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FEATURES

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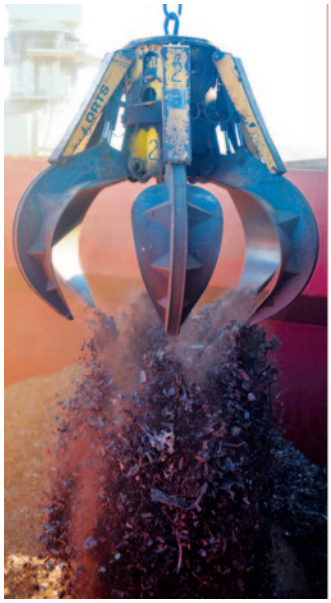

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Coal trade restraints become more visible

Influences hampering commodity import demand in some countries have gained greater prominence recently. Assuming the pattern continues, growth in world seaborne dry bulk trade is likely to be constrained, and the annual volume during 2025 may see little or no increase compared with last year.

A beneficial change in underlying trends affecting dry bulk trade is the modest upgrading of economic growth estimates contained in the International Monetary Fund's latest (end-July) analysis. Global GDP growth in 2025 is now expected to grow by 3.0%. Although still below last year's 3.3% rise, this revised figure is a better prospective outcome than foreseen a few months ago when there was more uncertainty about international trade policy changes.

Coal

Accumulating evidence from changes in the past six months, coupled with signs (albeit tentative) of how the trend could evolve over the months ahead, suggest that world seaborne coal trade may see a sizeable decline this year. Among major importers weaker trends in China, India and South Korea are notable features.

The negative perspective is reinforced by the International Energy Agency's mid-year coal market update. According to a view of prospects for 2025 as a whole, IEA analysts suggest that "we expect global coal trade to decline, reversing the upward trend observed in 2024". Global movements in the dominant steam coal trade segment, and also in the coking coal category, are both expected to be about 7% lower this year at about 1,450mt (million tonnes) in total (including overland).

Iron ore

Prospects for iron ore trade point to difficulties in achieving further upwards momentum in the current year, with a possibility of an annual decrease occurring. While many countries may be able to maintain import volumes, others are likely to experience weakening influences.

A reduction of 19mt or 3% in China's iron ore imports to 592mt during the first half of this year, compared with 611mt in last year's same period, has been revealed. Currently it seems unlikely that the decrease will be fully or more than offset in the second half, resulting in an annual decline. Some positive changes among countries comprising the remaining quarter of world seaborne trade may not be sufficient to prevent a setback in the global trend.

Grain & soya

Forecasts for world grain and soya trade in the period ahead provide a favourable outlook. During the 2025/26 trade year starting October 2025 (beginning July for wheat) global imports of grain could recover from the previous year's downturn while soyabeans/meal imports increase again.

World trade in wheat, corn and other coarse grains, plus soyabeans and meal could increase by 29mt in 2025/26, according to a Bulk Shipping Analysis calculation based on US Department of Agriculture estimates. The total of 715mt predicted is 4% higher than the estimated 686mt total in the current 2024/25 year, which is a similar percentage below trade in the previous twelve months. An upturn in China's imports is foreseen as one of the principal contributions.

Minor bulks

One of the larger and more prominent components of the minor bulks seaborne trade category is aluminium raw materials — bauxite and the processed alumina — which saw robust growth of about 10% in 2024 and looks set to experience another possibly larger expansion. Higher imports into China could enable the global total to grow by over 15% in 2025, reaching around 255mt.

Bulk carrier fleet

Cargo carrying capacity in the world bulk carrier fleet, this year, will be augmented by newbuilding deliveries with a total possibly exceeding the 34 million deadweight tonnes delivered from shipbuilding yards in 2024. Among vessel size groups, some variations are likely. Increases in the Handysize, Handymax and Panamax segments could contrast with a lower Capesize volume.

TABLE 1: KEY ASIAN SEABORNE COKING COAL IMPORTERS (MILLION TONNES)

	2019	2020	2021	2022	2023	2024
Japan	54,6	49.7	52.1	51,3	49.8	46.0
South Korea	22.6	21.2	21.5	22.3	22.2	25.0
China	42.0	44.5	39.5	36.1	45.3	62.5
India	63.2	59.2	67.8	72.0	76.0	77.5
Total of above	**127.8**	**174.6**	**180.9**	**130.4**	**193.3**	**211.0**

source: various & BSA estimates

TABLE 2: BULK CARRIER NEWBUILDING DELIVERIES (MILLION DEADWEIGHT TONNES)

	2019	2020	2021	2022	2023	2024
Handysize (10–39,999dwt)	3.1	2.8	4.1	4.3	4.4	5.7
Handymax (40–69999dwt)	8.2	9.2	7.0	7.3	9.4	10.5
Panamax (69–99,999dwt)	11.4	12.1	8.6	9.8	10.9	10.0
Capesize (100à,000dwt and over)	19.0	25.1	19.0	10.3	10.7	7.7
Total	**41.7**	**49.2**	**38.7**	**31.7**	**35.4**	**33.9**
% change from previous year	45.8	18.0	-21.3	-18.1	11.7	-4.2

source: Clarksons Research & BSA estimates

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Chinese demand moves iron ore prices

Kunal Bose

China, which nearly has two-thirds share of the global seaborne trade in iron ore is likely to see its import of steelmaking ingredient to fall this year, the first since 2022. Its imports henceforward will be marked by volatility.

China, which has a share of over half the world steel production and at the same time accounts for nearly two-thirds of seaborne trade in iron ore by way of imports, will unarguably have a major impact on price movements of the steelmaking ingredient in all situations. This feature of the trade will be well underlined by two recent developments: first, iron ore futures on China's Dalian Commodity Exchange for the most traded September contract firmed up recently because of the country's steel industry's strong restocking demand fuelled by what is perceived as low inventories at ports. Leading commodity consultancy Mysteel headquartered in Shanghai says in a report that better margins on steel secured in July despite rises in production cost encouraged the industry to fund restocking of iron ore.

Then, more recently, the combination of two China-related factors brought iron ore futures down: suspension of construction activity in and around Beijing to enable the holding of a military parade to celebrate the end of the second World War in a clean environment. Simultaneously, the mills and the trade pressed the caution button awaiting key Chinese data that should give a clear idea of the likely future curtailment of steel production in the world's largest user of all metals. The fact remains that, being such a major producer of steel and with falling output of its own, mostly low-grade ore, it is imperative for the Chinese steel industry to maintain a fairly large portside inventory in all seasons, varying from 135mt (million tonnes) to 150mt.

Portside iron ore inventory

However, the compulsion to maintain this kind of inventory — the volume is more than enough to meet the iron ore requirements of the world's third-largest producer

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Japan which made 84mt of crude steel in 2024 — has to be seen in the context of the mammoth sizes of foreign origin ore, mostly from Australia and Brazil that China routinely receives to feed its steel mills. The inventory is more than an insurance against any temporary disruption in supplies from Australia and Brazil. In fact, supply disruptions, generally short-lived keep on happening due to storms, rains and floods. But the industry has also been a witness to the collapse of a tailings dam at a Vale-owned mine in Brazil's Brumadinho in January 2019 reportedly killing 270 people and causing serious damage to the environment. It took Vale a long time to repair the damage and bring production back to normal, besides paying hefty penalties. The accident and all its consequences alerted the global mining industry of the need for adequate investment and constant vigil to create an accident-free environment at open and underground mines.

In the meantime, China as is its wont keeps on using its business guile to draw from or add to the inventory to command some influence on iron ore prices; this primarily moves on global seaborne trade balance and the trade's perception of the short and medium-term world economic outlook. The ore market at this point remains in surplus, though the volume, according to trade officials, is down significantly because of an unexpected resilient demand of the raw material in the face of a fall in global steel production, thanks largely to the 3.1% year-on-year drop in Chinese crude steel output to 594.47mt in the first seven months of this year. Under combined pressure of high temperatures and heavy rains, the July production at 79.66mt hit a seven-month low. The slide in production has also got to do with Beijing crackdown on steel overcapacity in a drive to bring the industry in alignment with local demand. Since as much as 98% of iron ore is used in steelmaking, developments in the Chinese steel industry will come in for close scrutiny of mining groups and trade officials. At the time of writing, SGX (Singapore Exchange) TSI iron ore (62% Fe fines) CFR China Index Futures is $101.90 a tonne.

Interestingly, though the world has to contend with intense geopolitical risks and tariff uncertainties unleashed by President Donald Trump whose impact will spill into commodity trade, including steel and iron ore, the spread between high and low in iron ore prices this year remains muted at $14–15 a tonne compared with about $52 in 2024 and $32 in 2023. Iron ore trade has never been immune to buying of the ingredient by China and now the Beijing move to restructure the steel industry, — which nurses considerable idle capacity and is the source of trade frictions because of unwelcome big steel exports — is under the watch of iron ore traders. Not only are Chinese imports of iron ore down but Kepler data shows imports by other major steelmaking countries such as Japan and South Korea and also Europe are also down in the first half of 2025. During this period global seaborne imports were lower by 3% year-on-year or 25.09mt to 818.01mt.

Reuters suggests that Australia shipping a lower volume of 460.02mt in the first half compared with 464.34mt in the same period of 2024, thanks to the not uncommon weather-related disruptions in shipments by the world's largest producer exporter of iron ore acted as a mitigating factor of "the price impact of the decline" on seaborne imports so far in the current year. According to S&P Global Market Intelligence, iron ore prices are likely to seek lower levels gradually, falling from an "estimated average of $97.20 a tonne in 2025 to a forecast low of $80 a tonne by 2029." The anticipated surplus in global seaborne trade balance will be the principal reason for prices to fall. The agency says at the same time iron ore prices will recover to $95 a tonne by 2035 with the tightening of trade balance.

Chinese imports volatility

The single most influencing factor in iron ore trade balance, China recorded all-time high imports of 1.28bn tonnes in 2024, up 4.9% on 2023 imports of 1.18bn tonnes, a rise of 6.6% on the previous year. But

henceforward, Chinese imports are likely to be marked by significant volatility, says S&P. "We anticipate a notable drop of 45.8mt in 2025, reducing imports to 1,192mt, marking the first decline since 2022, primarily driven by an expected reduction in the country's steel production," S&P forecasts. Come 2029, Chinese imports are likely to be a record 1.254bn tonnes in the face of decline in domestic ore supply. Going further to 2035, ore imports are to slip to 1.194bn tonnes in sync with the "persistent decline in China's steel output" and that will negatively impact the demand for the raw material. The agency expects steel production of the country to sink below 900mt by 2035, compared with the record 1.065bn tonnes in 2020.

A common question is why does China — with proven iron ore reserves of around 17bn tonnes and unproven reserves exceeding 200bn tonnes — rely on imports to such a high degree? A part of the answer is provided by Mysteel Global, which says the average Fe (iron) content in the Chinese ore is a dismayingly low at around 30%. Such ore requires beneficiation, producing a concentrate for use in blast furnace (BF), after its pelletisation. Not only is China burdened with very low quality ore, but the cost of extracting ore at Chinese mines is so high that mines will break even or make small profits only when the raw material fetches at least $100 a tonne. S&P, therefore, says when ore prices fall "domestic miners will face pressure to close unprofitable mines, especially those located in regions where importing iron ore is easily accessible and competitive." Compare this with the Australian BHP Billiton or the Brazilian Vale, which by way of optimizing infrastructure and improvement in equipment and machinery performance and workforce rationalisation have been able to bring down production cost to $20–21 a tonne. The Australian Fortescue has an iron ore cost guidance of $18.50 to $19.75 a tonne.

Chinese mines decommissioning

Experts believe that the unfavourable production cost factor being highly pitted against China will be the reason for domestic production to fall in the long term. Moreover, the mounting pressure to decarbonize operations covering the entire steel value chain starting from raising ore from the earth will likely lead Beijing to decommission the unprofitable mines and also the ones stuck with unscientific mining practices. Whatever the size of Chinese domestic supply of iron ore in future years, the country has the comfort of knowing,

the world will be experiencing significant seaborne iron ore trade surpluses beginning 2026, thanks to progressively rising supplies from Australia and Brazil; perhaps more significantly, the start of shipments from Guinea's ambitious Simandou greenfield project by 2025 end. India, however, presents a different picture where because of the growing domestic demand for ore, there will be diminishing export surpluses. Indian steel capacity grew 10% during 2024–25 to 205mt and the country has an ambitious capacity target of 300mt by 2030. To the extent steel production then will be through BF/BOF route, the government, which itself owns the country's largest iron ore producing company NMDC, wants the entire ore demand to be met from domestic sources. This is a difficult proposition though, considering the bureaucratic logjam to be encountered in securing clearances for new mines opening and also for capacity expansion of operating mines. In fact, the possibility remains of India becoming a net importer of iron ore by 2030.

Resource nationalism

This, and the constant lobbying by Indian steel producers that natural resource must be exclusively processed within the country, ensured an export duty structure that supports shipments of only iron ore fines of low Fe content. The assertion of resource nationalism and fall in Chinese demand for low grades of fines led to 10% contraction in fines export to 30mt in 2024. The year also saw a 24% drop in pellet exports to 8mt, leaving the manufacturers with high idle capacity. Setbacks in exports happened when India, the world's fourth-largest producer of the ingredient, lifted 2024–25 iron ore production to 289mt from 277mt in the previous year. Citing India's rich reserves of 25.24bn tonnes, and the possibility of identifying new major resources through exploration as happens all the time in Australia, Brazil and elsewhere, the country's leading mining expert RK Sharma says the country has the potential to once again become a major volume exporter. Incidentally India, benefiting from benign foreign trade environment, exported 117.37mt in 2009–10. Exports, however, collapsed to 12.24mt in 2013–14 following imposition of a 30% export tax on iron ore and 5% on pellets.

Whatever way India's approach to iron ore exports evolve, S&P foresees "significant seaborne iron ore trade surpluses to emerge from 2026." This will happen mostly on account of the planned commissioning of shipments from the Simandou greenfield project of ore of exceptional quality starting November 2025. Located in southeastern Guinea, the project area has an estimated reserve of 2.4bn tonnes. What makes Simandou extraordinary is that its ore has an iron bearing of 65% and more. Experts think that the project, as production is gradually ramped up has the potential to reshape the global iron ore market, giving China a leverage in global price determination. The project is divided into four blocks: Block 1 and 2 are developed by Winning Consortium Simandou with Singapore based Winning International Group, China Hongqiao Group and United Mining Suppliers as partners. The Simfer joint venture, including Rio Tinto, Chalco Iron Ore Holdings and government of Guinea is developing block 3 and 4.

Driven mainly by Chinese companies with the support of Beijing, their involvement goes beyond opening and running of Simandou mines to constructing a 622km rail line connecting mining site to

photo courtesy of Weba Chute Systems.

a new deep-water port facilitating exports primarily to China. At its peak capacity use, the project will annually yield 120mt of iron ore in which the respective share of China and Rio Tinto will be in the 75:25 ratio. In all likelihood, all other ore producer-exporters will be encountering a "competitive threat" from high quality BF and DRI (direct reduced iron) friendly Simandou ore.

In order to counter the emerging threat, Rio Tinto has decided to use a portion of its share of Simandou ore for blending with supplies from Australia's Pilbara region. When will Simandou be producing and exporting at the optimum level? More than one timeline has been doing the rounds. S&P, however, says considering the challenges linked to building "transportation infrastructure… we have cautiously estimated that (Simandou) exports will reach 100mt only by 2029."

Economic diplomacy

Whether it is iron ore or bauxite on whose big volume imports China is destined to remain permanently dependent has been early to identify several African countries for investment in their rich mineral resources. The strategic consideration of building alternative sources of minerals supply from Australia, whose security-related moves, particularly involving Quadrilateral Security Dialogue, led Beijing not only to acquire offshore iron ore and other mineral assets but also make investments in related infrastructure such as road, rail line and deep water port. Simandou is a result of that and Guinea has also emerged as a major source of supply of bauxite (of high Al_2O_3 content) to China ahead of Australia. China's economic diplomacy that includes the Belt and Road Initiative is turning out to be a major enabler for industrial raw materials, including iron ore security. As China's future iron ore procurement strategy unfolds with new suppliers like Guinea coming on board, shipments from Australia and Brazil will count, maybe to a lesser extent.

S&P says that, while shipments from Australia are to rise from an estimated 905mt in 2025 to 917mt by 2029, the uptrend will then be reversed due to depletion in mines and falling ore grades to settle again at 905mt. Will there then be an occasion to make adjustments to the specifications of the 62% Fe IODEX price benchmark to reflect quality deterioration in Western Australian iron ore? Brazil, in the meantime, aided by significant investments at Carajas mines owned by Vale SA, will be gradually stepping up ore exports from an anticipated 393mt to 444mt by 2035. As the steel industry is operating mostly in low margin environment, the mills are inclined to consume lower grade ore supported by alternative blending strategies. That way steelmaking cost is curbed.

At the same time, in spite of all the mitigating steps taken so far to clean up steelmaking operations in and outside China, the industry still accounts for 11% of global carbon emissions and 7% to 9% of greenhouse gas emissions. Expectedly, pressure is mounting on the industry everywhere to decarbonize operations. Like in aluminium, consumers are showing a preference for green steel. Production of such steel will demand the use of high grades of iron ore and DR (direct reduction) pellets. Then the carbon border adjustment mechanism provides incentive for commercialization of low emission production systems. The industry, therefore, is on the horns of a dilemma: low steel margins create compulsion for use of low grades of ore. As against this, making steel that leaves comparatively low carbon footprint will demand feeding BFs with high grades of ore whose supply from Australia is falling. President Trump's fiddling with tariffs targeting all nations has brought to the fore geopolitical risks that iron ore faces. China has been early to take protective steps from the risks of sudden disruptions in iron ore supplies. DCi

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REGISTRATION OPENS

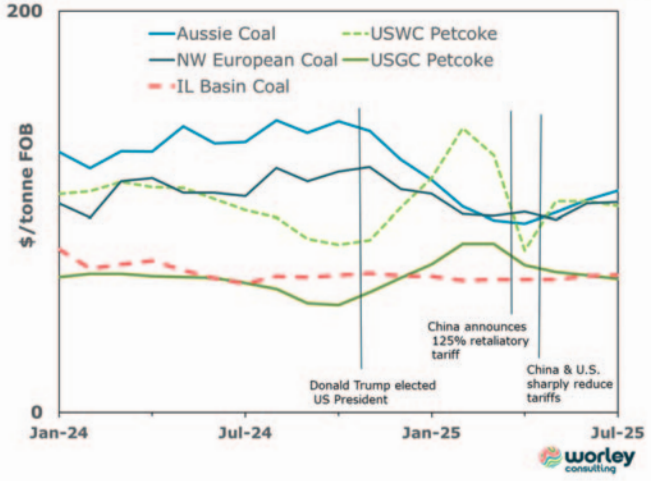
Tuesday, September 2

Petcoke market roiled by tariff uncertainty

Ben Ziesmer, Pedro Mackay & Rituraj Jha, Worley Consulting

Since the election of US President Trump, the petroleum coke market has been roiled by the impacts of tariff uncertainty, especially uncertainty regarding tariffs associated with a potential trade war with China. This uncertainty has impacted petroleum coke trade flows and petcoke prices. While both calcined and non-calcined petroleum coke are traded internationally, the trade flow discussion will concentrate on non-calcined (i.e., 'green') petroleum coke as the seaborne trade of non-calcined petroleum coke is almost eight times larger than calcined petroleum coke (CPC). The United States is the dominant exporter of non-calcined petroleum coke, providing 80% of the seaborne trade volume. The US exported

Figure 1 – Thermal Coal and Fuel-grade Petcoke Prices



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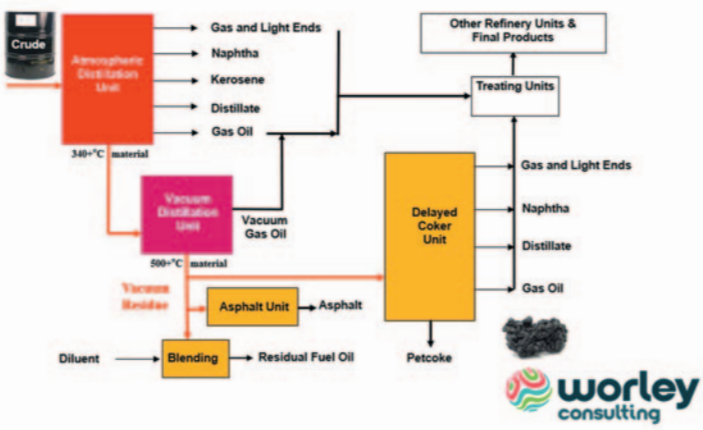
36.7mt (million tonnes) of non-calcined petcoke in 2024, which was 2% higher Y/Y. Worley Consulting expects US petroleum coke production will be about 2% lower this year due to the closure of LyondellBasell's Houston (Texas) refinery in the first quarter of 2025 and Phillips 66's Carson (California) refinery in the fourth quarter of this year, partially offset by increased production at several refineries that experienced unusual problems in 2024. YTD through May, US petroleum coke production is flat, but export volumes are down 3% compared the same period in 2024.

We focus on United States fuel-grade petroleum coke export prices because the vast majority of non-calcined petroleum coke trade is fuel-grade petcoke. Fuel-grade petroleum coke has lower pricing and is generally lower quality than petcoke used for carbon applications (see Petroleum Coke Markets below for more information). Figure 1 illustrates US West Coast (USWC) fuel-grade petroleum coke prices are higher, sometimes substantially higher, than US Gulf Coast (USGC) petcoke prices. USWC petroleum coke prices are higher because USWC petcoke typically has much lower sulphur content than USGC petcoke (there are exceptions) which allows it to go into higher value markets like the steel and glass industries, and export volumes are much lower (<6 vs. 29mt+), which makes it easier to limit sales to higher value markets. USWC exports are dominated by China and Japan which typically each receive about 40% of USWC exports. Recently USWC petroleum coke pricing has been much more volatile than USGC petcoke pricing because China is such an important market for USWC exports and the potential for China to impose very high tariffs on US petcoke. In contrast, USGC export destinations are varied with shipments typically going to 40+ different countries in a year.

Figure 2 - Simplified Coking Refinery Flow Diagram



Before discussing changing trade flows and tariffs, let us review a brief background on petroleum coke.

Coking Background

Petroleum coke is produced as a by-product in many oil refineries. Crude oil is first processed in an atmospheric distillation unit, followed by a vacuum distillation unit. The heavy residuum exiting the bottom of the vacuum tower (i.e., vacuum tower bottoms, or VTB) can be used to make asphalt, residual fuel oil (RFO)[1], or used as feedstock for a coker (see Figure 2 — Simplified Coking Refinery Flow Diagram) or other bottoms upgrading technology.

For decades, the refining industry has faced the problem that demand growth for transportation fuels (i.e., gasoline, diesel, jet fuel) has been, and continues to be, much greater than demand growth for RFO. To put it another way, people are buying cars and trucks and flying in airplanes, but no one is building RFO-fuelled power plants or industrial facilities. In response to this problem, the refining industry developed various technologies to upgrade VTBs to produce more valuable light products and eliminate the need to produce RFO.

Coking is the dominant bottoms upgrading technology. It allows refiners to reduce production of RFO per barrel of crude oil processed and bridge the gap between growth in demand for light products and RFO demand growth. To summarize, the primary purpose of a coker is to reduce the production of residual fuel oil by converting heavy VTBs into high value transportation fuels (gasoline, diesel, jet fuel, etc.) with petroleum coke produced as a by-product of the coking process.

It is also important to recognize that the percentage of VTBs produced in refining crude oil increases dramatically as the crude oil processed in the refinery gets heavier (i.e., lower specific gravity). For example, about 10% (by weight) of light Arabian crude oil becomes vacuum tower bottoms, whereas almost 40% of very heavy Mexican Maya or Alberta crude oils become vacuum tower bottoms. Consequently, the percentage of crude oil that converts into petroleum coke increases dramatically, and refineries that are designed to process heavy crude oils are much more likely to have coking capacity (or other VTB upgrading technology) than refineries designed to refine lighter crude oil.

1. Typically, about 30% high value diluent such as light cycle oil needs to be added to meet RFO viscosity and density specifications.

Refining trends

Before we move to further sections, let's see how the oil demand and refining future looks. While international agencies are projecting oil demand to peak by this decade, OPEC sees no such peak in the foreseeable future. In its latest report, the IEA significantly reduced its estimates for displacement of fossil fuel vehicles based on EV adoption by 2030. In the US, just 7.5% of new car sales are EVs, while the rest are still fossil-fuel powered. Within the EU, almost 90% of trucks, 80% of vans, and 65% of buses are diesel-based. On the other hand, China is moving rapidly towards electric vehicles. In fact, China's gasoline demand already peaked in 2023. However, China's overall oil demand will continue rising in the near-term due to a significant rise in the demand for petrochemical feedstocks.

Thus, on a practical note, oil demand and the refining sector might persist for longer than anticipated.

Petroleum coke production

As mentioned before, cokers are traditionally installed in oil refineries to convert VTB and other heavy residual oils into higher-value light transportation products (e.g., gasoline, jet fuel, diesel fuel). Until recently, a coker almost invariably increased refinery profitability because the yield of high-value transportation fuels is maximized and the production of low-value RFO is minimized[2]. While the coking process has been in use since the 1930s, petroleum coke production saw its largest growth between 1995 and 2018 (production: 1995= ~30mt, 2018= ~140mt) principally because light transportation petroleum product demand grew faster than RFO demand worldwide, and the overall global crude slate got heavier. Consequently, petroleum coke production grew much faster than crude oil demand (1995–2018 CAGR = 6.6% for petcoke vs. 1.6% for crude oil).

However, recently petroleum coke production growth has slowed markedly because crude oil, on average, is getting lighter and the recent move for refineries to be configured for oil to chemicals production. Two factors have been driving crude oil, globally, to be lighter. The first is due to increased production of shale oil [i.e., tight light oil (TLO)], particularly in the United States, because of the fracking revolution. The second reason is crude oil production cuts by OPEC+.

The sharp rise in US crude oil production has been primarily driven by shale oil (TLO). US crude oil production

increased from 5.5 million barrels per day (mbpd) in 2010 to 13.2mbpd in 2024 and is further projected to grow to ~13.4mbpd by 2026. This dramatic increase of US crude oil production has been driven by TLO production, which soared from ~0.5mbpd in 2010 to 9mbpd in 2024 and is expected to grow by a further 20% to ~10.6mbpd by 2030, primarily from the Permian Basin in Texas. The share of TLO is seen rising from ~9% in 2010 to over 75% by 2030.

Refineries run a blend of different crude oils (known as the crude slate), and choices of crude oils which are in the crude slate significantly impact the quantity and quality of petroleum coke that is produced. The selection of crude slate is driven by a complex series of factors including the capacities and capabilities of the various processing units within the refinery, the expected operating state of various processing units, crude oil pricing and availability of different qualities of crude oil, and demand for various refined products.

Increasing TLO share of crude oil production makes the crude slate lighter - hence lower petroleum coke production. The US imports less expensive heavy crude oil (especially from Canada) and exports some its higher priced domestically produced lighter crude oil, mostly to European refiners, pushing crude slates lighter.

Whenever OPEC members undergo production cuts, they preferably reduce the output of relatively cheaper heavy crude oil. By doing so, they minimize their revenue losses from reduced production by selling relatively more expensive lighter crude oil. Thus, OPEC+ production cuts tend to make the overall global crude slate lighter.

OPEC+ production

OPEC+[3] members have been holding back 5.85 mbpd of production cuts for years, consisting of three tranches:

1. 2mbpd cuts by the whole group
2. 1.65mbpd of first stage voluntary cuts by eight members
3. 2.2mbpd cuts in the second stage of voluntary cuts by the same eight members.

The first two tranches (2mbpd and 1.65mbpd) are currently planned to stay in place until the end of 2026. Frustrated by non-compliant OPEC+ members and rising non-OPEC+ crude oil production, a select group of OPEC members decided to retake market share by raising oil production, thus lowering prices. They gradually started unwinding the third tranche (2.2mbpd) starting in April 2025, with this tranche of production cuts ending in September 2025.

Crude oil prices so far this year are down 11% Y/Y, with Brent averaging ~$71.8/bbl and WTI averaging ~$68.3/bbl. According to the Federal Reserve Bank of Dallas, to cover the operating expenses for operating wells in the US, the average price of WTI must be in the range $26–45/bbl, depending on the region. Moreover, to profitably drill a new well, firms will need $65/bbl oil, on average. In the US, currently

2. Since the early 1990s cokers have also been used in upgraders that produce various grades of synthetic crude oil (SCO) from bitumen or ultra-heavy crude oils. This type of upgrader exists in Venezuela where ultra-heavy Orinoco Belt crude oil is upgraded and is exported as lighter crude oils, and in Canada where upgraders are used to produce SCO from the bitumen derived from Alberta oil sands. Upgrading economics are driven by crude oil economics, not refining and coking economics.

3. OPEC+ consists of 9 OPEC members plus 13 non-OPEC oil exporters led by Russia.

the number of active oil producing rigs is the lowest since September of 2021, which clearly indicates rising pressure on shale producers because of declining oil prices. Another aspect of rising OPEC+ production is increasing heavy crude oil volumes returning to the market, which is favourable for increased petroleum coke production. Exports of heavy crude oil from Venezuela will also resume shortly after Chevron received authorizations from the US Treasury Department last month to operate in Venezuela again, export its oil, and do swaps with PDVSA through a restricted license. Venezuela heavy crude oil grades such as Hamaca are well-suited for USGC coking refineries.

Green petroleum coke is usually upgraded by calcination when it is used as a carbon source.

Petroleum coke markets

Petroleum coke is unusual because it is used not only as a heat source (i.e., fuel) but also as a carbon source in metal production and chemical processes. Petroleum coke that is used as a carbon source requires better quality (e.g., low sulphur and metals content) and commands a higher value than fuel-grade petcoke prices, driven by different factors than fuel-grade petcoke prices.

Green[4] petroleum coke is usually upgraded by calcination when it is used as a carbon source. Calcination is a process that uses heat [1,150–1,350°C (2,102–2,462°F)] to remove moisture and volatile matter from petcoke, improves critical physical properties, and converts green petcoke into an electrically conductive form of carbon. Green petcoke that has been calcined is referred to as calcined petroleum coke (CPC). The largest market for CPC is in the production of carbon anodes for aluminium smelting. Other uses for CPC are in the production of carbon electrodes for electric arc furnaces, titanium dioxide (TiO_2) production, as a recarburizer (i.e., carbon raiser) in the iron and steel industry, and, very recently, as a source of synthetic graphite in lithium-ion (Li-ion) battery production. A little over 30% of petroleum coke that is produced is sold into these higher value-added markets for higher quality petcoke; the remaining production is used as a fuel source. The carbon source market share has been growing recently as demand growth in these specialty markets has outpaced overall petroleum coke production growth.

Fuel-grade petroleum coke is used in a variety of industries — primarily as a substitute for coal, but sometimes as a substitute for fuel oil. Petroleum coke has higher calorific value (i.e., kcal/kg) and much lower ash content than coal. However, it is more difficult to burn, generally has higher sulphur content, and is often more difficult to pulverize[5] than coal because most fuel-grade petroleum cokes are harder than coal, so it typically sells at a discount to coal.

The cement industry is the largest consumer of fuel-grade petroleum coke because cement kilns are particularly well suited to burn petcoke, and cement kilns inherently capture approximately 90% of the sulphur oxides (SOx) emissions resulting from burning petcoke. The next largest demand segment for fuel-grade petroleum coke is the 'other industry' category, which includes lime[6], brick, calcium carbide, and glass production. The next largest demand segment is gasification of petcoke to produce chemicals (e.g., ammonia, urea, ammonium nitrate, etc.), currently dominated by Reliance Industries Limited's huge gasification complex located adjacent to its 1.24mbpd refinery in Jamnagar, Gujarat, India. The remaining categories in declining market size are power generation, long-term storage, and iron & steel production. The 'long-term storage' category refers to petroleum coke produced as a by-product of upgrading bitumen (primarily Western Canadian oil sands) where petcoke is placed underground as part of the reclamation process associated with open cast (open pit) mining of bitumen or was placed in long-term storage in Venezuela because dependability problems at petcoke terminals located at the Port of Jose prevented exports of petroleum coke from keeping up with petcoke production.

4. Technically, all petcoke that has not been calcined is green petcoke (GPC). However, within the petcoke industry, the term GPC is usually only used for petcoke that is used as calciner feedstock. Unless otherwise noted, discussion of petcoke or petroleum coke will be referring to green (i.e., not calcined) petroleum coke.

5. Coal (and petcoke) is typically pulverized to approximately the consistency of talcum powder to facilitate the pulverized (suspension) fuel combustion process used in the power, cement, lime, and many other industries.

6. Lime kilns are very similar to cement kilns and have the same inherent capabilities to successfully burn petcoke as cement kilns.

Tariffs

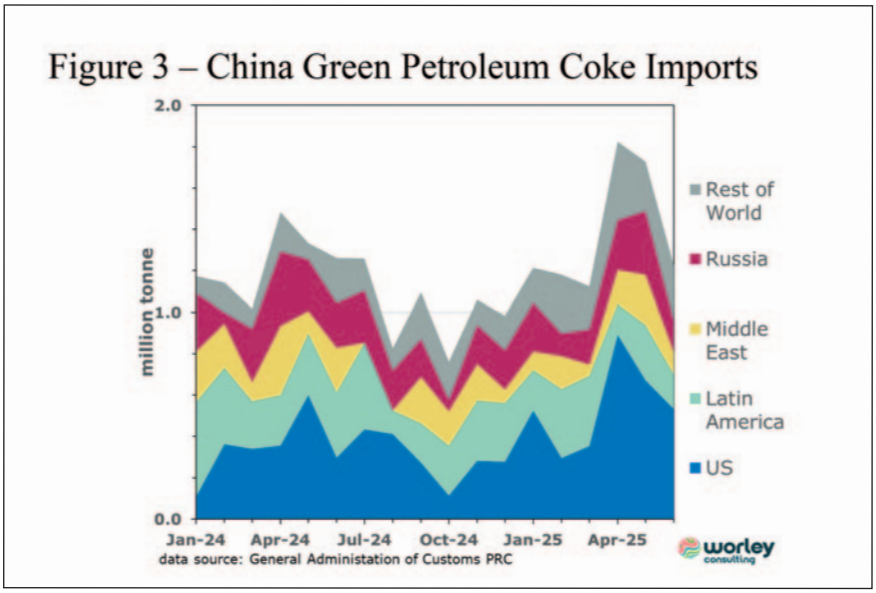
Generally, petroleum coke is subject to no or very small import tariffs. However, China demonstrated during the first Trump Administration that it is willing to put significant tariffs on US goods (including petroleum coke) in retaliation for President Trump imposing significant import tariffs on Chinese goods. The USWC petroleum coke market is particularly sensitive to China import tariffs because 40+% of USWC petcoke is exported to China. With President Trump becoming US president again, Chinese importers expected a trade war between the US and China would break out, and they began purchasing additional US petroleum coke in January 2025 so this petcoke could clear customs before China imposed retaliatory tariffs on US petcoke.

President Trump announced a 10% additional tariff on Chinese goods on February 1, then added another 10% on March 3. Each time China's retaliatory tariffs were limited and did not include petroleum coke. Then in early April there was a series of 'tit for tat' tariff increases culminating on April 11 with a base 145% US tariff on Chinese goods and China imposing a 125% base tariff on US goods, including petroleum coke.

The 125% retaliatory tariff caused Chinese buyers to retreat from the market, and petroleum coke prices, especially USWC prices, fell (see Figure 1 – Thermal Coal and Fuel-grade Petcoke Prices). On May 12 China and the US announced a temporary tariff truce with US import tariffs dropping to 30% and China's import tariffs decreasing to 10%.

China's lower tariff allowed USWC pricing to recover, but not to the level seen before the tariff war broke out. On August 11, President Trump announced a 90-day extension of these temporary tariffs.

Figure 3 – China Green Petroleum Coke Imports



Tariff uncertainty shifting petroleum coke trade flows

In the above paragraphs, we saw general discussion on crude oil markets, petroleum coke, and tariffs, which we will correlate with the trade flows in the paragraphs below.

China

In 2024, China imported ~13.4mt of non-calcined (green) petroleum coke, which was 16% down Y/Y from the record high ~16mt in 2023. Despite US exports into China dropping by 32% in 2024, the US remained China's largest supplier with 29% market share. In 2025, with the latest available numbers, during the first half (1H25), China imported ~8.3mt of green petcoke (+ 12% Y/Y).

As discussed previously, this year Chinese importers raced to import US petcoke before retaliatory tariffs took place, causing import volumes of US petcoke to spike in April, before declining in May and June (see Figure 3 – China Green Petroleum Coke Imports).

Over the years, China's appetite for petcoke grew continuously and thus, its imports. For example, between 2019 and 2023, China's imports of green petcoke grew up by 100% (i.e., from ~8mt in 2019, to ~16mt in 2023). In 2024, there was a sudden drop because importers had over-estimated demand and petroleum coke inventories by the end of 2023 had grown to 6mt+. Venezuelan petcoke came back into the market in 2021 and within two years almost 15% of China's petcoke imports came from Venezuela. In 2024, however, because of the above-mentioned reason, volumes came down significantly.

Another notable trade shift in trade patterns has been Russian petroleum coke exports, which lost their typical destinations due to Western sanctions. By 2024, Russian petcoke imports into China had almost tripled compared with 2021 levels (i.e., pre-Russia-Ukraine conflict year). Imports continue at the same pace this year as well.

