design requirements and to carry the shiploader wheel loads.

The existing wharf belt conveyor was modified and extended to accommodate the new shiploader tripper, and provided with a rolling cover belt system.

This project highlights Ausenco's ability to provide innovative solutions to challenging problems. Despite the restrictive site conditions, Neptune now has a dual purpose export/import berth.

SHIPPING FACILITIES AT RIDLEY ISLAND, PRINCE RUPERT GRAIN, PRINCE RUPERT, BC

Client: Prince Rupert Grain Ltd.

Scope: Design of shiploading system and electrical/instrumentation/control facilities

Services: Conceptual and detailed design, field services, commissioning



The shipping facilities at this 202,000-tonne grain terminal, located on Ridley Island near Prince Rupert, BC, is capable of loading bulk carriers from 15,000 to 65,000dwt, at a rate of 4,400tph. The system has capacity for ships up to 100,000dwt after future expansion of the berthing facilities. Principal features of the shipping facility include: three tower-mounted shiploaders; three shiploader towers; an enclosed shipping gallery; an enclosed wharf gallery; a unique tripper and flow-splitter system; and steel-pile-supported trestle supporting an access road, overhead ship gallery and all services.

In association with Howe International Ltd., Ausenco was responsible for the design, field supervision and commissioning of the shiploading system and all electrical/instrumentation/control facilities for the terminal.

UNITED GRAIN CORP., AUTOMATED TRIPPERS, PORT OF VANCOUVER, WA

Client: United Grain Corporation

Scope: Design of five new trippers

Services: Structural, mechanical, dust control design, shop inspection, field services during construction



As part of an ongoing programme to modernize and expand United Grain Corp's 136,000-tonne-capacity grain elevator, Ausenco was commissioned to design five new trippers in three storage annexes. Three of the five new machines were designed to suit the current conveyors but with the capability of accommodating larger conveyors to be installed in future. Ausenco's designers successfully modified a previous Ausenco tripper design to suit the clearance and operational requirements of the United Grain facility which included an inclined ramp to bridge a 30" elevation change at mid-travel in one annex. Its dust control specialists incorporated a travelling turtle/duct system for on-board and bin purge dust extraction to reduce dust emissions during bin filling operations. Features of the trippers include trailers and nested sleds to provide full belt support and reduced spillage. The scope of work included detailed design, shop inspection during fabrication, field services during construction and commissioning assistance.

PRINCE RUPERT GRAIN ELECTRICAL SYSTEM, PRINCE RUPERT, BC

Client: Prince Rupert Grain Ltd.

Scope: Electrical and control system

Services: Planning, design, procurement, and construction

Prince Rupert Grain Ltd.'s export terminal has a projected throughput capacity of 3.5mtpa (million tonnes per annum). This facility with 200,000 tonnes storage capacity receives grain by railcar at rates of up to 19,000 tonnes/day and processes it ready for export. It is then loaded onto 15,000dwt to 65,000dwt bulk



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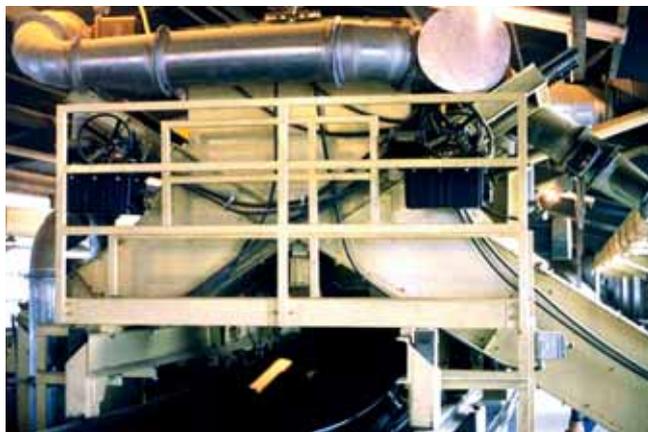
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carriers at rates up to 4,400tph.

To achieve maximum use of remote control, full instrumentation and sensing was installed throughout the terminal. Batch scales are electronic with separate video displays and calibrated metering gates, continuous bin-level sensing, and bearing monitors were installed. Radio control is used for conveyor trippers and shiploaders. Closed circuit TV was installed at the train unloading and shiplading areas.

Most recently, Ausenco has been working on the following projects for the grain industry:

VITERRA PACIFIC TERMINAL, VANCOUVER, BC – NEW SHIPPING SYSTEM STUDIES

Ausenco was selected to perform a pre-feasibility study (PFS) on the upgrade of an agricultural products (grain) receiving, storage, and export terminal in Vancouver, BC, called Pacific Terminal. This study explores the feasibility of upgrading the terminal to handle the required capacity throughput increase. The study was supported by capital cost estimates (CAPEX) based on preliminary drawings to an accuracy of $\pm 25\%$. The proposed upgrade includes a new rail yard, and a new shipping system plus modifications to the existing system downstream of the shipping bins. The shipping system included a three-tower shiplading system. To accommodate this shipping system, new marine supporting structures will be installed as required.

In support of Viterra's shipping system project, additional dredging is required at the La Pointe Pier basin in order to cater for the larger vessels that are expected at the terminal. As part of the PFS, Ausenco carried out a geotechnical investigation in the La Pointe Pier berth basin, which revealed the presence of glacial till. Conventional dredging techniques were deemed uneconomical due to these challenging ground conditions, so Ausenco proposed an innovative approach. This involved building an extension arm for an excavator with sufficient power to be able to rip out the glacial till in an efficient manner.

Further work also includes upgrading and replacing the shipping drives for Pacific Elevator 1, and assisting with the demolition of Pacific Elevator No.3 to make space for additional storage bins in the future.

WEST COAST GRAIN EXPORT FACILITIES – BC, CANADA

Ausenco has recently and currently been involved in preliminary studies for confidential clients to determine suitable locations to increase the capacity of the Canadian west coast grain exports.

AUSENCO GRAIN PROJECTS IN BRAZIL

Client: Vale (formerly CVRD)

Project: TMPM Soya Export Expansion, Ponta da Madeira Terminal, Sao Luis, Brazil

Ausenco carried out a planning and optimization study for the



expansion of Soya and Soya meal exports over the northern transportation system and through the Ponta Madeira Terminal near Sao Luis, Brazil. The study determined the requirements for upgrades and expansions to increase the soya and soya meal exports from a level of 4.5mtpa up to 9mtpa throughput.

The study recommended the shifting of gusa (pig iron) shipments to an alternate berth, flattening and lengthening the soya export season, increasing the capacity of existing conveyors and shiplader and carrying out the design and construction of additional rail car dumping, conveyors, storage and a new shiplading system.

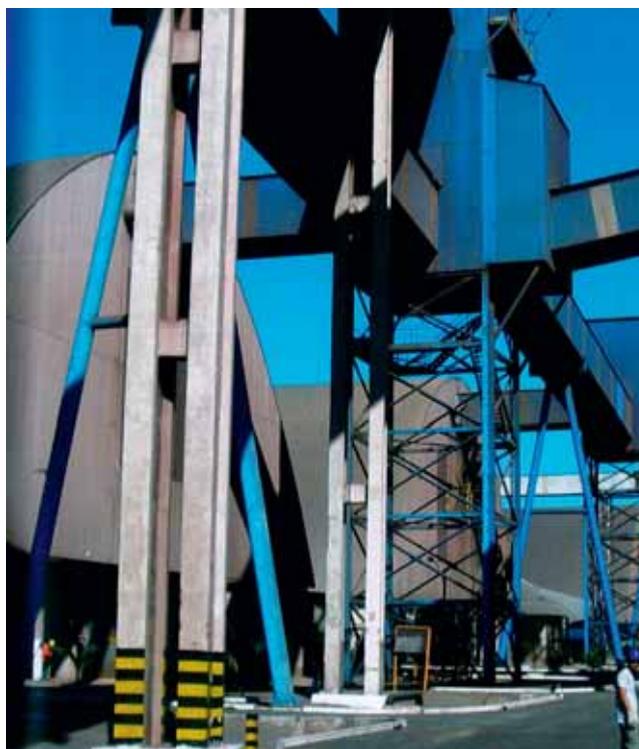
Plans for the optimal staging of the upgrades and expansions to meet the increasing demands over the next five years were developed.

Client: Vale

Project: Tubarao Port Master Plan, Vitoria, Brazil

Ausenco carried out a master plan study for the expansion of the Vale Tubarao Port near Vitoria, Brazil. The study included reviews and analysis of the existing facilities and future requirements for the handling of iron ore, pellets, gusa (pig iron) and soya exports and the imports of coal and fertilizer products.

The master plan determined the requirements for expansion of all products over the next 25 years. The soya exports were forecast to increase from approximately 4mtpa to as much as 16mtpa. Part of the increased capacity could be gained through upgrades and optimization of the existing facilities and also by expansions. The new soya facilities required to handle the increased demands included a rail loop, railcar dumper,





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Handling grain at the quayside: overcoming infrastructure limitations

Many ports around the world struggle with the surmounting demand for physical assets such as storage space within the terminals often with the added burden of reducing areas to expand into — especially problematic when it comes to bulk commodities and the equipment that is needed to handle it. With increasing demand for this valuable space Nectar has throughout the last few decades brought many space-saving solutions to the ports of often developing countries, maximizing port efficiency and often the margins of the shared users and stakeholders. With a holistic view of the progression of ports and end to end logistics, and through many years of research and development, Nectar has developed an enviable fleet of equipment and handling solutions to not only encourage the introduction of new methods of handling but also to improve efficiencies across the board. Its equipment is suitable for a range of bulk commodities, including grain.

Ports in many regions of the world suffer from similar issues and it is only by looking at the bigger picture that Nectar has been able to best implement the services and equipment that has brought it to be one of the leading bulk commodity handlers in the industry. With industry awards including those for port management and innovation it is no surprise that the range of services and equipment is growing at a steady pace with eyes fixed on how processes can be improved further. A fine example of this innovation can be demonstrated with the new Modular Bulk Hoppers (Patent Application Number 1406035.4) which act as a normal bulk hopper with many additional safety features and accurate controls but with the added advantage of being collapsible to be stored as just 2 x 20ft containers and 1 x 40ft container.

The thinking behind this design was simple as with all of Nectar's fully mobile equipment. With markets, such as those in Africa, dependant on seasonality, GDPs and government subsidies, there is a particular emphasis given to economical unit costs. With this in mind it becomes apparent that the greatest

economical advantage of port equipment can be the ability for it to be relocated to where the demand is with minimum cost giving users in regions, rather than specific ports, the lowest cost per unit whilst bringing the high standards that are expected around the world today.

By not compromising on quality of service Nectar has developed a reputation of being able to assist not only the International traders in an extremely wide spread of locations but also the local receivers that require day by day, hour by hour assistance in the arranging of the efficient and professional discharge and handling services with a dedicated local contact. Offering this Global approach has led Nectar to operate in over 75 countries worldwide and handle in excess of 55 million tonnes of bulk commodities worldwide.

With emphasis being given to unit costs it is now no wonder that there is higher demand for end to end service providers. Nectar has pushed forward with this mentality in providing a complete service right the way through from the efficient discharge of vessels, to the provision of transport and storage solutions. It was from hearing the plight of cargo owners having to deal with costly and inefficient third party operators with little or no cohesion particularly at the multi-modal transfer points that led Nectar to become an end to end logistics operator providing a single point of contact and incorporating many of the Nectar values and quality assurances into the service. A typical example of such an operation might be the use of Nectar's pneumatic dischargers transferring wheat from a gearless ship to Nectar's trucks via the Modular Bulk Hoppers. The GPS located trucks are then dispatched to storage areas or the final receiver's warehouses whilst continually providing reports on location and ETA. Having a single point of contact takes much of the communication difficulties surrounding such operations out of the picture and using a single operator provides economies of scale and a fluid efficiency that enables the entire chain to benefit.

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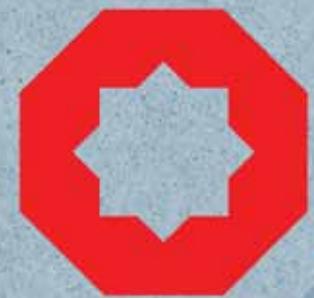
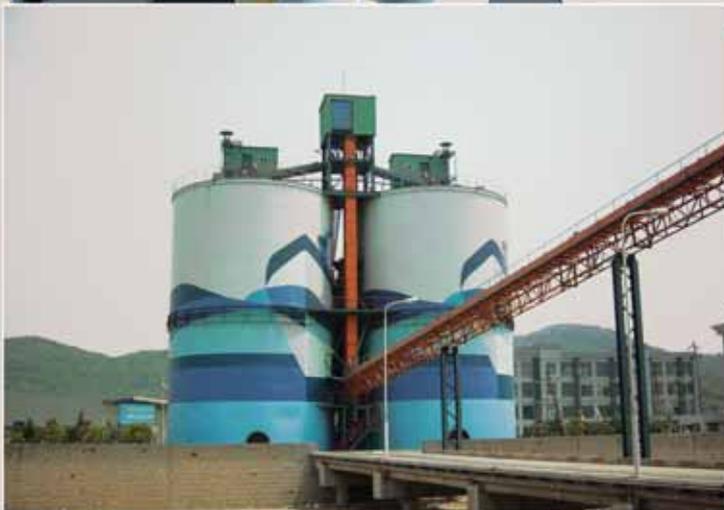


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Expertise in ports and bulk material handling

CNBM Engineering, part of the CNBM Group, is an experienced EPC (engineering, procurement and construction) contractor in international engineering projects. It has reliable partnerships with 13 research and design institutes in the building materials industry, and has been involved in more than 30 overseas cement EPC projects.

CNBM Bulk specializes in offering customer-oriented services, furnishes integrated solutions to process materials including powder, large particle and slurry.

Its scope of supply includes engineering design, equipment procurement, plant construction and project management, industrial maintenance, storage and spares supply. CNBM is heavily involved in many ports and terminals contracts. Notably, it offers expertise in unloading, loading, conveying, storage, stacker/reclaimers, and system engineering. Below is a representative example of some of CNBM's bulk specialities.



CNBM's range of pneumatic ship unloaders can be used for commodities including cement, fly ash, alumina, grain, and more. They are available in the following capacities: 20tph (tonnes per hour), 50tph, 100tph, 150tph, 200tph, 300tph, 400tph and 500tph.

PNEUMATIC SHIP UNLOADERS



The suction arm varies in length from 12m to 35m, according to the needs of the customer.

The ship-unloaders are available as either fixed installations on the quayside, mobile on wheels, mobile on rails, and installed on specialized vessels. They are suitable for barges ranging from 500dwt to 20,000dwt.

SCREW SHIP UNLOADERS

CNBM's screw ship unloaders are used to unload commodities including cement, coal, grain, dry cassava, mineral powder and chemical fertilizers. They operate at capacities of 300tph to 2,700tph.



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It is accurate in volume indication, friendly to environment and highly automatic.

CONVEYING SYSTEMS

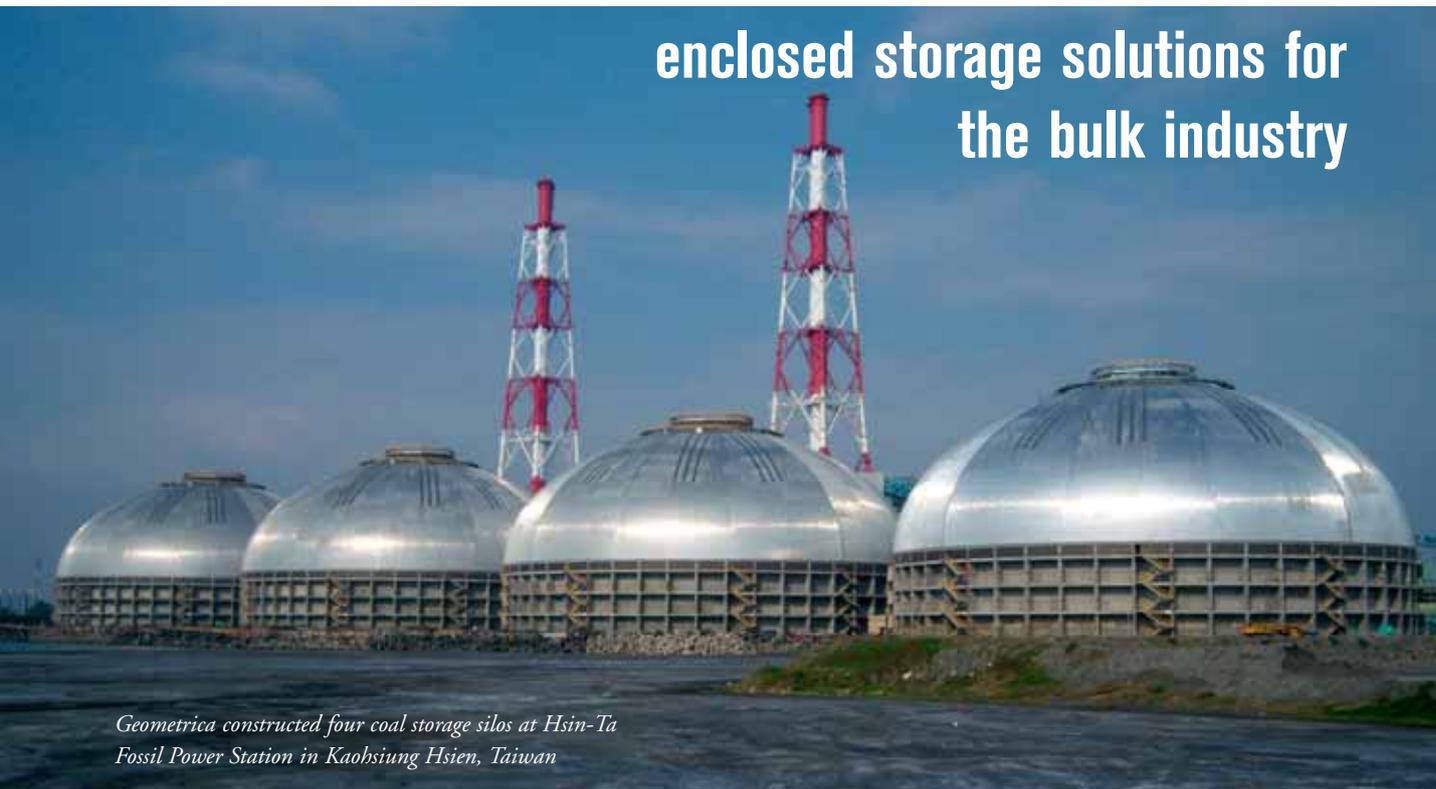


DC



Covering up?

enclosed storage solutions for the bulk industry



Geometrica constructed four coal storage silos at Hsin-Ta Fossil Power Station in Kaohsiung Hsien, Taiwan

Domes and dry bulk

Geometrica works with plants and facilities at all altitudes to achieve the highest calibre of coordination between shipping and dry cargo handling and storage, writes *Melanie Saxton of Geometrica*. Whether port side or high on a mountain, operations for mining, cement, fertilizer, power and many other industries require the stockpiling of large quantities of dry bulk materials. Storage of these raw materials has revolutionized over the decades with the advent of long span domes, horizontal silos and barrel vaults. Today's technology allows for:

- ❖ internal cladding especially designed to minimize internal dust and protect structures from corrosive or combustible stockpiles; and
- ❖ external cladding that covers stockpiles and spares the ecosystem from emissions, runoff, and air pollutants. Neither brutal saltwater environments nor heavy snow loads are a match for Geometrica's Freedomes®, which can span up to a remarkable 300 metres without internal columns or barriers.

Other challenging environments, such as those with typhoon-force wind loads or extremely uneven topography, also require careful design and remarkable structural strength and flexibility. Options include circular, conical, longitudinal and freestyle storage solutions. These structures, plus cylinders and geodesic domes, are ideal covers for stockpiles. The goal is to turn an often dusty or combustible stockyard into an environmentally sustainable system regardless of terrain or climate. Lightweight yet incredibly strong, Freedomes are prefabricated, containerized and shipped anywhere in the world. Regardless of geography,

construction may proceed before, during or after material handling equipment is installed. Frequently, these all-terrain domes are built over existing live material stockpiles with minimal or no downtime.

Following are examples of durable storage structures in extreme locations around the world.