From the Middle East, Saudi Arabian petcoke volumes to China peaked in 2018 at ~2mt but fell dramatically thereafter. In 2021, volumes reached close to 2018 levels but fell more than 50% in 2022 and 2023. In 2024, ~1.55mt of Saudi Arabian petcoke were imported by China. In 2025, with the latest available data through May, Saudi Arabian petcoke volumes into China appear to be flat or marginally higher on Y/Y basis.

Petcoke imports from Oman have also varied significantly, after reaching ~0.3mt in 2021, they fell to just ~60,000 tonnes in 2024. However, so far this year, Oman volumes to China have soared and could reach ~1.6mt.

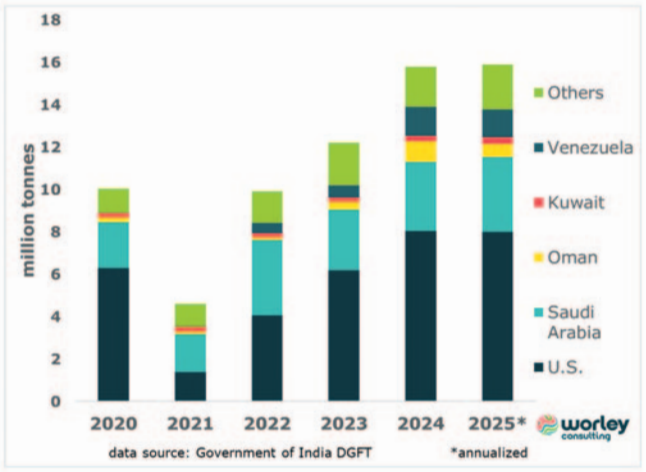
India

India's green petcoke imports in 2024 increased 30% Y/Y to a record high ~15.2mt. Prior to this, in 2016, India imported ~13.2mt of green petcoke, soon after which, court cases restricted petroleum coke's use, and imported volumes decreased significantly. However, in 2018, India's apex court (i.e., Supreme Court of India) allowed certain industries to import unlimited quantities of petcoke, while restricting imports by other industries based on quality and quantity. As of today, cement, gasification, lime kiln, calcium carbide, and graphite anode (for lithium-ion batteries) industries can import petcoke without any restrictions, while integrated steel plants are only allowed to import less than 3% sulphur petcoke, and only up to 10% of the feedstock to coke ovens. Calcined petroleum coke (CPC) calciners and aluminium smelters have restrictions on their imports. Calciners can import up to 1.9mt/year of anode-grade green petroleum coke, while aluminum smelters can import up to 0.8mt/year of CPC.

During the first five months of 2025, India's fuel-grade petcoke imports eroded 1% Y/Y, to ~6.4mt (i.e., from ~6.5mt during the same period in 2024). However, seeing the expected growth rate of the petcoke consumers, India might end up importing the same level as in 2024, though there is a risk factor of US tariffs on India goods and consequently, retaliatory tariffs by India on US goods.

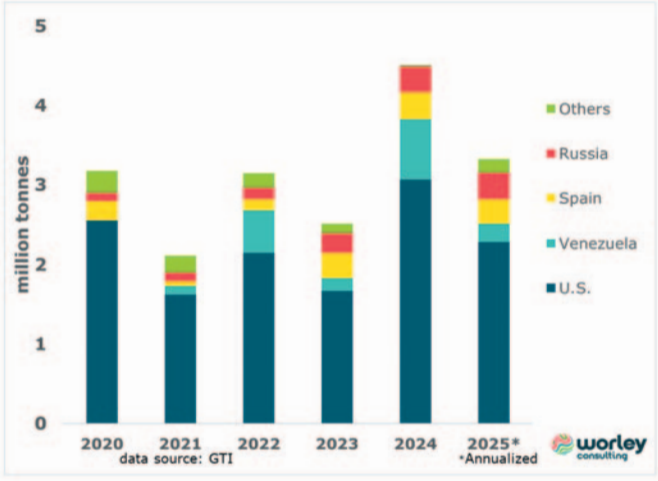
More than half of the fuel-grade petcoke imported by India is from the US, followed by Saudi Arabia and Venezuela (see Figure 4 – India Green Petroleum Coke Imports). Venezuelan petcoke entered the Indian market in 2022 and by 2024 volumes had tripled. However, due to various commercial and sanctions-related issues, purchases of Venezuelan petcoke have slowed in 2025.

Figure 4– India Green Petroleum Coke Imports



Saudi Arabia petcoke volumes have been variable, depending on competition with US material on pricing and offers from China. Duqm petcoke from Oman this year has been mostly going to China where pricing is higher, possibly because it can be used as blend stock for battery anode production or calciner feedstock.

Figure 5 – Türkiye Green Petroleum Coke Imports



Türkiye

In 2024, Türkiye imported ~4.5mt of green petcoke, out of which ~70% was from the USGC. Türkiye's fuel-grade petcoke imports in 2024 rose 79% Y/Y, primarily due to its cement industry purchasing petroleum coke instead coal (especially Russian coal) due to favourable economics, and increased cement production. However, so far this year, strong fuel-grade petroleum coke pricing has caused much of Türkiye's cement industry to switch back to coal, especially Russian coal. However, the trend of decreased imports may not continue since China's aforementioned surge of US petcoke imports in the second quarter of 2025 is unlikely to continue, leaving more US petroleum coke available for other countries such as Türkiye.

Since more than two-third of Türkiye's fuel grade petcoke imports are from the

US, less volumes are left for other petroleum coke exporters. Among them, historically, Spain has been the second largest supplier. Imports from Russia have increased after they lost their regular customers due to Western sanctions, and last but not the least, is Venezuela (see Figure 5 – Türkiye Green Petroleum Coke Imports). Imports from Venezuela have been decreasing, apparently largely due to US sanctions.

Summary

The petroleum coke trade has shown notable developments this year as Chinese importers aggressively moved to purchase and deliver US petcoke before the expected trade war between China and the US broke out. This surge of buying activity pulled USGC petroleum coke from other markets, most notably Türkiye. However, if current tariffs do not materially change, then trade flows in the second half of 2025 will likely return to pre-2025 norms.

Longer-term outlook — petroleum coke megatrends

Developments in specific industries as well as the trajectory of the energy transition are expected to significantly shape the petroleum coke industry going forward. We refer to these developments as petcoke megatrends and are summarized as follows:

- Pace of the energy transition from oil-based transportation fuels to renewable fuels and electric vehicles.
- Repurposing of petroleum refining assets to renewable fuel production.
- Permanent shut down of marginal refineries.
- Refineries pursuing oil to chemicals strategy, which typically does not involve the installation of a coker.
- Increased demand for synthetic graphite produced from petroleum coke for battery production to support increased use of electric vehicles and renewable power generation.
- Growth in aluminium production (primary and recycled).
- Inert anode (also known as 'carbon free') aluminium smelting technology (eliminates current need for calcined petroleum coke in consumable anodes).
- Growth in recycled aluminium supply vs. primary aluminium.

Each of these trends will have a different impact on petcoke production or consumption and the net effect will determine the future course of petroleum coke. These megatrends will be discussed in more detail at our upcoming 24th Annual Petcoke Conference in March 2026. DCi

About the authors

Ben Ziesmer (Senior Adviser)

Ben is a widely recognized authority in global petroleum coke consulting. He successfully led Worley Consulting's Fuel Grade Petcoke practice for many years and now acts as a senior advisor to the team. Ben continues to be a key contributor to Worley Consulting's *Pace Petroleum Coke Quarterly*, as well as providing support to single client consulting projects, the annual Worley Consulting Petcoke Conference, and other Worley Consulting petcoke related publications.

Pedro Mackay (Principal Consultant)

Pedro has over 25 years of experience working in various energy-related fields such as oil exploration, solid fuel purchasing and trading including petroleum coke and coal, ocean freight chartering, consulting in the petroleum coke industry, and raw materials purchasing in the coke calcining industry. Through his career, Pedro has held responsibilities focused on purchasing and supply chain aspects related to solid fuels for cement plants and raw materials for calciners, solid fuel trading, ocean shipping, and consulting. He holds a bachelor's degree in Mechanical Engineering from the University of Texas at Austin and a Master's in International Management from Thunderbird.

Rituraj Jha (Deputy General Manager — India)

Rituraj is the Mumbai-based resource for Worley Consulting's Insights team. He is the lead author of Worley Consulting's *Market Perspective Report* and is a contributing author for Worley Consulting's *Pace Petroleum Coke Quarterly*© (PCQ) and *Calcined Petroleum Coke Report*© (CPC). He is also involved in numerous petroleum coke market studies and is team's regional expert on Indian petroleum coke market and refining segment. Background-wise, Rituraj is a chemical engineer from one of India's top engineering colleges, with a specialization in petroleum refining.

Worley Consulting (formerly Jacobs Consultancy, Inc. and previously The Pace Consultants, Inc) has published the *Pace Petroleum Coke Quarterly*© since 1983. The report has been published monthly since January 1985 and is considered the global authoritative source of petcoke market information.

Jotun joins RightShip's Zero Harm Innovation Partners Program

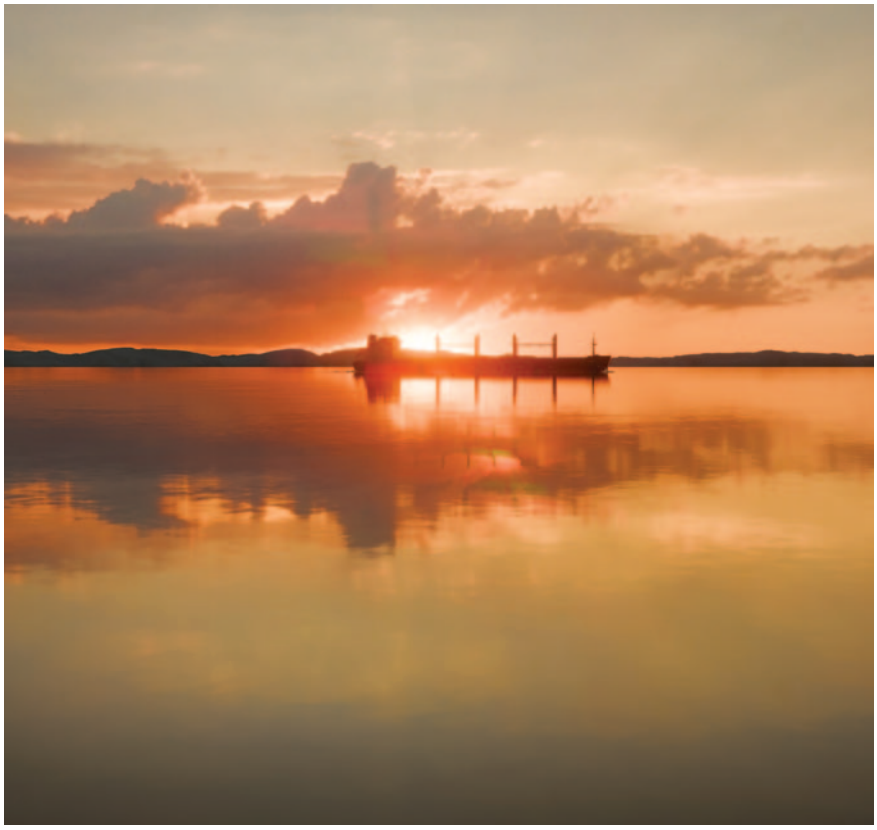
Jotun, the global expert in marine coatings, are proud to be announced as the latest member of RightShip's Zero Harm Innovation Partners Program. Jotun brings nearly a century of expertise in protecting vessels and infrastructure — combining science, technology, and sustainability to advance safer, cleaner, and more efficient maritime operations.

The partnership between Jotun and RightShip reflects a shared commitment to minimizing harm to both air and water, while improving vessel performance across the global fleet. With Jotun's ongoing Clean shipping commitment, focusing on cutting carbon emissions, preserving fuel, and protecting biodiversity, Jotun relies on good partnerships and initiatives like RightShip, driving real environmental impact through creating more awareness on the topic.

"Joining forces with RightShip's Zero Harm Innovation Partners Program is a significant milestone for Jotun. This collaboration underscores our shared commitment to advancing environmental stewardship and innovation in the maritime industry. As a leader in the industry, we are also committed to contribute with knowledge, innovations and technologies, and working together with RightShip to do so will create great benefits for the shipping industry," said Jessica Doyle, Sales Director Shipping at Jotun.

Jessica Doyle.

During Nor-Shipping in June, Jotun presented its latest flagship solution, HPS 2.0 (Hull Performance Solutions). Part of the solution, beside delivering technical service, hull condition management and performance guarantees, is three different products — tailored to different trades.



SeaQuantum X200 and **SeaQuantum XT** delivers high performance for vessels navigating in predictable and high-fouling trade routes, respectively, using patented silyl methacrylate binder technology for long-lasting protection. SeaQuantum X200 has recently proven and validated performance of 1% average speed loss as per ISO 19030 by DNV. The third product, **SeaQuest Endura II** stands out as the world's first tin-free, biocidal fouling release coating optimized for flexibility and slime resistance in unpredictable trades, offering environmental advantages without compromising performance.

"With the launch of HPS 2.0, Jotun delivers a Tailored to Trade hull performance solution that are technology-neutral, including premium SPC and biocidal FRC options. Our active efforts towards zero harm content are exemplified by the introduction of the first tin-free biocidal FRC as part of HPS 2.0, emphasizing our position as the Home of Hull Performance — and it is a string contribution to the Zero Harm Innovation Partners Program."

Besides HPS, Jotun also contributes to hull performance with its cutting-edge Hull Skating Solutions (HSS) developed in collaboration with Kongsberg Maritime, combining robotics with advanced coatings to deliver proactive, in-water hull cleaning ensuring a clean hull even in the most challenging operations. During Nor-Shipping, Lloyd's Register awarded the world's first Recognised Enhanced Antifouling Type Approval to Jotun's SeaQuantum Skate antifouling coating, alongside type approval certification for the HullSkater, making it the first fully integrated hull cleaning and coating solution to be certified by a classification society.

"We are proud to welcome Jotun to the Zero Harm Innovation Partners Program and look forward to the transformative impact their cutting-edge solutions will have on driving safer, more sustainable maritime operations." said Ajinkya Kadam, Head of Partnerships at RightShip. He added, "The accelerating momentum of the Program underscores the industry's collective drive for innovation and collaboration in pursuit of a zero-harm maritime future."

Jotun joins the Zero Harm Innovation Partners Program to promote greater adoption of environmentally responsible solutions. The goal is to accelerate industry progress toward more sustainable vessel operations by offering products that are not only high-performing but also reduce harmful content and emissions. Through this partnership, Jotun and RightShip aim to amplify each other's efforts in fostering a more responsible maritime ecosystem — one that prioritizes both operational excellence and the health of our oceans.

Biofouling management: the dry cargo sector's overlooked emissions solution

At a time when the maritime industry is under mounting and increasing pressure to reduce greenhouse gas emissions, improve vessel performance, and meet tightening international regulations, one major contributor to inefficiency continues to be underestimated, which is biofouling, *writes Nick Cowley, President of Cathelco & HEM Business Line at Evac Group*.


Nick Cowley.

The 83rd session of the IMO's Marine Environment Protection Committee (MEPC 83), held in April 2025, marked a key turning point. While most attention was on the sector's decarbonization roadmap, another significant development emerged. For the first time, the IMO committed to developing a legally binding international framework on biofouling management. This now signals a long-overdue recognition of biofouling's impact not just on biodiversity, but on fuel efficiency, operational costs, and overall emissions.

Under the current timeline, development and rollout of the framework is expected to begin in 2026, with potential adoption by 2029. That means it could be several years before the new rules come into effect. However, this renewed focus offers an opportunity the industry cannot afford to waste.

For too long, biofouling has been sidelined in maritime environmental policy, treated primarily as a biosecurity issue, rather than a critical component of vessel performance and emissions management. However, the evidence is unmistakable, with unmanaged biofouling can increase fuel consumption by as much as 20 to 40 %. This makes it one of the most overlooked drivers of GHG emissions at sea. Despite its impact, global action has lagged behind, with fragmented regional guidelines and limited enforcement compared to better-known efficiency measures like EEXI and CII.

The international regulatory landscape on biofouling today is seen as a patchwork. Regions such as Australia and New Zealand enforce strict controls to prevent the spread of invasive species via hull fouling. These frameworks are comprehensive and science-led, but they represent the exception, not the norm.

For most of the industry, inconsistent obligations, limited access to compliant in-water cleaning solutions, and uncertainty around enforcement have created confusion and inaction.

MEPC 83 presents an opportunity to change this. By aligning biofouling with the IMO's broader decarbonization efforts, the industry can finally elevate this issue beyond environmental silos. Biofouling should no longer be viewed solely through the lens of maintenance or compliance, it is a powerful tool for energy efficiency and emissions reduction, with benefits both above and below the waterline.

Proper hull management improves fuel performance, reduces time charter penalties, and extends drydock intervals. These are not marginal gains, they offer shipowners a commercial edge while also advancing their ESG commitments. However, to unlock these benefits across the fleet, voluntary guidance won't be enough. A global regulatory framework must set clear expectations, define performance benchmarks, and support enforcement in a way that drives consistency without restricting innovation.

Despite good intentions, voluntary actions have achieved minimal impact. Regulation is likely the only way to ensure meaningful compliance, but this should be complemented by the right incentives for operators who are ready to move faster. Now is the time to shift perceptions: biofouling management is not simply a maintenance issue, nor should antifouling technologies be seen as narrow tools to preserve vessel operability. They are critical enablers of global environmental goals.

To achieve this shift, the narrative around biofouling must evolve. First, shipowners need to recognize the biodiversity implications, particularly as work begins on the post-MEPC 83 convention. Protection of marine habitats and control of invasive species will be core components of the upcoming regulations. Second, and equally vital, is understanding the connection between antifouling strategies and decarbonization. As new frameworks like FuelEU Maritime and the IMO's mid-term measures come into force, shipowners must see clean hulls as a proven contributor to reducing GHG emissions and improving overall efficiency.

Fragmented regulations and a lack of data sharing have slowed the development of truly integrated biofouling strategies. Rather than treating biofouling as a standalone compliance issue, the sector needs a unified approach, one grounded in collaborative science, shared operational experience, and harmonized standards.

The maritime sector needs to bring biofouling into the core of its sustainability agenda today and not years from now when a new convention takes effect. With proven solutions already on the market, there is every reason to act. Cleaner hulls not only save fuel and cut costs, they reduce emissions, protect marine ecosystems, and help operators stand out in an increasingly competitive and compliance-driven global market.

Cathelco believes biofouling management must be fully integrated into a vessel's environmental strategy. From hull protection to wastewater and resource management, our solutions help dry cargo shipowners take a proactive approach to sustainability, delivering measurable gains above and below the waterline.

PPG completes 100th dry docking using electrostatic coating application

Sustainable application technique offers improved efficiency, reduced waste

PPG recently announced the 100th dry docking performed using electrostatic application for marine hull coatings. PPG completed the project on the *Colossus*, a 287-metre bulk carrier owned by Enterprises Shipping and Trading S.A. at CUD Weihai Shipyard Co. Ltd. in China. The team applied PPG NEXEON™ 810 antifouling on the boot top and PPG SIGMAGLIDE® 2390 fouling release coating on the underwater hull.

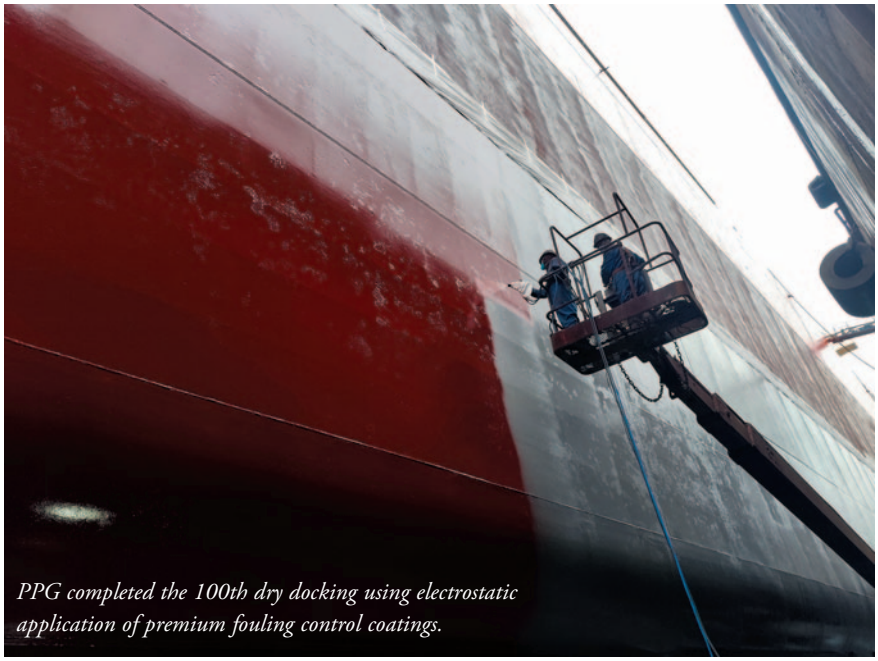
PPG is the first coatings company to introduce the application technique to the marine sector, having utilized electrostatic spraying in the automotive and aerospace industries for decades.

The method uses an electrostatic spray gun to apply the coating to a grounded metal hull, with electrically charged paint particles precisely guided toward the vessel's surface. This results in even distribution and the formation of an ultrasmooth, long-lasting film layer. Compared to traditional airless spraying, electrostatic application increases transfer efficiency, resulting in significant reductions in overspray and waste, and providing a cleaner operation and improved work environment for applicators.

PPG's focus on innovation and sustainability led to the development of premium fouling control coatings

specifically designed for electrostatic application. The unique formulation of both PPG Sigmaglide fouling release coating and PPG Nexeon 810 antifouling coating ensures compatibility with the application method. These low-friction hull coatings also provide benefits in fuel consumption and greenhouse gas emissions savings.

"We're continuing to expand electrostatic application across our global network to help shipowners and shipyards comply with increased regulations and sustainability goals," said Sijmen Visser, PPG sales director, Marine EMEA, Protective and Marine Coatings. "We already see it quickly being adopted by large shipping companies and shipyards in Europe, Oman, Dubai, Turkey, Singapore and China."



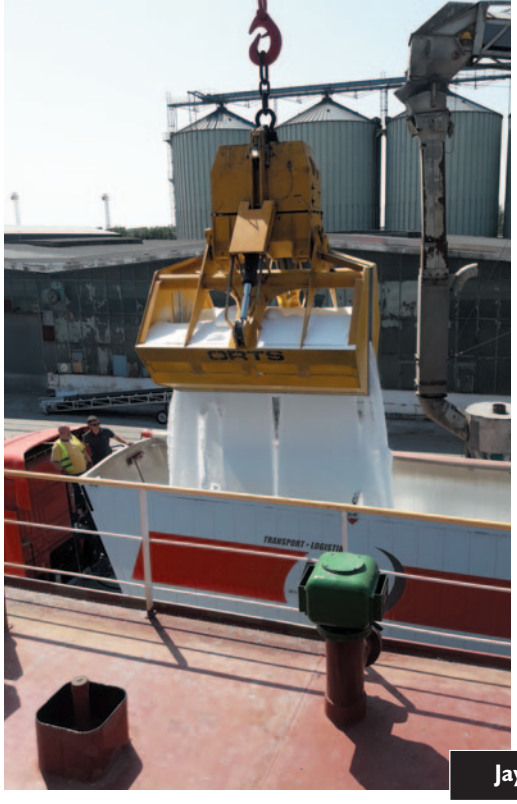
PPG completed the 100th dry docking using electrostatic application of premium fouling control coatings.

The technique has already demonstrated measurable results in recent projects. EDR Antwerp shipyard confirmed a 40 percent reduction in overspray using electrostatic application of PPG Sigmaglide coating on a RoRo passenger vessel from Stena Line.

"PPG continues to work closely with shipyards, owners and operators to offer innovative marine coating technologies that drive operational efficiency and environmental compliance worldwide," Visser said.

PPG: 'We protect and beautify the world®'

At PPG (NYSE: PPG), the company works every day to develop and deliver the paints, coatings and specialty materials that its customers have trusted for more than 140 years. Through dedication and creativity, PPG solves its customers' biggest challenges, collaborating closely to find the right path forward. With headquarters in Pittsburgh, PPG operates and innovates in more than 70 countries and reported net sales of $15.8 billion in 2024. The company serves customers in construction, consumer products, industrial and transportation markets and aftermarkets.



All aboard! Shipboard grabs

Jay Venter

ORTS Grabs: "The Best Link between Ship and Shore" – Made in Germany

For 50 years now, ORTS GmbH Maschinenfabrik has been delivering its grabs to customers all around the world. In 2024, these customers came from Southeast Africa, the Near and Middle East, Eastern Mediterranean and North America, as well as Sweden and, of course, Germany.

The company's main customers are shipping companies with their bulk carriers, which know that they can rely on the performance, speed and reliability of ORTS grabs for many, many years — even in the harsh conditions experienced by sea-going vessels. However, terminal operators, stevedore companies and heavy industry companies (e.g. steel works) also value the quality of ORTS grabs.

The complete range of grabs is offered, from electro-hydraulic grabs and radio-controlled diesel-hydraulic grabs to mechanical rope grabs. Each grab is the own construction of ORTS Maschinenfabrik. This is visible at first sight, because of the unique construction design. It is not enough to just replace the block and tackle construction in the middle of a mechanical rope grab with a hydraulic cylinder, e-motor or hydraulic pump to get an electro-hydraulic grab. If you install a six-cylinder engine in a tractor, you don't get a racing car.

Therefore ORTS's electro-hydraulic grabs and also the radio controlled diesel-hydraulic grabs look different. And they do not only look different, they are different: They offer lower dead weight and higher closing force, while being fast and reliable. The construction surrounding the drive-unit (hydraulic parts, e-motor, control block etc.) is easy and safe to reach for the service engineer/seaman. The escutcheons can be opened from two sides of the grab and used as a working platform straight in front of all important parts of the grab.

Unique and innovative grabs, like the radio-controlled diesel-hydraulic technology, came from ORTS.

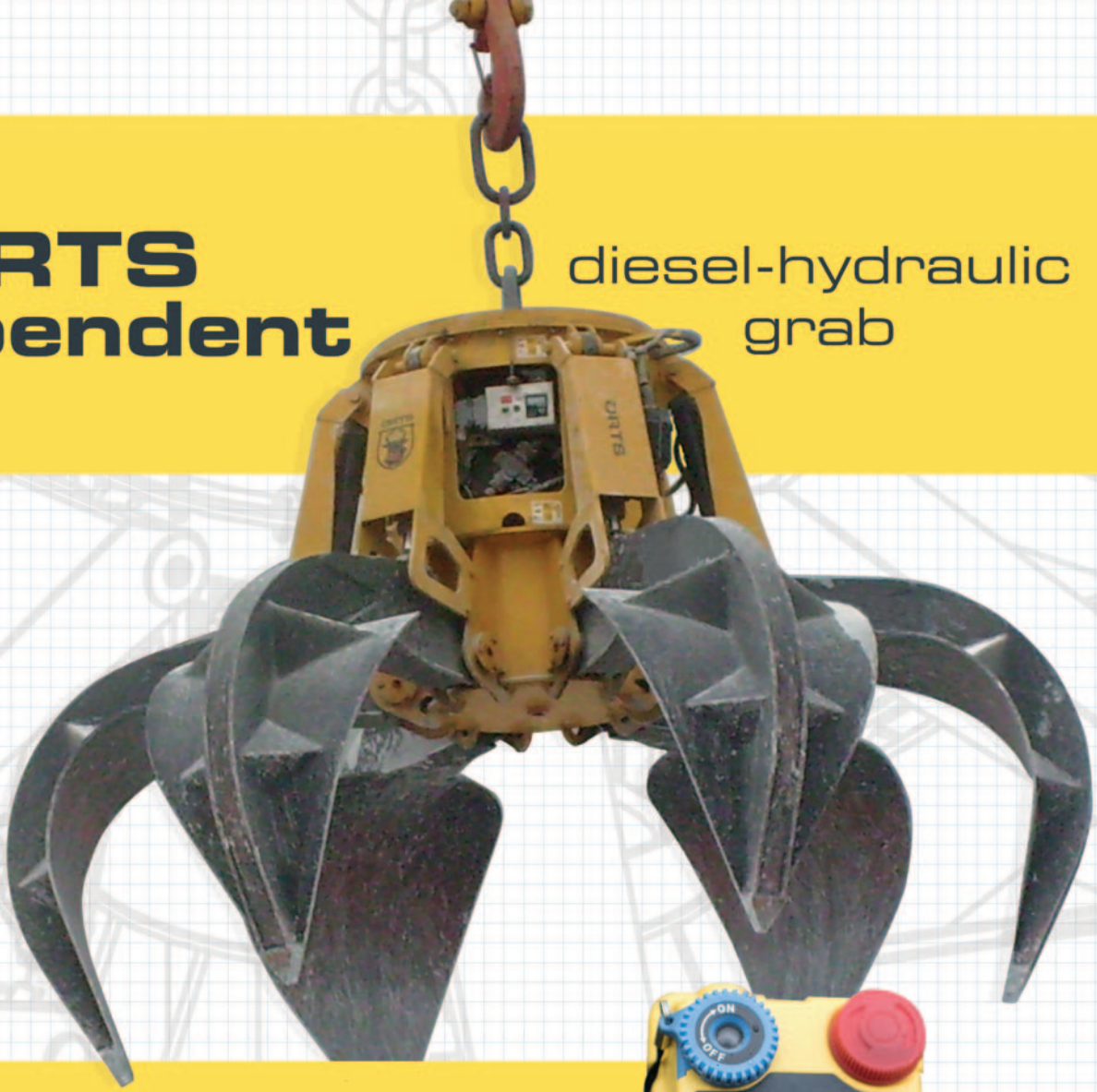
The idea of this grab was born over 30 years ago in the technical offices of ORTS GmbH.

Since that time, the radio-controlled diesel-hydraulic grabs from ORTS (type DHS-B, DHM and DHZ) are being manufactured in the workshop near Lübeck in Northern Germany.

ORTS boasts significant long-term experience with this specific grab type. Over the years, since 1995, the ORTS diesel-hydraulic grabs became flexible, reliable, high-performance 'workhorses'

ORTS independent

diesel-hydraulic grab



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since 1972

thanks to continuous improvements in co-operation with customers. ORTS's DHS-B (two-clamshell design) and DHM (orange-peel clamshells) are in operation on all continents, in all climate zones.

ORTS was also one of the very first grab makers to develop and build environmentally friendly grabs with enclosed clamshells in the 1980s, specifically to address environmental concerns.

All of the grabs by ORTS (diesel-hydraulic, electro-hydraulic and mechanical ones) are well-known for their effectiveness (high discharge-rates), reliability and the long lifetime over millions and millions of tonnes.

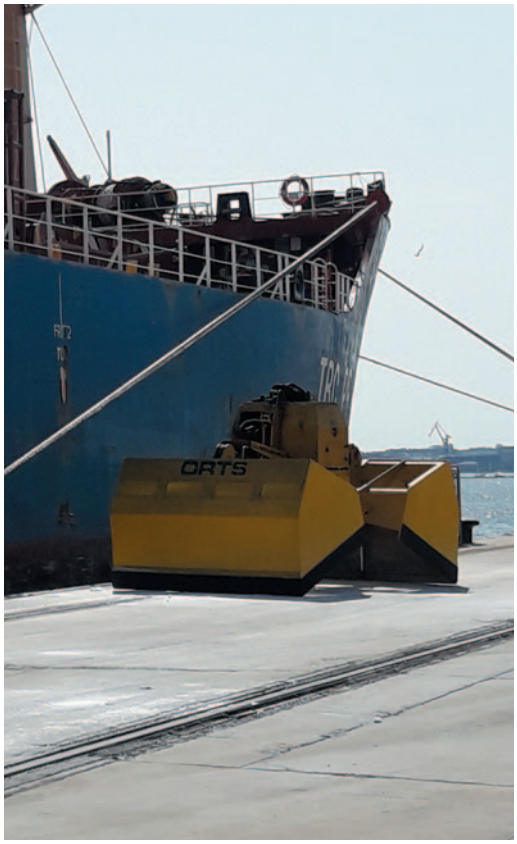
The purchasing price for a grab becomes less and less important, the longer the grab is working for the owner/operator. Quality, reliability and performance are more important and are the characteristics that really pay off over the years.

A cheap grab can become a very expensive grab very quickly: when the grab needs the first spare parts after only a short time of being in operation, has breakdowns during operation or takes more time for loading/discharge operations because the clamshells do not work at full capacity.

ORTS still supplies customers with spare parts for grabs, even when those are 25–30 years old. One of the first radio-controlled diesel-hydraulic grabs is still functional after 25 years.

But ORTS doesn't only produce smaller grabs; bigger grabs with 50t (orange-peel dredger grab), 60t, 80t (two-clamshell dredger grabs) and 115t (salvage grab for ship wrecks) dead weight were also constructed and built by ORTS in the past.

In addition to grabs, special constructions like a self-floating oil-salvage grab, which is able to skim off oil from the water-surface after ship-accidents, and load-beams for up to 100t have been developed and built by ORTS.



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Professional companies in more than 110 countries worldwide work with Verstegen grabs, because our grabs offer them the highest reliability and best productivity. Combining our extensive knowledge and experience with the feedback from our loyal customers results in optimized grabs for all bulk materials and unloading situations. We call this 'Grab Intelligence'.

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LET'S MOVE MOUNTAINS

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Smart solutions on board: Why shipowners around the world choose Guven Grab

In today's fast-paced shipping world, every hour counts. Delays, downtime, or equipment failure can mean serious financial losses — and shipowners know it better than anyone. That's why more and more bulk carriers are equipped with Guven grabs — built for reliability, efficiency, and peace of mind.

With over 40 years of experience in bulk handling, Guven Grab and Machine Inc. has become a trusted name across the maritime industry. Whether it's a brand-new vessel or one that's been sailing for years, the company's grabs are making cargo operations smoother, safer, and smarter — in over 130 countries and counting.

Recent deliveries: first-class grabs for first-class bulk carriers

Shipowners investing in new vessels are making one thing clear: they want equipment that works flawlessly from day one. That's why Guven Grab has become a go-to choice for cargo handling equipment on newly built bulkers in China and Japan — two of the world's most important shipbuilding hubs.

Reliable operations start in China

Guven Grabs proudly delivered its latest wireless, battery-powered remote-control grabs to vessels under construction at some of China's top shipyards:

- New Dayang Shipbuilding Co., Ltd.
- Nantong Xiangyu ShipbuildIng & Offshore Engineering Co., Ltd.
- Jiangmen Nanyang Ship Engineering Co., Ltd.
- Dalian COSCO KHI Ship Engineering Co., Ltd. (DACKS)
- Jiangsu Hantong WING Heavy Industry Co., Ltd.

These shipyards are known for building high-quality bulkers — and shipowners working with them choose Guven Grabs to keep cargo operations running smoothly from the first voyage, avoiding off-hire risks and ensuring full operational readiness.

Japan: precision meets performance

In Japan, where precision and engineering excellence are a way of life, Guven's grabs are also making their mark. The company has delivered equipment for vessels built at:

- Minaminippon Shipbuilding Co., Ltd.
- Iwagi Zosen Co., Ltd.

- Shin Kasado Dockyard Co., Ltd.
- Oshima Shipbuilding Co., Ltd. — Saikai NS

Shipowners choose Guven Grab because its technology matches Japanese shipyards' high standards. With wireless control, ultra-long battery life, and shockless opening to protect cranes, Guven's grabs help shipowners achieve faster turnaround and safer operations — with less maintenance and more uptime.

What sets Guven Grab apart for shipowners?

Shipowners choose Guven for the same reasons they invest in quality ships: trust, performance, and long-term value. Here's what makes Guven a preferred partner:

1. Proven reliability: Guven's grabs are designed for continuous operation — even in the toughest environments. Fewer breakdowns mean fewer delays.

2. Advanced, user-friendly technology: from wireless remote control to over 400 hours of battery life (without charging or changing batteries), Guven Grab's systems are built for simplicity, safety, and speed.

3. Worldwide support: with training services, installation support, and fast spare parts delivery, Guven keeps vessels operating smoothly wherever they are.

Guven Grab doesn't just deliver equipment — it makes sure the customer's team is trained and confident before the vessel even leaves the shipyard.

Delivering to vessels already in service

Newbuilds aren't the only ones benefiting from Guven Grab. The company also supplies and retrofit existing bulk carriers operating around the world — helping shipowners upgrade their operations without waiting for drydock or yard time.

Thanks to its global network of stock points, Guven is able to arrange deliveries quickly and efficiently, even on short notice.

Built to perform, built to last

Founded in 1984, Guven® Grab has delivered more than 15,000 grabs worldwide, earning a reputation as one of the largest and most trusted grab manufacturers in the maritime sector.

The company is proud to be a 95% export-driven company, supporting clients in Europe, the Americas, the Middle East, Asia, and beyond. But what really sets it apart is how the company builds its grabs:

- Collaborative robotic welding for consistent strength.
- Laser steel cutting for precision and durability.
- Automatic shot-blasting to extend service life.
- Advanced CNC machining to guarantee fit and finish.
- Full in-house R&D for custom solutions when needed.

This investment in Industry 4.0 technology means Guven's products aren't just strong, they're smart, efficient, and made to last.