TAI POWER SILOS

Four beautiful examples of corrosion-resistant infrastructure are the immense coal storage silos at Hsin-Ta Fossil Power Station in Kaohsiung Hsien, Taiwan (see picture above). Gibsin Engineers specified aluminium cladding and galvanized steel for the structure. Due to Geometrica's prefabrication and barcoding system of round tubular members, the bid was competitively priced. A team consisting of Geometrica, Triumstar International Co. Ltd. and Chien Yang Construction and Engineering Co. Ltd. (both from Taipei), was awarded the job.

The long span solution consisted of four 126m diameter concrete wall and metal dome covers built in a marine environment over an internal automated stacker/reclaimer system. Each unit would store 180,000 tonnes of coal in a live pile for a total of 720,000 tonnes. Geometrica handled design, manufacturing and technical assistance during installation and construction of the domes on site. All units were assembled using the 'perimeter-in' method of construction: the first nodes and tubes were set on the supporting concrete wall. Each of three to five tubes were joined to one node forming a 'spider'. Each spider was then raised to the work front and tapped into

place, creating rings around the base that grew one on top of the other until the whole skeleton was formed. Co-ordination with other trades was easy, as the area under the dome was free of obstacles. Neither scaffolding nor other special equipment were required, and the project was completed with a perfect safety record.

Turnover of the domes and testing of the first silo started approximately 16 months after start of construction. Today the Taiwan Power Company produces electric power in a clean and safe environment for surrounding communities.

EL BROCAL



El Brocal, compared to Tai Power, is an extreme opposite example of a setting. Far, far away from saltwater, the mining facility sits 14,200 feet above sea level in the Andes — one of the highest-altitude cities in the world. But whether portside or mountainside, a concern for the environment is a priority. The mine's rugged landscape required protection from dust generated by mining copper ore and also transporting it to and from storage. As Peru's largest publicly traded precious metals mining

company, El Brocal fulfilled its commitment to preserving the environment with the architecture of its new storage building in Cerro de Pasco in central-western Peru.

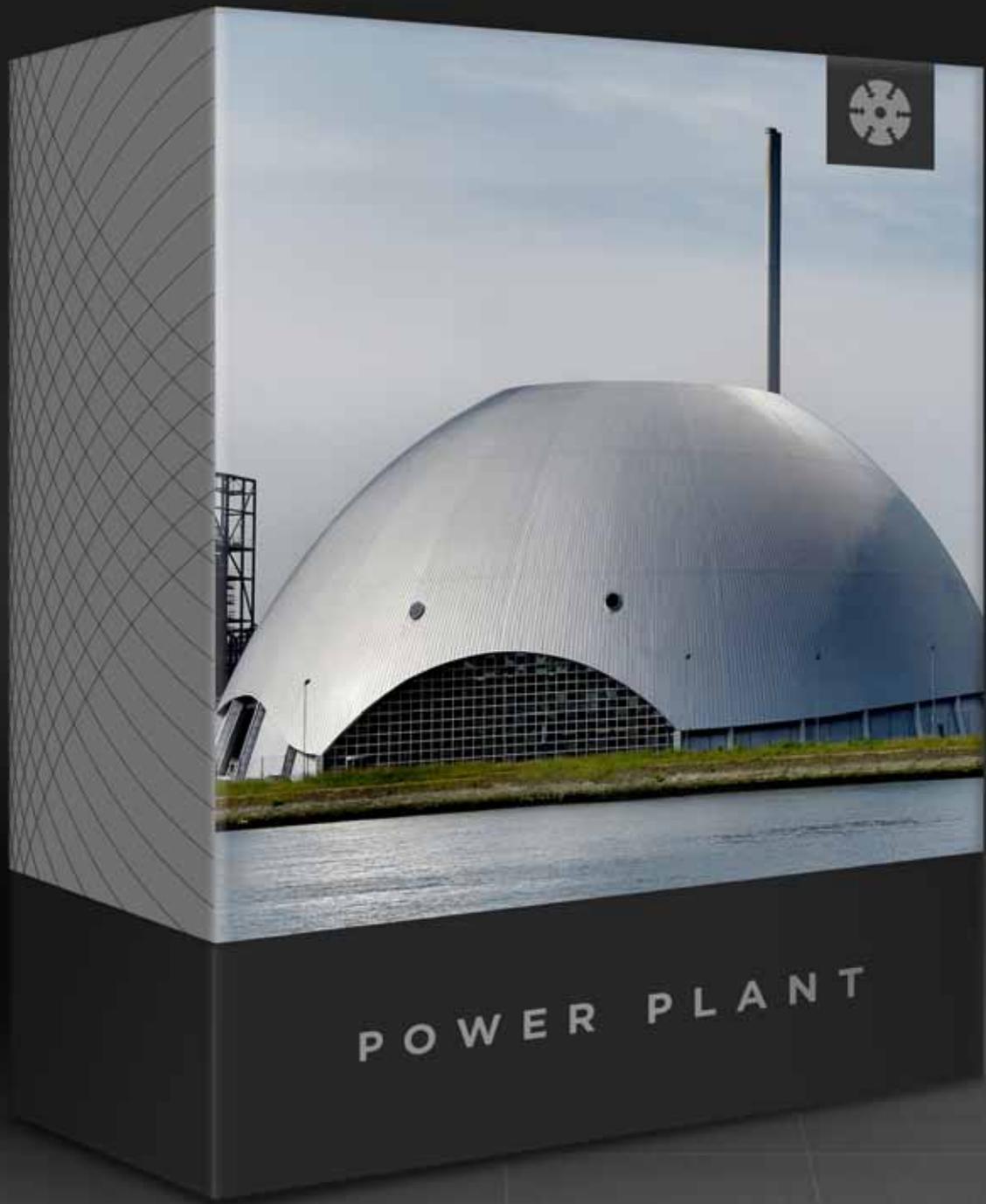
The new storage structure was to be built within a constrained space, which meant that copper ore must be delivered via a tripper conveyor suspended along the length of the building's apex. Therefore, the building's shape had to support wind, live and material loads efficiently. It also needed a structure strong enough to support the weight of the conveyor equipment, as well as the vibrations and impacts created by the conveyed copper ore. Furthermore, even in the constrained space, El Brocal management mandated that construction take place with minimal interruption to its nearby mining facilities.

UREA STORAGE PORTSIDE

In another quayside project, Grupo CICE, a diversified logistics and transportation company, called Geometrica about its need to store urea as it arrived at the port of Veracruz (see picture below). When exposed to humidity, this extremely corrosive material 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. Up to 15,000 tonnes of urea needed to be stored while waiting for transport, and CICE 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





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



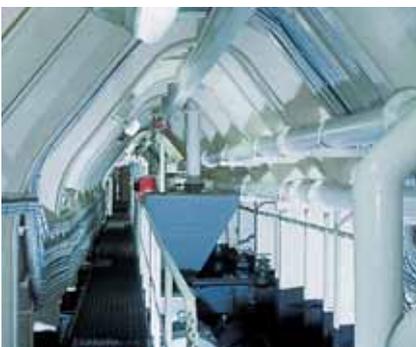
During the voyage on the River Seine in France: The cement barge of LAFARGE Cement.

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

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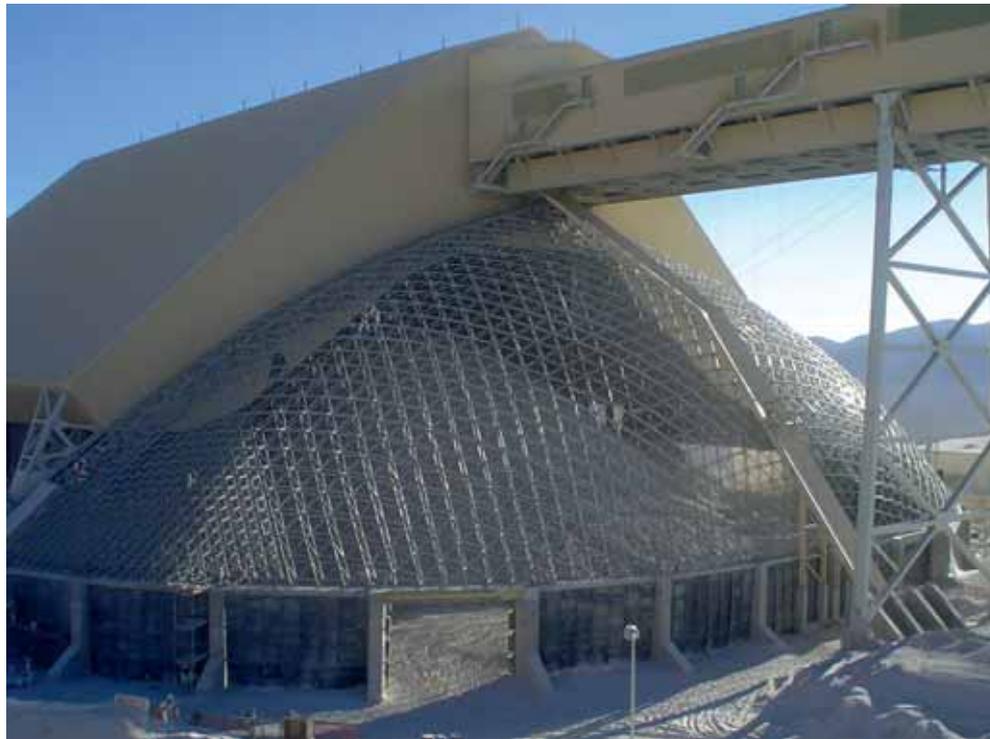
at the centre, and 120m length. The building's lightweight skeleton is made of high-strength aluminium alloy and left exposed. But since urea can attack aluminium, the structure was protected by applying FRP cladding to its underside. The combination is perfect, with each material exposed only to conditions 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. One hundred per cent recommendable."