With you — before, during, and after delivery

At Guven, the company believes service is just as important as the product. That's why it offers:

- Onboard crew training before delivery.
- Fast global logistics and co-ordination.
- Responsive after-sales support.
- Spare parts when and where the customer needs them.

Whether building a new vessel or upgrading an existing fleet, customers can count on Guven Grab to support them from start to finish — and long after.

Smarter cargo handling starts with the right partner

For shipowners, choosing the right equipment isn't just about specs — it's about confidence; confidence that cargo will move safely; that delays will be avoided; that the vessel will meet expectations— every time. With Guven Grab, that's exactly what customers get.

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Leading Grab Maker"

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MacGregor strengthens global maritime operations under Triton's ownership

Highly automated cranes are part of MacGregor's wide portfolio for cargo and load handling.

MacGregor continues to serve its maritime and offshore customers with its wide portfolio of cargo and load handling equipment under the ownership of Triton, a leading European mid-market investment company. The transaction between Triton and MacGregor's previous owner, Hiab (former Cargotec) Corporation, was closed on 31 July 2025.

"We at Triton are very pleased and excited about being the new owner of MacGregor. MacGregor has great engineering capabilities, a broad and sustainable product offering, high quality equipment and a strong market position," says Ilkka Tuominen, Investment Advisory Professional at Triton and Board Member of MacGregor Group AB. "We look forward to collaborating with the MacGregor team to further develop both its merchant and offshore businesses. We especially anticipate strengthening the aftermarket platform where we see great potential."

MacGregor continues to build lifetime value for its customers through its wide portfolio of products and services. After a successful financial turnaround in the past two years, the company is geared up for growth, building on its profitable performance and strong orderbook.

"Having Triton as the owner opens up new opportunities to strengthen the lifetime value we deliver to our customers. Our lifecycle-focused strategy is closely aligned with Triton's commitment to sustainable growth and value creation," says Jonas Gustavsson, CEO of MacGregor. "We have an excellent portfolio, a global network of service centres, and skilled personnel with great capabilities to innovate and deliver. Together, we continuously improve our customer service to be easy to do business with."

MacGregor has been in business since 1937 and is a leader in its field. MacGregor equipment can be found on every second merchant vessel sailing at sea.

About MacGregor

MacGregor enables sustainable global maritime and offshore operations by maximizing efficiency in cargo and load handling. With decades of experience, a global presence, and a strong portfolio of innovative technologies and services, MacGregor creates lifetime value to its customers.

MacGregor's solutions are designed to perform with the sea, helping its customers enhance safety, reduce environmental impact, and optimize operational efficiency from newbuilding to upgrades and modernizations.

In 2024, MacGregor's sales totalled approximately €800 million and it employs about 2,000 people in 30 countries.

About Triton

Founded in 1997 and owned by its partners, Triton is a leading European mid-market sector-specialist investor. Triton focuses on investing in businesses that provide mission critical goods and services in its three core sectors of Business Services, Industrial Tech, and Healthcare.

Triton has over 200 investment professionals and value creation experts across 11 offices and invests through three complementary "All Weather" strategies: Mid-Market Private Equity, Smaller Mid-Cap Private Equity, and Opportunistic Credit.

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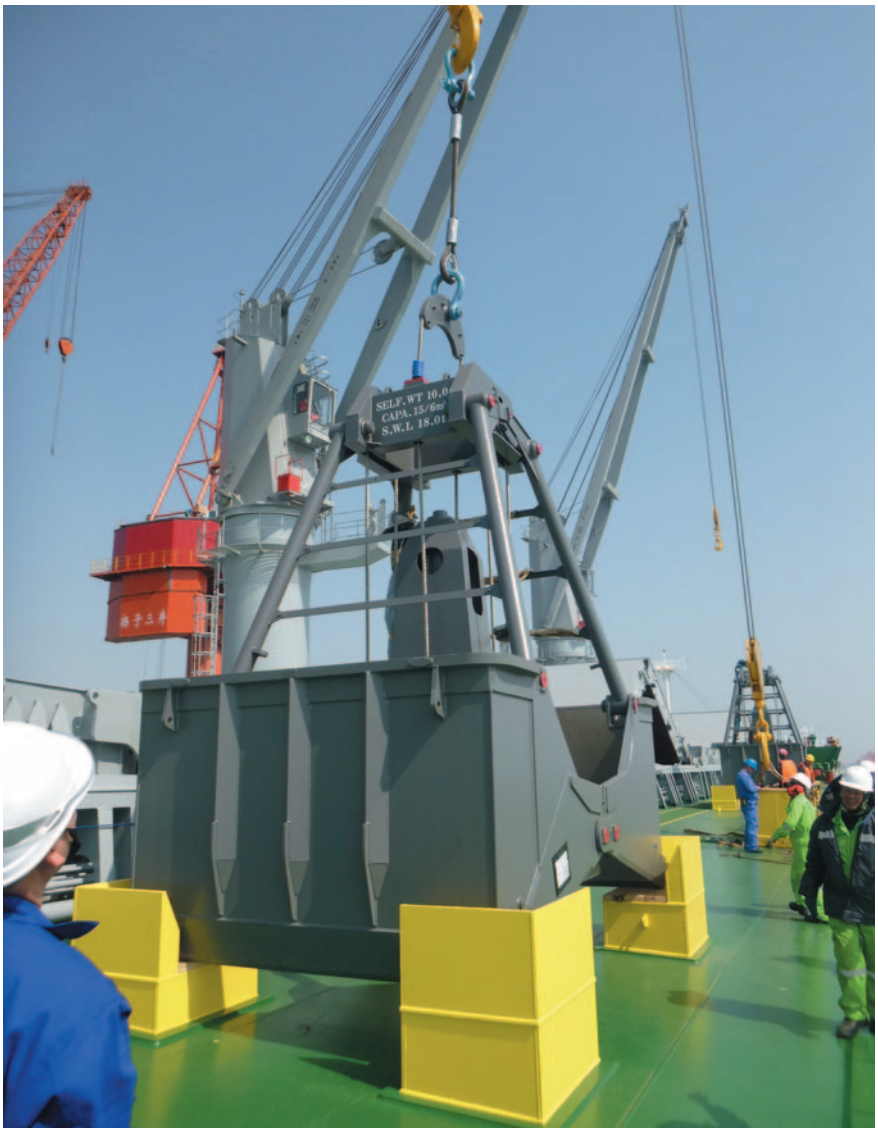
"Have you ever seen TOBU Grab?"

TOBU JUKOGYO, known for TOBU GRAB, was established in 1963 in Japan. Since that time, the company has been manufacturing, developing and improving many kinds of grab buckets and lifting devices. In terms of the shipping industry, TOBU JUKOGYO has supplied grab buckets for more than half a century as deck machinery. Its main customers are shipyards in Japan that build Handymax-sized bulk carriers, domestic and overseas ship owners, or shipping companies. The company's grab buckets are delivered to shipyards that are not only in Japan, but also shipyards overseas, such as China, Philippines and Korea.

TOBU JUKOGYO believes that its products grab and hold not only the cargo, but also its customers' hearts firmly. One of the reasons for this is that it has sincerely supported customers in need. The recently developed product, the new lower-in-height model grab (Model: L10), was created based on customer feedback. This is its story:

TOBU JUKOGYO's best-selling product, grab bucket for radio-controlled opening type was released in the 1990s after supplying manual types. It enables loading/discharging bulk cargo from ship to shore, and vice versa without power supply during the operation. It could be used with any type of crane by simply hooking onto the crane hook. Its simple structure and power-free operation make it easy to use and maintain. No drive gears, engines, electric motors are equipped. However, due to this structure, it requires a high lifting height of about 11.5m — that is the total height from crane hook to the bottom of the grab. In some cases, customers could not keep enough clearance while discharging cargo to hopper.

Before the new model L10 was developed, engine hydraulic or electro-hydraulic type grabs were the only solution



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for this height problem. However, these grabs require time-consuming and costly maintenance, and fitting equipment to the crane is needed for the electro-hydraulic type.

TOBU JUKOGYO has received some feedback from customers, "We prefer to use this radio-controlled opening type of grab, but the problem is the height during the operation... Could you shorten the required height?" In response to these voices, to resolve the issue and improve the efficiency of cargo handling operations, the company developed a model lower-in-height, called the L10 Grab.

The total height of L10 Grab, from crane hook to the bottom of the grab, is 9.7m, shortened by nearly 2m, compared to its standard model for radio-controlled opening type (see *Figure 1* below). Moreover, this new model contributes not only to resolving the height problem, but also to reducing the working time of each operation, (loading and unloading cycle time). Also, thanks to the flattened shell shape that makes the shell wider, L10 grab stands more stable when putting it on the cargo.

As illustrated by the example above, TOBU JUKOGYO listens to its customers' voices, and values its own ability to solve problems by empathizing with their concerns and constantly strive to evolve to stay competitive in the market with liability.

The L10 Grab was developed after taking the voice of the customer into consideration.

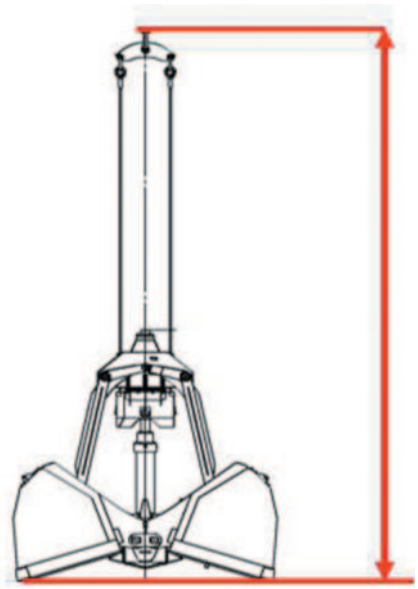


Figure 1:

	L10	*T10AM (Standard Model)*
**TOTAL height:*	*±9.75m*	*±11.59m*

**TOTAL height from crane hook to the bottom of grab (Opened position).*

NEGRINI
since 1967 S.R.L.

Negrini company, established in 1967, specializes in engineering and manufacturing a comprehensive range of grabs and buckets for rope machines and crawler mounted cranes; they are employed to do many jobs. Negrini buckets and grabs are very well-known for quality as well as for the very accurate and skilful engineering work; in fact Negrini supports their clients by analyzing the job to be done and, if needed, by adjusting the standard design of grabs and buckets to enhance their performance once in operation.

VIA TORRICELLI 4 - CASTELFRANCO E. (MO) - ITALY

J&B Grijpers: grabs fit for variety of cranes and commodities

Located in the Netherlands, J&B Grijpers B.V. is engaged primarily in the developing, manufacturing and reconditioning of hydraulic and wire rope grabs. The company started in 1945 in the manufacture and overhauling of re-handling grabs. 80 years of know-how, results in a perfectly balanced product for bulk handling.

The company uses 3D solid modelling and FEA analysis in the design of its grabs. This means that customer-specific requirements can be implemented in the design and production process.

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

J&B grabs are used among many brands and types of available cranes; some examples are E-Crane, Sennebogen, Caterpillar, Hitachi, Liebherr, Volvo, Fuchs and more.

Due to the many brands and types of cranes using different connecting systems, J&B Grijpers has developed a number of quick-change connectors. Mechanical and hydraulic systems make changing between grabs achievable within 10 minutes.

A J&B hydraulic orange peel grab on its way to a customer.

J&B Grijpers' products

Hydraulic clamshell grabs

These grabs are available as:

- rehandling grab (clamshell);
- closed rehandling grab;
- dredging grab;
- horizontal profiling clamshell;
- log grapple;
- woodchips; and
- bale grab.

The design of the grabs in combination with two hydraulic cylinders apply a maximum of penetration.

The two shells closes synchronously.

The grab is built of high quality steel, for a long durability.

The grabs can be supplied with several attachments.

Hydraulic cactus grabs

Various applications:

- scrap handling;
- garbage/refuse;
- rock; and
- woodchips.

The capacity of the grab is determined by the material density, material condition and the capacity of the material handler/excavator.

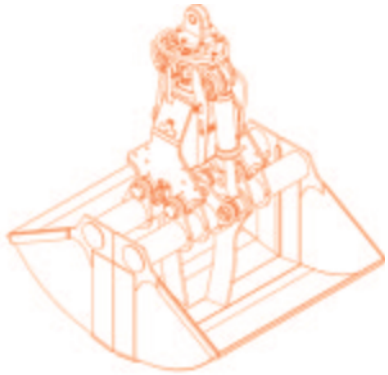
Rope grabs / C

J&B wire grabs can be divided into the following types:

- rehandling rope grab;
- cactus rope grab/orange peel grab; and
- special rope grab

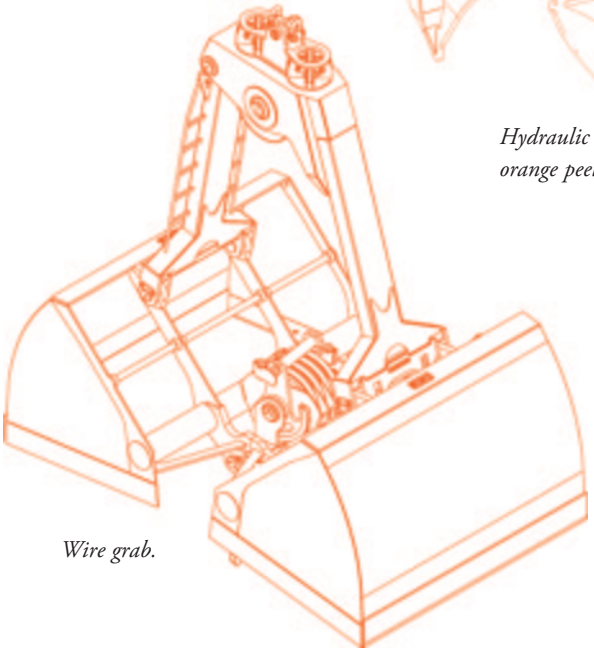
J&B's engineers are specialized to meet the specific needs of the customers' requirements.

DCi



J&B Grijpers' hydraulic clamshell grab.

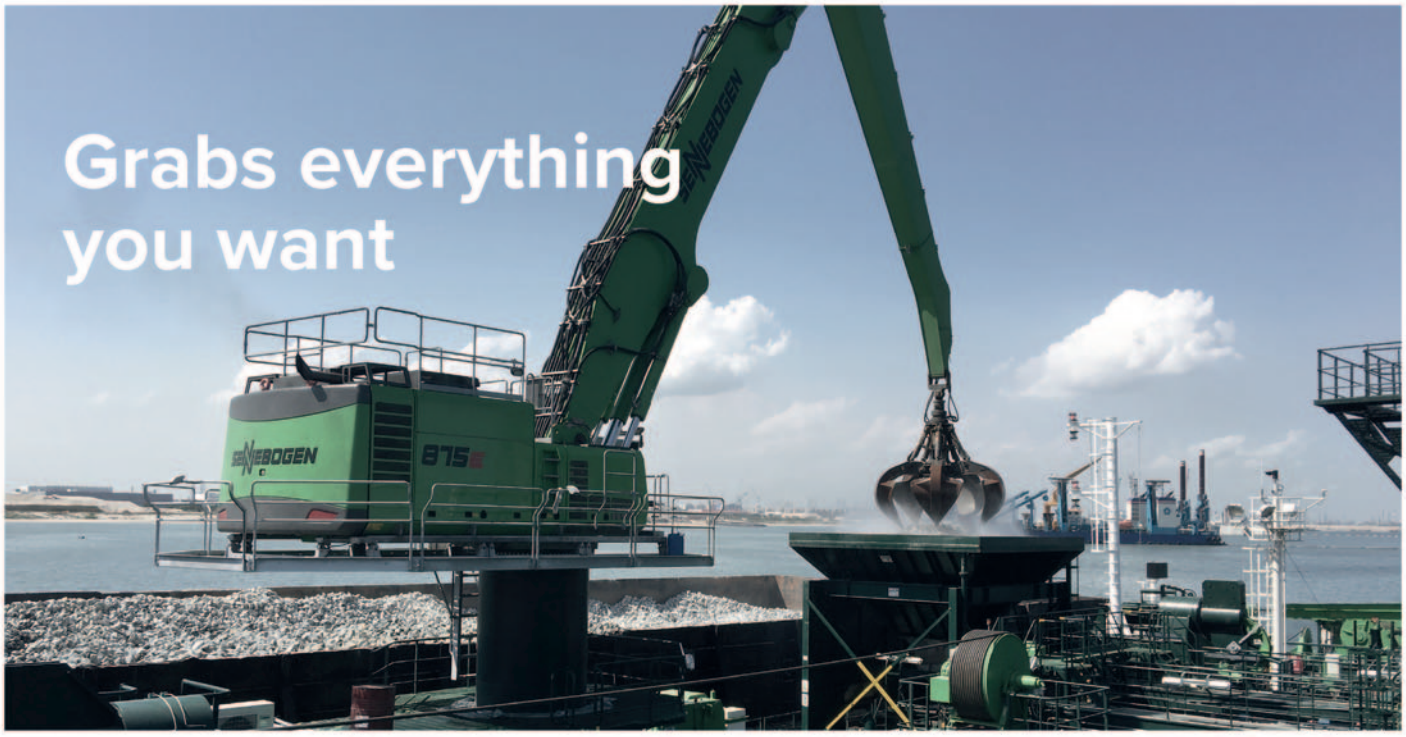
Hydraulic cactus grab / orange peel grab.

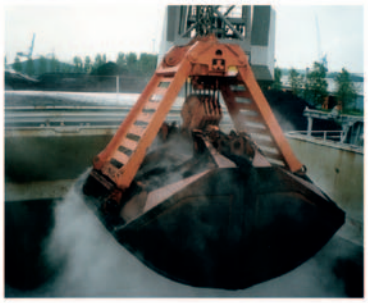


Wire grab.

J&B Grabs

More than 75 years experience





Our products

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- Clamshell Rope Grabs
- Hydraulic Cactus Grabs
- Hydraulic Clamshell Grabs
- Hydraulic Log Grabs
- Hydraulic Demolition & Sorting Grabs
- Quick Change System
- Multipurpose Spreader

All our grabs are custom made, designed and produced to our customers requirements.

J&B Grabs are highly efficient for large volume and low deadweight handling.

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Take a look at our website jb-grijpers.nl

Critical project cargo barge shipment at Mount Vernon port

Indiana River & Rail Terminals handles critical barge shipment at Mount Vernon port for large pharmaceutical project in central Indiana

Indiana River & Rail Terminals recently managed the barge-to-truck transload of some delicate oversized cargo at Ports of Indiana–Mount Vernon destined for a state-of-the-art pharmaceutical manufacturing facility under construction in central Indiana.

As the largest general cargo operation on the Ohio River, Indiana River & Rail Terminals plays a critical role in supporting Indiana's economy through the multimodal handling of steel, project cargo and a variety of breakbulk commodities.

The shipment consisted of two 51-tonne specialized tanks built in the Houston metro area. These tanks will play an integral role in the manufacture of medications at a pharmaceutical research, development, and production campus under construction near Lebanon, Ind., 35 minutes northwest of Indianapolis.

The tanks' 44-foot by 18-foot dimensions and weight made overland shipping financially and logistically impractical, so the company's transportation provider, Barnhart, arranged for the barge shipment to Ports of Indiana–Mount Vernon. The tanks were carefully braced and loaded in a standard 195-by-35-foot barge to move from Texas to Mount Vernon via the Gulf Intracoastal Waterway, Mississippi River and Ohio River. Upon arrival, Indiana River & Rail Terminals transloaded each tank onto Barnhart specialized heavy-haul trucks for the final leg.

"Our team utilized the same expertise, operational skill and care for transloading this cargo that they do for every customer, no matter the commodity," said Shane Davenport, Terminal Manager for Indiana River & Rail Terminals. "However, we took some extra pride from this knowing that this equipment will aide in creating medications that can improve thousands of lives for many years to come."

Established in 2024, Indiana River & Rail Terminals is a joint venture between Ports of Indiana and Superior River Terminals Indiana, a general cargo stevedore operating at Ports of Indiana's Mount Vernon and Jeffersonville facilities.

"Barnhart chose Indiana River & Rail at Ports of Indiana-Jeffersonville to handle Lebanon-bound materials earlier this year, and we're very happy to have Mount Vernon's heavy-duty capabilities play a role in this historic expansion of Indiana's pharmaceutical industry," said Ports of Indiana-Mount Vernon Port Director Jason May. "Indiana River & Rail Terminals has quickly built a reputation for safe, reliable and efficient logistics management across the full spectrum of commodities for Fortune 500 and family-owned small

Oversized equipment destined for a pharmaceutical production campus in Lebanon, Ind., gets careful handling at Ports of Indiana's Ohio River facility en route from Texas.

businesses alike, and we're proud to serve so many Indiana job-creators while growing the state's economy."

About Indiana River & Rail Terminals

Indiana River & Rail Terminals is a partnership between Ports of Indiana and Superior River Terminals – Indiana that handles cargo at two Ohio River ports in Jeffersonville and Mount Vernon. The terminals provide extensive multimodal services for river barges and rail cargo inside the Louisville, Ky., and Evansville, Ind., metro areas, with access to multiple Class I railroads.

About Ports of Indiana

Ports of Indiana is a statewide port authority operating three maritime ports on the Ohio River and Lake Michigan, with an inland port near Madison, Ind., set to open in 2025. Established in 1961, Ports of Indiana is a self-funded enterprise dedicated to growing Indiana's economy by developing and maintaining a world-class port system, and by serving as a statewide resource for maritime issues, international trade, and multimodal logistics.

Concepción del Uruguay dispatches timber to India

Recently, two bulk carriers arrived at the Port of Concepción del Uruguay, where they took on board 36,000 tonnes of timber bought by clients in India. The port is situated on the western shore of the Uruguay river, in Argentina.

The first vessel was the *African Raven*, a 183-metre long Handysize vessel, that had previously called at the Brazilian Port of Paranaguá. Its consignment consisted of 18,000 tonnes of bulk pine logs from forest plantations in the country's Mesopotamian region.

The second vessel, the *Paiwan Ace*, had come from the Ecuadorian Port of Guayaquil and also loaded 18,000 tonnes of pine for India.

After calling at Concepción, both vessels then stopped at the Port of Ibicuy, taking more cargo on board before steaming to India.

Over the past seven years, clients in India and China have been the main purchasers of timber from the Entre Ríos province, in Argentina, which is where Concepción del Uruguay is located.

Barry Cross

Incheon looks at ways of reinvigorating dry bulk traffic

Incheon Port Authority, in South Korea, is introducing measures to help bring back lost dry bulk traffic to the port. Initially, it held a meeting with seven bulk terminal operators present in the inland and northern harbours, and also with the Incheon Port Logistics Association to discuss strategy.

A statement was subsequently issued, which stated that the plan was to strengthen the co-operative system to expand the attraction of bulk cargo and resolve difficulties in the field.

The present situation is a difficult one. Over the past four years, there has been an annual average decline of 4.3%, as more dry bulk has been containerized. At the same time, manufacturers have relocated from the metropolitan area to the provinces. As a sign of what more is to come, dry bulk traffic for the first two quarters of this year fell 5.6%.

Some of the ideas put forward at the meeting included securing additional storage areas for automobiles, steel, and calcium chloride, as well as expanding the attraction of special cargo, such as raw steel materials and fly ash. The port is also to look at factors that hinder the efficiency of unloading services. *Barry Cross*

New US owners for debt-ridden Odessa grain terminal

US-based investment funds, Argentem Creek Partners and Innovatus Capital Partners, have recently acquired control of Ukraine's Olimpex grain terminal at the port of Odessa. The facility can handle up to 5mt (million tonnes) of grain annually.

The terminal, which currently has debt of $95 million, plans to resume operations in September 2025.

The move, which was first announced in the *Financial Times* newspaper, is significant, because the terminal was originally in the hands of Ukrainian businesses and had an 'opaque' ownership history. The purchase took place following disruption to Ukraine's Black Sea grain exports.

In 2024/25, Ukraine reported grain exports of 43.7mt of grain, despite significant logistical problems caused by the war with Russia, although is sufficiently important to considerably boost Ukrainian grain exports. *Barry Cross*

Gdansk agri-food terminal to emerge from refurbished Wińlane quay

Gdansk Agricultural Terminal (GAT) is to build a flat warehouse at Szczecińskie Quay. In an initial phase, it will be able to handle traffic of three million tonnes annually. The new facility is viewed as key for 2025-2028, as demand in the agri-food market diversifies, along with exports of same.

In addition to the warehouse, a steel silo complex will be built. This will have a total capacity of 100,000 tonnes, as well as a shiploading and unloading system capable of transfer rates of 1,000 tonnes per hour.

At the port, the upgrade work, which begins this years, will involve the comprehensive refurbishment of Wińlane Quay, with work scheduled for completion in 2028. Renovation of the dock initially encompasses both road and rail infrastructure, to be followed by warehouses and silos.

According to the Port Gdańsk Shipping Company, the grain market is currently characterized by exceptional volatility, with significant fluctuations in both export volumes and destinations, which is due to the overall geopolitical situation and the pressure of climate change.

To cope with volatility, Gdańsk Agricultural Terminal has been designed to be flexible and scalable to allow it to adapt to various market scenarios. Not only will cargo handling capacity increase, but so will the operational resilience of the Port of Gdańsk when dealing with the agri-food sector. It also forms part of a long-term strategy to consolidate Poland's position as a leading grain exporter. *Barry Cross*

A quick note of "Thank you" to our Global Partners.

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Port Saint John: a growing global gateway for bulk excellence

Port Saint John, a critical piece of Canada's national supply chain, boasts a compelling value proposition for shippers and receivers of bulk and breakbulk cargoes. With unparalleled North American connectivity via three Class I railways (CPKC, CN, CSX), world-class terminal operators, and a favourable location on the eastern seaboard, Port Saint John is a leading global gateway.

That global gateway connects into an expansive transportation network, providing swift and efficient access to major population bases throughout central Canada and the North-Eastern and Mid-Western United States. Located in the province of New Brunswick, Port Saint John boasts a diverse cargo base enabled by a skilled labour force and competitive ancillary services.

While record traffic at the newly modernized west side container terminal continues to deservedly dominate headlines, cargo diversity continues to be the key to success at Port Saint John, one of North America's fastest growing ports. With capabilities and capacity to handle a wide array of commodities, Port Saint John provides flexible options for new opportunities with an experienced and growing labour force.

Cargo handled

Cargo handled at Port Saint John includes: dry bulk; liquid bulk; breakbulk & project cargo; container; and cruise. Port Saint John prides itself on its flexibility, and on being able to handle a wide variety of cargoes. Operators are encouraged to reach out to the port, which will build a solution for their other cargo needs.

Key focus areas and opportunities

Barrack Point Potash Terminal

- Storage and export of Canadian potash to global markets.
- Major infrastructure upgrades came online in 2025.

Newly-modernized West Side Terminals

- Importing breakbulk woodpulp.
- Importing food-grade liquid bulk.
- Transloading available.

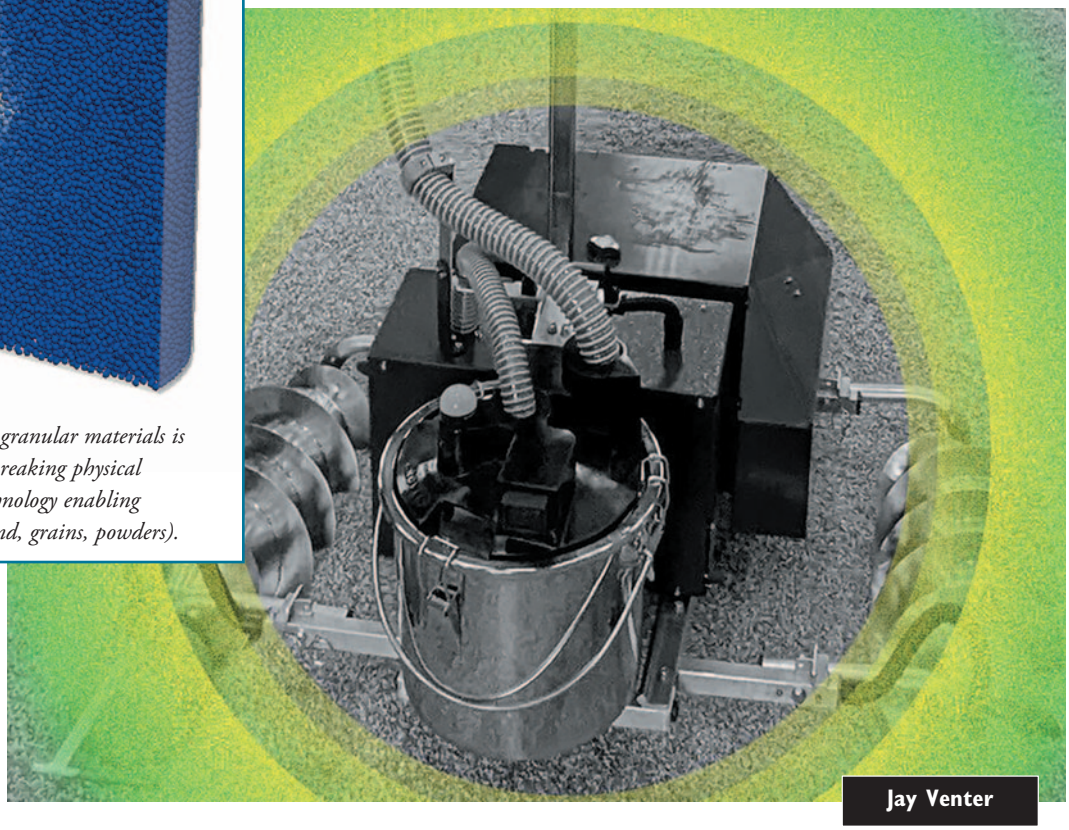
11 Acres for additional investment available

- Lower Cove
- Long Wharf.

Cross-section specimen

sampling, inspection & analysis

Crover's method of movement in granular materials is made possible by a new ground-breaking physical discovery and patented (UK) technology enabling locomotion in bulk solids (e.g. sand, grains, powders).



Jay Venter

Control Union and Crover announce strategic collaboration to advance grain inspections

Control Union and Scottish robotics company Crover announced, on 23 July 2025, a new collaboration aimed at the deployment of Crover's innovative grain storage robot across grain inspection networks.

The Crover is a state-of-the-art grain monitoring and sampling robot, designed to crawl across the surface of grain bulks and take representative samples at depth.

It enables operators and traders to monitor storage conditions remotely and precisely — measuring key indicators such as temperature, moisture, CO_2, and grain quality without the need to disturb the grain manually.

Joint vision and next steps

Under a newly signed Memorandum of Understanding (MoU), the two companies will work together to:

- continue to test The Crover in real-world storage environments;
- share operational feedback to support effective integration with grain inspection operations; and
- explore further applications of robotic solutions in storage inspection and logistics.

"We are thrilled to be partnering with Control Union, a global leader in testing, inspection and certification. Their field expertise and international scope make them an ideal collaborator to bring our technology to practical use on a global scale," said Dr. Lorenzo Conti, Managing Director at Crover Ltd.

"At Control Union, we continuously look for ways to innovate our services in commodity trade. The Crover offer unique value through data-rich, remote monitoring and representative sampling — enhancing both the efficiency and sustainability of grain management," said Koen Backer van Ommeren, Director at Control Union.

The Crover Effect

The core technology behind The Crover robot comes from years of research in granular physics and rheology (the study of how granular materials 'flow').

Crover's method of movement in granular materials is made possible by a new ground-breaking physical discovery and patented (UK) technology enabling locomotion in bulk solids (e.g. sand, grains, powders).

Like plane or drone wings in air, or a boat's rotor in water, it allows an object to move through solid grains.

It works in any environment made of

bulk solids and powers, like sand dunes, heaps of grain, mineral bulks, chemical powders and even loose Martian terrain.

Crover Effect & CroverMini

The Crover Effect discovery was first applied to the CroverMini, the company's first generation research-scale swimming robot.

The discovery led to further development of additional robots, the CroverBasic and CroverPro. The leading solutions for small to large scale farmers, agriculture coops, storage and transportation facilities.

Seamless integration. Simple operation.

The Crover can reach below the surface safely, with ease. It works in:

- granular environments such as stored grain, oilseeds, and protein crops; and
- other bulk materials like sand, minerals, and chemical powders.

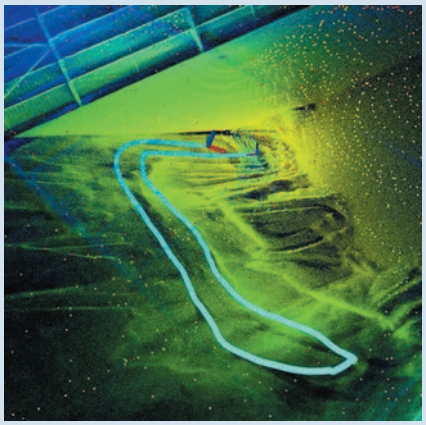
With Crover, it is possible for users to safely reach areas of grain bulks that were previously inaccessible, ensuring better storage conditions and protecting their investment.

1) **Simply deploy:** deploy The CROVER robot in your grain bulk.
2) **Easily controlled:** remotely control it using an intuitive interface on the web App.
3) **Gather info:** gather precise readings on temperature, moisture, and CO_2 levels.
4) **Smart decision:** use the data to take proactive measures, ensuring grain quality and safety.

The CroverMini.

Features of the Crover:

1) Reach below the surface: *Access areas of grain bulks that were previously inaccessible.*



2) Precise data collection: *Measure temperature, moisture, and CO_2 levels with high accuracy.*

3) Remotely operated: *Control the robot via an intuitive interface with a live video feed.*

4) Grain aeration: *Stir and mix the grain to prevent crust formation and maintain quality.*

5) Representative sampling: *Collect grain samples at depth for traceability and lab analysis.*

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Iowa Soybean Association launches Partners+ Program with AGI

Partnership to provide information, savings to ISA farmer members

In an innovative move to support Iowa farmers amid tightening margins, the Iowa Soybean Association (ISA) is launching a Partners+ Program with Ag Growth International (AGI) as its first participant.

AGI is a global leader in grain storage, handling, and conditioning systems. As an ISA Partners+ participant, AGI will provide ISA farmer members discounts on monitoring systems and grain conditioning and handling solutions.

"This partnership is about equipping farmers with the tools and knowledge they need to be more successful while saving them money," said Brent Swart, ISA president and soybean farmer from Spencer. "By aligning with AGI, we're helping deliver opportunities that could help our members make smarter decisions, reduce risk, and maximize the return on every bushel stored."

AGI's digital retrofit solutions — including smartphone-operated in-bin monitoring systems — offer farmers real-time visibility into grain conditions, helping prevent spoilage, reduce stress, and generate year-over-year performance data.

"We are delighted to partner with ISA, especially from a digital perspective," said David Postill, senior vice president of AGI Digital & Global Marketing. "The goal is to help soybean farmers save or make money through operational upgrades while deepening our relationship with an association that does so much to advocate for the industry and agriculture."

An in-bin monitoring system retrofit to an existing bin could transform how a farmer manages grain in the bin — ensuring quality, increasing safety, providing real-time visibility, and preserving the value of their hard-earned crop.

"In a challenging ag economy, producers are seeking affordable upgrades that streamline grain storage, handling and conditioning," Postill added. "This programme delivers exactly that — providing additional insights that can make a farm more profitable."

Discounts are available to active ISA farmer-members. Verification of membership status will be confirmed before programme benefits and discounts are applied.

Additional ISA Partners+ Program participants will be announced this fall.

About the Iowa Soybean Association

The Iowa Soybean Association is "Driven to Deliver" increased soybean demand through market development and new uses, farmer-focused research and results, timely information and know-how and policy initiatives enabling farmers and the industry to flourish. Founded in 1964 by farmers to serve farmers, ISA is governed by a board of 22 farmers to advocate on behalf of the state's 37,000 soybean producers, including more than 7,000 ISA farmer members and industry stakeholders. It is not funded by the soybean checkoff.

About Ag Growth International

AGI is a provider of solutions for global food infrastructure including seed, fertilizer, grain, feed, and food processing systems.

AGI has manufacturing facilities in Canada, the United States, Brazil, India, France, and Italy and distributes its products globally.

SGS has signed an agreement to acquire ATS, a major American player

Testing, inspection and certification company, SGS, announced in July 2025 that it has signed a definitive agreement to acquire the entire issued share capital of Applied Technical Services (ATS), a leading provider of specialized Testing, Inspection, Calibration and Forensics solutions in North America. ATS is expected to bring US$460 million of sales and US$95 million of EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) before synergies in 2026.

With close to 60 years of history, ATS is a resilient and diversified pure US player with a strong brand and service culture. It delivers solutions and services in regulated and high-growth end-markets such as Manufacturing, Aerospace & Defence, Power Generation & Distribution, and Insurance. Powered by a team of 2,100 skilled professionals and a network of 85 state-of-the-art facilities strategically located across the United States, ATS serves a large base of blue-chip clients across a broad range of industries.

The proposed transaction will strengthen SGS's position in the US with total annual sales to exceed US$1.5 billion in North America. This marks a major milestone in SGS's ambition to more than double its sales in the region by 2027 compared to 2023. It will also allow SGS to expand into new attractive segments. The complementarity of the offers and customers opens significant opportunities for cross-selling.

This transaction is valued at US$1,325 million (Enterprise Value on a debt-free, cash-free basis)* corresponding to a multiple of 11.2 times 2026 EBITDA including run rate synergies. A small portion of less than US$100 million will be paid in SGS shares to some shareholders and key employees subject to a three-year lock up period. The remainder of the purchase price will be financed through cash and debt while maintaining the leverage around two times. EBITDA synergies of at least US$30 million per year are expected on a run rate basis within three years of closing, driven by cost rationalization and cross-selling opportunities. The acquisition will be accretive on the EPS (Earnings Per Share) from the first year. It is also expected to enhance SGS's revenue growth and adjusted operating income margin, supported by the synergies.

The transaction is subject to customary closing conditions and is expected to close by late 2025/early 2026.

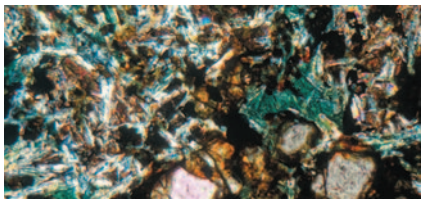
Géraldine Picaud, CEO of SGS, commented: "We are very happy to have signed the acquisition of Applied Technical Services. This transaction will significantly accelerate the execution of Strategy 27 by strengthening our presence in North America. ATS has exceptional teams, highly skilled with strong integrity and customer-oriented culture. By combining our forces in the US, we will deliver sustainable growth and synergies, and create lasting value for our shareholders. We are incredibly excited about the significant opportunities ahead."

About SGS

SGS is a testing, inspection and certification company. It operates a network of over 2,500 laboratories and business facilities across 115 countries, supported by a team of 99,500 dedicated professionals. With over 145 years of service excellence, SGS combines the precision and accuracy that define Swiss companies to help organizations achieve the highest standards of quality, compliance and sustainability.

** Before IFRS 16 Adjustment on operating leases of US$65 million*

From rock to revenue: The power of mineral processing



Close-up of mineralogical results.

Comminution.

Mineral processing - Flotation.

Mineral processing - Shaking table.

In today's mining landscape, ore grades are in decline and sustainability expectations are rising. As a miner or mineral processor, it is no longer enough to simply extract ore; one needs to extract maximum value, *writes inspection, analysis and technical consultancy services company, Alfred H Knight.*

From understanding the unique makeup of your ore to designing the most efficient extraction and refining strategy, mineral processing is a crucial step between mining and trade, helping turn geology into revenue.

Could optimizing your mineral processing operations be the difference between being marginal and profitable?

What is mineral processing and why is it critical to ore value?

Mineral processing, or beneficiation, is the separation of valuable minerals from waste rock. It transforms raw, heterogeneous mined material into a concentrated, marketable product..

By utilizing various mineralogical, metallurgical, and analytical techniques — including physical processes like crushing, grinding, and screening, and chemical separation methods such as flotation and leaching — minerals are effectively prepared for further extraction of metals or direct use in various industries.

Effective mineral processing maximizes mineral grade and recovery, minimizes waste, optimizes operational efficiency, and ultimately boosts profitability.

Understanding your ore

The success of any mineral processing strategy starts with a deep understanding of your ore.

Mineralogical analysis reveals the makeup of your material: what minerals are present, how they're distributed, how fine they are, and how they're locked together. This information is fundamental to designing an efficient flowsheet. Without it, you're relying on guesswork, often at the cost of recovery, reagent efficiency, and plant stability.

A robust mineralogical profile helps operators identify processing challenges early, tailor grind sizes for effective liberation, and avoid downstream inefficiencies that could impact metal yield.

Before you make processing decisions, make sure you know exactly what you're dealing with.

Getting the grind right

Crushing and grinding, known together as comminution, may seem like basic steps in the flowsheet, but they carry significant weight. In fact, comminution typically accounts for the largest share of energy use in mineral processing.

More importantly, it's the stage where valuable minerals are physically liberated from the gangue. If your ore isn't ground to the right size, those minerals stay locked and unrecoverable, even with the best separation techniques downstream.

Optimizing comminution isn't just about energy savings. It's about finding the sweet spot: fine enough to liberate, coarse enough to avoid overgrinding. That balance is different for every ore, which is why testing, modelling, and mineralogical input are so important.

Extraction, not just recovery

Once your minerals are liberated, the focus shifts to separation, the crucial step that transforms liberated particles into a saleable product.

Depending on your ore, this might involve flotation, leaching, gravity separation, magnetic separation, or a combination of techniques. Each has its own operating parameters, and success depends on careful alignment with your ore's mineralogy and chemistry.

While recovery rates often steal the spotlight, real value lies in designing a separation strategy that suits your material. That means optimizing reagent selection, pH, residence time, and process sequence to suit your ore's behaviour, not a generic flowsheet.

Bench-scale and pilot testing help define these parameters, guiding you toward a process that's not just technically sound, but commercially viable.

When separation is done right, even lower-grade ores can become valuable products.

Turning data into strategy

Technical data only becomes powerful when it informs decision-making.

Therefore, by combining mineralogical analysis, test work, and process modelling, you gain more than numbers; you gain insight into how your ore behaves and what that means for project economics.

Strategic test programmes, from grindability to flotation kinetics to leach recovery curves, reveal the practical boundaries of your deposit and enable smarter decisions on plant design, capital spend, and risk mitigation.

For new projects, this integrated approach helps turn drill core into a commercial strategy, forming the backbone of scoping and feasibility studies. For operating sites, it can unlock improvements in throughput, recovery, or cost efficiency.

In short: turning data into strategy is how you move from promising resource to profitable operation, with confidence and clarity.

Unlocking ore value with expert mineral processing support

Alfred H Knight works closely with clients to understand their unique challenges, providing tailored, data-driven support at every stage of the mineral processing journey, from mineralogical analysis and metallurgical test work to flowsheet development, plant optimization, and trade.

The company's team doesn't just deliver results; it collaborates with clients to interpret them, guide decision-making, and refine the approach based on real material behaviour and practical outcomes. It's a consultative partnership designed to help clients extract more from their ore, efficiently, sustainably, and with confidence.

Whether clients need support on a new project or are looking to improve an existing plant, Alfred H Knight's services help them unlock the full value of their ore, sustainably and efficiently.

SABS Mining and Minerals: servicing the mining industry in South Africa

Since 1975, the South African Bureau of Standards (SABS) Mining and Minerals Department has built a proud global reputation for excellence in sampling and analysis as a trusted third-party service provider to the international mining industry.

Today, SABS delivers high-value support to the mining sector across its core service areas: testing, standards development, local content verification, and certification. It also provides meaningful guidance to mining companies in meeting the requirements of the Mining Charter.

While its historic focus has been on coal and iron ore, SABS' technical capacity and equipment extend to the broader mining sector, offering a robust and competitive value proposition. SABS is further recognized as a local content verification service provider across Southern Africa, as mandated by the Department of Trade, Industry and Competition (the dtic).

Expertise

SABS offers a unique combination of technical expertise, impartiality, and a holistic suite of services — from exploration through to certification of commodities destined for both export markets and domestic use.

Specialized services include petrography, coal utilization, and classification, delivered by a highly experienced team supporting exploration and mineral development activities.

Services

Sampling

SABS applies the most stringent ISO standards in manual and automated sampling. Samples are crushed, subdivided, sealed, and retained, with multiple tests conducted in parallel to reduce turnaround times. A Laboratory Information Management System (LIMS) ensures traceability, data integrity, and the secure issuance of certificates of analysis.

Analysis

- **Proximate analysis:**automated mass transfers from balances into LIMS with repeat testing for out-of-tolerance results.
- **Calorific value:** determined via bomb calorimetry under controlled oxygen pressure.
- **Ultimate analysis:** determination of carbon, hydrogen, and nitrogen (CHN), with oxygen calculated by difference.
- **Total sulphur:** measured by automated analysers, integrated with LIMS.
- **Coal ash oxides:** determined using atomic absorption spectrophotometry.

All analyses are conducted in strict accordance with ISO standards and validated through rigorous internal quality controls.

Quality assurance

SABS operates under a formal Quality Management System aligned with the SABS Laboratory Services Division framework, ensuring consistency, impartiality, and continual improvement.

Key accreditations include:

- ISO/IEC 17025:2017 / SANS 17025:2018 – Competence in sampling, preparation, and analysis of coal.
- ISO/IEC 17021:2015 – Competence in certification of management systems, including:
  - o ISO 9001 (Quality Management)
  - o ISO 14001 (Environmental Management)
  - o ISO 45001 (Occupational Health & Safety Management).

Testing capabilities

SABS' comprehensive testing menu includes:

- Coal characterization (ash content, calorific value, moisture, volatile matter, sulphur, fixed carbon, density, grindability, fusibility, etc.).
- Elemental analysis P_2O5_2, SO_3, manganese, boron, mercury, chlorine, fluorine, free silica).
- Advanced petrographic analysis (maceral, reflectance, mineral group, weathering, coke texture, char morphology).
- Iron ore and limestone chemistry by XRF.
- Plant control and stockpile management.

Petrography and Advanced Laboratories

The Pretoria-based petrographic laboratory offers internationally accredited coal petrology services, while upgraded XRF and CHN analyzers provide the fastest and most accurate coal quality assessments.

Additional value-added services include:

- COALSPEC International Coal Proficiency Testing Scheme.
- Certified Reference Materials (CRMs) and benzoic acid calibration tablets.
- Trace element analysis (e.g., mercury, boron, selenium) using atomic absorption with vapour generation.

Certification services

ISO 9001 – Quality Management Systems

Helps companies:

- Improve operational efficiency and customer satisfaction.
- Enhance shareholder value and market credibility.
- Increase revenue and competitiveness through better processes and consistency.

ISO 14001 — Environmental Management Systems

Supports companies in:

- Reducing environmental risks and improving sustainability.
- Demonstrating compliance and responsible stewardship.
- Balancing environmental protection with socio-economic growth.

ISO 45001 – Occupational Health & Safety Management Systems

Assists organizations in:

- Minimizing workplace risks and improving safety culture.
- Ensuring compliance with legislation.
- Enhancing operational and financial performance while safeguarding employees.

Conclusion

The SABS Mining and Minerals Department remains a cornerstone of quality infrastructure in South Africa's mining sector. Through world-class laboratories, impartial expertise, and internationally recognized accreditations, SABS supports mining companies in meeting local regulatory requirements while competing globally.

From coal and iron ore to broader mineral industries, SABS provides not only testing and certification but also a platform for innovation, compliance, and sustainable growth in line with South Africa's industrialization and transformation objectives.

DCi

Doppelmayr wins contract award for the first RopeCon® in India

The Doppelmayr Group has been awarded a contract for the construction of a RopeCon® system for the Aditya Alumina Refinery project, located in Kansariguda, Odisha, India. The RopeCon®, the first of its kind in India, will start to transport bauxite in Q3 2027 and supports Hindalco's commitment to implement eco-friendly and sustainable solutions.

The Indian company Hindalco Industries Ltd (Hindalco), has selected a RopeCon® system to be implemented at Aditya Alumina Refinery in Kansariguda, Odisha, India. This innovative aerial conveying system will cover a distance of approximately 2,300m and a drop in elevation of –241m across challenging and agricultural terrain by means of using just four towers.

The RopeCon® system will transport bauxite at a rate of 1,500 tonnes per hour, and it will also be capable in the future of transporting tailings in the opposite direction.

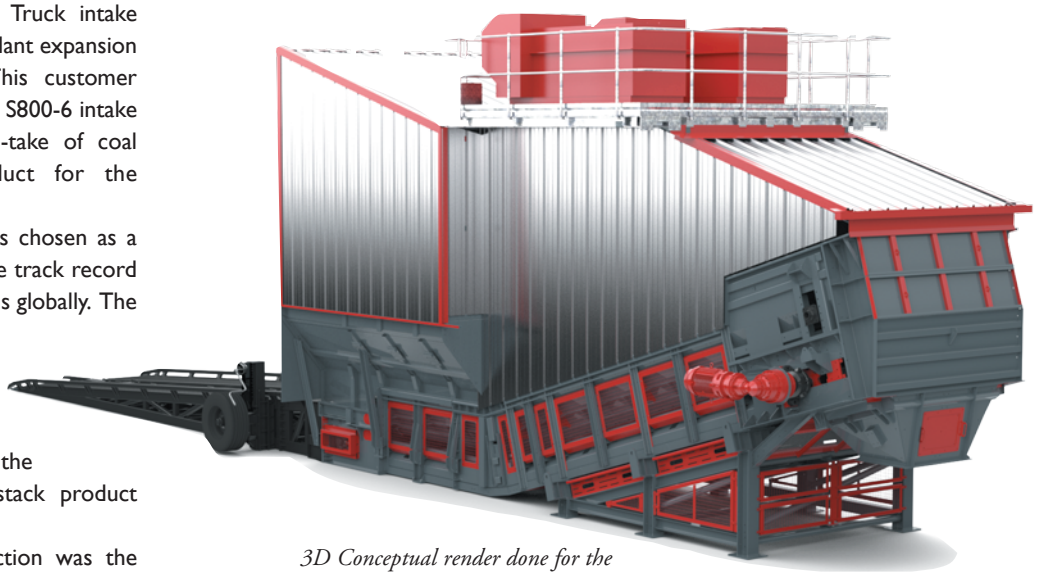
The RopeCon® will have a minimal footprint on the ground by flying over the landscape while respecting sufficient ground clearance at any time. In operation it will regenerate up to 907kWh, which is confirming HINDALCO's commitment for implementing environmentally friendly and sustainable solutions.

The RopeCon® commissioning is planned for Q3 2027.

Telestack announces new project for TITAN Truck intake system as part of Cement Plant expansion in Switzerland

Telestack has been awarded a contract for the supply of a new Titan Truck intake system as part of a cement plant expansion project in Switzerland. This customer opted for the Telestack Titan S800-6 intake system for the efficient in-take of coal which is a critical product for the manufacture of cement.

The Telestack S800-6 was chosen as a result of Telestack's extensive track record with proven Titan installations globally. The system has to work within a pre-defined area within the plant as part of the cement plant expansion, which aligns with the customized nature of Telestack product portfolio.



3D Conceptual render done for the customer as part of the contract signing.

A key part of the selection was the customization needed for this project. The system consists of customized options required for the application including integrated dust enclosure and dust extraction filters to meet the environmental requirements on site, along with integrated access ladder/steps and maintenance walkways throughout for the operator. There is also extended mobile ramps to ensure easy access for the Trucks in the area.

Fully designed, manufactured and assembled before dispatch from factory

As with all of Telestack's products, the TITAN S800-6 unit is fully designed, manufactured, fully assembled, tested and fully operation before dispatch. This ensures the quality and easy installation of the unit when arrives on site, allowing for a seamless build process.

Telestack's expertise in designing bulk reception feeders means it fully understands the truck unloading process and the benefits that surface type feeders can offer each operation, including:

- eliminating costing excavations/civil constructions on site with ground level mounting (no water drainage issues);
- easy access and maintenance of the unit compared to underground constructions;
- eliminating double/triple handling of material – direct feed system – 'truck to plant';
- provide consistent feed and flow to cement plant to increase efficiencies; and
- seamless integration with existing/new plants in relation to dust enclosures, extraction and electrical/PLC Control systems.

The customer visiting Telestack's facility and seeing the completed unit as part of Factory Acceptance Testing.

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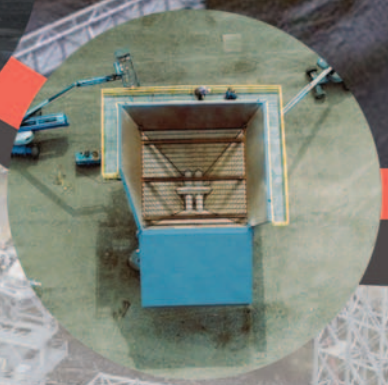

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AGRICO SALES

Bruks Siwertell boasts major projects on North American East Coast

Bruks Siwertell is a major supplier of dry bulk handling and wood processing systems. With thousands of installations worldwide, its machines handle raw materials from forests, fields, quarries, and mines, maintaining critical supply lines for manufacturers, mills, power plants and ports.

Bruks Siwertell designs, produced, and delivers systems for loading, unloading, conveying, storing, stacking and reclaiming dry bulk materials, alongside equipment for chipping, screening, milling, and processing wood for the biofuel, board, sawmill, pulp and paper industries.

Bruks Siwertell is global and local. The North American office is in Alpharetta, Ga with additional offices in Sweden, Germany, China, Philippines, and Taiwan.

A few of Bruks Siwertell's latest southeast coast projects include:

Port of Corpus Christi

Bruks Siwertell has been awarded a major contract to deliver a new belt conveyor system for the Port of Corpus Christi (POCC), Texas, USA. Commissioned by the Port of Corpus Christi Authority (PCCA), this award marks the beginning of a new customer relationship, secured through a competitive public bidding process. Bruks Siwertell was selected based on the proven reliability of its technology and the strength, clarity, and detail of its project proposal.

"We are proud to partner with the Port of Corpus Christi Authority on this critical infrastructure initiative," says Derek Tatum, Sales Manager, Conveyor Technology and Business Development, Bruks Siwertell. "Our advanced conveying systems will not only replace aging infrastructure but also deliver long-term operational flexibility and enhanced environmental protection."

The contract includes the design and supply of three 1.2-metre-wide (48-inch) belt conveyors, three new transfer towers, and additional equipment engineered to optimize the port's material flow and operational efficiency. Two of the conveyors will be equipped with emergency hoppers for payloader reclaim, with one system also featuring a magnetic separator for tramp metal removal. A dedicated washdown system is included for all conveyors to support cross-contamination control between cargoes.

The system is designed to handle petroleum coke (petcoke) and sulphur at rated capacities of up to 2,500tph (metric tonnes per hour), with future flexibility to handle taconite pellets. "Our solution begins at a new feed point beneath an existing transfer tower and eliminates the need for two legacy conveyors, streamlining the material handling process," adds Tatum. "From there, materials will move through a sequence of modernized transfer points in route to the waterfront and the port's future expansion berth."

Environmental safeguards are a key component of the design, featuring enclosed conveyors, fully covered transfer stations, and integrated dust-suppression systems within head chutes — all supporting compliance and sustainability goals.

System delivery is scheduled for the first quarter of 2026.

Port of Lake Charles

Bruks Siwertell has provided two shiploaders and a terminal hopper to the Port of Lake Charles in Louisiana. POLC is the nation's tenth-busiest port district.

The port manages the Calcasieu Ship Channel, which runs inland 36 miles and extends out into the Gulf of Mexico a further 32 miles. The Port of Lake Charles' official name is the Lake Charles Harbor & Terminal District, which encompasses 203 square miles. It's a port of choice for breakbulk, specialty and project cargo, ranging from international lumber shipments to global industrial needs.

The newest shiploader commissioned 5/2024 weighs over 1.6 million pounds. Its total transported/offload weight with support bracing and self-propelled modular transport is more than 2.1 million pounds.

It has a load rate of 3,200tph.

The loader underwent initial construction in Mexico, then completion at Bo-Mac in Beaumont, Texas.

The travelling import hopper is designed for unloading Barite and Rutile equipped with a vibratory feeder, shuttling/reversing conveyor and truck loading spout designed to handle 800tph.

From concept to commissioning — mission accomplished

Container Rotation Systems (CRS) is thrilled to have provided Lynas Rare Earths at Kalgoorlie and Mt Weld with a complete container handling solution for its cutting-edge Rare Earths concentrating facility in Western Australia, a milestone for Australian mining.

With a focus on environmental considerations, CRS collaborated closely with Lynas to design and implement the optimal concentrate handling systems. To meet very strict environmental approvals, a fully sealed processing plant was required.

Lynas Australia approached CRS for a solution, as it wanted a 'one-stop-shop'. The selection of CRS's Rotorcon® Heavy Duty containers, rated at 38.4 tonnes gross weight, was driven by its unique tub internal shape, ideal for handling wet and sticky concentrates.

Specifically tailored solutions were delivered, including the Rotainer Eurospec 38PC-360 for the processing plant in Kalgoorlie and the Rotainer Eurospec 38RS for unloading the concentrate at the mine end. Additionally, a CRS-designed, dual-station, fully automated lid lifting apparatus was installed in the loading shed.

All CRS equipment was meticulously manufactured, rigorously tested at CRS's Sydney facility, and then transported over 4,000km to Western Australia for installation. To facilitate seamless operations in remote locations, all CRS supply was equipped with Rotainer Remote Monitoring (RRM).

CRS takes pride in contributing to the developing Rare Earth market and is enthusiastic about the potential for further growth in this sector.

Engineering efficiency: how ASGCO® boosted aggregate production with smart system design

In the competitive world of construction and infrastructure development, staying ahead means constantly optimizing operations for efficiency, reliability, and scale. For aggregate and asphalt producers, this often involves tackling complex material handling challenges where conventional solutions fall short. One major producer recently found themselves at such a crossroads, faced with production constraints that threatened the success of a large-scale project. US East Coast manufacturer ASGCO®, known for its expertise in custom-engineered conveyor and material handling solutions, stepped in to turn the situation around with a tailored approach that exceeded expectations.

The pressure of production demands

The producer, a key player in the aggregate and hot-mix asphalt industry, had committed to supplying a significant quantity of 57 stone* for a fast-approaching infrastructure project. Roughly 70% of the material needed to be re-crushed from 2B aggregate, a demanding process that placed immense pressure on the plant's existing system.

Unfortunately, the existing configuration lacked the necessary throughput capacity and adaptability to support the additional re-crushing workload. Bottlenecks in material flow, combined with excessive wear and inefficient delivery mechanisms, posed a serious threat to project timelines. The risk wasn't just missing a deadline, but also about protecting the company's reputation and delivering on internal performance standards.

Custom engineering meets real-world constraints

Recognizing the urgency and complexity of the situation, ASGCO® initiated a comprehensive site evaluation to fully understand the operational and spatial limitations. This included a point cloud scan of the portable crusher area and surrounding structures technique that provided an accurate 3D representation of the site, crucial for precise engineering and layout planning.

With this detailed model in hand, ASGCO® engineers designed a fully customized support structure and chute configuration that would fit seamlessly into the existing environment. The new system was crafted not just for compatibility, but for performance, resilience, and ease of maintenance.

A central innovation was the transfer chute redesign. Engineered to handle abrasive materials at high velocity, the chute was lined with 12" x 12" Ceramic-Embedded Urethane Magnets, known for their exceptional durability and impact resistance. To reinforce high-wear areas,

** 57 stone is a crushed stone aggregate used in a variety of construction and landscaping projects.*

the design also incorporated ultra-high molecular weight (UHMW) polyethylene and AR400 steel edge protectors, extending equipment life while reducing the risk of costly shutdowns.

From concept to impact: the results

The transformation was nothing short of remarkable. Post-installation, the plant's production rate of 57 stone surged from 185 tonnes per hour to an impressive 440 tonnes per hour, an increase of 135%. This significant improvement not only allowed the team to meet their project goals ahead of schedule but also optimized long-term operational efficiency.

Beyond raw output, the upgraded system reduced downtime due to maintenance, improved flow consistency, and enhanced overall system reliability. The materials moved more smoothly through the system, with less turbulence, better control, and greater wear protection, making it easier and safer for operators to manage high-volume throughput.

The success of the upgrade didn't just solve a technical problem; it boosted team morale and demonstrated the value of smart engineering to stakeholders across the organization.

Strengthening partnerships and building momentum

What began as a single project quickly evolved into a broader partnership. Impressed by the professionalism, innovation, and responsiveness of the ASGCO® team, the customer brought them in to assist with another challenge at a different plant. The relationship grew stronger, rooted in trust, proven results, and shared commitment to continuous improvement.

This outcome is a testament to ASGCO®'s philosophy: that every material handling problem deserves a custom-engineered solution, one that's grounded in real-world conditions, high-performance materials, and practical design.

Delivering on a promise of performance

As industries continue to evolve and demand more from their production systems, ASGCO® remains at the forefront, delivering engineered solutions that increase efficiency, extend equipment life, and support long-term growth. This project serves as a powerful example of how tailored innovation can unlock new potential, even under pressure.

For companies looking to elevate their material handling systems, the message is clear: with the right partner, even the toughest challenges can become opportunities for breakthrough success.

Grain handling in cargo port with SENNEBOGEN material

All pictures: two SENNEBOGEN 875 E in the port of Muuga handling grain.

The PK Terminal in the Estonian port of Muuga is one of the most modern cargo terminals in Europe. Since 2019, the company has been relying on high-performance SENNEBOGEN material handlers: two 875 E, one 870 E and one 355 E to efficiently handle bulk goods and steel. With the purchase of an 885 G in this year, the PK Terminal is confirming its long-term focus on the proven technology and efficiency of SENNEBOGEN.

Cargo port with over 50 years of experience

The PK Terminal, operated by the Palgard Group, can look back on over 50 years of experience in port handling. At the Muuga site, Estonia's largest freight harbour, the company operates two quays where up to three ships can be handled simultaneously. The main goods handled are grain, wood pellets and steel products. Thanks to its excellent road and rail connections, the freight terminal is an important hub in the European transit trade. Muuga is particularly important for grain exports to

handlers: reduced berthing times and green operations

Africa, the Middle East and Europe.

Reduced berthing time for grain handling

The terminal uses two SENNEBOGEN 875 E material handlers to load grain onto Panamax ships. Equipped with 12m³ grabs, these machines achieve an impressive handling capacity of 600 tonnes per hour each. This shortens the lay times of the ships considerably. Despite the high handling capacity, the SENNEBOGEN Green Hybrid energy recovery system ensures low consumption — making operation particularly economical and environmentally friendly:

"The decision was made in favour of a machine that enables maximum efficiency at a reasonable cost. SENNEBOGEN machines are extremely powerful, and the hybrid system also ensures low fuel," says Rain Rannala (Board Member PK Terminal).

Excellent view into the ship's hull

The advantages of the two SENNEBOGEN 875 E machines become especially evident during the loading of Panamax ships. The crawler portal, combined with the Portcab cabin — featuring Skylift height adjustment — provides optimal visibility into the ship's hull. At the same time, the innovative SENcon control technology ensures precise operation at high handling speeds. Board member Rannala emphasizes that operators also highly value these features: "Our operators particularly appreciate how easy the machines are to handle, enabling them to work with great precision despite demanding tasks."

Cargo terminal expands SENNEBOGEN fleet

In order to meet the increasing demands in the port of Muuga, the PK Terminal will expand its fleet of machines with a SENNEBOGEN 885 G. This investment is expected to further enhance the terminal's ability to handle larger ships more efficiently.

With this fleet expansion, PK Terminal reaffirms its trust in SENNEBOGEN's solutions: powerful, efficient, and environmentally friendly machines that meet the challenges of modern port operations.

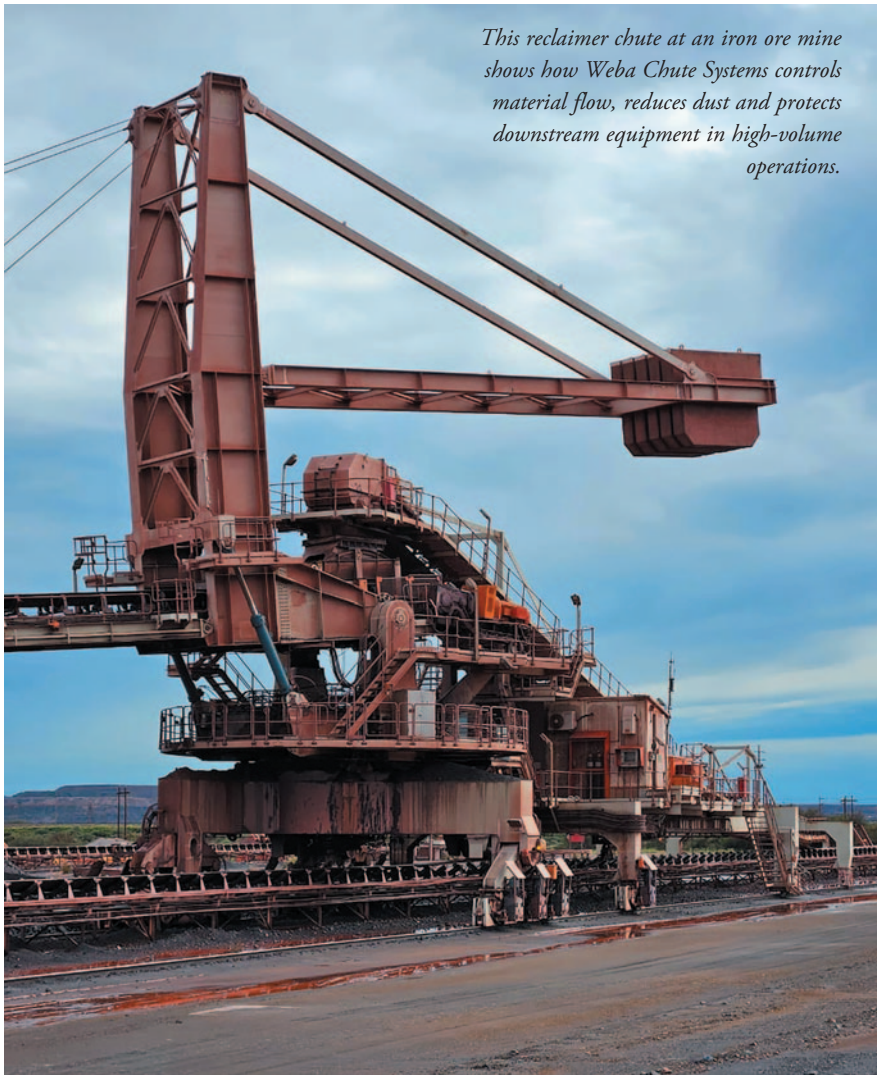
Weba Chute Systems warns against

In the world of materials handling, transfer chute design is often underestimated — sometimes with costly consequences. While it may seem like a simple task, it is in fact one of the most complex aspects of materials handling design, as some of the world's largest equipment suppliers have discovered to their detriment.

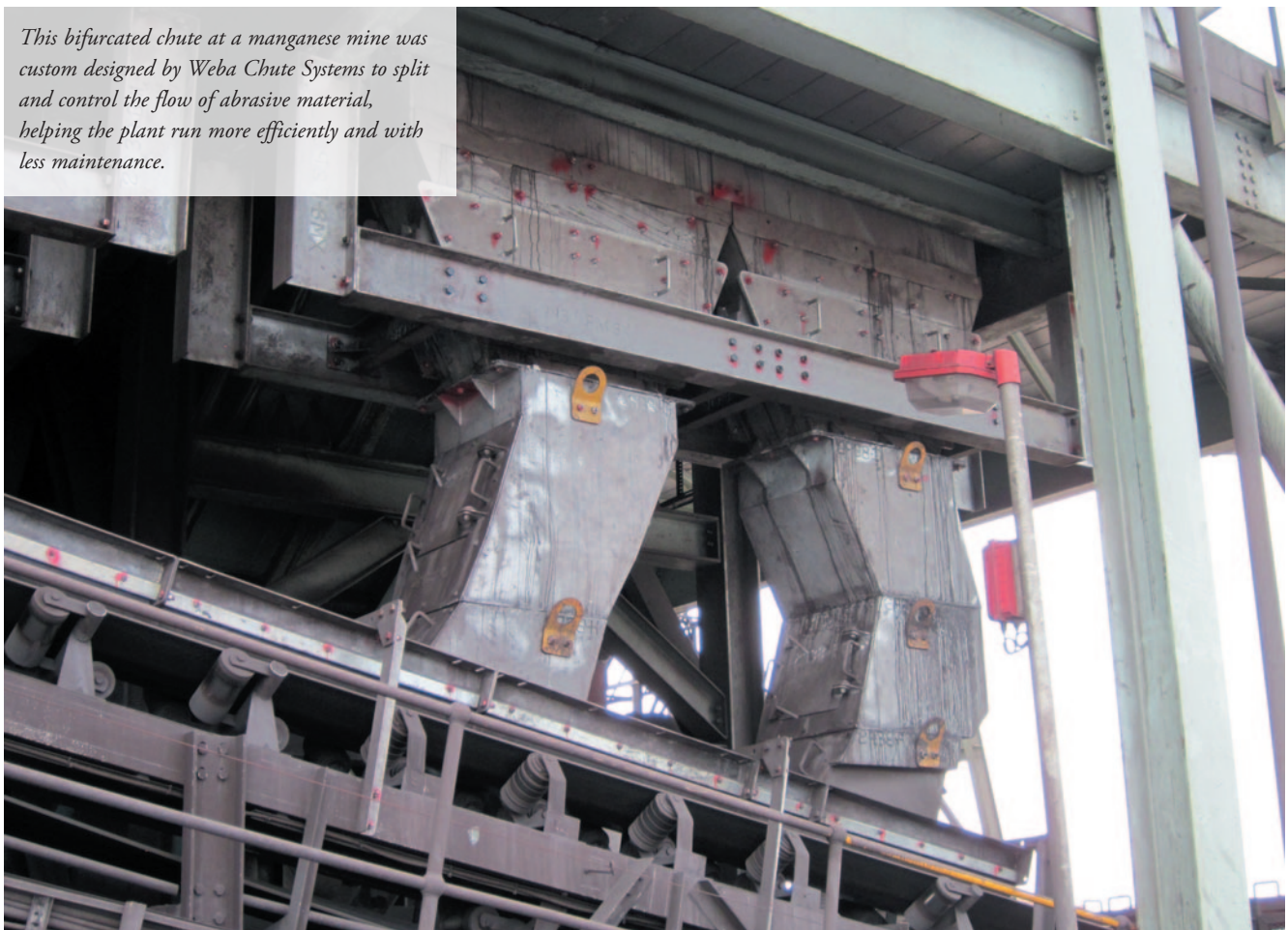
Mark Baller, Managing Director of Weba Chute Systems, says the company's more than four decades of experience have highlighted a consistent misunderstanding across the mining sector — that anyone can build a chute. "Over the years, we have seen a number of big-name global players try to enter the market, only to withdraw when they realized that chute design is not a bolt-on activity. It demands highly specialized expertise," he says.

The problem, says Baller, is the widespread perception that chutes are little more than simple platework structures. This belief has led many companies to assume that designing and manufacturing transfer chutes is a relatively low-risk and low-skill endeavour — when the reality is the opposite.

"Each transfer point must be custom engineered to suit the application, considering factors like particle size, density, velocity and trajectory. A standardized or off-the-shelf approach simply doesn't work," he explains.



This reclaimer chute at an iron ore mine shows how Weba Chute Systems controls material flow, reduces dust and protects downstream equipment in high-volume operations.



This bifurcated chute at a manganese mine was custom designed by Weba Chute Systems to split and control the flow of abrasive material, helping the plant run more efficiently and with less maintenance.

oversimplifying chute design

Weba Chute Systems has spent decades building a deep understanding of material flow and applying that knowledge to bespoke chute design. "We don't just design chutes to move material. Our solutions are engineered to control the flow which protects downstream equipment, reduces dust and spillage and, importantly, improves overall plant performance," explains Baller.

A well-designed and engineered chute can significantly enhance the performance and lifespan of costly equipment like conveyor belts. Poorly designed chutes, on the other hand, can result in excessive wear, environmental hazards, unplanned downtime and in severe cases, bring entire operations to a standstill.

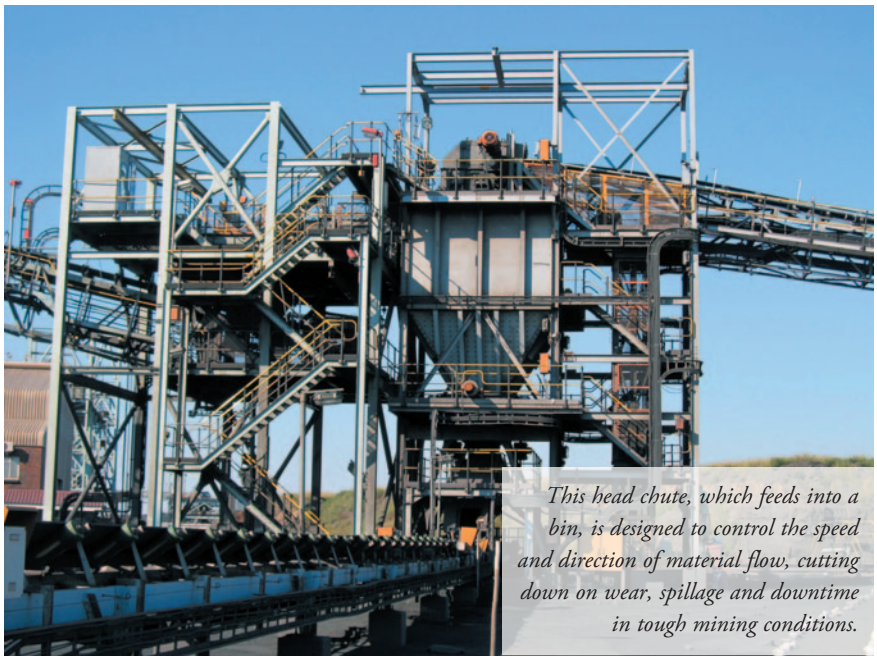
To ensure each chute is fully optimized, Weba Chute Systems uses advanced simulation tools such as discrete element modelling (DEM), which allows engineers to model the behaviour of individual particles and understand how they interact with the chute structure. "This technology gives us insight into particle flow dynamics and allows us to precisely control flow direction and velocity," says Baller. "We can engineer solutions that deliver real measurable improvements in safety, productivity and operating cost."

He points out that with almost 5,000 chutes installed globally, the company's solutions have been proven in the field across a range of demanding applications, environments and commodities. "Our designs are backed by hard-won experience and continuous innovation. This is not something you can replicate overnight by simply buying design software or completing a short training course."