DUST DEFEATED IN ESCONDIDA

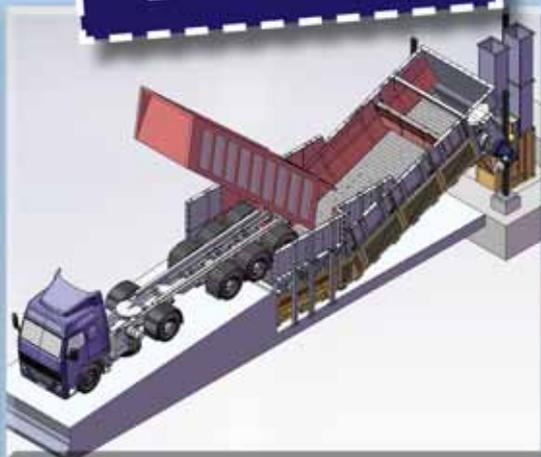
Freedomes may also be used to close-off existing, open ended storage structures in the most efficient manner, as done at the Escondida mine in Chile. Geometrica designed and manufactured



the end for a 100m span vault built several years earlier. The vault had open ends, through which dust continued to escape until the 99m span Geometrica Freedom was installed (see picture above).

Geometrica has built some of the largest, highest and longest industrial domes in the world. The question is, "What can Geometrica do for you?"

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PIRS SAS, the leading European builder of reinforced concrete domes, launches new website so check it out :

www.domepirs.com



This is a unique portal dedicated to information on **Agridome®** and **Domeconcept®** technologies. The new site sets out to highlight and reflect PIRS expertise in two markets : **Industrial bulk Storage** and **Architectural facility**.

Looking for a solution for industrial bulk storage or an architecture facility, feel free to contact our sales team at info@domepirs.com.

PIRS SAS IN FIGURES :

- **30 years of experience** in dome building
- **150 domes built** worldwide
- **1,600,000t** of dry bulk product stored
- **260,000 m²** of inflated domes

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Dailymotion

PIRS domes do more than protect the environment

Concrete domes are highly effective storage systems, as they not only protect the environment from potentially harmful products, but they also protect the stored commodities from destructive elements such as moisture and condensation.

INTRODUCTION

The environmental debates that have raged since the Rio and Copenhagen conferences show clearly that environmental laws must be reinforced — and further laws created — to protect the environment.

In many countries, there is a glaring absence of rules about the storage of materials, and people can just store what they want, where they want.

Domes help to protect the environment because they are hermetically sealed, insulated and waterproof (Figure 1). Products — such as fertilizers, cement, alumina and fly ash — can be stored easily, protecting the environment, while other materials like sugar and cereals are protected against contamination during their storage time.



Figure 1:
Riga Fertilizer
Terminal – Latvia

ADVANTAGES

Cost effectiveness

Domes remain among the most cost-effective storage infrastructures, and represent one of the more competitive solutions for the storage of large volumes of bulk material. Operation, maintenance, conservation and energy costs are kept to a strict minimum.

Rapidity in construction

Once the airform is inflated, all the work is carried out inside the dome. Consequently, the stored products are unaffected by exterior environmental factors such as rain, wind, and daylight.

Optimization of the land

Domes minimize floor space while optimizing the volume. This means lower cost per tonne of storage.

Reclaiming

The bulk material enters the dome through openings positioned on the roof and is then reclaimed through one or more galleries located in the floor of the

dome. Automatic reclaim systems such as mechanical screws, pneumatic systems or vibrating floors are perfectly well adapted to the dome.

Insulation

Domes are an ideal solution for the storage of bulk materials that are sensitive to temperature changes and humidity. The application of Vethane foam on the inner surface of the airform gives the dome the quality of being equivalent to a controlled atmosphere chamber. Condensation is practically eliminated inside the dome since the insulation of the dome will conserve a stable ambient temperature. The whole structure itself is perfectly adapted to the techniques of prolonged conservation of perishable products.

Waterproofing

A PVC membrane forms the exterior layer of PIRS' domes and acts as the initial framework for the application of Vethane foam and shotcrete. Opposite to what is usually done in traditional construction, waterproofing is controlled at the very beginning of the process, once the airform is inflated. This membrane, added to the Vethane foam, ensures that water will never leak inside the dome and spoil the product.

Domes are an ideal solution for the storage of sensitive bulk materials.

CONCLUSION

PIRS concrete domes have proven their efficiency in protecting the environment and products against temperature and humidity. The filling and reclaiming systems, including operation and maintenance, are usually cheaper for domes than many other solutions. There are other factors that must be considered: the cost of the land, especially in a port (Figure 1 — see 'PIRS SAS builds fertilizer terminal in the Port of Riga in Latvia' on p84 of the November 2013 issue of *Dry Cargo International*) knowing that the domes will use less space than flat storage, for example. The time of execution can save financial costs and the operation can start earlier.

Domes are an innovative solution that are capable of bringing advantages in terms of product conservation, insulation, operation and maintenance costs. As a storage solution, they can help ensure maximum waterproofing and are a strong and durable solution for storage.

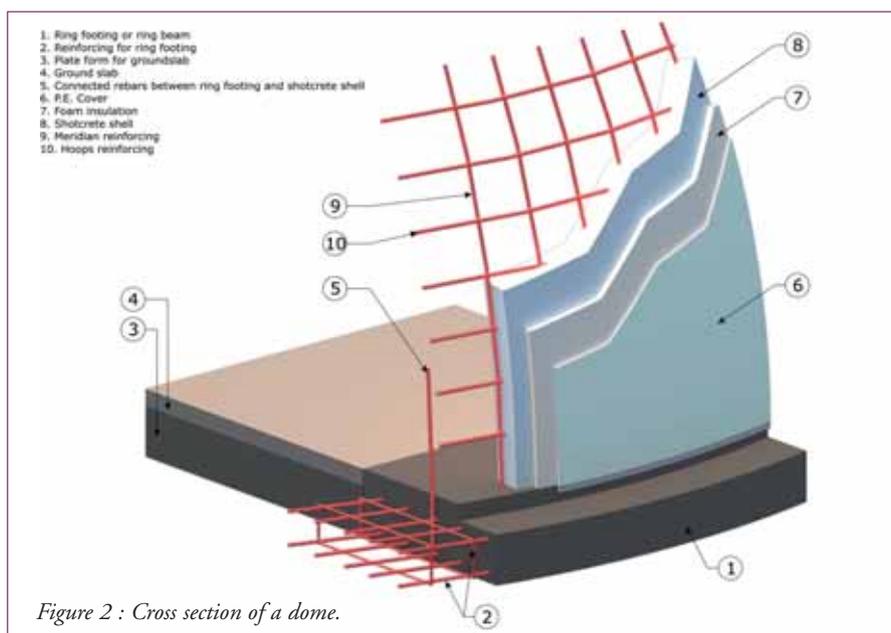


Figure 2 : Cross section of a dome.

Safe silo storage of coal

Chris Geijs and Jaap P.J. Ruijgrok of ESI Eurosilos BV, the Netherlands, review fire protection in coal silos with the Eurosilos® system.

INTRODUCTION

With a history of over 40 years and a track record of more than 125 units built around the world, ESI Eurosilos is a leading engineering and contracting company in enclosed storage and handling systems. Proven silo storage solutions for coal fired power stations are in operation in a growing number of places around the world. FGD gypsum (a byproduct of the flue-gas desulfurization process), limestone, fly-ash and coal can be stored in silos with the proven Eurosilos® system. Enclosed storage of coal is based on a core flow silo system and meets with today's stringent environmental and fire safety regulations, while providing the smallest possible footprint. Approximately one-third of space is used, compared to longitudinal and circular storage configurations (Fig 1). The Eurosilos® system offers



Fig. 1 – Footprint and exposed area (purple) for 100,000m³ storage configurations

storage capacities up to 125,000m³ per unit. A recent example of coal storage is the commissioning of two 100,000m³ silos at Lünen power plant for the Trianel Cooperation, Germany (Fig. 2).



Fig. 2 — Inside view of one of the 100,000m³ coal silos, recently commissioned in Lünen, Germany.



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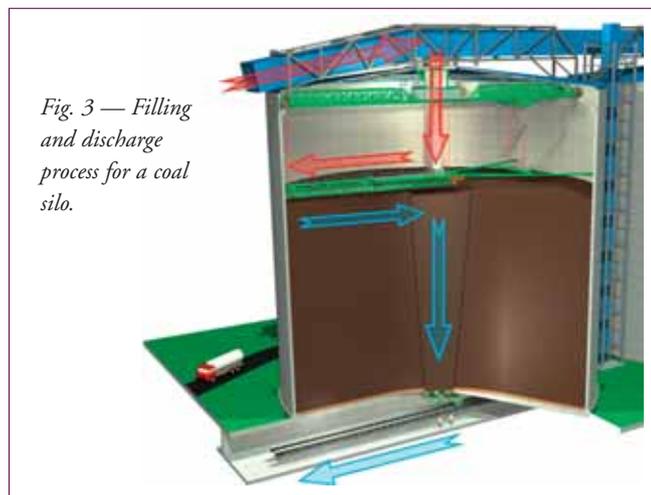
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EUROSILO® SYSTEM WORKING PRINCIPLE

A core flow system is used for the storage of coal. During the filling process, the product enters the silo through a hopper mounted in the center of the roof and ends up in the telescopic chute (Fig. 3 — red arrows). From here, the product can freely drop down towards the auger frame, located at the top surface of the stored bulk material. Two augers convey the material towards the silo wall. At this point, a sensor is activated, allowing the overhead bridge and suspended auger frame to rotate towards free space and distribute a new segment of bulk material.



This process continues for a complete layer of 360°. The winch system (located at the overhead bridge) hoists the auger frame one predetermined step after completing a full rotation. This cycle can be repeated until the silo is completely filled with bulk material.

During the discharge process (Fig. 3 — blue arrows), vibration devices, called Uncoalers, initiate a core flow in the middle of the silo to extract the bulk material. The overhead bridge and suspended auger frame rotate in a continuous counterclockwise direction, while one of the augers digs into the bulk material and transports the product towards the core flow in the centre of the silo. After a full rotation, the auger frame is lowered one step. This process continues until the silo is completely emptied. The Eurosilos® system also has the flexibility of simultaneous filling and reclaiming.

SELF-HEATING OF COAL DURING STORAGE

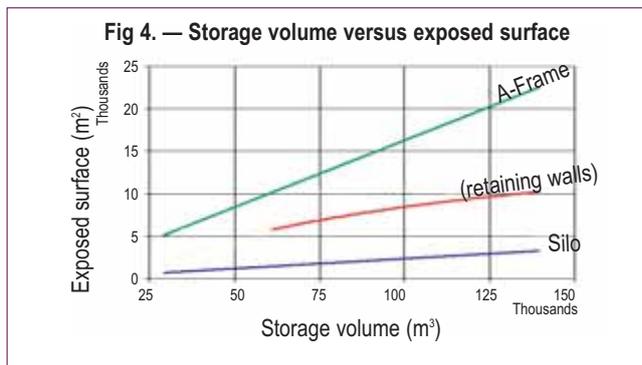
Self-heating of materials means the onset of an exothermic chemical reaction and a subsequent temperature rise within the combustible material, without the action of an additional ignition source. Generally, self-heating is supposed to occur when the rate of heat production exceeds the heat loss. When exposed to the atmosphere, nearly all types of coal show signs of self-heating, which results in a decrease of calorific value. Spontaneous combustion ultimately occurs when the heat build-up due to the right amount of oxygen is present over a longer period of time.

Limiting airflow (and thus oxygen) can be an effective way to reduce the possibility of self-heating. Storage time can be prolonged and calorific value will be preserved. A variety of methods can be used to reduce air entrainment in a stored pile of coal :

- ❖ reduction of the exposed pile surface;
- ❖ minimization of water percolation into the pile (water creates channels, allowing increased airflow in a later stage);
- ❖ reduction of segregation during handling; and

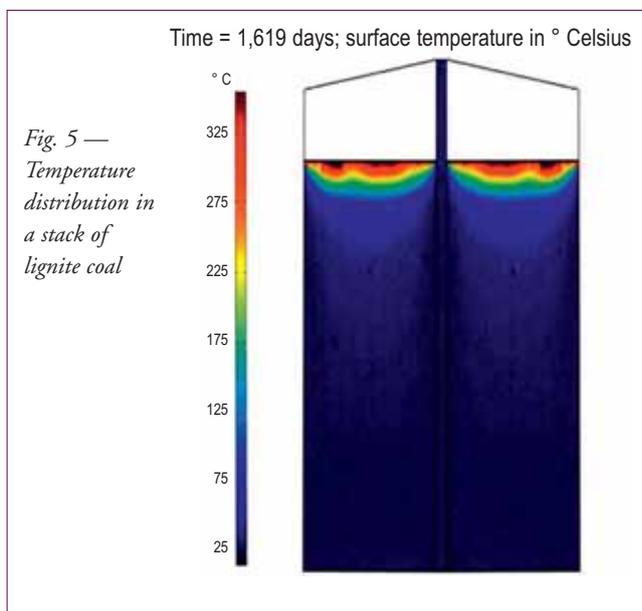
- ❖ compression of the coal, reducing the voids in between the particles.

Storage of coal in a Eurosilos® takes advantage of all the mentioned entrainment reduction methods. The exposed area for a coal silo is significantly smaller, compared to A-frame type configurations or circular storage (Fig. 4/ Fig. 1).



Enclosed storage in a silo protects the coal from rain. On top of that, spraying of the exposed surface to reduce dust emission is not required, thereby further reducing the percolation of water. The controlled method of stacking layers with the auger system ensures a minimum of segregation compared to the conventional chevron stacking method, which is used for most storage configurations. Layer stacking also establishes an optimal and evenly distributed compression of the stored bulk material.

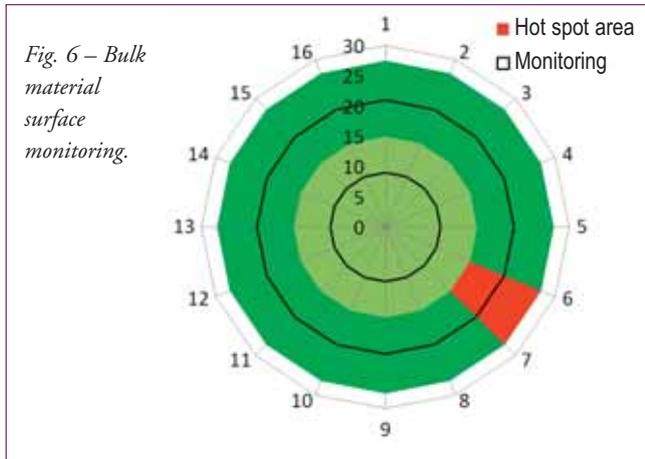
Research by BAM [1] on self-heating in large coal silos shows that the chemical process is drastically reduced due to the relative small exposed surface and the evenly compressed bulk material. As a result of the absence of oxygen in the lower layers, the hot spots tend to originate just below the coal surface (Fig. 5).



These hot spots can be reclaimed first due to the FILO (First in, last out) principle of the auger system, as explained earlier. It can be concluded that FILO reclaiming is favoured for this type of storage configuration! Multiple existing Eurosilos® coal storage projects confirm these research results. The Vattenfall Tiefstack project (two silos) has been storing coal for over fifteen years now [2]. The Salmisaari power plant in Helsinki (four underground silos) even stores the coal up to six months without significant problems.

EUROSILO® FIRE PREVENTION SYSTEMS

Eurosilos® coal silos are equipped with multiple types of monitoring equipment to detect hot spots in an early stage. The filling and reclaiming mechanism is always right on top of the bulk material surface and rotates within the silo. This enables the system to do continuous monitoring of the entire stored bulk material surface.



Sensors continuously observe the amount of methane, carbon monoxide and oxygen in the air. Potential hot spots will develop close to the surface as mentioned earlier. The released CO can be spotted in an early stage and is indicated on a map to the operator (Fig. 6). Measuring carbon monoxide over temperature (Fig. 7) is strongly preferred as detection method for self-heating in coal storage piles due to its advanced warning period.

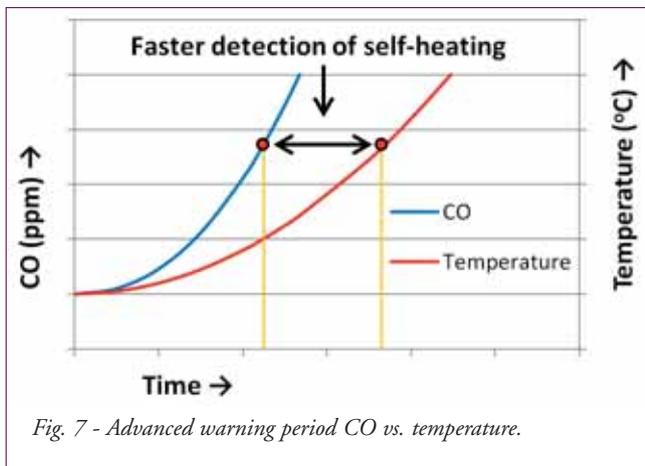


Fig. 7 - Advanced warning period CO vs. temperature.

Methane, carbon monoxide and oxygen sensors are also present in the basement and at the overhead bridge. Depending on the amount of CO (ppm), monitoring can be intensified,

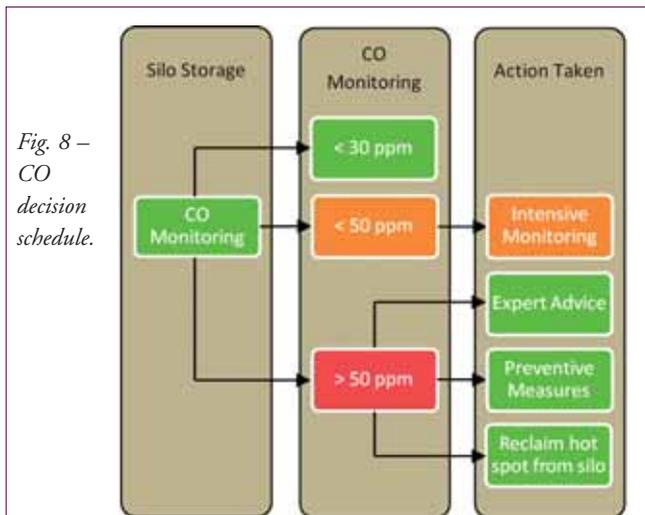


Fig. 8 – CO decision schedule.

preventive actions can be taken, or the hot spot can be reclaimed from the silo (Fig. 8).

All the ingoing bulk material during filling is monitored temperature wise. Bulk material in excess of 55 °C (104 °F) is rejected, according to IMSBC-code [*].

Stated CO values refer to the IMSBC code [3]. All the ingoing bulk material during filling is monitored temperature wise. According to IMSBC, bulk material below 55°C can be stored in the silo. The operator gets an alarm for bulk material in excess of this temperature, resulting in intensified monitoring. When the temperature exceeds 70°C, the arriving coal shouldn't be stored in the silo (Fig. 9).

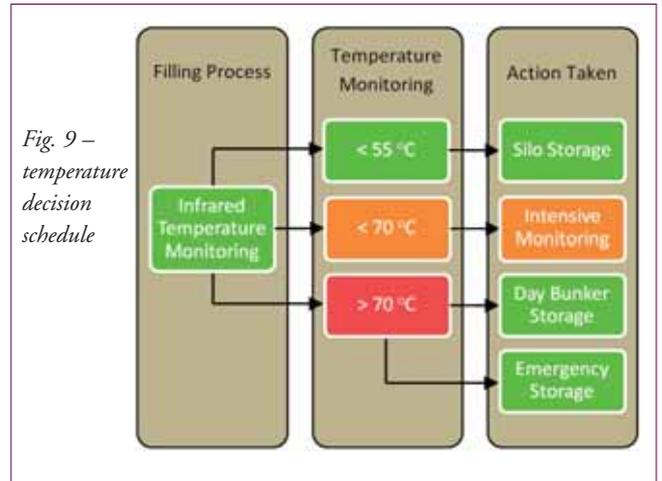


Fig. 9 – temperature decision schedule

Besides continuous monitoring, active airflow prevention is also part of the Eurosilos® fire system. The hoppers in the bottom of the silo are a potential entry point for air. By installing a slide valve underneath the reclaiming openings, air penetration is reduced to a minimum (Fig. 10).



Fig. 10 – Slide valve.

EUROSILO® FIRE SUPPRESSION SYSTEMS

All coal silos are equipped with a Nitrogen-purging system, enabling operators to purge the whole, or just a section of the silo, thus enabling longer trouble-free storage periods. The piping for this system is embedded in a layer of gravel at the bottom of the silo and covers the whole surface.

The reclaiming hoppers, being a potential entry point for air, can also be purged with nitrogen separately. A nitrogen evaporator outside the silo is able to make a direct connection to a truck with liquid nitrogen (Fig. 11). This system has proven to be very efficient [*].