While Baller welcomes healthy competition in the industry, he cautions that entering the chute market without deep technical knowledge and a long term commitment can lead to poor outcomes for both the supplier and the customer. "When chutes under-perform or fail, the impact on mining operations can be significant. It makes far more sense for mines to partner with experienced specialist providers who understand the nuances of material flow."

He concludes by reiterating the critical role that chutes play in plant performance. "Despite being a relatively small capital item, a chute's failure can halt production entirely. That is why our approach is rooted in delivering engineered quality and reliability — because when it comes to chute design, getting it wrong is simply not an option."

At this conveyor-to-conveyor transfer point custom Weba chutes keep material flowing smoothly while reducing spillage and belt wear, thanks to years of experience and advanced flow simulation



This head chute, which feeds into a bin, is designed to control the speed and direction of material flow, cutting down on wear, spillage and downtime in tough mining conditions.

Built for a specific need, this head chute reflects Weba Chute Systems' focus on performance, reliability and preventing unplanned downtime.

Conveying biomass

Conveyor belts that carry biomass face the perfect storm. They operate in highly explosive, combustible environments, so they need to be completely anti-static and self-extinguish very quickly if ignited. Biomass contains oils and resins that seriously damage rubber plus they are constantly exposed to the damaging effects of ozone pollution and ultraviolet light and to be cost-effective, they need to provide the longest possible operational life. Here, *conveyor belt specialist Leslie David* explains the four key qualities and the consequences of not having them.

1. Risk of explosion (anti-static properties)

In the production process of biomass wood pellets, wood chip and similar renewable resources, the materials are continually broken down, resulting in high levels of combustible dust. This can be easily ignited by static electricity created within the conveyor system because the source only requires ignition energy as low as 17mJ for the ultimate ignition to take place. Biomass dust is also prone to self-ignition, especially if the material has become damp because a chemical reaction can take place that causes self-heating and the emission of carbon dioxide, carbon monoxide and methane emissions, which is referred to as 'off-gassing'.

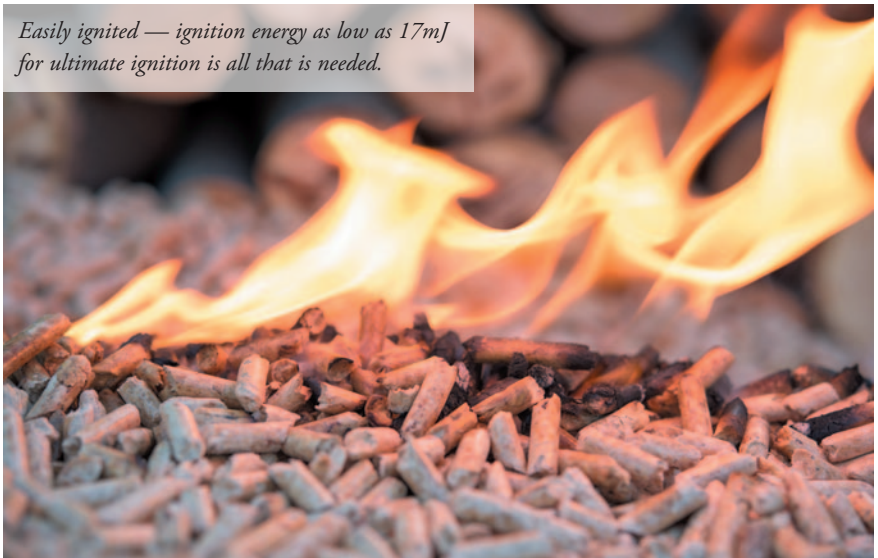
Strict conformity to Directive 94/9/EC (applicable to potentially explosive atmospheres of zones 20, 21 and 22 where combustible dust is present) should be a pre-requisite. It is absolutely essential that the electrostatic dischargeability (anti-static) properties of the conveyor belt cover rubber (according to DIN EN ISO 284 test methods) do not exceed the maximum resistance value of 300MΩ.

2. Fire safety (self-extinguishing properties)

Factual evidence gained from laboratory testing as well as anecdotal evidence indicates that even some of Europe's biggest ports and terminals are using belts that do not achieve their claimed standard classification. Only the best quality fire resistant belts for conveyors carrying biomass should be considered.

The majority of conveyor belts used in dry bulk handling are rubber multi-ply

Easily ignited — ignition energy as low as 17mJ for ultimate ignition is all that is needed.



construction. The first thing to bear in mind is that they can never be totally fireproof. Rubber is flammable and the fabrics used in the carcass of multi-ply belts are mostly polyester and nylon, which have virtually no resistance to fire. Once alight, they can be remarkably efficient at conveying flames at a frightening speed. Fortunately, they can be engineered so that the risk is dramatically reduced.

Rubber conveyor belts can never be totally fireproof.

What is meant by 'fire-resistant'?

A more accurate description rather than 'fire resistant' is 'self-extinguishing'. This is because the ability of a rubber conveyor belt to 'resist' fire is achieved by adding special chemicals and additives such as antimony trioxide, decabromodiphenyl, alumina trihydrate and magnesium hydroxide to the rubber compound during the mixing process. The actual amounts depend on the level (international standard) of fire resistance required. Once fire-resistant rubber has been vulcanized and is ignited it emits gases that effectively suffocate (extinguish) the fire by starving the flames of oxygen.

Low-price fire-resistant belts can prove deadly.

Prioritizing a competitive price.

The special additives are costly so if low grade or insufficient quantities are used in order to keep the selling price sufficiently attractive to win orders then the ability of the belt to self-extinguish will be slower (and sometimes non-existent) and therefore much less safe. Especially in the past twenty years or so, the conveyor belt market, particularly in Europe, has been inundated by 'cheap' imports from South East Asia, primarily China. Performance, longevity and ultimately safety, have all become sacrificial lambs in the effort to win greater market share and force out the competition.

EN ISO 340 testing.

The reality is that 'economy' versions of high-quality fire-resistant belts simply do not exist. The biggest single influence on the ability to resist fire is the fire-resistant properties of the rubber. Unfortunately, because rubber constitutes around 50% of the material cost of a conveyor belt, it is the prime cost saving target for manufacturers who want to compete on price, even though they will happily claim to meet the same safety specification as the premium brand versions, safe in the knowledge that their deception is unlikely to be discovered.

EN ISO 340 testing

The tests involve exposing six individual samples of belt to a naked flame causing

them to burn. The source of the flame is then removed, and the combustion time (duration of flame) recorded. A current of air is applied to the test piece for a specified time after the removal of the flame. The flame should not re-ignite.

The time it takes for the belt sample to self-extinguish after the flame has been removed is a maximum of 15 seconds for any individual sample with a maximum cumulative duration for each group of six samples of 45 seconds. This means that the maximum allowable average time per sample is 7.5 seconds. This factor is of paramount importance because it effectively determines the distance that the fire can be carried by belt when in motion.

Even if a manufacturer states that their fire-resistant belt has passed the ISO 340 test, caution must still be exercised. A typical conveyor belt will easily travel several metres within the 15 seconds allowed for a belt sample to pass the test, which is a potentially very dangerous distance. For this reason, one major European manufacturer (Fenner Dunlop in the Netherlands) applies an average maximum time limit standard of less than one second, which is more than six times faster than the required standard and decidedly safer as a consequence.

Given the highly flammable nature of biomass, EN 12882 Class 2B (S' grade) should be regarded as the minimum standard. For enclosed conveyors the higher standard, Class 4A of EN 12882, which includes an additional fire test, is recommended.

3. Resistance to oils and resins

Biomass, especially the wood and wood waste content, can contain vegetable oils and resins that can have a very detrimental effect on the performance and life expectancy of a conveyor belt. When the oils and resins penetrate rubber it causes the rubber to swell and distort, resulting in serious tracking and steering problems as well as premature wear. The oils, resins, fats and greases that have these damaging effects can be divided into two distinct sources — mineral and vegetable/animal.

The level of oil and resin present depends very much on the type (origin) of the wood itself.

For most wood from Scandinavia for example, good resistance to oil is necessary as these trees are mostly pine trees, which have high turpentine content. In South-European countries and in Latin America, Eucalyptus trees are commonly used. The wood from these trees contains little or no turpentine so oil resistance is not so essential. This is generally valid for non-pine wood such as poplar and birch. If the origin of the wood used for the biomass can be from variable sources then the use of conveyor belts that have a combined resistance to fire and oil is recommended.

Oil-resistance ASTM 'D' 1460 testing.

The first signs — small cracks appear in the surface of the rubber.

There are two recognized test methods for oil resistance, both of which involve almost identical test procedures. These are ISO 1817 and the comparable, slightly less elaborate but very stringent American ASTM 'D' 1460. Samples of rubber are immersed in the relevant test liquid for a specific period of time and then measured for absorption and expansion. ISO or DIN international performance standards for oil & grease resistance do not yet exist. Manufacturers can use whichever test method they deem most suitable. However, there is a sting in the tail concerning the matter of test methods.

DIN 22102 G — not what it seems

Some of the largest manufacturers of belting in the world, primarily those in Asia and in Europe use the DIN reference number 22102 G when referring to oil-resistant belting. This can be very misleading because the letter 'G' is simply used to denote oil (or grease) resistant belting. In truth, there are no firm requirements, test methods or limits specific to oil resistant belting associated with DIN 22102 G. This is a classic example of how simply indicating a test method reference number on the technical datasheet is designed to create a false sense of security, but which is actually meaningless in respect to actual performance.

4. Ozone & UV resistance

The fourth essential characteristic of belting used to carry biomass is the ability to resist the damaging effects of ground-level ozone and UV rays. At low altitude ozone (O_3) becomes a pollutant that attacks the molecular structure of rubber. Ground level ozone increases the acidity of carbon black surfaces with natural rubber,

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90% of belts tested for ozone resistance test are NOT resistant.

polybutadiene, styrene-butadiene rubber and nitrile rubber being the most sensitive to degradation. The reaction that occurs is known as ozonolysis.

The first visible sign is when cracks start to appear on the surface of the rubber. Further attacks then occur inside the freshly exposed cracks, which continue to grow steadily until they complete a 'circuit' and the product separates or fails.

Ultraviolet light from sunlight and fluorescent lighting also has a similar, seriously detrimental effect on rubber because it accelerates rubber deterioration by producing photochemical reactions that promote the oxidation of the rubber surface resulting in a loss in mechanical strength and wear resistance. This is known as 'UV degradation'. The combination of ozone and UV has a seriously limiting effect on the operational lifetime of a rubber belt, regardless of geography or type of climate.

Although ozone and ultraviolet damage is easy to prevent, extensive laboratory testing shows that some 90% of belts tested according to EN ISO 1431/1 procedure B static ozone resistance test are not resistant. In fact, the vast majority typically start to crack within the first six to eight hours of the 96-hour test duration. This translates into cracking occurring within a few months, and possibly weeks, from installation. This is because the anti-ozonants needed to protect the rubber have been omitted from the rubber compound mix because of cost. The best advice is to make ozone & UV resistance a constant requirement when selecting any rubber conveyor belt.

Not worth the risk.

Conveyor belt manufacturers and suppliers will naturally claim that their belts possess all the essential characteristics in abundance but operators need to be as sure as possible that what is promised is actually delivered. Belts that convey biomass that are not of the highest standard are a very dangerous and expensive liability.

About the author

After spending 23 years in logistics management, Leslie David has specialized in conveyor belting for over 19 years and is one of the most published authors on conveyor belt technology in the world. DCi

Leslie David.

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Unloading in style

when bulk unloaders come into their own

Louise Dodds-Ely

VIGAN CSUs – the quiet revolution surpasses performance expectations

In the world of bulk material handling, few innovations have reshaped the landscape as significantly as the evolution of pneumatic continuous ship-unloaders (CSUs). Over the past 20 years, these machines have undergone a quiet revolution — one that has now reached a tipping point. VIGAN, a renowned global expert in pneumatic unloading technology, has not only kept pace with this transformation but has actively driven it, setting new benchmarks in performance, efficiency, and sustainability.

A technological leap forward

Historically, mechanical ship-unloaders were often favoured for their high throughput and perceived energy efficiency. However, recent technological advancements have dramatically shifted this balance. Pneumatic unloaders, once considered less efficient, have now surpassed expectations thanks to intelligent design changes and the integration of smart electronic systems.

VIGAN has been instrumental in this shift. By reengineering the core components of its pneumatic CSUs and incorporating advanced control systems, the company has significantly reduced energy consumption. The result is a machine that delivers exceptional performance with a much lower environmental footprint. Concerns about kilowatt-hours per tonne discharged — once a major consideration for port operators — are now largely negligible when comparing pneumatic and mechanical systems.

Breaking the throughput barrier

One of VIGAN's most impressive recent achievements is the development of a pneumatic CSU capable of unloading over 800tph (tonnes per hour) of grain using a single unit with a single boom. This is a first in the industry and a clear demonstration of how far pneumatic technology has come. Even more impressively, the same design is being optimized to reach 1,000tph, enabling efficient unloading of Panamax-class vessels.

This leap in capacity is not just a technical milestone — it's a game-changer for port operations. Higher throughput means faster turnaround times, reduced demurrage costs, and improved logistics efficiency. For ports handling large volumes of grain, these benefits translate directly into increased profitability and competitiveness.

Efficiency beyond the numbers

While raw capacity is important, overall operational efficiency is what truly matters. VIGAN's pneumatic CSUs deliver on both

fronts. In real-world conditions, these machines achieve over 75% efficiency relative to their nominal capacity, the challenging hatch-cleaning phase included. This level of performance is unmatched by any other unloading technology currently on the market.

Several factors contribute to this high efficiency:

- **Smart design:** optimized airflow paths and suction systems ensure consistent performance across all stages of unloading.
- **Ease of operation:** user-friendly controls and automation reduce the need for manual intervention.
- **Low maintenance:** with fewer moving parts than mechanical systems, pneumatic CSUs require less upkeep and have lower spare part costs.
- **Environmental advantages:** pneumatic systems generate no dust and can be acoustically insulated, making them ideal for ports with strict environmental regulations.

A GLOBAL FOOTPRINT OF INNOVATION

Since early 2024,VIGAN has seen a surge in demand for its high-capacity pneumatic CSUs. The company's NIV800 model, capable of unloading at 800tph, has quickly become a preferred choice for ports around the world.

Currently, two NIV800 units are being commissioned in Belgium, following the successful deployment of two similar

machines in Puerto Callao, Peru. In the Middle East, two more units are being assembled and will soon be operational. Additional installations are under way in Morocco and South Korea, bringing the total to eight machines delivered in just one year.

Each of these machines boasts a daily unloading capacity of 13,000 tonnes, meaning the combined output of all eight units is an impressive 104,000 tonnes per day. Assuming a conservative estimate of 200 working days per year, these machines will collectively unload more than 20 milion tonnes of grain annually. That's enough to feed several large nations and aligns closely with the global annual increase in cereal consumption.

A STRATEGIC PARTNER FOR THE FUTURE

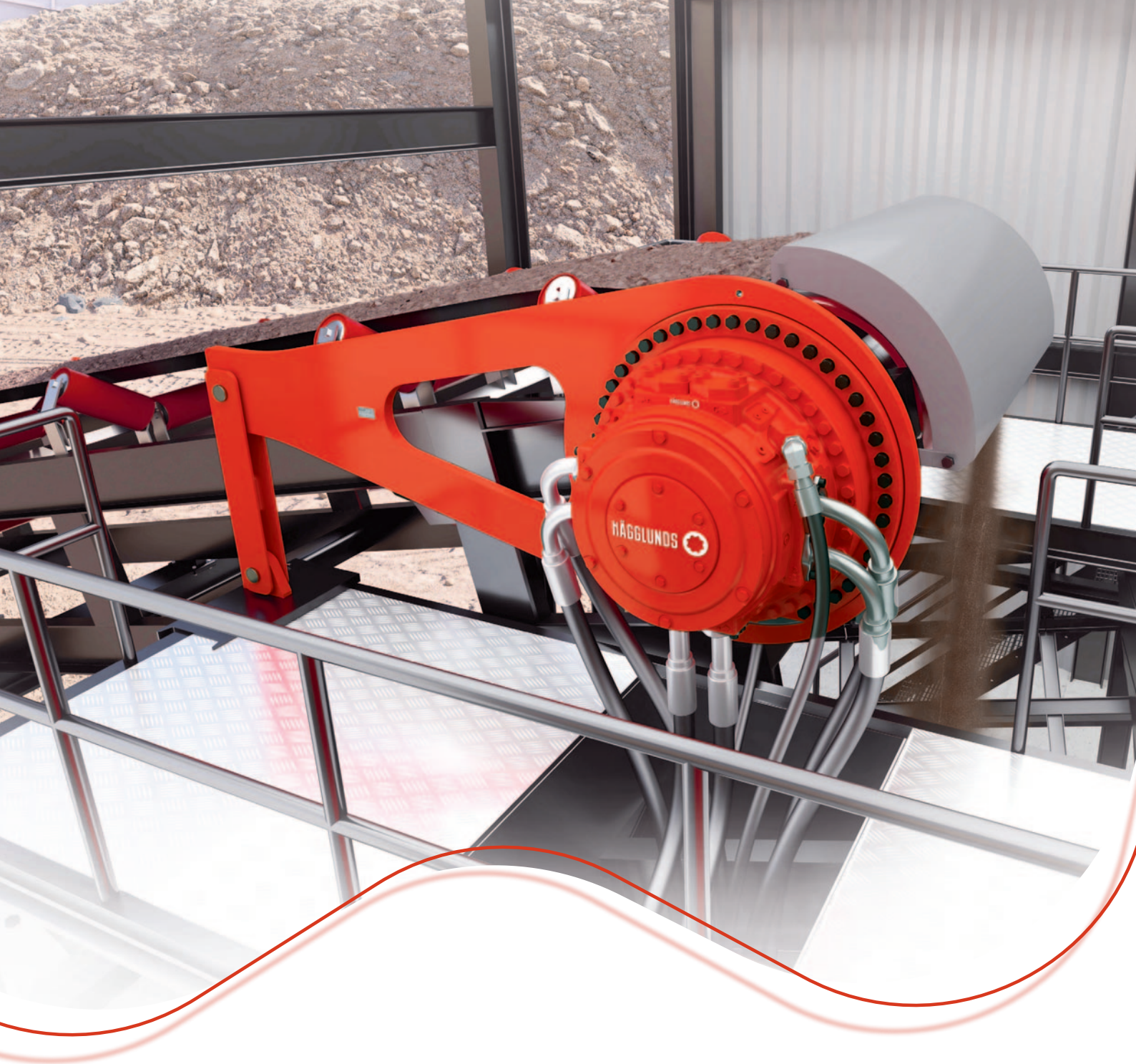
VIGAN's success is not just about machines — it's about partnerships. The company works closely with port authorities, grain terminal operators, and logistics providers to deliver tailored solutions that meet specific operational needs. This customer-centric approach has made VIGAN a trusted partner in some of the world's most demanding markets.

As global demand for cereals continues to rise, driven by population growth and changing dietary habits, the need for efficient, high-capacity unloading solutions will only increase. VIGAN is well-positioned to meet this demand, offering a product line that combines cutting-edge technology with proven reliability.

CONCLUSION

The evolution of pneumatic CSUs is a story of innovation, perseverance, and vision. VIGAN has not only embraced this evolution — it has led it. With machines that rival and often surpass mechanical systems in capacity, efficiency, and environmental performance, VIGAN's pneumatic unloaders are redefining what's possible in bulk grain handling.

For ports looking to future-proof their operations, reduce costs, and meet growing demand, VIGAN's pneumatic CSUs offer a compelling solution. They are no longer just an alternative to mechanical systems — they are the new standard.



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Neuero and GSM pioneer floating terminal to revolutionize Argentina's grain export industry

The CombiFlexiport system in action aboard the Grisel N *barge, showcasing the Flexiport pneumatic unloader and shiploader in operation at Alpha Zone (all photos: GSM)*

Introduction

In a groundbreaking advancement for Argentina's grain export industry, Grupo Servicios Marítimos (GSM) has teamed up with Neuero to deliver a pioneering solution for the country's longstanding shipping challenges. The CombiFlexiport CF1000, a floating grain terminal, represents a revolutionary approach that addresses the issue of low river draughts, particularly in the Parana River, by integrating a pneumatic ship-unloader, shiploader, and a commercial bulk scale into a single, reinforced barge. This innovative offshore transshipment unit provides a powerful solution to the limitations posed by the declining river depths and promises to optimize grain export operations.

Part of the team at first ship.

Overcoming grain export challenges

As one of the world's leading producers and exporters of grains, including soybeans, wheat, and soybean meal, Argentina's ability to ship its harvest efficiently is critical. However, over the past decade, the Parana River, a major shipping route, has faced a decline in draught levels, with reductions of up to 2.5 metres. This has led to ships being unable to carry their full load, leaving valuable cargo space unused. With ships departing with 15% to 35% less cargo, export costs for producers and the nation have increased significantly, impacting the global competitiveness of Argentina's agricultural exports. To combat this, GSM


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The Grisel N *barge, modified and reinforced to support the CombiFlexiport system*

and Neuero developed the CombiFlexiport CF1000, which aims to ensure Panamax vessels can be fully loaded, even in conditions of low draught.

GSM's pioneering floating grain terminal vision

GSM's vision, led by CEO Monica Navarro, involved transforming a 30,000dwt barge, the *Grisel N*, into a floating transshipment unit capable of transferring grain from the Parana River to oceangoing vessels. This transformation ensures that Panamax vessels can carry full cargo loads, irrespective of the river's draught fluctuations. The upgraded *Grisel N* barge provides a stable platform for the necessary equipment, which includes the Flexiport pneumatic ship-unloader, a commercial bulk scale, and a shiploader.

GSM's partnership with Neuero, a global expert in bulk material handling, was critical in providing the essential equipment for this operation. The collaboration ensures the integrated, efficient handling of grain, even in adverse conditions.

The CombiFlexiport CF1000 solution

The CombiFlexiport CF1000 system integrates three essential functions into one mobile platform:

- **1. Flexiport pneumatic ship-unloader:** the Flexiport unloader is designed for efficient handling of non-free-flowing materials like soybean meal. This pneumatic system utilizes a rotating feeding nozzle to help to introduce materials into the conveying pipes. The unloader operates through a system of vertical and horizontal conveying pipes, turbo blowers, and rotary valve for material flow. The system's ability to handle challenging materials in offshore conditions is a significant advantage for operations like those in the Parana River. This unloader is mounted on a mobile gantry, which also carries the scale and ship loader, ensuring seamless movement as a unit.
- **2. Commercial bulk scale:** the commercial bulk scale, supplied by Precia Molen, is integrated into the system to provide precise weight measurements of the grain or meal being unloaded. This scale ensures compliance with commercial and regulatory standards and is specially adapted to offshore conditions. It works in tandem with bucket elevators, allowing for the efficient movement of material while maximizing space on the barge for other operational components. The scale is crucial for accurate custody transfer, ensuring all transactions are transparent and precise.
- **3. Shiploader:** the KIKO shiploader is designed for the efficient transfer of grain onto Panamax vessels. It features slewing, luffing and vertical telescopic capabilities, which allow it to adjust to varying vessel sizes and river levels. These movements enable the loader to work effectively regardless of the conditions, maximizing the ship's capacity.

Overcoming Engineering Challenges

Integrating the CombiFlexiport system into the *Grisel N* barge required addressing several engineering challenges. The barge was initially not built to support such heavy equipment, necessitating reinforcement to ensure it could handle the weight and mobility of the system. Additionally, the integration of the commercial bulk scale and the coordination of multiple mechanical and electrical systems in a floating environment required innovative design solutions.

The pneumatic unloader and shiploader were equipped with kick-in/kick-out mechanisms to provide greater operational flexibility. These features, alongside slewing and luffing capabilities, ensure precise handling of materials, even under challenging environmental conditions.

Conclusion: a new era for grain export logistics

The collaboration between GSM and Neuero, as well as the integration of cutting-edge technology, has resulted in the CombiFlexiport CF1000 — a game-changer for grain export logistics. This system is not only designed to overcome the specific challenges posed by the Parana River's declining draught but also sets a new standard in offshore transshipment technology. By combining continuous unloading, accurate weighing, and efficient loading functions, the CombiFlexiport CF1000 enables fully loaded vessels to navigate even in low draught conditions, minimizing wasted cargo space and reducing freight costs.

This solution has the potential to transform the future of grain export logistics, offering new opportunities for transporting bulk goods in increasingly difficult environments. With its innovative approach, the CombiFlexiport CF1000 promises to help Argentina maintain its leadership position in global agricultural exports, despite the challenges posed by fluctuating river conditions.

This innovation represents not only a technical achievement but also a strategic breakthrough in grain export logistics, providing a sustainable solution for handling bulk goods in challenging environments.

Enabling efficient and reliable ship-unloading with radar-based assistance and automation

indurad is firmly committed to improving the safety, efficiency, and automation-readiness of ship-unloading operations through radar-based sensor solutions. As ship-unloaders become larger and operational, more productive expectations continue to rise, there is a growing demand for robust, real-time solutions that provide operators with greater visibility, control, and protection — even under the harshest environmental conditions.

One of indurad's most recent projects exemplifies this approach: the implementation of its iShipunloader solution at Glencore's Port of Quebec facility. This solution was installed on a newly delivered Siwertell screw-type ship-unloader used to handle nickel concentrate and is designed to address two core objectives — collision avoidance and operator assistance through 3D cargo visualization.

How indurad addresses bulk unloading challenges

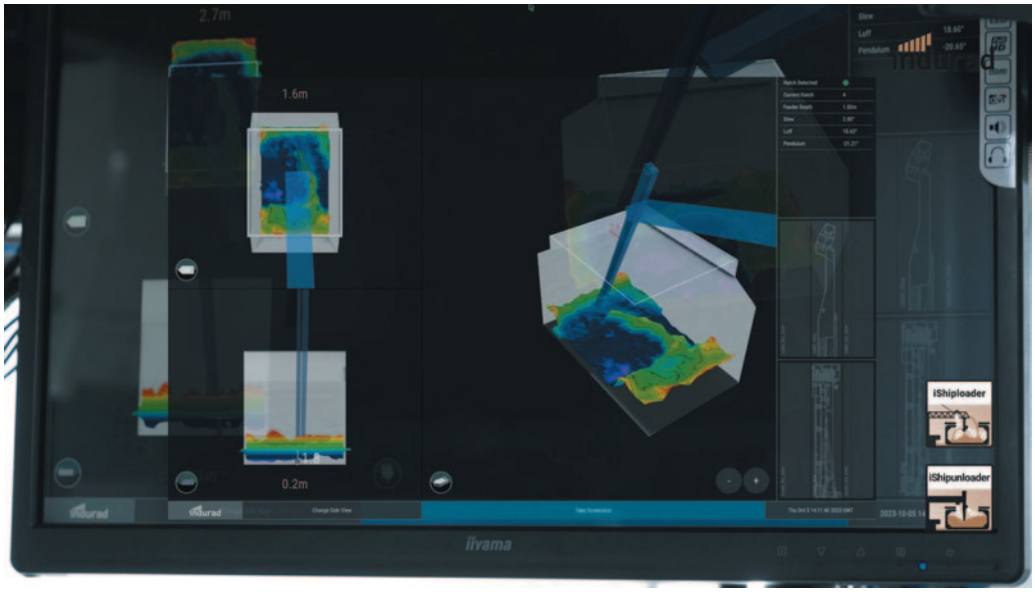
The unloading of nickel concentrate at the Port of Quebec is subject to both operational and environmental constraints. Due to dust emission concerns, fog suppression systems are used, which severely limit the operator's line of sight into the hold. At the same time, the unloader must operate in close proximity to the ship's structures, requiring precise maneuvering to avoid collisions.

indurad's radar-based solution was developed specifically to overcome these issues. It equipped the unloader with a system combining anti-collision sensors and 3D radar scanners to support both operator awareness and process optimization. All hardware and software involved — including the radar sensors, processing units, and visualization tools — are developed by indurad to ensure tight integration and full control over performance and reliability.

What the solution includes

The iShipunloader solution at Glencore integrates two main objectives:

- **Collision avoidance:** 2D radar sensors are placed on critical parts of the ship unloader to scan both horizontally and vertically along the structure. These sensors define virtual zones around the machine to prevent accidental collisions with hatch coamings, cranes, or other shipboard or jetty structures. In the slow-down zone the machine slows down before completely coming



to a hold in the stop zone.

- **Loading assistance:** to compensate for poor visibility due to fog and dust, indurad uses 3D radar sensors mounted on the boom. These provide a continuously updated 3D scan of the cargo inside the ship's hold. GNSS-based position tracking allows indurad to correlate radar data with the exact position of the ship-unloader, generating a real-time topographic map of the material surface. This data is visualized to the operator on a rugged touchscreen unit, providing operator assistance for more precise and efficient unloading.

Designed for harsh conditions and real operation

indurad's sensors are built for the realities of maritime bulk handling — dust, fog, rain, and low visibility. Unlike laser-based solutions, indurad's radar technology is unaffected by airborne particles or weather. Testing conducted jointly with Glencore demonstrated that its radar could successfully detect nickel concentrate through fog and dust suppression conditions. Even when other systems fail, radar continues to deliver reliable data.

From assistance to automation

Although the current deployment is focused on operator assistance, the architecture that indurad has implemented is scalable. By combining radar perception, GNSS-based position tracking, and real-time processing, indurad is enabling a gradual transition toward semi- or fully automated ship-unloading.

This future-readiness was an important part of the project's vision: Glencore aims to automate key aspects of unloading over time to ensure consistent performance and reduced environmental impact.

Broader applications and experience

While this project focuses on nickel concentrate, the underlying technology is applicable to a wide range of dry bulk materials — including coal, iron ore, bauxite, fertilizer, and grain. indurad has implemented radar-based solutions at ports, mines, and terminals across the globe, serving clients such as Fortescue, BHP, and others.

indurad's solutions are used not only for ship-unloaders, but also for shiploaders, stackers, reclaimers, train loading stations, and conveyor monitoring . This experience across the bulk handling value chain allows indurad to develop solutions that are both technically robust and tailored to specific operational needs.

About indurad

indurad (Industrial Radar) specializes in developing radar-based solutions for industrial automation. With its headquarters in Aachen, Germany and a global presence through offices and partners, it serves clients in mining, ports, and other bulk industry worldwide. indurad has recently been acquired by Hexagon AB.

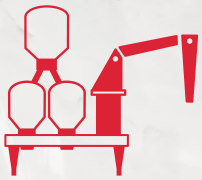
This connection brings numerous synergies, enhances service capabilities, and opens up new markets for indurad solutions.

Final thoughts

At indurad, radar is seen as a foundational technology to establish digital reality in the future of bulk handling — one that provides reliable, real-time data even when visibility is poor and conditions are challenging. indurad's work at Glencore's Port of Quebec demonstrates how combining radar perception with machine integration and user-friendly interfaces can lead to safer, more efficient, and ultimately more sustainable port operations.

The answer to your bulk handling questions

Ship unloaders



Road mobile ship unloaders

Storage & reclaim

Convey units

Truck loading

Ship loaders

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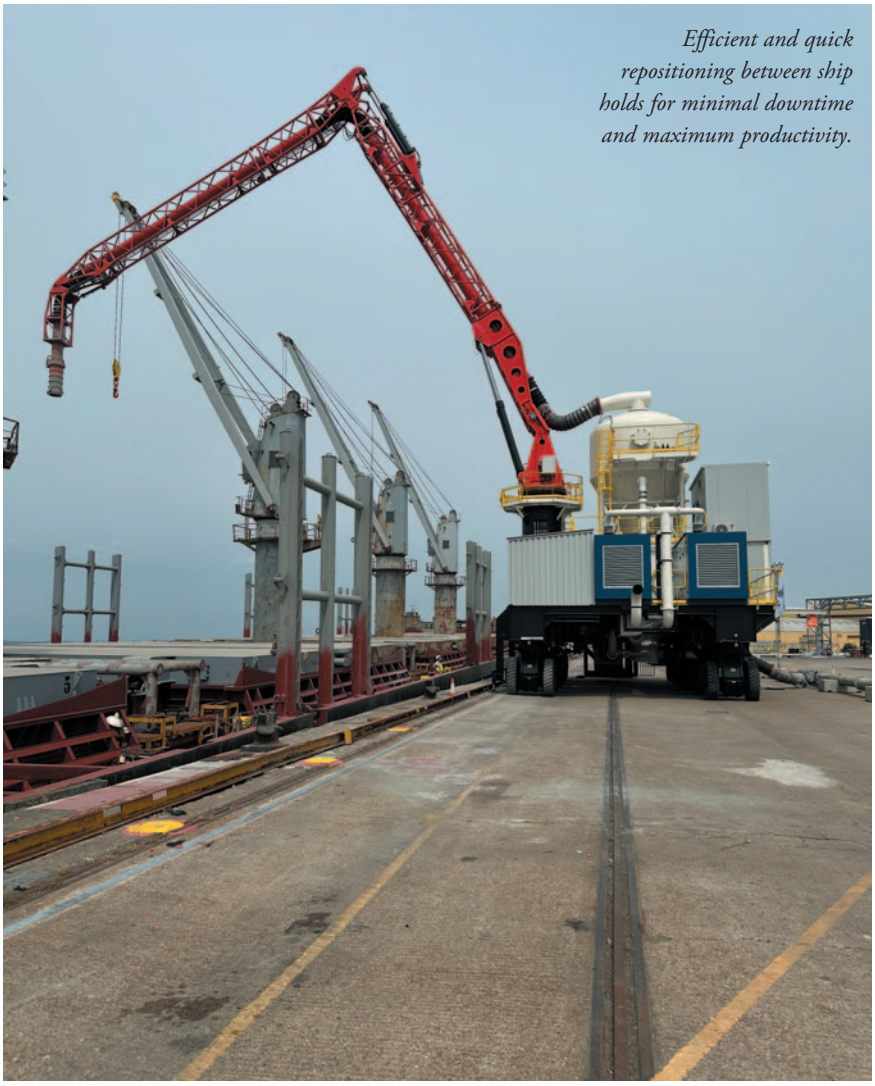
VAN AALST
BULK HANDLING

Smart mobility for heavy loads: how Van Aalst Bulk Handling overcomes quay load limitations



Efficient and quick repositioning between ship holds for minimal downtime and maximum productivity.

In the world of bulk handling, efficiency often comes down to millimeters and metric tonnes. Port infrastructures often have their limits, and unloading equipment is becoming larger and more powerful to meet the growing demand. This presents operators with a challenge: how to maintain mobility and stability with machines exerting high wheel loads on quays that are structurally limited?

Van Aalst Bulk Handling, a prominent Dutch company based in Hazerswoude-Dorp and specialized in pneumatic bulk handling systems, offers a smart solution. It latest mobile ship-unloader, recently delivered to Invicta Cementitious Solutions in the United Kingdom, proves that even with heavy equipment, flexibility and performance can go hand in hand without compromising safety.

The challenge: limited quay pressure vs. heavier equipment

Many modern port quays are designed for specific load profiles. As equipment becomes more powerful and larger, wheel pressure increases. At the same time, many existing quays can only tolerate limited point loads. Without mitigation, this either means investing in costly quay reinforcement or reducing machine performance, neither of which is a preferred option.

The Solution: Intelligent Load Distribution and Advanced Steering System.

Invicta Cementitious Solutions, active in the logistics of cementitious products across the UK, faced exactly this dilemma. For its new terminal, its needed a high-performance mobile unloading unit, but its quay infrastructure couldn't support the extreme wheel loads.

The solution: intelligent load distribution and advanced steering

Van Aalst Bulk Handling engineered a tailor-made ship-unloader specifically for this situation, one that intelligently distributes its load across multiple wheel sets. The unit features 12 hydraulically suspended and actively steered wheel sets. These suspension systems ensure that vertical pressure at any point remains within quay load limits, even as the working machine continuously shifts its centre of gravity through its moving suction arm in the ship.

"One of the biggest challenges with mobile unloaders is that the load distribution is constantly changing," explains Max Grootjans, Technical Project Engineer at Van Aalst. "The suction arm moves, the load continuously shifts, and yet pressures on the quay must remain within limits. That's why we opted for a fully hydraulic suspension system, coupled with a cutting-edge load detection and control system."

In addition, the advanced steering system allows this large machine to manoeuvre with remarkable precision. Thanks to multiple driving modes, including crab steering, rotation mode, and diagonal movement, the operator can efficiently reposition the machine between ship holds without unnecessary back-and-forth movements.

Van Aalst ship-unloader unloading a 40,000dwt bulk vessel.

Deployment at Invicta Cementitious Solutions

Since its commissioning, the machine has been in successful operation unloading dry bulk such as cement, fly ash, and GGFBS at Invicta's site. The machine discharges directly into the storage facilities via a 450-metre-long enclosed pneumatic discharge system, avoiding dust emissions.

Invicta has appreciated the machine's reliability and user-friendly operation. "What Van Aalst delivers is not just a machine, it's a complete solution," says Alper Atik Bayram, Technical Affairs Director of Invicta. "From day one, the collaboration was hands-on, the engineering support was solid, and the instructions for use and maintenance were clear."

New sleek lattice-type suction arm design with smooth piping, easier to operate and over 20% lighter.

About Van Aalst Bulk Handling

Van Aalst Bulk Handling is a family-owned company based in Hazerswoude-Dorp, the Netherlands, with decades of experience in designing and building pneumatic conveying equipment. The company supplies mobile and stationary ship-unloaders, loaders, conveying units and steel silo systems to clients in the construction branch worldwide.