At upper bridge level, gel sprayers are present to cover specific parts of the coal surface with a layer of FIRESORB® gel [5] in case of a self-heating emergency. These sprayers are fed by a gel station, located in the roof gantry. The gel prevents the coal from having contact with the air and cools the coal down as well.

A spraying system is installed above the heat resistant conveyor belt in the basement of the silo to cool down heated coal (Fig. 12).

FIRE AT MOORBURG POWER PLANT

A recent example of self-heating in coal storage is the circular storage configuration at the new Vattenfall power plant in Hamburg-Moorburg (Fig. 13).



Fig. 12 – spraying system.

Raised CO-values were found in one of the domes, caused by self-heating [6]. Further investigation showed increased temperatures up to 70°C for various locations in the stored coal. As a result, around 50,000 tonnes of coal were carried towards the Wedel power plant. It would have been better to deal with the cause of the problem in the first place, instead of having to struggle with the consequences.

An ounce of prevention is worth a pound of cure. Inherent to circular storage is the large exposed area and the impossibility to do continuous CO-monitoring of the entire surface. Subsequently, hot spots will not be detected in an early stage and drastic measures will be required to solve the problem. On top of this, nitrogen purging is not a possibility for this type of storage configuration, leaving carrying away of all the stored bulk material as the only viable solution.

DISCUSSION

The Eurosilo® fire protection system combines limited access of oxygen to the coal due to the FILO stacking process with an



Fig. 11 - Nitrogen evaporator next to the Lünen coal silos

extensive monitoring and suppression system to minimize the risk of a fire hazard. Comparing fire risk assessments of coal storage silos using this protection system, with those of storage in A-frame type configurations or circular dome storage, the mammoth silos will be favourable in many cases.

Chris Geijs (MSc Eng.) R&D manager and Jaap Ruijgrok (MSc Eng.) Managing Director of ESI Eurosilo B.V.

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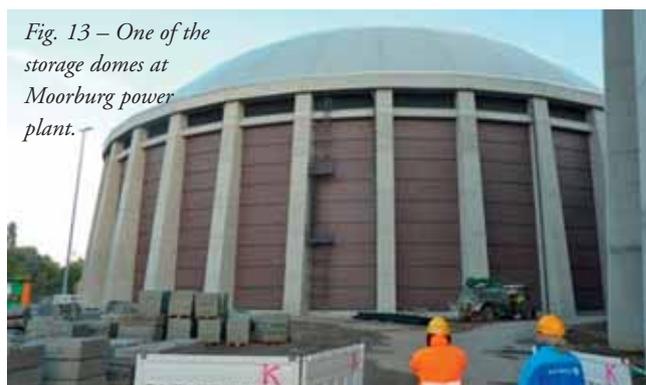


Fig. 13 – One of the storage domes at Moorburg power plant.

Rubb: ideal port of call for those needing storage facilities

A manufacturer of relocatable engineered fabric structures is leading the way in the space race when it comes to providing storage solutions to the ports and marine sectors.

Rubb was the first port of call when Sunderland City Council required a new cargo facility at Hendon Docks in the UK. A versatile storage area was needed to help continue the development of the Port of Sunderland's cargo handling facilities. In conjunction with SGW Construction, Rubb erected a 24m span x 65m long BVE cargo handling and storage facility with 7.65m sidewalls. The design and quality of the structure provided a safe and pleasant cargo storage solution. Rubb's innovative customized structures ensure safe and secure access to the storage area, while the translucent roof provides a natural source of light. The internal clear-span steel framework allows the maximum use of available storage space.

Rubb also helped a port building project grow at the Port of Belfast. Rubb began working with Belfast Harbour Commissioners back in 2001 to ensure that their ever changing and ever expanding storage requirements were met as use of the port developed. The first Belfast Harbour warehouse storage facility was erected in 2001 at the head of the dockside area. It measures 24m span x 45m. In 2005 an additional building measuring 24m span x 65m long was erected directly adjacent to the existing harbour structure. In 2003 a much larger harbour storage building measuring 45m span x 175m was installed at a different location on the dockside and in 2004 this was extended to 217.5m in length. In 2005 the Rubb design team was given a brief to erect the largest possible building on the remaining land on this site. Careful consideration had to be given to the design because of restrictions created by the nearby dockside traffic. However, a 32m span x 60m harbour storage facility was installed, maximizing all possible space available, taking the storage area constructed by Rubb to a massive 14,347m².

Meanwhile the Port of Workington offers high-quality storage facilities in the form of two relocatable Rubb constructed ports buildings. The ports structures measure 25m span x 32m in length and 25m span x 61m in length. These port facilities provide storage space for animal feed and protection from the elements and light. The design features a split storage capability. As this part of the west coast of England is susceptible to severe winds and rain, the storage systems were constructed on top of 4m retaining walls. The walls consist of a steel support structure complete with pre-stressed concrete infill panels, which allow for quick and easy construction. This method provides a fully sealed facility to prevent water ingress and also allows for internal retaining walls to be built for different storage needs. The client required a dark covered port storage facility as animal feed needs to be protected from light, however the translucent PVC material used on other Rubb ports projects provides a brighter working environment without the need for windows.

More recently Rubb has been providing facilities to the renewable energy, alternative fuels and biomass power marketplace. Rubb's bioenergy storage structures can provide customers with the ideal environment for the processing, handling and storage of bulk materials. Its technical team can offer expertise and experience in the design, engineering

and construction of large scale biomass building projects at port locations. Ongoing product development of biomass energy facilities ensures that Rubb continues to meet its clients' demands. Experience and a flexible approach enables us to efficiently overcome

Rubb structure at the Port of Sunderland.



Rubb structure at the Port of Belfast.



Storing biomass.

Two crane liftable buildings cover offshore pile clusters at Harland and Wolff.



challenges, meet changing needs and requirements quickly and cost effectively.

Rubb Buildings Ltd was also tasked with designing, manufacturing and erecting two crane liftable buildings to cover offshore pile clusters in a marine environment. The two marine manufacturing covers from Rubb's new BLE series for Harland and Wolff feature spans of 30m and each measure 35m in length. To increase the overall internal apex height of the manufacturing bays to 20.2m, H&W asked Rubb to use a 7.3m high wall constructed out of 40ft containers as the building's foundation. A custom designed supporting frame was created to hold the containers together and act as the fixing base for the Rubb BLE structures.

The buildings are designed with reinforced base beams and anchor brackets so they can be easily lifted from their container foundations and moved to one side. This allows the client to then crane lift materials into the space within the foundation frames for various operations. The building roof is replaced to protect employees and materials from the elements. Each gable end of both paint and blast facilities includes a pedestrian door and a 4m x 4m roller shutter door for equipment access.

Ten advantages of selecting Rubb structures

- ❖ all Rubb products are suitable for ports/logistics/warehousing type applications. The flexibility of a Rubb structure means it can be used to house a wide variety of goods;
- ❖ Rubb's port storage solutions offer a number of advantages to our clients. Its climate controlled warehouses provide dehumidified storage environments, while our bulk storage facilities are ideally suited for storage of materials under the

strenuous conditions of a marine environment;

- ❖ Rubb storage buildings offer marine terminals a solution that allows for maximum flexibility with respect to multiple handling methods and configurations;
- ❖ relocating and re-using these buildings to suit the changing needs of a busy port is easy and cost effective;
- ❖ additional buildings can be added as required;
- ❖ the PVC cladding will not corrode in a marine environment and allows the structure to accept differential settlement without the need for expensive pile foundations. These same features give Rubb an advantage when it comes to preventing leaky roofs;
- ❖ Rubb structures provide large column free spaces, illuminated by natural light through a translucent roof. This provides a safer and more cost effective working environment than other traditional warehouse buildings;
- ❖ Rubb buildings can be designed, delivered and erected within eight weeks;
- ❖ these semi-permanent structures are designed to stand for as long as the client requires. All steel used in a Rubb building is hot dip galvanized to strengthen the frame and provide a durable maintenance free facility. The high quality PVC coated fabric cladding has been proven to last in excess of 30 years;
- ❖ Rubb's unique custom solutions enable it to handle all types of projects, large and small, from designing, manufacturing and constructing large new plants to extending existing facilities.

Rubb Buildings Ltd was established in 1977 and is based in Gateshead, Tyne and Wear. The Rubb Group also has office and manufacturing facilities in Norway and the USA.



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TOGETHER IN MOTION

Cement storage and onward forwarding from Motril in Granada, Spain

The project began when the company Hormigones Domingo Giménez decided that it needed to get maximum processing efficiency at its plant in the Port of Motril in Granada, Spain, writes *Eduardo Heras Villoldo of Claudius Peters Ibérica, S.A.* This rectangular-shaped plant stores cement that is brought into the port by ship.

Claudius Peters Ibérica designed an optimum solution — flat silos. These silos had to meet two pre-conditions: they had to fit the rectangular surface, and meet the height limit of approximately 12m.

SILOS

The three silos measure 20m x 20m each, with a height of 12m and a total capacity of approximately 3 x 5,000 tonnes.

In traditional cement silos, there is always a significant loss of height, due to the need to place trucks below the silo for loading. One of the main advantages of this new silo design is that it uses the height from the ground level to store material, which leads to



a significant gain in the silo capacity and the possibility of lower height in silos in places where needed to meet regulations.

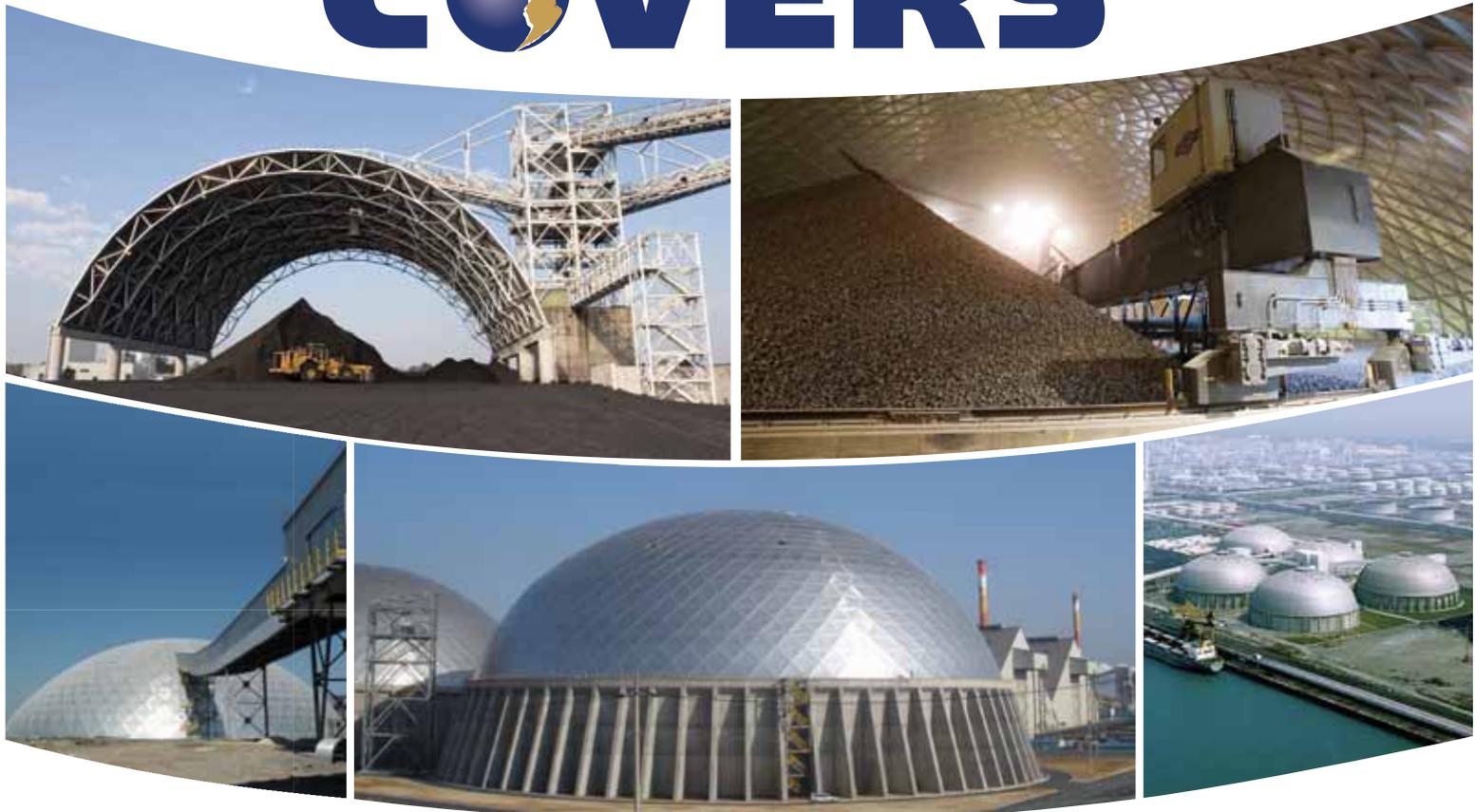
SHIP UNLOADING

Ship unloading is achieved by a Siwertell machine (which uses a hydraulic and mechanical system of screw conveyors) to two tank trucks. Cement unloading is achieved at a rate of 500tph (tonnes per hour). From the dockside, the cement is transported to the silos.



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FEEDING THE SILOS

The cement is carried by tank trucks and, with their own compressors, is pneumatically conveyed to four inlet ducts for each silo that homogeneously spread the cement that is to be stored.

Another proposal, which was not pursued, was transporting the cement to the silos pneumatically, using a Claudius Peters pump and compressor.

EQUIPMENT IN THE SILO ROOF

In the roof of each silo, there is:

- ❖ a filter bunker, for dedusting the air from the feeding system and the silo discharge;
- ❖ pressure valves, with two level detectors;
- ❖ four material inlets; and
- ❖ horizontal and vertical doors with safety protection.

FLUIDIZATION

Each silo is divided into four quadrants. Each of these has three fluidization sectors, that are further divided into subsectors. During normal operation these are fluidized via a programme in automatic cycles and by rotary blowers during residual discharge.

SILO EMPTYING AND TRUCK LOADING

Each silo is emptied radially, towards the centre, using four outputs through 90°, positioned in a 3.3m x 3.3m chimney in the centre of each silo.

The material in each output is dosed by a pneumatic flow control gate. It is then sent to a feed box where a vertical screw conveyor collects material at ground level and raises it 14 metres before loading it into a 12m-long aeroslide. This aeroslide conveys the material, by a fan at one of the silos. It falls into a stationary loading device with a wear cone system. From here, it





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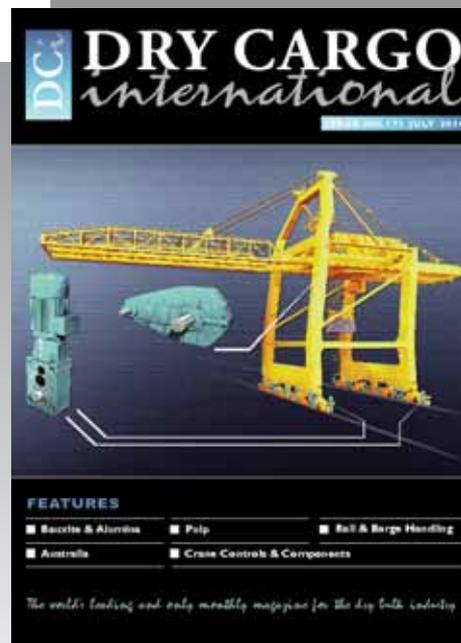
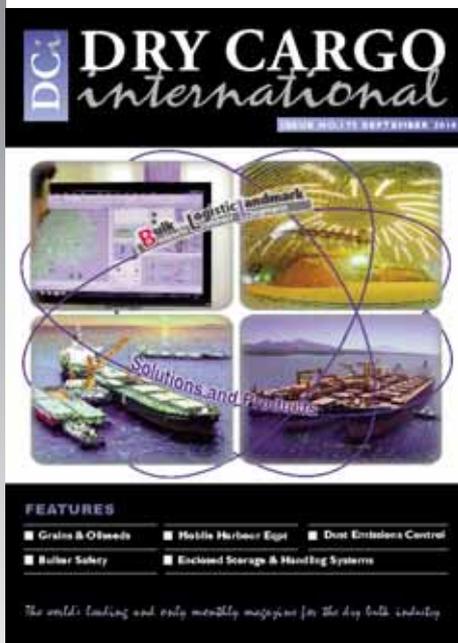
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is loaded into tank trucks that are weighed on the scale underneath.

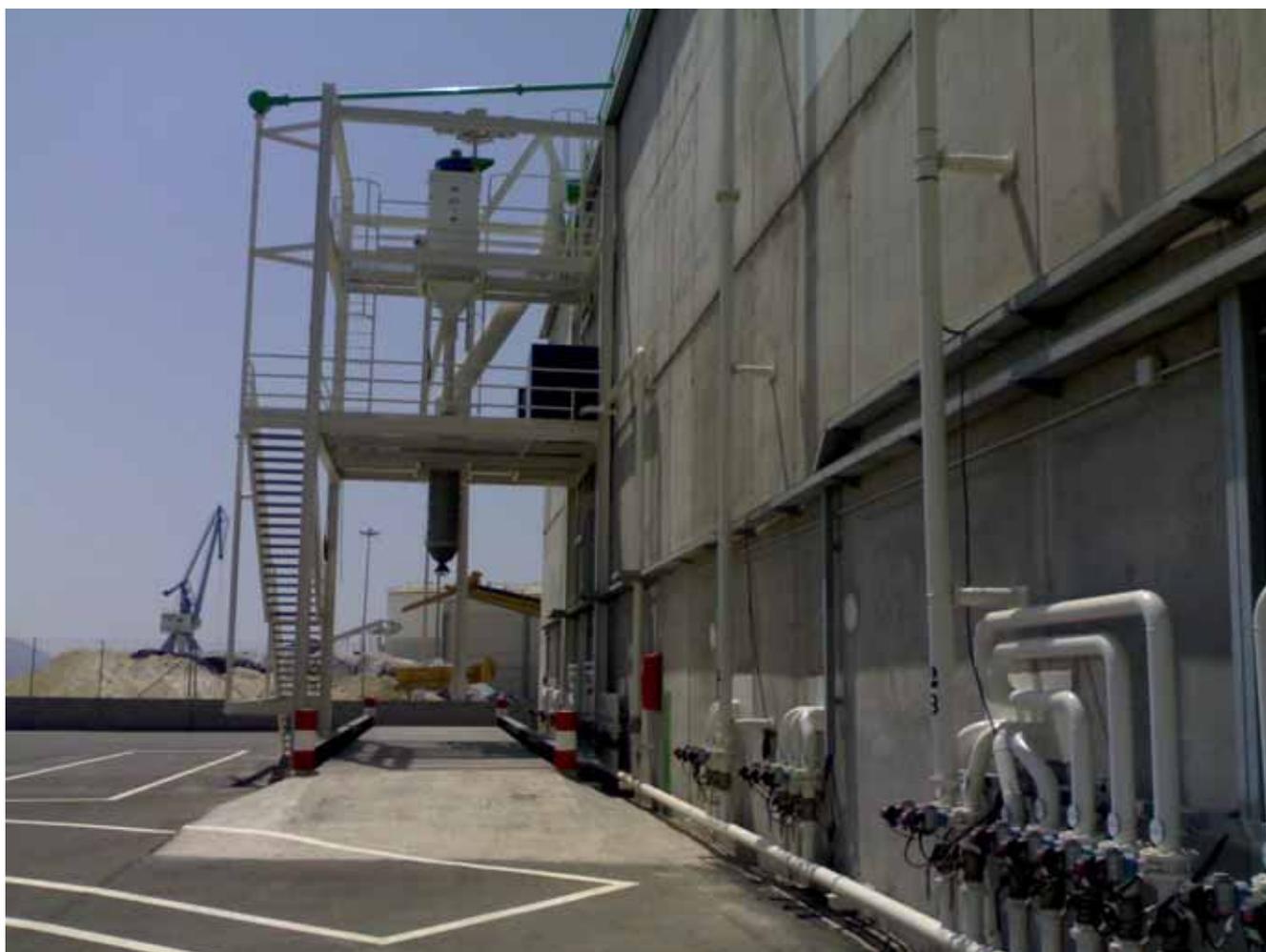
Trucks are loaded automatically with the required weight. The loading speed is 250–300tph, and does not generate any dust. The system allows for the simultaneous feeding of the silo from 12 trucks, and at the same time is able to load three trucks from the silo. The silos began operation in August 2008, once all commissioning was complete and the performance guarantees were achieved to the full satisfaction of the customer. At that time, it was a new design for the storage and emptying of silos for this type of product.