What sets Van Aalst apart is its custom approach. No installation is off-the-shelf. Every piece of equipment is designed with the end user and specific site conditions in mind. Whether it's road mobile configurations, ASME certification, or complex mobility requirements, Van Aalst is the problem-solving partner.

With its own growing engineering department and service team, Van Aalst offers a fine combination of experience, flexibility, technical knowledge, and operational reliability. The project with Invicta Cementitious Solutions is just one example demonstration of how smart engineering can overcome physical limitations.

Conclusion

Mobility, performance, and safety continue to be key themes in the bulk handling industry. Thanks to innovative solutions like those from Van Aalst Bulk Handling, companies as Invicta Cementitious Solutions can achieve their operational goals without compromising infrastructure, throughput, or sustainability.

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KOCH Solutions stands at the vanguard of material handling, driving progress with over three centuries of combined expertise and a global portfolio boasting 10,000 projects. At KOCH Solutions, we are redefining material handling excellence with our advanced stockyard systems. Meticulously engineered to cater to the dynamic demands of high-capacity operations, our solutions stand out for their modular innovation and seamless integration into existing workflows. Crafted from a blend of tried-and-tested components, each system we devise is a testament to our commitment to tailor-made efficiency. We don't just provide equipment; we deliver comprehensive, turnkey solutions that resonate with your unique specifications, ensuring operational effectiveness paired with economical investment and operating costs. Our ethos is to forge a path of progress in material handling that aligns with your vision of growth and efficiency.

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Another E-Crane® successfully delivered to Port of Coeymans (USA)

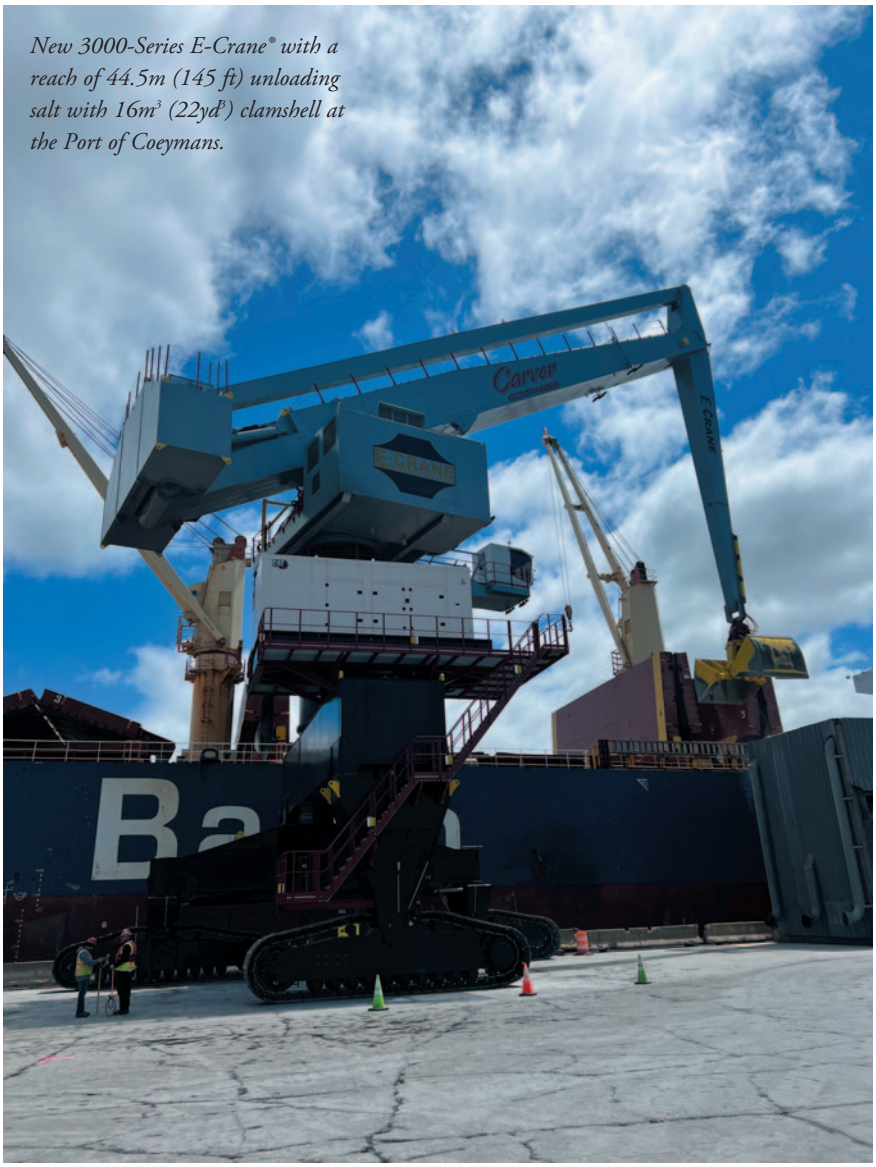
Unloading and loading with E-Crane's first mobile crawler crane for the Port of Coeymans

E-Crane® has once again taken a bold step forward with the successful delivery of its first mobile crawler crane to the Port of Coeymans (USA). This impressive machine, weighing 600 tonnes, combines exceptional performance with unmatched mobility — a true world first in its class.

E-Crane® CEO Lieven Bauwens explains: "This crane offers a reach of 44.5 metres (145 ft) and a lifting capacity of 39 tonnes. Its extremely short swing radius of just 10 metres (34 ft) provides outstanding manoeuvrability — even in tight terminal environments like the Port of Coeymans. This level of mobility is made possible by a unique three-crawler portal with true steering geometry and a clearance height of 6 metres (20 ft)."

Matt Hofmann, operations manager at Carver Companies, adds: "I've had a lot of experience with our floating E-Cranes®, but I was especially looking forward to the new tilting spreader for our skips. Alongside the crane, a specially engineered spreader was commissioned, designed specifically to handle our bulk buckets — or skips. During initial testing with gravel, we managed to load and dump up to 22 tonnes per cycle with ease. That exceeded even my most optimistic expectations."

Bauwens concludes: "Carver Companies is the kind of customer that always pushes us a little further. They challenge us, inspire us, and motivate us. They think ahead, roll up their sleeves, search for solutions, and aren't afraid to break new ground. We're grateful for their trust and the constructive collaboration throughout the development of this tailored solution for the Port of Coeymans."



New 3000-Series E-Crane® with a reach of 44.5m (145 ft) unloading salt with 16m³ (22yd³) clamshell at the Port of Coeymans.

Bulk pan handling has never been easier, safer, or more efficient. It takes the wheel loader longer to fill the 22-tonne gravel pan than it takes the E-Crane to swing 120° and unload the material onto the stockpile. Switching between grab and bulk pan is quick and effortless thanks to the E-Crane quick connect system. This makes the E-Crane the most versatile piece of equipment the terminal.

The commercial deployment of the special spreader followed shortly after testing, with the successful loading of scrap into a Handymax-vessel. The new concept proved its value from day one.

With this mobile crawler crane solution and the development of a dedicated skip spreader, E-Crane® once again confirms its role as an industry pioneer in bulk material handling technology.

About Carver Companies

For over 30 years, Carver Companies fundamental belief has been to provide superb service all while maintaining its values of honesty and integrity both on land and sea. The company prides itself on its

PREMIUM COMPONENTS FOR MATERIAL HANDLING

Rulmeca offers a wide range of quality Rollers/Idlers, Motorized Pulleys, Pulleys and components used in the most demanding applications in belt conveyors material handling. We are close to you, whenever you need us, with a global network of sales and service centers.

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excellent logistics services and superior products to its customers, partners and tenants. It works hard to inspire its diverse, well-rounded workforce and management team to always perform at the highest levels of safety and professionalism.

Carver Companies has a long-term vision of growth that will transform the way its clients respond to challenges. It becomes its customers' partner in comprehensive project management. It provides resources, unlike any other organization, and in turn can respond quickly to its client's needs, no matter how unique.

Reaching for the bottom of this Handymax ship is easy and reaching underneath(!) the hatch coamings guarantee full coverage of the bottom of the ships hold.

About E-Crane®

E-Crane® offers tailor-made solutions to meet the needs for high productivity and reliable handling of scrap, grain, coal, cement clinker, or any other bulk material, while striving to optimize operations, increase efficiency, and lower costs. As a heavy equipment design and construction company based in Belgium — with subsidiary companies in the USA, Brazil, the Netherlands, Poland, Singapore, Indonesia and Bangladesh — E-Crane® has been providing reliable solutions for the past 35 years to the recycling and bulk handling industries. With a global network of agents, it offers local support from certified E-Crane® service engineers.

E-Crane®'s mobile crawler crane provides uninterrupted quay logistics

E-Crane® is proud of its groundbreaking crawler crane concept that combines full machine mobility with uninterrupted logistical flow along the quay. Designed for E-Cranes with an operating weight between 400 and 750 tonnes, this innovative solution offers unique advantages for bulk terminals where flexibility, efficiency, and infrastructure preservation are key.

Key features of the concept:

- **Stable tripod configuration:** the crane is mounted on a triangular undercarriage (tripod), with the slewing ring positioned at the center of gravity. This ensures maximum stability and optimal weight distribution during both operation and travel.
- **High portal design with generous clearance:** the tripod is combined with an elevated portal structure, offering approximately nine metres of drive-through width and six metres of vertical clearance. This allows uninterrupted passage of quay traffic, including trucks, reach stackers, and other mobile equipment.
- **Minimal impact on quay surface:** thanks to the steering crawlers — with two out of three tracks capable of pivoting around a vertical axis to determine the driving direction — combined with flat track shoes, maneuvering is smooth and efficient with minimal load and wear on the quay surface.
- **Maximum deployment flexibility across the terminal:** due to its exceptional mobility and manoeuvrability, the crane can be deployed flexibly — not only along the quay, but also in various other areas across the terminal, depending on operational requirements.
- **Pendulum-mounted crawlers for optimal load distribution:** each crawler track is mounted on a pendulum suspension system, allowing continuous and automatic adaptation to surface irregularities. This ensures even distribution of ground pressure, even on uneven terrain.

With this new crawler crane concept, E-Crane® responds to the growing demand for heavy-duty, mobile, and quay-friendly crane solutions in the bulk handling industry.

RIKON RPS-640

ONE CRANE, ALL CARGOES

JSC RIKON is a European manufacturer of a wide range of all-electric cranes — from Double Jib Level Luffing to remotely operated Barge RMGs and fully automated RMGs. Engineered for peak performance in ship unloading, ensuring efficiency, precision, and reliability for all cargo types.

RIKON

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City Group Expands E-Crane fleet to boost bulk handling operations

As one of Bangladesh's foremost industrial powerhouses, City Group continues to set benchmarks in operational efficiency and innovation through a long-standing partnership with E-Crane. Today, City Group proudly operates 12 high-performance E-Cranes comprising: three units of 700 series, six units of 1000B series and three units of 1500C series E-Cranes — each selected to meet the growing demands of its dynamic operations.

The journey began in 2005, with the installation of the first 700 series E-Crane at City Sugar Industries, a subsidiary of City Group located in Rupshi, Rupganj, Narayanganj. Tasked with unloading various bulk materials such as raw sugar, soya seed, wheat, and mustard seed from ships, the E-Crane demonstrated unmatched speed, precision and efficiency. Inspired by this success, City Group expanded its fleet with additional units in 2008 and 2010.

With the expansion of business operations and growing demand for bulk material handling, City Group installed a 1000B series E-Crane in 2014 at another of its subsidiaries — City Auto Rice Mill. This was followed by a major upgrade at City Sugar Industries in 2018, where the 700 series E-Cranes were replaced with state-of-the-art 1000C series models.

By 2021, three more 1000C series E-Cranes were installed at the same facility. Recognizing the advantages of E-Crane's technology, City Group took another major step in 2024 and installed three 1500C series E-Cranes at its newly established UK Bangla Cement Factory.

From sugar to cement, City Group's trust in E-Crane is built on years of reliable performance, low maintenance costs, and responsive after-sales support. This progressive adoption of E-Crane reflects City Group's commitment to operational excellence, efficiency and together they continue to redefine possibilities within industrial operations, establishing higher benchmarks for productivity.

Unloading and so much more: crane automation is accelerating the transition from IoT to AoT

From IoT to AoT – the next evolution in industrial automation

For over a decade, the Internet of Things (IoT) has transformed industries by connecting devices, enabling data exchange, and optimizing processes. From smart sensors to cloud computing, IoT has made industrial systems more intelligent — yet largely static. Now, a new revolution is emerging: the Autonomy of Things (AoT), where machines do not just communicate — they also move and act independently.

In ports, mines, and power plants, crane automation is at the forefront of this shift. Traditional cranes rely on skilled operators who must navigate complex challenges:

- **Precision of control:** the inertia of heavy loads makes it difficult to control spreader movement, increasing collision risks. During long periods of a loading/unloading operation, any drop in the alertness level of the operator further increases safety risks.
- **Harsh environments:** the on-site work environment is harsh, and operators are at risk of developing occupational health issues.
- **Dependency on skilled operators:** as the current generation of operators age, fewer and fewer younger workers are entering the field. Following this trend, the dry bulk cargo industry will eventually struggle to find the necessary workforce to meet its needs.

AoT eliminates these limitations by introducing autonomous cranes — machines that see, think, and act with safety, precision, and efficiency.

The automated workflow: how it works

1. Intelligent 3D vision — the eyes of automation

At the core of the system from Shanghai Rays Electronic & Tech Co., Ltd is high-precision 3D LiDAR scanning, which acts as the 'eyes' of the system.

- **Real-time ship and cargo scanning** generates a dynamic 3D model of the ship and cargo.
- **Pointcloud-based vision software** identifies the safe working zone by automatically detecting the bounds of the ship hatch. Shanghai Rays' vision software also determines the optimal grab point and converts it into control commands.
- **Continuous monitoring** adjusts for changing ship attitude and environmental factors, ensuring that safe operating conditions and unloading efficiency are maintained at all times.

Shanghai Rays has deployed such automation systems for multiple heavy machineries within ports across China. In order to meet the needs of its customers, it developed autonomous vision control systems for portal crane unloaders, ship-unloaders, bucket wheel reclaimers, and other port heavy machinery.

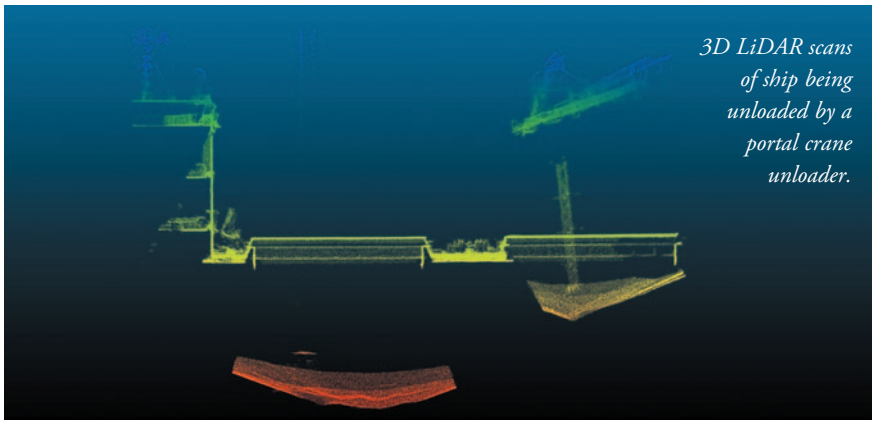
2. Programmable logic controller — the hands of automation

Shanghai Rays Electronic & Tech Co., Ltd has more than 20 years of experience working in the electric control industry. Most of its technical staff have more than ten years of experience in industrial automation technology development, design, installation, and commissioning of large terminal electrical control systems.

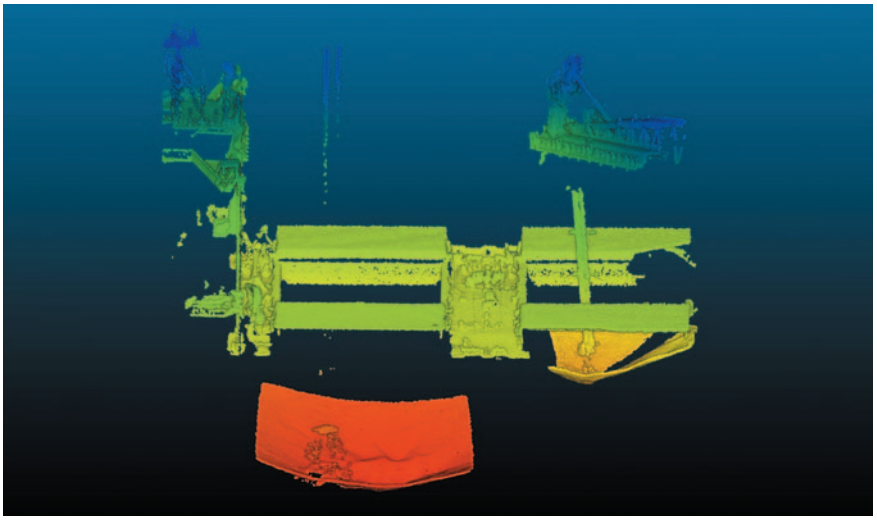
It is precisely this experience that enables the systems to translate the digitized information from high precision visual control software into safe and efficient control.

- **Efficiency:** based on the working conditions, Shanghai Rays' autonomous systems boast close to, and even exceeding, human operator level of efficiency (95~105%) in shiploading and unloading.
- **Automation rate:** Shanghai Rays'

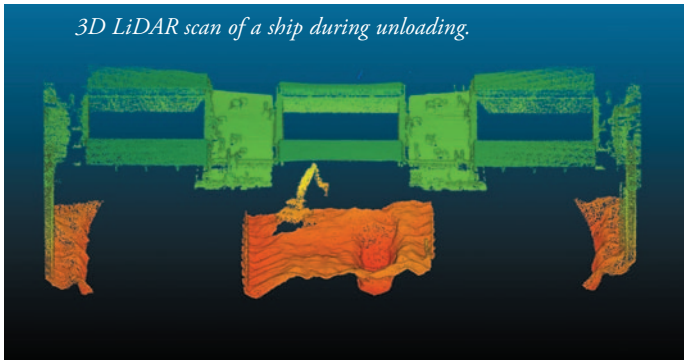
Portal crane unloader.

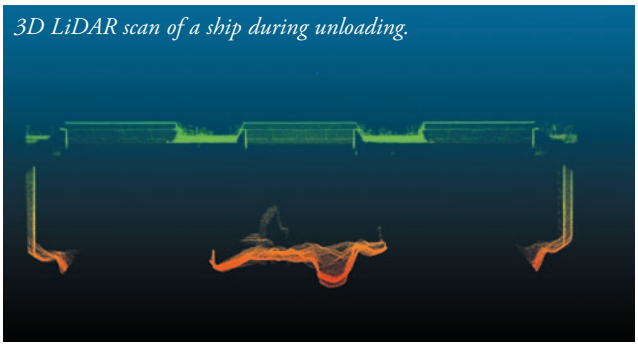


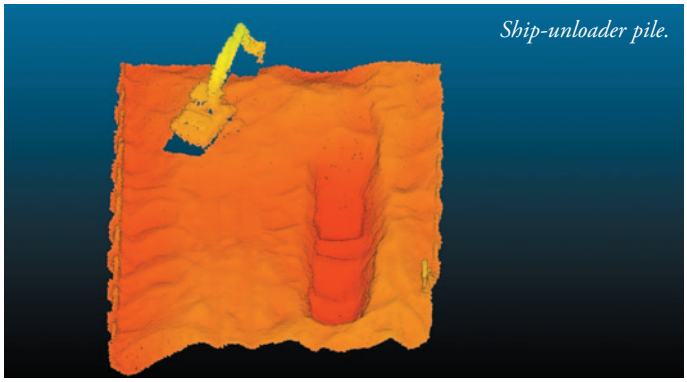
3D LiDAR scans of ship being unloaded by a portal crane unloader.




Ship-unloader.


3D LiDAR scan of a ship during unloading.


3D LiDAR scan of a ship during unloading.


Ship-unloader pile.

automation rates average in the range of 85~95%. For high automation rate projects, one operator to multiple control system operations are regularly conducted to reduce the demand for operators.

- **Sway control:** real time LiDAR scanning is used to provide closed loop bucket sway feedback to the PLC control system, developed in a joint venture between ICRAS Motion Control Solutions and Shanghai Rays; this can automatically handle sway dampening controls as well as warn the user of unexpected motions during automation.

The visual control systems deliver these kinds of results while providing added layers of safety monitoring. By leveraging its experience in electric control systems, Shanghai Rays fine tunes the control systems to avoid unnecessary wear and tear due to excessive force during operation.

3. The Digital Yard System (DYS) — the brain behind operations

Beyond individual cranes, the Digital Yard System (DYS) integrates UAV-based real-time data, historical trends, and predictive planning to optimize entire port operations.

- **Multi-sensor fusion** combines drone scans, gantry-mounted LiDAR, and GPS to create a live 3D digital twin of the stockyard.
- **Automated pile detection** calculates storage capacity, identifies available space, and suggests optimal material stacking.
- **Real-time synchronization with production logistics** ensures precise cargo matching.
- **Integration with production logistics and real time machinery automation information** enables


Bucketwheel reclaimer.

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Konecranes Gottwald Cranes on Barge are a power of transshipment on waterways. Our Generation 6 will impress you with their ability to handle any kind of cargo. They are fully certified for barge operations under the Lloyd's Register Code for Lifting Applicances in Marine Environments. They open up new horizons for continuous cargo handling in the open sea.
Strengthen your transshipment with our new Generation 6!

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data-driven planning both in real time and in long term.

Real-time transmission & processing

- Live data streaming from drones to ground servers.
- Fast 3D model generation via fused Lidar, IMU, and camera data.
- Automated pile detection updates inventory records within minutes - not hours.

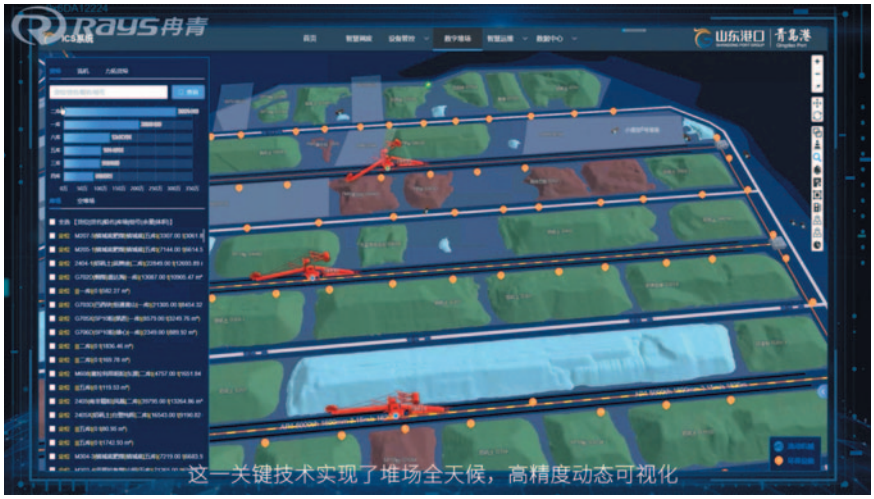
This minimized latency in data processing ensures port operations always have the most up-to-date view for decision-making.

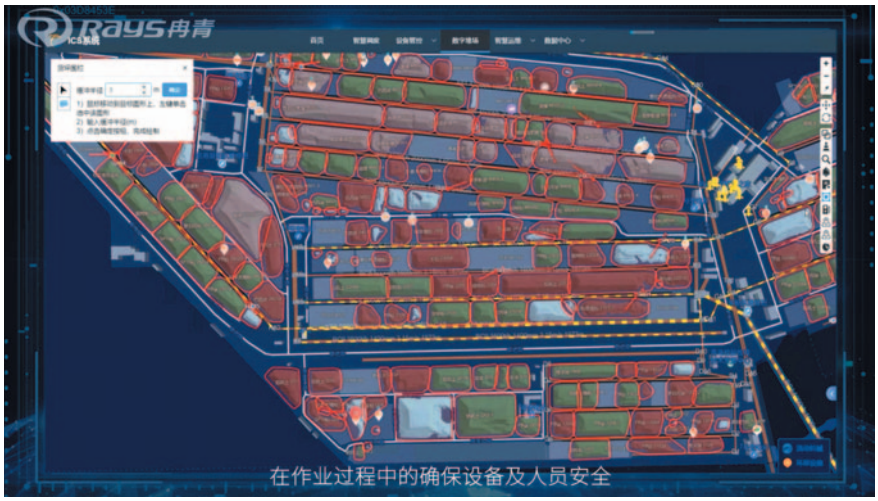
Conclusion: the future is autonomous

The shift from IoT to AoT is not just about technological advancement, it is about redefining safety, efficiency, and precision in industrial operations.

- **Safer ports:** no more risky manual operations.
- **Faster operations:** data-driven planning and improved efficiency of control.
- **Transparent logistics:** real-time tracking from ship to stockpile and beyond.

With crane automation and its digital yard system, Shanghai Rays is transforming ports into smart, self-optimizing hubs of the future.





About Shanghai Rays Electronic & Tech Co., Ltd

Shanghai Rays is committed to becoming a leading provider of intelligent solutions for port machinery in the world. Its automated solutions have been achieved in many bulk cargo projects, such as stacker-reclaimers, stackers, reclaimers, ship-unloaders, shiploaders, portal crane unloaders, train loaders and so on. Its automation can achieve 'co-ordinated automation among multi cranes', which means one person can monitor and operate multiple cranes at the same time. In this way, Shanghai Rays seeks to achieve the goal of unmanned operations, crane automation, and digitization of yard management.

Shanghai Rays' intelligent solutions are in operation in many well-known terminals around the world, including: Qingdao Port; Yantai Port; Bohai Bay Port; Shanghai Port; Ningbo Port; Tianjin Port; Shenzhen Yantian Port; Dalian Port; Fujian Luoyu Port; Bangkok Port in Thailand; and the Port of Barcelona in Spain. Meanwhile, its automated system has successful cases in domestic steel mills and power plants as well as the field of intelligent logistics.

The company has established a system software development centre and a large-scale remote visualization operation and maintenance centre. Shanghai Rays Electronic & Tech Co., Ltd is committed to providing high-quality products and fast technical service for domestic and foreign users.

WHY USE BOTH UAVS AND GANTRY-MOUNTED SENSORS?

UAV (Drone) Scans	Bucketwheel reclaimer (BWR) scans
Port-wide perspective (updated periodically)	**Localized, real-time updates** in high-activity zones
Captures **long-term stockpile changes**	Less affected by **weather disruptions**
Ideal for **strategic planning**	Optimized for **immediate operational adjustments**

ONE CONVEYOR ENDLESS POSSIBILITIES

SUPERIOR®

TELESTACKER® CONVEYOR

REDUCE MOVES, LOAD SMARTER

Its telescoping reach and 360° mobility minimize feed point adjustments to load in fewer moves while preserving material quality.

TRUCK IN, SHIP OUT

Efficiently and quickly transfer your materials from truck to ship with seamless unloading, reduced handling, and optimized flow.

BUILD BIGGER, BETTER STOCKPILES

Create higher capacity stockpiles with reduced material segregation and optimized storage capacity on tight footprints at the terminal.

UNLOAD, TRANSFER & STACK

Handle ship unloading, material transfers, and stockpiling, maximizing efficiency and reducing equipment needs at the docks.

superior-ind.com

Advancing efficiency and sustainability in cargo handling

The dry cargo sector relies heavily on efficient and thorough ship-unloading and cargo handling, and a critical, often overlooked, aspect of this process is cargo hold cleaning.

Ensuring cargo holds are immaculately clean between shipments is paramount for preventing cross-contamination and swift vessel turnarounds.

CLIIN Robotics offers robotic cleaning solutions that redefine industry standards for safety, efficiency, and environmental responsibility.

Cleaning up coal from the hold of a bulker.

Background: a vision for using robot technology

CLIIN Robotics was founded by three Danish students on the premise that sustainability and operational cost improvements can be achieved simultaneously through the use of robot technology.

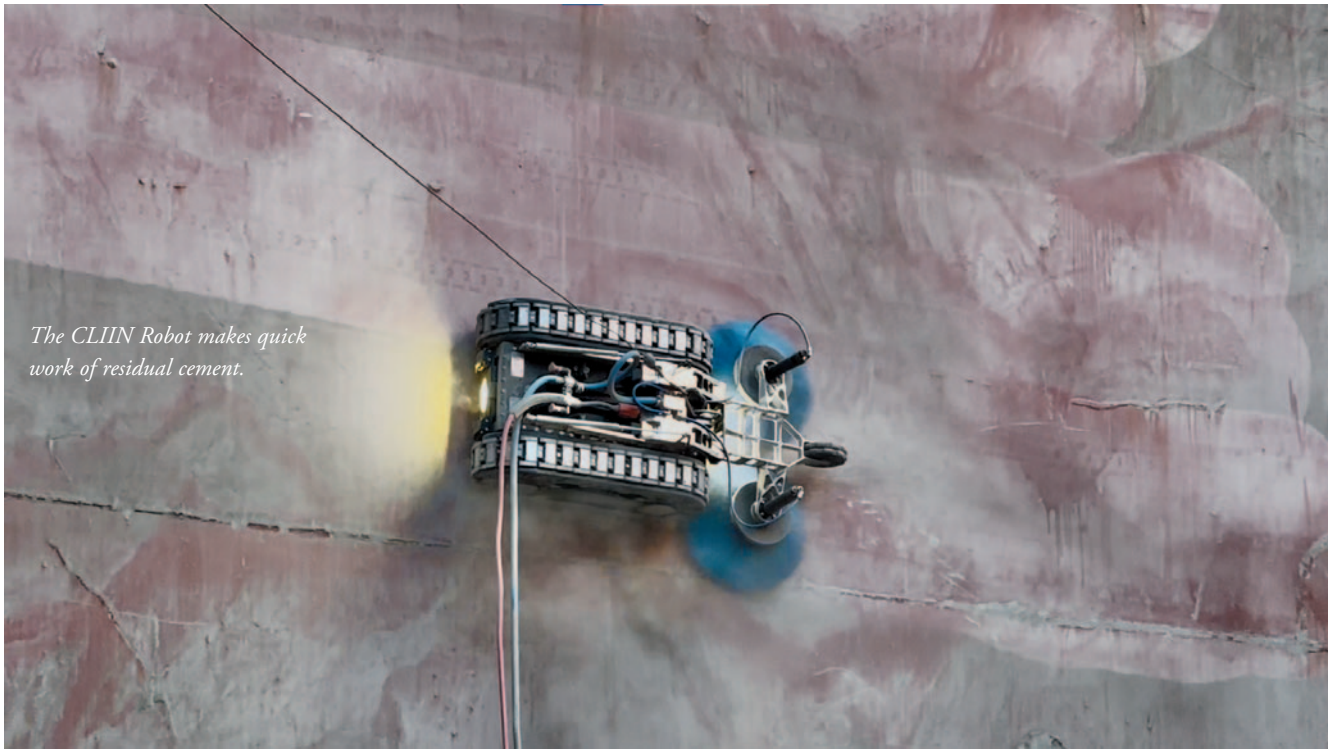
With a strong background in industries, shipping and vessel coating, the founders set out to develop a versatile robotic system that would address critical pain points in heavy industries, particularly shipping and oil & gas.

Headquartered in Copenhagen, Denmark, CLIIN Robotics has rapidly expanded its global presence, with agents in shipping hubs such as Singapore, India, Japan and Greece.

Customize your robot

The CLIIN Robot is a versatile magnetic crawler robot, built with highly durable, non-corrosive materials. Its patented magnetic support system and tracks ensure exceptional adhesion, allowing it to navigate even challenging surfaces, including obstacles and cleaning in hard-to-reach

CLIIN Robot in operation.



The CLIIN Robot makes quick work of residual cement.

areas.

The robot is equipped with a tooling plate for attaching different tools or gear on top.

The robot performs industrial cleaning and inspection jobs that require working at heights, and with customized tools, the robot can simplify jobs across industries.

CLIIN Robotics specializes in cargo hold, tank and hull cleaning.

The CLIIN Cargo Hold Robot (CHR): revolutionizing cleaning operations

At the heart of CLIIN Robotics' offering for the cargo hold market is the **Cargo Hold Robot (CHR)**.

The CHR is fully functional on topside tanks (angles up to 60°), between and behind frames, on hopper tanks, stools (angles up to 75°), and front corrugated bulkheads.

The robot is compact enough to fit between cargo hold frames, and it is easy to handle, requiring only two people for cleaning operations, which reduces the need for an extensive crew.

The CHR uses **high-pressure freshwater cleaning**, eliminating the need for the use of harmful chemicals in cargo hold cleaning.

This single-step freshwater process significantly reduces environmental impact and the generation of hazardous sludge. With an in-line heater for the water, it is possible to reach temperatures up to 60° Celsius, to tackle more stubborn residues.

The versatility of the CHR is enhanced by its modular tool mounting system, allowing for various cleaning attachments. This enables the CHR to effectively clean most cargos, including demanding materials such as coal, iron ore, cement, and other bulk materials.

Dry cleaning for cement cargo holds

Cleaning a cargo hold after cement is an extremely difficult and costly task.

If you use liquids, you will end up with solid rock instead of a clean hold. Using cherry pickers and manpower results in a costly solution.

This challenge has led to the development of a new specialized brush, designed to dry clean cement cargo holds. At present, CLIIN Robotics is the only provider worldwide who can offer dry cleaning of cement.

The cement brush easily attaches to the robot through a simple clip system.

The innovative air-driven brush tool with four brushes and a pressure reduction valve, for effective dry cleaning, also reduces dust, ensuring a safer and dust-free environment, thus safeguarding the well-being of workers.

Controlled by a remote control, the CHR robot can be operated from a safe distance on the ground, minimizing exposure to harmful cement dust.

Additionally, the cleaning operation reduces the need for cherry pickers and minimizes the number of personnel involved.

Cleaning cement has historically been a significant challenge, but CLIIN Robotics' new Cement Cleaning Tool empowers its robot, making the impossible a reality.

Staying competitive: safety, efficiency, and sustainability

CLIIN Robotics has a relentless focus on:

- **Enhanced safety:** by deploying the CHR, the need for human workers to perform dangerous tasks at heights or in confined spaces within the cargo hold is virtually eliminated. This significantly reduces the risk of accidents and improves the overall working environment.
- **Unmatched efficiency:** the CHR drastically cuts cleaning time by up to 50% compared to conventional cleaning multi-step methods, where you have to set up scaffolding and use a large team of workers. This leads to faster vessel turnaround times, maximizing laden days, and improving profitability for shipping companies. The robot's ability to clean even while the ship is sailing (with hatches closed) further boosts operational efficiency.
- **Environmental responsibility:** the core principle of using only freshwater for cleaning, thereby eliminating harmful chemicals, positions CLIIN Robotics as a leader in sustainable maritime solutions. This aligns perfectly with the increasing global focus on reducing the shipping industry's environmental footprint and adhering to stricter regulations.
- **Technological innovation:** continuous development in collaboration with customers is a cornerstone of CLIIN Robotics' strategy. The development of cement brush tools was a clear result and demonstrates CLIIN

Cleaning petcoke from the walls of the hold.

Robotics' flexibility and commitment to continue solving the challenges that its customers face.

- **User-focus:** the CHR is designed for ease of use. It is easy to operate by the vessel's crew, requiring minimal training. This empowers crews to manage cleaning operations in-house, reducing reliance on external cleaning contractors and further driving down operational costs.

Shipping industry steers towards new horizons

The shipping industry is undergoing a significant transformation, driven by an increasing focus on sustainable and safe maritime practices.

Shipping operator Royal Wagenborg has invested in cargo hold robots to perform its cleaning.

Andreas Beikes, Cargo Superintendent at Royal Wagenborg, shared his experience: "The CLIIN robot has truly transformed our cargo hold cleaning operations. We've enhanced not only safety and sustainability but also seen a significant boost in efficiency. It's incredibly easy to use, allowing our cleaning crews to operate it effectively, which means we are now able to leave port a whole day earlier than before."

Outlook

The future of cargo hold cleaning is here: are you ready?

Industries everywhere are embracing advanced automation using robots and the cargo hold cleaning is next.

Outdated and dangerous cleaning methods are a thing of the past; it's time to embrace the possibilities that robotic cleaning solutions offer.

Invest in a safer and more sustainable future and gain new levels of performance and a strong return on investment.

Facts

- **Cleaning capacity:** covers 500-800m²/h.
- **Weight:** 89kg.
- Dimensions: L747mm x W562mm x H310mm.
- **Power requirements:** operates on 100–-240V, 13A+ at 50–60Hz with a high-pressure system.
- **Pressure resistance:** successfully passed submersion tests up to 60 metres in repeated cycles, crash testing at depths exceeding 100 metres, and IP69K high-pressure steam washing.
- **Submersible endurance:** proven reliability with over 4,000 hours of continuous underwater operation.
- **Vertical lifting capacity:** capable of lifting up to 250kg vertically.
- **Impressive torque:** boasts a peak torque of +1,800Nm, surpassing that of modern electric cars.
- **Durable construction:** crafted in Denmark from advanced, non-corrosive materials including duplex stainless steel, titanium, carbon glass, reinforced polymers, ensuring long-lasting performance and resistance to chemicals.
- **Impact testing:** achieved IK10 rating. Tested with a 1,000g mass dropped from 400mm onto light-transmitting parts, and from 700mm onto connectors.
- **Extreme temperatures:** the robot was tested for 672 hours at 80°C and for 24 hours at –25°C.

Sumitomo CSUs – continuous innovation since 1978

Since delivering the first bucket elevator (BE) type continuous ship-unloader (CSU) in 1978, Sumitomo Heavy Industries Material Handling Systems has remained at the forefront of the industry. Through continuous innovation, its machines have consistently demonstrated high unloading efficiency and reliability, securing its position as a top player with 85 units delivered or under construction, primarily for the power generation and steel sectors. Sumitomo Heavy Industries' success in handling challenging multi-materials like iron ore and coal with its BE type CSU has been particularly notable, earning the company significant trust from its customers.

Over the past few years, the company has been delivering 1,500tph (tonnes per hour) of high-performance BE type CSUs to coal-fired power plants in Japan. This equipment is highly valued by customers for its high cargo handling efficiency and excellent reliability. It helps reduce operating costs and the burden of maintenance, and improves long-term customer satisfaction by enabling stable operation under strict conditions. In addition, the BE type CSU provides peace of mind to Sumitomo Heavy Industries' customers with regular maintenance and support. As a result, many domestic coal-fired power plants continue to choose its products as proof of trust.

The company also has experience delivering a 1,200tph bucket elevator type continuous unloader tailored for unloading coal barges for PT. Semen Tonasa, located in Sulawesi, Indonesia. This project exemplifies Sumitomo Heavy Industries' ability to meet the specific needs of international clients with reliable and high-performance equipment.

Regarding high cargo handling efficiency, the 'swing' mechanism reduces the remaining load on the bottom of the ship and minimizes the work of heavy machinery on board. Although lifting bottom cargo can lower overall efficiency, our BE type CSU employs this 'swing' mechanism to mitigate inefficiencies by addressing the handling challenges of bottom cargo.

In addition, the hydraulic system has many consumable parts, complex mechanisms, and a high risk of failure, so the BE type CSU drives most of its functions electrically, improving serviceability. Therefore, reliability is enhanced through improvements based on many previous operational performances.

The demand for screw unloaders for power plants using wood biomass as fuel is still high in Japan. As a result, Sumitomo Heavy Industries' vertical screw type continuous unloader (VSC) has been active as the company's main product. With the expansion of the use of wood biomass, efficient and reliable cargo handling systems are required in power plants aiming for sustainable energy supply. The VSCs are especially capable in transportation and durability, playing an important role in supporting a stable supply of biomass fuel. Against this background, Sumitomo Heavy Industries' products have been introduced to many power plants and are highly trusted within the industry.

From now on, Sumitomo Heavy Industries would like to actively provide its products not only to the domestic market but also to overseas steel and power plants. In areas where infrastructure development and environmental regulations have been strengthened, especially in Asia and Europe, the number of situations requiring high-performance equipment from Sumitomo Heavy Industries is increasing.

In these markets, Sumitomo Heavy Industries believes that the efficiency of power generation and steelmaking using coal and wood biomass is increasing, and that its technical capabilities and quality will be of great help. By expanding to overseas markets, the company intends to actively engage in sales activities with the aim of becoming a company trusted by more customers.

Inland port Basel relies on SENNEBOGEN EQ Balancer

In the Rhine port of Basel, near the tri-border area, a newly delivered SENNEBOGEN EQ Balancer in the inland port impresses with its efficiency and environmental friendliness. With an impressive cycle time of just 30 seconds, the machine sets new standards in port handling. With this new acquisition, Rhenus Port Logistics AG strengthens its partnership and, after the previous delivery of an identical balancer material handler, continues to rely on the proven technology from SENNEBOGEN.

The Balancer principle reduces energy consumption by up to 75 % compared to a conventional handling machine – saving 14 tonnes of CO_2 per year at the site.

Trans-European hub

As the southernmost Rhine port, Basel's inland port plays a key role in trans-European freight transport. Its strategic location in the tri-border area, with access to Europe's most important waterway, serves as a transshipment hub between major seaports such as Rotterdam, Antwerp, and Amsterdam and the European inland. Rhenus, a globally operating logistics provider, uses the site for loading bulk goods, general cargo, and heavy loads. This is where the SENNEBOGEN EQ Balancer shows its full potential with a reach of 30 meters and an impressive load capacity.

The asymmetrical portal of the Balancer was individually adapted to the conditions of the Basel harbour.

Up to 14 tonnes of CO_2 savings per year

The inland port makes a significant contribution to CO_2 reduction by shifting goods from road and rail to the more environmentally friendly inland waterway transport. Rhenus Port Logistics AG is also pursuing environmentally friendly solutions at the site. With the construction of a new terminal in 2024, efficiency and sustainability have been further improved. Rhenus installed the largest solar system in the canton of Basel-Stadt on the roof, generating 2.4 million kilowatt-hours annually. The same requirements were set when selecting the new material handlers. The new SENNEBOGEN EQ Balancer combines an impressive 30-second cycle time with very low energy consumption of only 80kWh. This enables annual CO_2 savings of up to 14 tonnes compared to a conventional material handler.

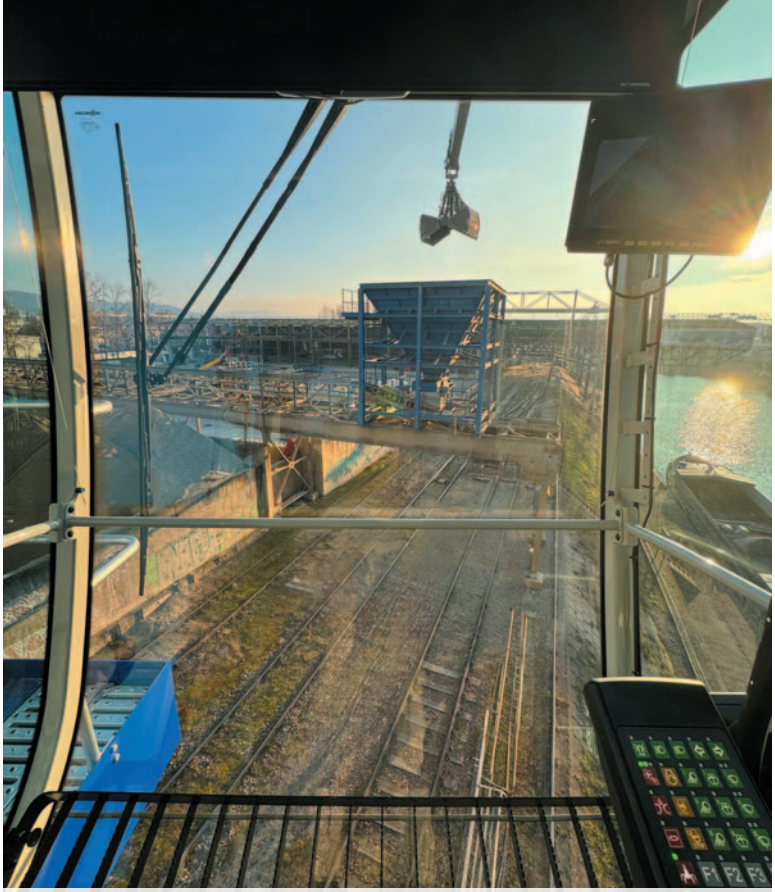
Asymmetrical portal

The demanding conditions of the sloped quay at the Basel site required a

customized solution. The SENNEBOGEN EQ Balancer was precisely adapted to the requirements with an asymmetrical portal, eliminating the need for costly structural modifications to the quay. The high reach of the new machine was an important criterion for Rhenus Port Logistics AG to accelerate handling between ship, rail, and road. The implementation was accompanied by SENNEBOGEN's sales and service partner, Kuhn Schweiz.

Technical highlights of the new EQ Balancer

- **30-metre reach:** perfect for flexible loading between ship, rail, and truck.
- **High load capacity:** ideal for handling heavy goods such as containers, coils, or bulk material.
- **Short cycle time:** only 30 seconds per loading cycle.
- **4.5-metre pylon:** optimum view of the working area.
- **Portcab cabin:** ergonomic and comfortable — with a retractable ladder to prevent unauthorized access.
- **Versatile attachments:** grabs with 1.5 and 3 m³ volume or spreaders enable handling of various goods.
- **400 volt system:** environmentally friendly and efficient operation with an energy consumption of only 80kWh.



The continuous front and floor windows of the new Portcab cab ensure an excellent view of the working environment.

The new SENNEBOGEN EQ Balancer impresses in Basel's Rhine port with its 30 metre reach, 30 second cycle time, and minimal energy consumption of just 80kWh. Tailored to the requirements of the sloped quay, it sets new benchmarks in efficiency, versatility, and environmental friendliness—a real future solution for port handling.

GravityVibe in action:real-world validation and system optimization

Following extensive theoretical studies to verify GravityVibe's feasibility, MacGregor is now engaged in the real-world validation and optimization of its pioneering self-unloading system based on in-house testing and customer feedback.

Evidence that verifies the advantages of GravityVibe has been accumulating quickly since MacGregor introduced the augment-market in February 2024.

Developed to allow bulk carriers to deliver a wider variety of cargo in greater volume, GravityVibe eases the discharge of coarse materials from cargo holds. In contrast with a standard gravity self-unloading configuration, where slope angles range from 35° to 60° depending on the material, MacGregor's system can discharge various cargo types with slope angles of just 15–20°.

The pioneering solution is the result of extensive research and development (R&D) that draws on MacGregor's decades-long experience in self-unloader design and comprehensive knowledge of material characteristics. Its benefits have also been recognized by renowned third-party specialists in materials handling.

In upholding its commitment to quality and reliability, MacGregor has collaborated with various international institutions and organizations to verify GravityVibe's feasibility in theoretical studies. In a simulation based on a theoretical model of the system, TUNRA — a wholly owned subsidiary of the University of Newcastle, Australia — found that GravityVibe functioned effectively with the three materials tested: wood chip, manufacturing sand, and gravel.

MacGregor later sought to ascertain the impact of the system's vibrations and how to minimize their transfer into the vessel's hull structure. The company worked with leading international sub-suppliers, and separately with the KTH Royal Institute of Technology in Sweden, to conduct thorough vibration and sound analyses. In both studies, vibration and sound readings were comfortably within the class-defined threshold.

Putting theory into practice

MacGregor is now engaged in efforts to validate the system's performance in

practical analyses using a full-scale test rig in China. Already, the company has confirmed the findings of TUNRA, its sub-suppliers, and KTH: GravityVibe efficiently discharges wood chip, manufacturing sand, and gravel, while both vibration and sound levels fall far below the upper limits stipulated by class.

Building on these encouraging results, MacGregor continues to validate GravityVibe's performance in real-world tests. According to Mikael Hägglund, Sales Manager for General Cargo, the company has turned its attention to optimizing the system based on data gathered from the test facility. "All the materials we have tested have flowed without any issues, so we know GravityVibe works, which is the first and most important step," he says. "As our approach to R&D emphasizes continuous improvement, we are now working to fine-tune the system's performance by adjusting its parameters for even more efficient and reliable cargo discharge."

Customer-centric development

While theoretical studies and extensive in-house testing are crucial aspects of MacGregor's R&D process, the company also places great importance on customer demonstrations and feedback.

"By discussing GravityVibe with our customers, showing them its functionality and inviting their input, we gain a deeper understanding of what matters most to their operations," comments Tomas Wallin, Senior Product Owner, MacGregor. "Customer consultation plays an invaluable role in a product's validation and optimization while nurturing confidence among our target audience. It therefore helps us to prepare our systems for a successful market launch."

Automation and machine learning

Involving customers in the testing phase also enables MacGregor to establish parameters for the programmable logic controller and software on board the vessel, ensuring that GravityVibe executes the complete unloading process as smoothly and intelligently as possible. Ultimately, MacGregor's objective is to enable the fully automated discharge of all kinds of bulk cargo.

Critical to this aim is GravityVibe's self-optimization functionality. Extracting data from built-in sensors, the system 'learns' the characteristics of each material and adjusts its vibration frequency accordingly, achieving optimal flow regardless of the cargo being unloaded and without the need for human intervention. As a result, the operator avoids overworking the system, which in turn minimizes energy consumption as well as operating and maintenance costs.

In the coming months, MacGregor intends to validate GravityVibe's performance with a wider range of materials to identify any operational limitations, making technical adjustments and functional improvements as needed ahead of the system's imminent market launch.

Questions and answers about GravityVibe

Q: *Historically speaking, what have been the biggest challenges when it comes to unloading maritime bulk carriers?*

A: Traditionally, bulk cargo unloading has faced challenges around operational efficiency, safety risks, environmental impacts, and high operational costs. Many systems depend on steep slope angles, which limit the types of materials that can be carried efficiently. Rough discharges, equipment wear, vibration damage, and limited weather operating windows have all constrained vessel utilization and performance. Moreover, older unloading systems are energy-intensive and labour-dependent, increasing both costs and environmental footprint.

Q: *Which of the challenges mentioned above does MacGregor's GravityVibe address?*

A: GravityVibe directly addresses these challenges by allowing efficient discharge with significantly lower slope angles, broadening the range of cargo that can be handled. It reduces reliance on gravity alone by augmenting the flow with controlled vibration. This improves operational efficiency, enhances safety

through more predictable material flow, and reduces wear on ship structures and unloading equipment. Additionally, the MacGregor GravityVibe system will in most cases require only one hold conveyor and no cross conveyor in the hold, making the operations both cost-effective and sustainable.

Q: *Briefly describe the GravityVibe augmented gravity self-unloading system and how it benefits the processes involved. What problems does it solve?*

A: GravityVibe is an augmented gravity self-unloading system that enhances cargo flow using vibration, enabling bulk materials to be discharged efficiently at lower slope angles (15–20°). It reduces material blockages and optimizes discharge without requiring steep holds, addressing the challenges of space utilization and cargo versatility. The system lowers mechanical strain on vessel structures,, and supports safer, smoother, and more efficient operations across different cargo types.

Q: *What are the benefits of using lower slope angles (15–20°) when delivering bulk cargo?*

A: Using lower slope angles allows ships to maximize cargo hold volume and transport a wider variety of bulk materials, including those that would not flow well with conventional systems. It improves operational flexibility. Structurally, vessels benefit from a more compact and efficient hold design, optimizing stability and potentially lowering construction and maintenance costs.

Q: *Why are vibration and sound levels a factor? What are the benefits of limiting these elements?*

A: Managing vibration and sound levels is critical for maintaining the structural integrity of the vessel and ensuring crew safety and comfort. Excessive vibration can lead to accelerated wear on ship components and fatigue damage over time. GravityVibe's design, validated by studies such as those from KTH and sub-suppliers, ensures that both vibration and sound levels stay well below class-defined thresholds, preserving vessel longevity and reducing long-term maintenance and repair costs.

Q: *How do physical and chemical properties of various bulk cargo impact the need for specialized handling and unloading techniques?*

A: Bulk cargoes have widely varying properties such as particle size, cohesiveness, moisture content, and chemical reactivity, all of which impact flow behaviour. Sticky, wet, or coarse materials require different unloading strategies to avoid blockages, segregation, or structural strain. GravityVibe's vibration-driven approach adapts to these material differences, maintaining consistent discharge rates and ensuring operational reliability across a broader spectrum of cargo types without manual intervention or excessive mechanical modification.

Q: *When will fully automated discharge of bulk cargo become a reality? What elements are missing and what work is still needed to achieve the goal?*

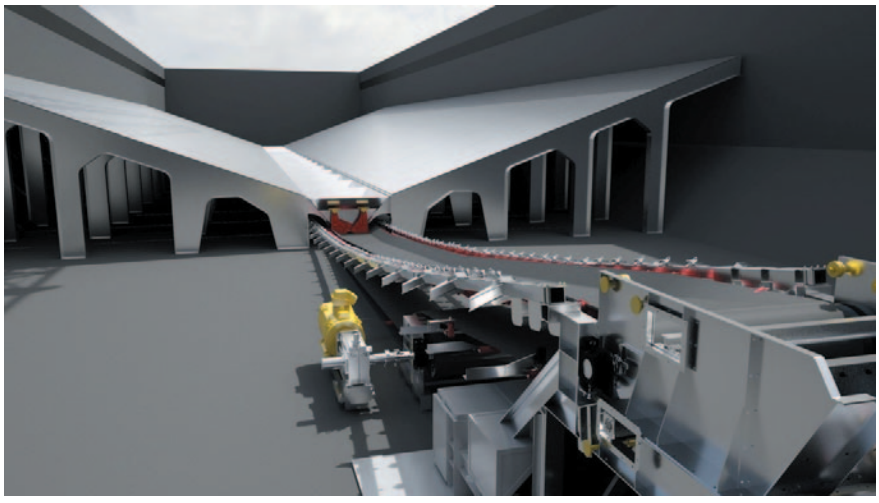
A: Fully automated discharge is rapidly approaching reality, thanks to intelligent unloading systems like GravityVibe. Key remaining elements include fine-tuning self-optimization algorithms, integrating predictive maintenance solutions, and standardizing automation interfaces between vessels and ports. MacGregor is actively working to refine onboard software, improve material recognition capabilities, and enhance real-time adjustment features. Wider industry adoption and regulatory frameworks are also crucial for achieving fully autonomous and seamless bulk unloading.

Q: *Please describe GravityVibe's self-optimization function and how it works. How is MacGregor continuing to fine-tune the system's performance?*

A: GravityVibe features a built-in self-optimization system that uses sensors to monitor material flow characteristics during discharge. Based on live data, it automatically adjusts vibration frequency and intensity to match the properties of each specific cargo, ensuring optimal unloading performance without manual recalibration. MacGregor is fine-tuning this system by gathering real-world data from full-scale test rigs, analysing operational performance across various cargo types, and incorporating feedback loops to continually improve discharge efficiency and system responsiveness.

Q: *What is the role of real-world validation to document the effectiveness of bulk cargo unloading systems? How has GravityVibe demonstrated its effectiveness?*

A: Real-world validation is essential to prove that unloading systems perform reliably under operational conditions. GravityVibe's performance has been verified through a combination of laboratory studies and full-scale rig testing. For example, validation by TUNRA showed efficient unloading across diverse materials such as wood chips, manufacturing sand, and gravel. In-house tests and studies with external specialists like KTH have confirmed low vibration levels, consistent discharge flow, and high operational reliability, providing strong evidence for commercial deployment.



Q: *What is the impact of required maintenance on downtime? How are newer approaches optimizing these elements?*

A: High maintenance requirements traditionally lead to significant downtime and increased operational costs. GravityVibe's system design is based on long-lasting components and improved cargo flow which reduces risks for failures and needed service, thereby lowering maintenance costs/needs. With real-time monitoring and smart diagnostics, potential issues can be detected and addressed before

they escalate, minimizing service interruptions. This proactive approach enhances equipment availability and ensures better operational continuity for vessel operators.

Q: *What is the biggest misconception when it comes to unloading bulk carriers?*

A: Regarding unloading of standard bulk carriers, there is always a need to clean the holds with manpower and external machines as the port cranes or the vessel cranes will not be able to empty the holds. The weather could also be a factor for delay in cases where the cargo is sensitive to water.

For the traditional gravity vessels this will have fewer problems due to the steep angles in the hold. Some manual work to clean remaining material will most likely still be needed.

For the MacGregor GravityVibe system, all material will be removed from the hold without any extra efforts.GravityVibe challenges this notion by demonstrating that with intelligent use of vibration, lower slope angles can achieve the same — or even better — results. This approach not only enables broader cargo flexibility but also reduces structural stress, energy consumption, and environmental footprint. Future-ready solutions such as MacGregor GravityVibe will make a major footprint as a cost-efficient, sustainable solution during the lifetime of the operation.

Advanced Siwertell road-mobile ship-unloaders specified for strategic cement handling project

Bruks Siwertell has secured an order from Italian construction materials specialist, Calme SpA, for the delivery of a new next-generation Siwertell 10 000 S road-mobile ship-unloader and the refurbishment of a pre-owned Siwertell 10 000 S unloader, originally delivered in 2014, which will be upgraded to the same advanced, next-generation standard.

"Calme opted for our Siwertell road-mobile ship-unloaders as we have a great track-record in similar cement handling applications," says Jörgen Ojeda, Sales Director Mobile Unloaders, Bruks Siwertell. "We could also deliver on a tight schedule and offer robust technical support.

"Sustainability is a top priority for Calme," continues Ojeda. "This order reflects the company's ongoing aim to invest in advanced technologies and environment-friendly solutions."

At their undisclosed location, the units will face challenging operating conditions, including high humidities and an abrasive, dusty atmosphere. "Siwertell road-mobile ship unloaders are specifically engineered to handle such demands and do so with reliability, agility, outstanding through-ship performance, and market-leading efficiency and environmental protection; the pair are an ideal fit," emphasizes Ojeda.

The decision to upgrade the pre-owned road-mobile unloader to next-generation technology means that both units will benefit from advanced digital solutions and an integrated communications system that enables remote access, troubleshooting and support. This can be further upgraded in the future if the owners want to take advantage of Bruks Siwertell's latest service support packages, which include the use of an augmented reality (AR)-kit.

"This is a very exciting project for us, and the delivery scope demonstrates our ability to think dynamically and offer customized solutions to meet specific needs," he adds.

Both trailer-based, diesel-powered units will offer a rated cement handling capacity of 300 tonnes per hour, discharging vessels of up to 10,000dwt, and have a double-bellows system for efficient material discharges. They are fully enclosed, eliminating spillage and minimizing fugitive dust, and are scheduled for delivery by mid-October 2025. DCi

Keeping the goods flowing

The CSL Welland *at the Port of Hamilton, loading Ontario-grown soybeans for export (photo: HOPA Ports).*

through the Great Lakes & St. Lawrence Seaway System

Louise Dodds-Ely

The Europe-North America trade route is a vital transportation link and is a long standing continental trade corridor. By extension, the St. Lawrence Seaway, 'Highway H2O', plays a significant part in facilitating this trade, and ensuring efficient routing to some of the most populous regions of North America. Vessel traffic between the European continent and North America via the St. Lawrence River and Seaway System serves as one of the world's foremost two-way trade lanes.

The Great Lakes–St. Lawrence Seaway System is a deep draught waterway extending 3,700km (2,340 miles) from the Atlantic Ocean to the head of the Great Lakes, in the heart of North America. The St. Lawrence Seaway portion of the System extends from Montreal to mid-Lake Erie. Ranked as one of the outstanding engineering feats of the twentieth century, the St. Lawrence Seaway includes 13 Canadian and two US locks.

The Great Lakes and St. Lawrence River have been major North American trade arteries since long before the US or Canada achieved nationhood. Today, this integrated navigation system serves miners, farmers, factory workers and commercial interests from the western prairies to the eastern seaboard.

Bulk commodities make up a significant portion of the total trade within the Great Lakes, and often can be credited for inciting other cargo opportunities to take advantage of vessel positioning. In 2025,

QUICK FACTS

- Cargo shipments on the Great Lakes-Seaway system generate $45 billion of economic activity and 238,000 jobs in Canada and the US.
- The binational St. Lawrence Seaway serves as the linchpin within the broader waterway, connecting the lower St. Lawrence River to the Great Lakes. Beginning in Montreal and extending to points west, the Seaway's 15 locks (13 Canadian and two US) enable ships to climb a total of 168 metres from sea level up to Lake Erie.

Wind energy cargoes highlight strong general cargo trend in Duluth

Ranked fifth in the US among single-harbour ports for dry-bulk tonnage, the Port of Duluth-Superior also serves as an important mid-continent hub for breakbulk/general cargo at its Duluth Cargo Connect facilities.

The 2025 season has been especially strong for wind energy cargoes moving through Duluth, with projects continuing in the midsection of Canada and the US. This season, Duluth will exceed 2.6 million freight tonnes of wind energy cargo all-time, dating back to its first-ever shipment in 2005.

In addition to wind energy components, Duluth Cargo Connect also handled generator sets, structural steel, gas turbines, supersacked minerals and waterborne containers through the opening months of the 2025 navigation season, plus various machinery and large cargo pieces for the extraction industries. It all added up to a strong first half of general cargo moves through the region's multimodal logistics hub.

potash remains a significant growth commodity, in particular on the Canadian side of the border at the Port of Thunder Bay located in Northern Lake Superior. The Port of Thunder Bay experienced the largest June cargo volumes seen in decades with 1.19mt (million tonnes) of diverse cargoes including (but not limited to) grain, potash, aggregates, phosphate, salt, and steel shipped through the harbour. A large percentage is the ongoing potash trade that strategically uses Thunder Bay to connect to the western part of the country as well as a gateway to the western-most regions of the Great Lakes basin.

Volume-wise, grain and potash continue to lead the pack in Thunder Bay. In fact, grain shipments continued to steadily rise with a 14% increase compared to the five-year average. Similarly, potash shipments increased by 50% over the five-year average and remain on pace with the record-breaking volumes reported last year. Grain and potash shipments are both expected to hold strong through July.

That focus on grain, soy, crush, and other agri-commodities continue to show volumes on the upswing in a range of Great Lakes ports on both sides of the border. Overall, grain continues the positive trend, with year to date increases of more than 20% over 2024. Last year, Canadian grain posted the second highest volume in more than 20 years, riding 11.2% over 2023.

With economic output estimated at $6 trillion, the provinces and states bordering the Great Lakes–St. Lawrence Seaway System account for 30% of combined Canadian and US economic activity and employment. There is renewed interest in FTZ (Free Trade Zone) applications and leveraging due to the uncertain landscape around tariffs. In addition, pursuing new business opportunities and strengthening ties to other industry organizations is a priority, and ensuring awareness and the opportunity of the marine mode is top of mind for logistics and trade organizations such as CITT and CIFFA are paramount.

Emerging from a slow start to the navigation season plagued by ice in eastern Lake Superior and global trade uncertainties, the Port of Duluth-Superior gained momentum through the early summer, highlighting progress at one of many American ports in the System. Iron ore, the port's king cargo, topped 4mt (metric) through June, narrowing the year-over-year deficit from 55% in March to just 4.6% on June 30. This positive trend appears likely to continue, with strengthening domestic steel demand pushing US raw steel production near a three-year high.

Coal and coke shipments slowed slightly in June, but still ended the month 2.3% ahead of last year's pace. Domestic shipments, in particular, remained above 2024 levels, with more than 1.7mt (metric) carried to the lower Great Lakes through June 30.

Salt shipments also posted YOY gains, topping the 2024 pace by 19%.

Limestone, another of the Duluth Seaway Port's major bulk cargoes, followed the iron ore trend of starting slow and then picking up the pace. Receipts are down YOY, but displaying a steady recovery from March through June, ending the month near 1mt (metric).

Grain, shipped both domestically and internationally from Duluth-Superior, is enduring another slow season, challenged

The Polsteam Dabie *calling at the Ceres Riverland Ag grain terminal in Duluth, Minnesota, on 28 July 2025. She was loading spring wheat bound for Italy (photo: Port of Duluth).*

by global pricing competition, the strength of the US dollar against other currencies, and modal shifts. Grain shipments finished June less than one percent behind the 2024 pace, but significantly below the five-season average. Grain exports, however, finished the month slightly above the 2024 pace.

Total waterborne commerce for the nation's seventh-leading dry bulk port by tonnage topped 8.2mt (metric) through June, down 6.8% from 2024's pace but reflecting an ongoing recovery.

The range of staple dry bulk cargoes that transit the Seaway include stone, sand, cement, salt, sugar, gypsum, stone and other aggregates. Some cargoes such as softwood pulp is also seeing a positive resurgence. In Hamilton and Oshawa, as of June 2025, agricultural traffic continues its upward trend with a 38% year-to-date increase, representing nearly 282,000 metric tonnes of grain moving through the port network and boosting overall tonnage by 6% compared to the same period last year. In 2024, HOPA handled 11.46mt (metric) across Hamilton, Oshawa, and the Thorold Multimodal Hub. Agri-food tonnage reached 3.42mt [metric] (31 % of total), with steel making up 47.5%, including over 956,000 metric tonnes of finished and semi-finished steel such as coils, slabs and beams. "Through strategic, long-term investments, we continue to support key industries and strengthen Ontario's supply chains," said Ian Hamilton, President & CEO of HOPA Ports.

The Baie St. Paul *leaving the Thunder Bay harbour after loading grain at Viterra terminal (photo: Port of Thunder Bay).*

Great Lakes St. Lawrence Seaway commercial vessel traffic through the US locks at Massena, New York, is up 11% over last year, and total cargo tonnage has increased by 4%, according to the Great Lakes Seaway Development Corporation.

US grain exports are upwards of 114%, and dry bulk has rebounded from a spring dip to post a 3% gain. Overall, binational Seaway traffic is slightly above 2024 levels at mid-season with a huge boost from a record year for Canadian grain.

Helping to drive new efficiency on the technology front, the newly launched Voyage Information System (VIS) is a web-based, bi-national platform that provides

real-time information to Seaway stakeholders. The platform provides vessel information, ship routes, weather patterns, lock and bridge information and much more. The ultimate goal of VIS is to make maritime traffic more efficient. The initial version of VIS was deployed in April 2024 and was upgraded in the fall of 2024.

The Great Lakes/St. Lawrence Seaway was built as a binational partnership between the US and Canada, and continues to operate as such. Administration of the system is shared by two entities, the Great Lakes St. Lawrence Seaway Development Corporation (GLS) in the US, a federal agency within the US Department of Transportation, and the St. Lawrence Seaway Management Corporation in Canada, a not-for-profit corporation (ownership of the Canadian portion of the Seaway remains with the Canadian federal government).

Three distinct vessel-operator communities serve the waterway. These include US domestic carriers (US Lakers) transporting cargo between ports on the Great Lakes, Canadian domestic carriers (Canadian Lakers) operating between ports on the Great Lakes and the St. Lawrence River and Canadian coastal waters, and oceangoing vessel operators (Salties), which operate between the region's ports and overseas destinations. These carriers serve more than 110 system ports located in each of the eight Great Lakes states and the provinces of Ontario and Quebec.

Bilateral Chamber of Marine Commerce: safeguarding the interests of St. Lawrence Seaway stakeholders

Founded in 1959, the Chamber of Marine Commerce (CMC) is a bi-national, private sector, not-for-profit association that represents marine industry stakeholders including:

- ship owners;
- cargo shippers;
- Canadian & US ports;
- The St. Lawrence Seaway;
- support companies;
- terminals; and
- industry partners.

The Chamber advocates for safe, sustainable, harmonized and competitive policy and regulation that recognizes the marine transportation system's significant advantages in the Great Lakes, St. Lawrence, Coastal and Arctic regions.

The marine industry is vital to prosperity by enabling efficient trade within North America and around the world. As the safest, most efficient and environmentally smart method of carrying bulk freight, the increased use of marine transportation alleviates highway congestion, reduces greenhouse gas emissions and is a vital catalyst to overall economic growth.

New member additions to the CMC

The Chamber of Marine Commerce (CMC) has recently added more than a dozen new members to its growing list of more than 100 member organizations. As the Chamber of Marine Commerce represents all aspects of the marine shipping industry (i.e. from producers of commodities, to ports and terminals, to ship operators, and support organizations like shipyards,) and as the CMC represents both Canadian and American organizations, it ideally positioned to lead advocacy efforts at a time when global trade is being reshaped, and so many organizations are seeing the benefits of membership.

Some of the CMC's newest additions include:

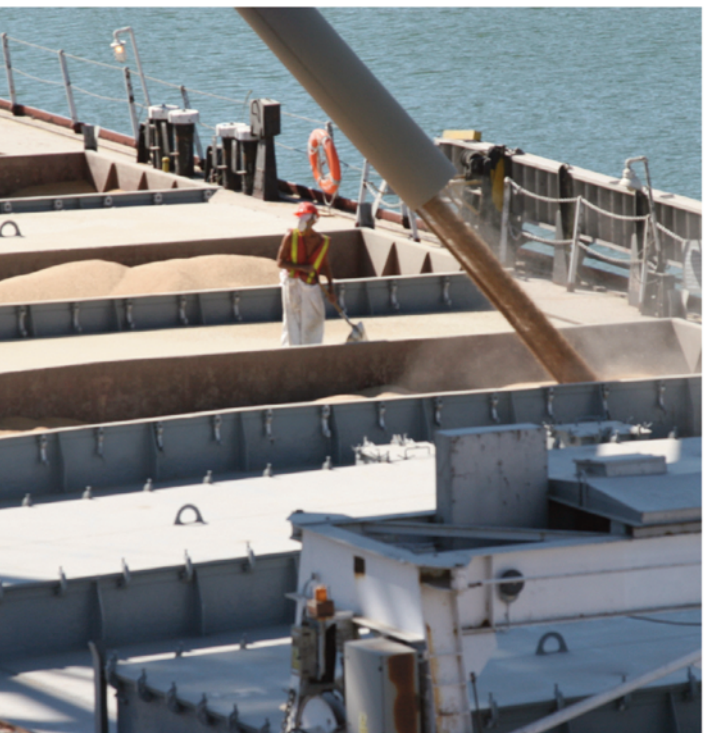
- **Oceanex:** a tremendously important Canadian ship operator as it plays a vital role in the movement of goods to and from the province of Newfoundland and Labrador. Specifically, the organization carries approximately 50% of the goods coming to the island, and close to 75% of all products destined for its most populous region.

  "As the nation focuses on activity that will make Canada the strongest economy in the G7, vital links in the supply chain provided by companies like Oceanex take on special importance, and the Chamber of Marine Commerce is proud to now call this organization a member and support it in achieving its mission," said Jason Card, Director of Communications for the CMC. "Given Oceanex's expertise in efficiently moving container, trailer and auto traffic, we look forward to the insights and expertise it will add to the diverse group of ship operators within our ranks."

  "Oceanex is proud to join the Chamber of Marine Commerce and stand alongside other leading organizations committed to advancing marine transportation in Canada," stated Matthew Hynes, Executive Vice President at Oceanex. "As a key player in the supply chain connecting Newfoundland and Labrador to the rest of the country, we believe in the importance of strong collaboration, sustainable practices, and a resilient maritime sector. We look forward to working with the Chamber and its members to help shape the future of marine commerce in our region and beyond."
- **Halifax Port Authority:** one of the most important ports in the Canadian supply chain given the Port of Halifax connects to more than 150 countries, and can welcome the largest container vessels on the Eastern seaboard given its deepwater berths.

  "At a time when building strength in Canada's economy has never been more important, vital transportation organizations like the Halifax Port Authority are banding together under the CMC banner to advance best practice, business intelligence, and advocacy that will maintain marine shipping's place as the most efficient and sustainable means of moving what matters," said Jason Card, Director of Communications for the Chamber of Marine Commerce. "We look forward to the unique insights and perspectives that the Halifax Port Authority and its partners will bring to our membership, and to supporting the port in delivering economic benefits to its local community, its region, and the country."

  "We're looking forward to working with our new partners at CMC to promote and further develop shipping and trade through Canadian ports," said Lori MacLean, Director of Communications and Marketing for Halifax Port Authority. "Ports in Canada are critical to secure supply chains and trade diversification for business. As a vital Canadian gateway, the Port of Halifax is positioned to contribute to supply chain resilience, with opportunities for customers seeking reliable and rapid connections with the rest of the world."
- **Fertilizer Canada:** an industry association representing Canadian producers, manufacturers, wholesalers and retail distributors of nitrogen, phosphate and potash fertilizer used



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in the production of agricultural crops that help feed the world, Fertilizer Canada and the CMC hold reciprocal memberships in each other's organizations to protect the movement of vital agricultural products across national supply chains.

- **Soshianest:** an AI company at the forefront of maritime market analytics, Soshianest is based in British Columbia, Canada, and specializes in providing cutting-edge, AI-powered supply chain solutions tailored for the global maritime industry.

The aforementioned examples demonstrate how the CMC is picking up new membership across different aspects of the supply chain and different aspects of the industry. Other new members include municipal governments, academic institutions, and other organizations who will be announced over the course of the coming months. The CMC is excited to continue its growth in both the number and diversity of its membership, and it helps it to bring the strongest and broadest perspectives to bear when it advocates on behalf of the industry.

A recent advocacy success that the CMC has achieved on behalf of members was assuring the contributions of Great Lakes marine shipping are fully understood and protected within newly introduced US policies related to port fees. When the USTR proposed a variety of new seven-figure port fees on any Chinese built or Chinese-operated cargo vessels or any operator planning to acquire new Chinese-built ships, the CMC was able to engage in the USTR consultation process and engage US and Canadian elected officials in ways that informed the proposal and avoided harm to ship operators, ports, and existing supply chains in general. The CMC looks forward to advancing more advocacy in the future to protect and assert the interests of members, and given the pace of change in global dynamics, it expects there will be a great deal of opportunity.