ADVANTAGES

This silo design has the following advantages:

- ❖ maximum exploitation of the storage from the ground level;
- ❖ lowest height required for a given silo capacity;
- ❖ costs of civil and installation work are greatly reduced;
- ❖ low energy consumption;
- ❖ easy and automatic running;
- ❖ low maintenance costs;
- ❖ versatility to position truck loading operations where the customer wants; and
- ❖ the silo surface can be adjusted easily to the ground or land available.



DemcoTECH: servicing the international dry bulk cargo industry

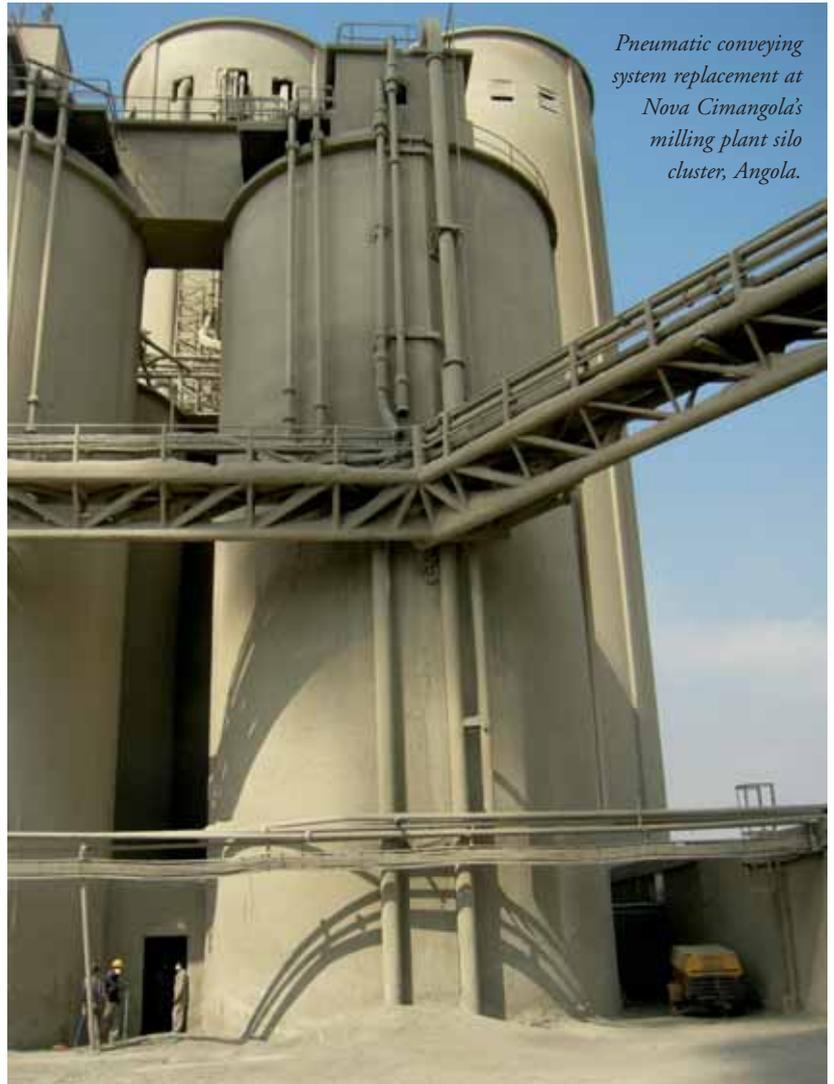
As opposed to liquid bulk, containers and other general cargo, dry bulk cargo is mostly transported in loose form, determining to a major extent the storage and transport technology employed at the quay, in the terminal and at other locations before onward transportation, says DemcoTECH Engineering General Manager, Paul van de Vyver.

Johannesburg, South Africa-based DemcoTECH has been responsible for designing and installing bulk materials storage and handling facilities for a growing international client base. Its comprehensive suite of systems and technologies ranges from troughed and pipe conveyors through to moving head systems, trippers, stackers, sampling plants, tipplers, storage facilities and bulk material silos.

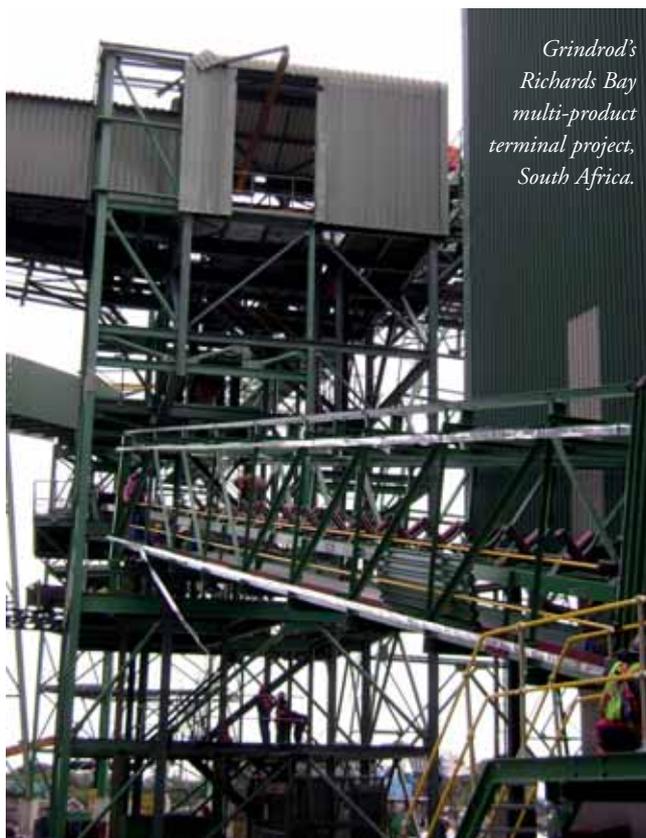
“Conveying cargo in loose form can potentially contaminate the environment and, vice versa, the material can itself be contaminated by the surroundings. With a clean environment now increasingly a major focus area of regulation and social pressure groups, we design and install equipment that complies with stringent environmental and safety requirements. In addition, we offer a range of enclosed conveying technologies such as our troughed AeroConveyors™, pipe conveyors and pneumatic conveying systems,” adds van de Vyver.

DemcoTECH counts amongst its clients major mining houses, cement producers and terminal operators.

“Projects we have been responsible for range from a clinker silo at NPC Cimpor’s Simuma Plant in KwaZulu-Natal, South Africa, through to materials handling engineering and support services for one of the world’s largest iron ore distribution centre projects in Malaysia ”



Pneumatic conveying system replacement at Nova Cimangola’s milling plant silo cluster, Angola.



Grindrod’s Richards Bay multi-product terminal project, South Africa.

DemcoTECH was the materials handling engineering-service company on Vale’s project to establish a regional iron ore distribution centre in Lumut, Perak, Malaysia. The distribution centre includes an ore storage yard and a marine terminal which will be capable of handling more than 60 million metric tonnes per year, receiving iron ore from Vale’s mines in Brazil for distribution to customers across the Asia Pacific region. DemcoTECH also provided operational readiness services, including the preparation of operational and maintenance manuals and training modules. Work started on the facility in 2010 and the first two 400,000dwt vessels carrying ore to the Malaysian Terminal were off-loaded early in 2014.

“DemcoTECH has in the past also been contracted by South Africa’s major shipping and logistics company, Grindrod Terminals, for projects at both its Maydon Wharf and Richards Bay terminals in South Africa’s KwaZulu-Natal province,” notes van de Vyver.

Responsible for the design and installation of the materials handling portion of the expansion to Grindrod’s multi product terminal at Richards Bay, DemcoTECH provided all the materials handling plant to convey various materials, but mainly rock phosphate and coal, from the three Richards Bay terminal sites.

The original system conveyed material from terminal conveyors to feed a single warehouse, with the expansion extending the system to feed two other warehouses.

For Grindrod’s Maydon Wharf terminal in Durban, DemcoTECH supplied a mobile ship offloading facility, together



40,000-tonne multi-discharge clinker silo project for NPC Cimpor's Simuma Plant in South Africa.

with a new warehouse distribution system for the fertilizer storage facility. The system replaced a trucking system and comprised four 400tph (tonnes per hour) mobile, tyre-mounted conveyors which are stationed on the jetty at locations to suit the ship docking arrangements. Once the ships have been offloaded, the conveyors feed the fertilizer to a central pivoting and retractable boom conveyor. The existing warehouses were modified to incorporate reversible, multi-point discharge shuttle conveyors that feed individual bays. Fully sequenced automatic starting and stopping of the systems ensures a seamless operation, and the ability to handle different types and grades of fertilizer.

“For cement producers, we offer a full range of services from silo design and construction through to materials handling systems,” says van de Vyver.

Working in a joint venture with Kantey & Templer Engineers of South Africa, DemcoTECH design and built a 40,000-tonne, multi-discharge clinker silo with associated feed and discharge materials handling plant at NPC Cimpor's Simuma Plant.

Kantey & Templer was responsible for the silo's civil and structural design, engineering and project execution, and DemcoTECH for the materials handling elements of the project, including the project execution of the system.

The new silo, positioned alongside the existing silo, handles hot clinker up to 205 °C, and features a clinker steel pan feed system that can feed clinker to either the existing or the new silo.

The clinker silo consists of a 40,000-tonne free capacity, reinforced, pre-stressed structure with a 30m internal diameter and 55m height. The clinker silo has two reclaiming tunnels and a precast concrete conical roof.

The silo receives clinker from the kiln via a silo feed Aumund steel pan conveyor and discharges at 250tph onto two reclaim conveyor belts with heat resistant belting. The clinker is then fed to either the existing plant or a new rail loading system.

Located in environmentally sensitive Oribi Gorge area of KwaZulu-Natal, the silo's design controls dust emissions from the plant to well below regulatory requirements.

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Commissioning of mobile, tyre-mounted conveyors stationed on the jetty at Grindrod Terminal, Maydon Wharf, South Africa.

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