CMC pre-budget asks to the Government of Canada

The Government of Canada is engaging in pre-budget consultations to help inform the next budget, and the CMC is advancing requests that are consistent with the economic imperatives it outlined at the start of the year. Specifically, these will be:

- **Asking the Federal Government to prioritize the marine shipping industry within the new $5 Billion Trade Diversification Fund:** given the overwhelming majority of goods used in our society have travelled to their end destinations by vessel, and given that we have a St. Lawrence Seaway and Great Lakes infrastructure that give North America a global competitive advantage in supply chain strength, the CMC feels it is only reasonable to expect the Canadian Government would prioritize marine shipping within the newly created funding programme if it wants to achieve its goal of building the strongest economy in the G7. Investment in marine infrastructure would enhance port capacity and waterway efficiency; improve intermodal connectivity; improve and sustainability as marine shipping is the most efficient and least carbon intensive way to move cargo.
- **Asking for new and permanent annual funding to increase the Canada Border Services Agency's capacity for customs clearance services at ports:** the CBSA must prioritize trade facilitation in addition to carrying out the security aspect of its mandate, otherwise the agency is only overseeing supply chain choke points. At present, CBSA only operates five marine container examination facilities in Canada: Halifax, Saint John, Montréal, Prince Rupert and Vancouver. This is causing strained ports of entry and pressures on trade relationships, especially considering most provinces and key trading hubs along the Great Lakes-St Lawrence Corridor, including the Greater Toronto Area, are completely without such facilities.
- **Seeking the establishment of a dedicated Marine Innovation and Technology Fund to accelerate the industry's transition to cleaner technologies while maintaining its competitive positioning:** this fund would support the marine sector in the development and adoption of alternative fuels, including biofuels and methanol, while incentivizing energy-efficient infrastructure investments in Canadian ports and ships that would also benefit the wider energy transition objectives across the economy. It bears noting that when the Federal Government created a Green Corridor Fund in 2023 that saw $165.4 million invested to support marine shipping decarbonization efforts. The programme was meant to last over a number of years but was fully subscribed in the first year by the ambitious and successful projects advanced by the industry. This demonstrates the enthusiasm and capacity of the industry to quickly turn investment into meaningful and beneficial developments.
- **Seeking substantial and sustained investment to implement a National Maritime Skills Strategy that addresses both immediate labour shortages and the structural barriers preventing adequate workforce development:** Canada's marine transportation sector faces an unprecedented workforce challenges that demand immediate and comprehensive government involvement. The Canadian Seafarers Pathway Study, recently released by the Canadian Marine Careers Foundation underlines what is now known about the significant human resource needs for the industry, and so the CMC is standing with the Canadian Marine Careers Foundation and other partners to address these challenges collaboratively with the government.

NORTH AMERICA'S LARGEST IRON ORE HANDLING PORT

PORT SEPT-ÎLES

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Port Milwaukee earns Great Lakes Seaway 'Pacesetter Award' for increased international cargo

Port Milwaukee sees a 70% increase in international tonnage, earning its 16th Pacesetter Award

Port Milwaukee has earned the Robert J. Lewis Pacesetter Award for the 16th time from the U.S. Great Lakes St. Lawrence Seaway Development Corporation (GLS), an operating administration of the U.S. Department of Transportation. The award recognizes ports in the Great Lakes and along the St. Lawrence Seaway whose activities increased international tonnage.

In 2024, Port Milwaukee increased international tonnage through the Seaway by 70%, shipping more than 324,000 metric tonnes of international freight. Leading cargo categories included dry bulk commodities such as salt, cement, and aggregates, alongside liquid bulk shipments. The port also sustained its role in supporting agricultural exports, including soybeans and animal feed. The port's handling of steel, breakbulk, and oversized project cargo strengthen regional manufacturing, construction, and logistics.

"Port Milwaukee continues to see success on the international stage, and I congratulate the entire port team for this achievement," Milwaukee Mayor Cavalier Johnson said. "This recognition reflects our strong commitment to growing Milwaukee's role as a hub for global commerce, job creation, and economic prosperity for the State of Wisconsin and the Great Lakes region."

Port Milwaukee Director Jackie Q. Carter acknowledges the collaborative effort that led to the award. "This Pacesetter Award is the result of Port Milwaukee staff and partners working together to elevate and demonstrate the diverse capabilities offered at Port Milwaukee. That work continues in 2025," Carter shared.

During an award ceremony on 15 August, GLS Administrator Mike McCoshen highlighted Port Milwaukee's strong commercial activity, supported by terminal operators and expanded agricultural infrastructure designed to accommodate higher-value breakbulk and project cargoes.

GLS continues to be a vital supply chain for regional manufacturers, growers, and producers to access global markets. According to GLS, "the Great Lakes pathway has a long, demonstrated record of being a safe, reliable, and efficient passage for commercial transportation, supporting 150,000 U.S. jobs, $26 billion in economic activity, and $19 billion in business revenue annually."

Positive figures from the GLS: clear signs of a strong, efficient corridor

The Great Lakes St. Lawrence Seaway Development Corporation (GLS)

The Great Lakes St. Lawrence Seaway commercial vessel traffic through the US locks at Massena, NY, is up 11% over last year, and total cargo tonnage has increased by 4% — clear signs of a strong and efficient corridor. US Seaway lock operations continue to maintain 99% reliability.

US grain exports are up more than 114%, and dry bulk has rebounded from a spring dip to post a 3% gain. GLS is working with its partners to support this growth and strengthen regional supply chains.

This progress is made possible by the dedicated people working across the system, whose commitment ensures the safe and dependable movement of goods and passengers throughout the region.

Port Milwaukee.

Exciting times for the Port of Monroe

McKeil Marine tug/barge Wilf Seymour/Alouette Spirit *loading gypsum at the Port in April 2025*

2025 SHIPPING SEASON UPDATE: STRENGTHENING BENEFICIAL REUSE SUPPLY CHAINS AND BUILDING FOR THE FUTURE

The Port of Monroe continues to solidify its position as a vital connector in the beneficial reuse supply chain across the Great Lakes region. Since 2012, the Port of Monroe and terminal operator DRM, have facilitated the efficient movement of coal combustion byproducts produced at DTE Monroe Power Plant.

In 2025, the port expanded its reach to new markets, further enhancing its commitment to sustainable practices and the circular economy. It celebrated exports of synthetic gypsum to Indiana Harbor, IN and Montreal, QC., the latter of which marked the port's first ever Seaway export of the material. This would not be possible without support from the port's marine partners, which play a critical role in moving the materials from Monroe.

2024 SHIPPING SEASON RECAP

The momentum that the Port of Monroe carries into the 2025 season was built off a strong 2024 season in which a cumulative total of 2,093,464 short tonnes were handled at facilities along the River Raisin.

- The **DTE Monroe Power Plant** received 1,679,466 tonnes of coal and petroleum coke, along with 208,605 tonnes of limestone.
- **Michigan Paving & Materials** imported 122,109 tonnes of liquid asphalt to its Monroe storage and blending facility.
- In collaboration with **DRM**, the port exported 82,822 tonnes of bulk materials and managed four specialized cargo operations.

INFRASTRUCTURE UPDATE

These operations exemplify the Port of Monroe's capacity to handle complex logistics and diverse cargo types, which will be further strengthened by over $30 million in infrastructure improvements.

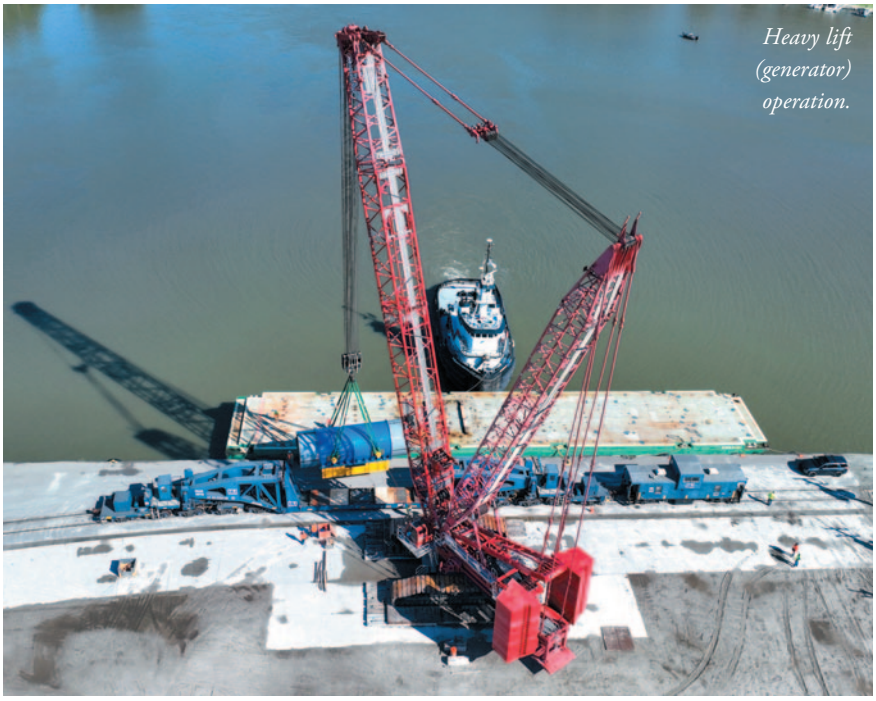
- **Lake Erie Renewable Energy Resilience Project (PIDP):** with over $30 million secured from federal, state, and local sources, we are rehabilitating existing infrastructure and constructing new facilities to enhance cargo operations, primarily geared to boost the export of wind energy components.
- **Michigan Maritime Gateway:** Michigan's first cargo inspection facility capable of screening international maritime containers, which will provide an efficient and safe supply chain for containerized and breakbulk cargo.
- **Roll-on/Roll-off (RORO) Dock Extension:** a grant from the Michigan Maritime and Port Facility Assistance Grant Program will fund the construction of a new RORO dock, enhancing the Port of Monroe's capacity to handle diverse and oversized cargoes.

MAJOR PROJECT CARGO WIN FOR PORT OF MONROE AND PARTNERS

In April 2025, the Port of Monroe handled project cargo bound for a Midwest location. The Port and DRM Terminal Management team worked closely with a diverse network of partners to ensure this

opportunity was executed efficiently and safely.

The cargo was loaded at Antwerp, Belgium — an established consolidation point for Great Lakes breakbulk — and laden onto Spliethoff's *Hudsongracht* (see picture below) as part of the carrier's scheduled Great Lakes service. At Monroe, the heavy-lift and breakbulk pieces were offloaded, staged, and transloaded for last mile delivery.



Heavy lift (generator) operation.

Why it matters

Port and DRM leadership have worked to position Monroe as a destination for international cargo, and this is proof positive that Monroe can be a solution for any cargo operation. Successful execution of this complex, high-value breakbulk operation builds credibility and momentum needed to advance Monroe's next-generation infrastructure.

"This cargo marks the first page in the next chapter of our port's history," said Port Director Capt. Paul C. LaMarre III. After nearly a decade of advocacy and planning, the Port of Monroe is one step closer to establishing itself as Michigan's premier intermodal marine terminal."

Moving forward

The Port has secured funding for $30 million in improvements, headlined by Michigan's Maritime Gateway, the State of Michigan's first cargo inspection facility capable of screening international maritime containers. Michigan's Maritime Gateway will provide a new supply chain solution for containerized and breakbulk cargo throughout the region.

The Lake Erie Renewable Energy Resilience Project funded by the USDOT Port Infrastructure Development Program (PIDP) will rehabilitate existing infrastructure and construct new facilities to enhance cargo operations. A Roll-on/Roll-off (RORO) Dock Extension funded by the Michigan Maritime and Port Facility Assistance Grant Program within the Michigan Department of Transportation will streamline the handling of oversized, wheeled, and modular cargo.

Partners on this cargo evolution included Spliethoff, Fr. Meyer's Sohn, Transatlantic USA, World Shipping, Bay Crane – Midwest, U.S. Customs and Border Protection, Triple R Transport, and International Industrial Contracting Corp.

HOPA Ports: bulk handling specialist

Loading Ontario-grown corn for export at the Parrish & Heimbecker facilities.

The Great Lakes–St. Lawrence corridor forms one of North America's most active bulk handling regions. HOPA Ports (Hamilton Oshawa Port Authority) plays a central role, moving roughly 31% of all cargo through the Great Lakes St. Lawrence Seaway System, a testament to the value of port infrastructure in Ontario's economy.

"Through strategic, long-term investments, we continue to support key industries and strengthen Ontario's supply chains," said Ian Hamilton, President & CEO of HOPA Ports.

Mid-season cargo performance

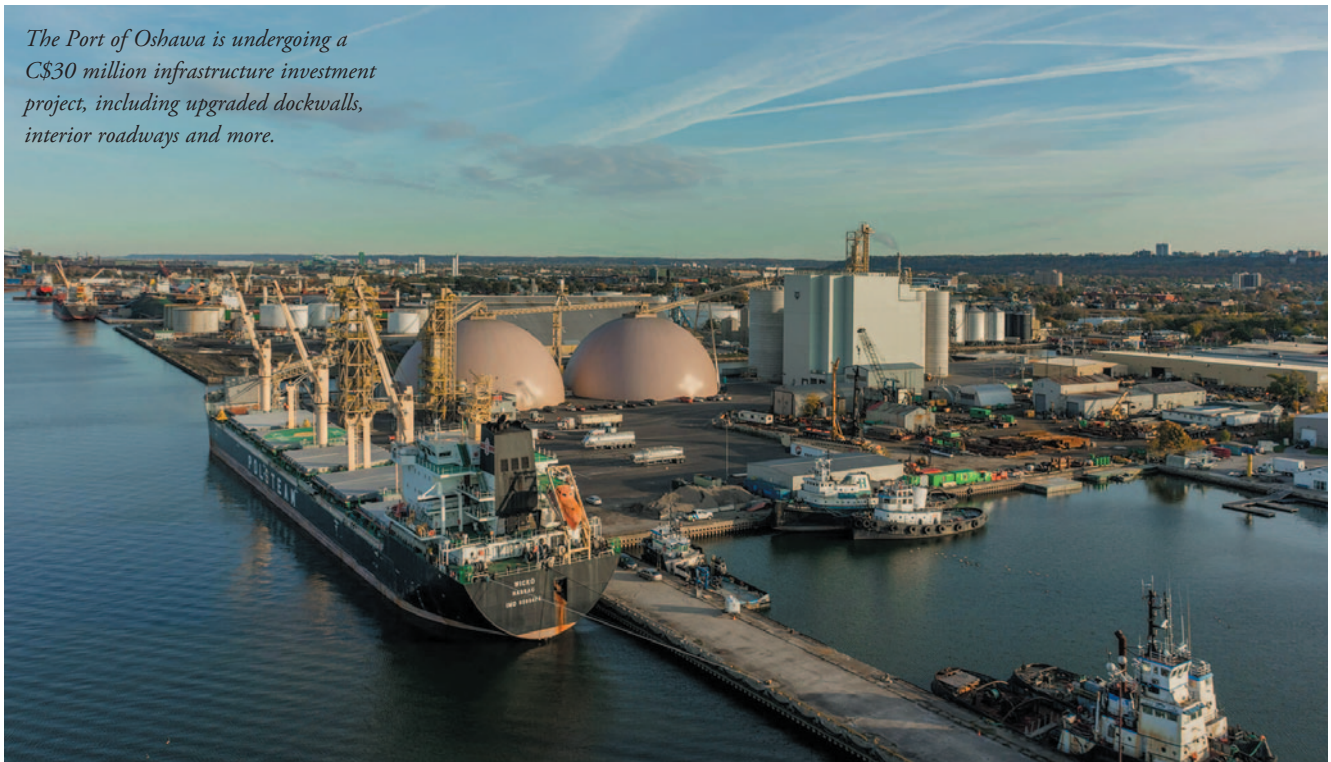
As of June, agricultural traffic continues its upward trend with a 38% year-to-date increase, representing nearly 282,000 metric tonnes of grain moving through the port network and boosting overall tonnage by 6% compared to the same period last year.

In 2024, HOPA handled 11.4mt (million metric tonnes) across Hamilton, Oshawa, and the Thorold Multimodal Hub. Agri food tonnage reached 3.42mt (31% of total), with steel making up 47.5%, including over 956,000 metric tonnes of finished and semi finished steel such as coils, slabs and beams.

Trade disruptions, tariffs & strategic government partnerships

Escalating trade tensions, including a recent 35% tariff hike on Canadian goods, continue to place pressure on Canada's steel and automotive sectors, threatening the stability of integrated cross-border supply chains.

"These challenges are a wake-up call," said Hamilton. "We can't afford to sit still. To protect the economic future of our



The Port of Oshawa is undergoing a C$30 million infrastructure investment project, including upgraded dockwalls, interior roadways and more.

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The Parrish & Heimbecker expansion, will be completed by late 2025

communities, we must work proactively with all levels of government to invest in the infrastructure that will open new trade corridors and reduce our over-reliance on any single market."

In this evolving landscape, HOPA Ports is stepping up as a critical link in Canada's supply chain strategy.

"Our approach is intentional," Hamilton added. "We reinvest every dollar into building a more agile and diversified port system by supporting steel, agri-food, and the construction and manufacturing sectors. Together with public and private partners, we're preparing for what's next, not just reacting to what's now. Resilience and sustainability aren't just goals; they're our responsibility and our core values."

Infrastructure investments at HOPA Ports

At the Port of Hamilton, major infrastructure developments include:

- A $135 million CAD sugar refinery under construction, capable of refining 1mt annually, supporting Ontario's food & beverage manufacturing sector (the third-largest in North America with revenues above $48 billion, 45,000+ businesses, and over 104,000 jobs).
- Installation of 750 metres of rail sidings with geogrid-based rail scales for the refinery, an investment exceeding $2 million. These rail works ensure vital connectivity and support anchor tenants' economic viability.
- The Parrish & Heimbecker expansion, to be completed by late 2025 includes two new silos and a third flour mill for feed and ingredient handling (soymeal, DDGS, wheat), reinforcing Hamilton's role in regional agri food supply chains and supporting over 100,000 jobs across Ontario.

"These infrastructure highlights reflect the strength of the agri-food cluster in Hamilton and reinforces the importance of building a resilient supply chain for Ontario farmers and food manufacturers," Hamilton continued. "The continued growth of companies like P&H demonstrates the value of collaboration and strategic investment in transportation and industrial infrastructure."

Bulk & oversized cargo handled by experts

The ports of Hamilton and Oshawa handle a wide variety of dry bulk materials, with extensive outdoor and indoor storage options, as well as multimodal transportation connections.

Two trusted stevedoring partners, Logistec and QSL, serve as HOPA's go-to operators for the movement of bulk cargo and critical over-sized cargo.

Types of cargo:

- **Construction materials:** asphalt, gypsum, gravel, sand, salt and more.
- **Grain + agri-food:** corn, wheat, soybeans, canola, sugar, molasses.
- **Crop inputs:** dry and liquid fertilizer.
- **Bulk terminal development opportunities:** those interested in new bulk terminal development in Hamilton, Oshawa or Niagara should contact HOPA directly.

Rail transit & inland connectivity

Last year, about 8,700 rail cars transited Hamilton and Oshawa, moving nearly 740,000 metric tonnes of cargo, highlighting robust inland rail throughput. HOPA has invested heavily in developing a new inland rail terminal at Pier 18 operated by Hamilton Container Terminal (HCT), in partnership with CN Rail, aimed at intermodal container movements between Hamilton and Montreal.

The terminal is complete and ready to operate, pending Canadian Border Services Agency (CBSA) approval for a sufferance warehouse. Once approved, bonded

containers can be cleared inland, streamlining imports, reducing congestion on highways, and supporting regional exporters of steel and agri food products.

At the Port of Oshawa, the grain terminal expansion is now operational, featuring:

- 20,000 metric tonnes of storage and a vessel loading rate up to 12,000 metric tonnes/day.
- A dual truck unloading structure capable of 700 metric tonnes/hour, accelerating throughput and reducing delays.
- $35+ million investment spearheaded by HOPA Ports and backed by $14 million contribution from the Government of Canada's National Trade Corridors Fund (NTCF).

"Making this facility work for regional farmers is our priority; we've invested in quality infrastructure, improving the terminal's efficiency from the front gate right onto the vessel," said Hamilton. "We're thrilled that the Port of Oshawa is contributing to the resiliency and reliability of Canadian agricultural supply chains."

"QSL is proud to be part of this effort to enhance the potential of the Port of Oshawa. We are looking forward to seeing more grain exported through this facility every year," said Gino Becerra, Vice President of QSL Ontario.

Additionally, nighttime navigation at Oshawa is now available. Dredging, improved lighting, and specialized navigation aids in collaboration with the Canadian Coast Guard allow vessels safe access after dark, significantly enhancing operational flexibility.

A REINVESTMENT DRIVEN, FUTURE FOCUSED VISION

Demonstrating resilience and vision in the face of economic uncertainty, HOPA continues to drive Ontario's leadership in bulk-handling and supply chain innovation through deliberate investment and strategic infrastructure enhancements, positioning the region for enduring growth and competitiveness.

The C$135 million Sucro Can sugar refinery is under construction at the Port of Hamilton. This will become Canada's largest sugar refinery, capable of refining 1mt annually (and above).

Eight concrete silos built in an astonishing eight-day period – while three vessels are offloaded during Picton Terminals' busiest week ever

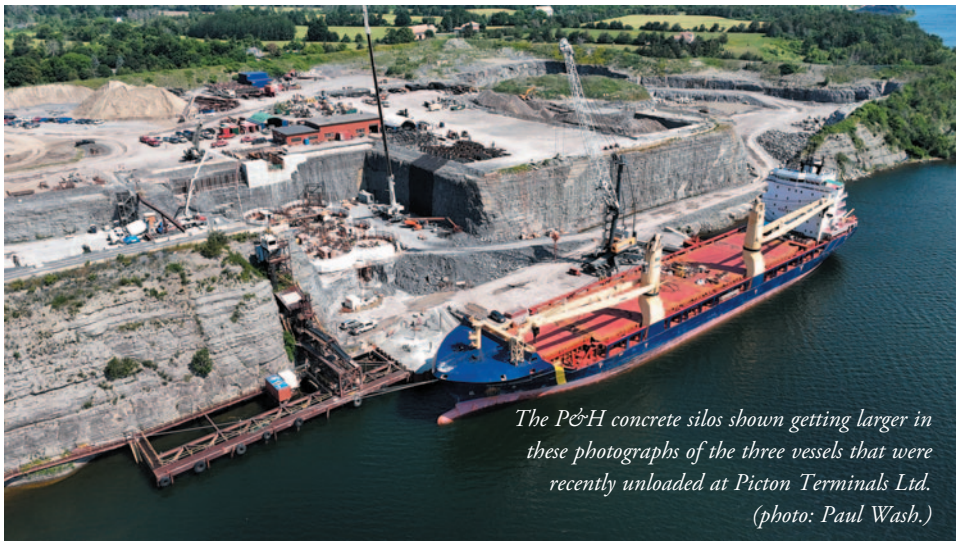
Picton Terminals Ltd (formerly known as Picton Terminals by Doornekamp) offers logistics solutions and diverse port services which provide better, more efficient shipping throughout the St. Lawrence Seaway & Great Lakes region. Picton Terminals offers unique storage options, innovative solutions and proximity to large markets.

In June this year, Picton Terminals Ltd had the busiest week in its history. It offloaded three vessels (project cargo, bauxite, steel) during the week, all while eight grain silos were built in an awesome, eight-day, round-the-clock, continuous concrete pour. This remarkable feat of engineering was made possible in a collaboration with FWS, which built the new silos. The eight 144ft-tall concrete silos were built by 90 crew members, working around the clock. In total, one million pounds of reinforcing steel were used, and over 400 concrete trucks delivered concrete, with 3,000m^3 of concrete poured.

"Our team is excited to partner with the Doornekamp Group, another family-owned business, as we build this new facility at Picton Terminals," said John Heimbecker, CEO of Parrish & Heimbecker, Limited. "P&H is committed to serving Canadian agricultural producers, and the addition of Picton Terminals to our supply chain strategy will make it more economical for local farms to bring their crops to global markets," he added.

"The Doornekamp Group is honoured to collaborate with the visionary team at Parrish & Heimbecker. We are thrilled to work with P&H to bring our shared vision of supporting regional agriculture to life. This project is an investment in the next generation of farmers," said Ben Doornekamp, CEO, H.R. Doornekamp Construction Ltd.

The project is all the more remarkable, as the work took place during heatwave. Engineers and construction crews faced gruelling conditions, as the sun pushed



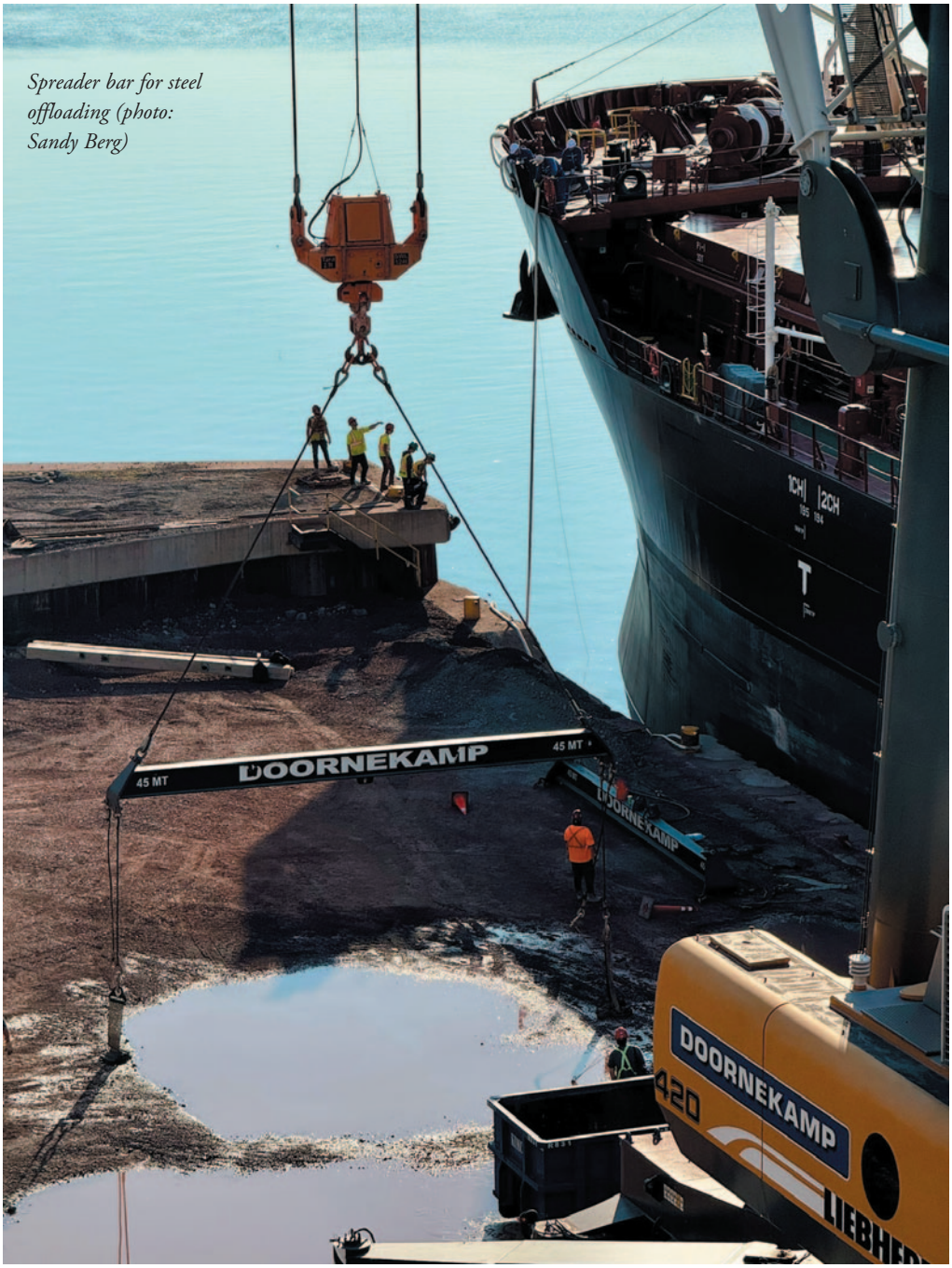
The P&H concrete silos shown getting larger in these photographs of the three vessels that were recently unloaded at Picton Terminals Ltd. (photo: Paul Wash.)

Unloading the Federal Oshima *(photo: Sandy Berg).*

On her maiden voyage into the Great Lakes, the Murgash *unloads at Picton Terminals Ltd. (photo: Sandy Berg).*

temperatures past what many would consider comfortable. Concrete needs to be poured at the right temperature to set properly, and workers need to take extra precautions to avoid heatstroke. But even in the harshest conditions, these dedicated professionals pressed on. They pushed through the sweltering heat because they know the importance of what they're building — the new Parrish & Heimbecker bulk agricultural marine terminal in Prince Edward County.

This state-of-the-art facility will provide crucial support to farmers in eastern Ontario by offering a closer, more efficient delivery option for their corn, wheat, and soybean crops. The new P&H grain terminal will begin operations in Spring 2026.



Spreader bar for steel offloading (photo: Sandy Berg)

History

The Picton port was brought back to life when it was purchased by Doornekamp in 2015. The port can trace its roots back to 1948, when Bethlehem Steel Mills of New York discovered a magnetite ore body in Marmora, Ontario, in 1948 via a government aeromagnetic survey.

The mine site was developed between 1951 and 1953 which included the stripping of 120 feet of limestone overburden. The first shipment of iron ore pellets commenced in 1955.

photo: Sandy Berg.

The iron ore containing magnetite was crushed and ground, and magnetically separated to produce 65% iron concentrate and roasted at 2,400F. Each day, one ore train of 30–35 cars delivered iron ore pellets to the Picton port for loading into 25,000dwt ore ships destined for the Bethlehem Steel Company plant in Lackawanna NY via the Welland Canal. Annual plant production was 520,000 metric tonnes.

The Marmora mine was expected to operate for over 50 years. However, in the late 1970s, iron production significantly decreased due to a sluggish economy, runaway inflation and a decrease in world demand for steel. In March 1978, the Marmora Mine closure was finalized resulting in the loss of over 300 jobs in the mine and at the Picton loading dock.

Port of Duluth-Superior earns 18th Pacesetter Award

The United States Great Lakes St. Lawrence Seaway Development Corporation (GLS) announced Friday the recipients of its Robert J. Lewis Pacesetter Award for international cargo tonnage increases during the 2024 shipping season, a septet that included the Port of Duluth-Superior.

Driven by gains across multiple cargo categories, Duluth-Superior claimed its 18th Pacesetter Award overall — second most among Great Lakes ports — and its first since 2019. Increased grain, petcoke and breakbulk exports emerged as the primary catalysts in a 17.4% international tonnage increase year over year (2024 compared to 2023).

"We're pleased to accept this award on behalf of all the waterfront cargo facilities in Duluth-Superior," said Kevin Beardsley, executive director of the Duluth Seaway Port Authority. "It takes partnership, persistence and vision to sustain a thriving world port, and we're grateful for the numerous contributors who play a role. Awards like this are a collaborative effort."

The GLS established its Pacesetter Award programme in 1992 to recognize US-based ports for increased maritime tonnage year over year through the St. Lawrence Seaway.

The award was renamed in 2001 to posthumously honour Robert J. Lewis, the former GLS logistics director who was instrumental in implementing the organization's trade development programme.

The GLS saluted its award winners on 15 August, during the American Great Lakes Ports Association Annual Conference in Chicago.

About the Port of Duluth

More than 700 vessels and 30 million short tonnes of cargo move through the Port of Duluth-Superior each year, making it the Great Lakes' largest tonnage port and one of the nation's top 20. The port supports more than 7,000 jobs and contributes $1.3 billion in business revenue to the regional economy.

First newbuild cement ship in the Great Lakes in 20 years sets new standard for sustainability and performance

Cement carrier Tamarack*, arriving in Montreal (photo: Vincent Tremblay).*

Cement carrier *Tamarack* arrived at the Port of Montreal on 22 August 2025, completing her maiden transatlantic voyage and marking a major milestone in North American shipping. Owned by Eureka Shipping, a joint venture between The CSL Group (CSL) and SMT Shipping, the state-of-the-art vessel is the first newly built cement carrier to enter service in the

Great Lakes in two decades.

Delivered on 23 July 2025, at Holland Shipyard in the Netherlands, the *Tamarack* made a brief stop in Montreal, before proceeding to load her first cement cargo. Managed by CSL's Canadian division, Canada Steamship Lines, the 12,500dwt mechanical/ pneumatic vessel replaces two older ships with a streamlined, high-performance design that maintains the same cargo capacity while reducing environmental impact.

Purpose-built for the Great Lakes, *Tamarack* features a 10,700m³ cement cargo hold, diesel-electric propulsion, and advanced manoeuvrability systems. The vessel is equipped to run on HVO biofuel and includes shore-power compatibility, noise insulation, and energy-saving cargo systems, all designed to reduce emissions and improve operational efficiency.

"Bringing *Tamarack* to the Great Lakes has been a true team effort," said Kai Grotterud, Managing Director of Eureka Shipping. "This highly efficient vessel is the result of a close collaboration with our customer, smart design, and a shared vision for more responsible shipping. We're proud to set a new standard for sustainability and performance in the region."

About Tamarack

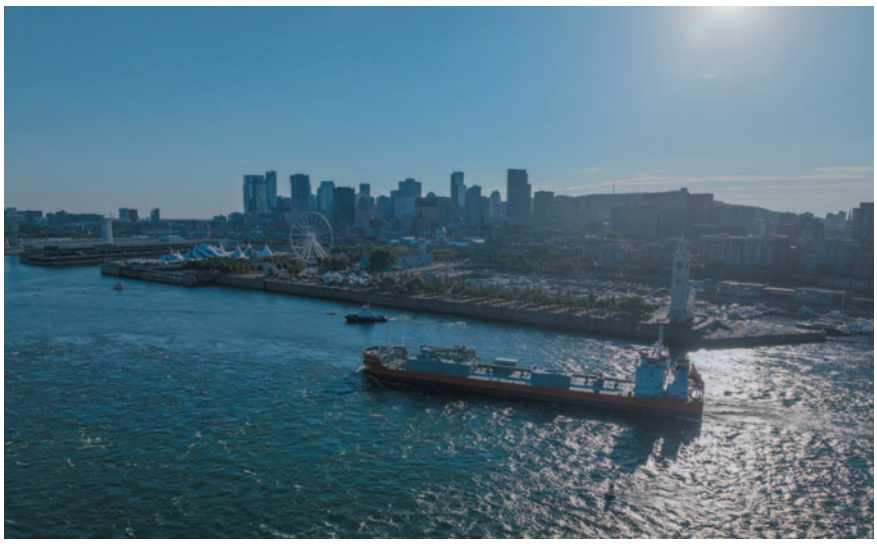
Tamarack is a mechanical/pneumatic cement carrier with a deadweight of 12,500 metric tonnes. This vessel currently operates in the Great Lakes and St. Lawrence Seaway.

Tamarack features diesel-electric propulsion and advanced manoeuvrability systems. The vessel can also run on HVO biofuel and includes shore-power compatibility, noise insulation, and energy-saving cargo systems, all designed to reduce emissions and improve operational efficiency.

Tamarack is co-owned by CSL and SMT Shipping as part of the Eureka Shipping joint venture.

TECHNICAL SPECIFICATIONS

Classification:	RINA
Year built:	2025
Deadweight:	12,500 tonnes
Length overall:	122.90 metres
Breadth moulded:	23.00 metres
Length B.P. (Lpp):	120.13 metres
Draught (in fresh water):	6.55 metres
Loading system type:	Mechanical | pneumatic
Discharge system type:	Mechanical | pneumatic
Total hold capacity:	10,856 cubic metres



Port of Windsor ships more goods to Europe, amid White House tariff chaos and unpredictability

Port Windsor in Canada is the third-largest Canadian Great Lakes port in terms of shipments. Cargoes include a wide range of products such as aggregates, salt, grains, steel, and petroleum.

Strategically located at the heart of the Great Lakes/St. Lawrence Seaway System, Port Windsor's economic presence is essential to the globe's third-largest economic regions. Port Windsor has direct access to the I-75, I-94 and I-96 to service half of the North American population in a single day's drive via a key USMCA corridor traversing the Port.

The port is very aware of the effects of

the imposition — and threat of further — tariffs imposed by the Trump administration.

- One, American cities and states, and ultimately taxpayers, will pay higher prices due to tariffs for Canadian road salt essential for winter road safety.
- Two, American industry, and ultimately consumers, will pay higher prices due to tariffs for Canadian aluminum essential to fill the 60% production gap in the US.
- Three, American livestock farmers, and ultimately consumers, will pay higher prices for grain due to tariffs.

And even if American cities, industry, and farmers are successful in insourcing without Canadian products, already steel in the US has risen 16% as US steel makers are now operating in a protected market — the same applies to aluminum prices.

Port Windsor is still shipping grain as it is tariff-protected by CUSMA (the free trade agreement between Canada, the United States, and Mexico, known as USMCA in the US). However, each day begins with uncertainty as to what will come from the White House. The US administration falsely claims that US farmers will face a 400% tariff trying to export to Canada. This claim has no basis in fact: these huge tariffs would only happen if American farmers were to exceed a pre-agreed threshold, and it has never come close to less than half of that. American farmers have never paid a tariff for milk and cheese coming into Canada under the current agreement, full stop.

Port Windsor is stockpiling aluminium from Quebec, anticipating that a new trade deal is inevitable, and necessary. However, Canada's Prime Minister has stated that such a deal with be one that is good for Canada.

Meanwhile, Port Windsor is shipping more goods to Europe, developing stronger trade ties there.

Some good news

As for activity on the good news front, ADM recently completed works with new storage and handling capacities that have enabled it to significantly increase production of crushed seed oils and byproduct. Up to 400,000 additional tonnes per year are expected to be shipped from Port Windsor. After a labour action and inventory adjustment, Windsor Salt is shipping once again. Sterling Fuels is increasing its ability to deliver up to 100% biodiesel for marine, and remain not only the first, but the largest provider of green fuels on the Great Lakes. And of course, work continues on the expansion at Morterm where 60,000ft^2 of new warehousing is complete and engineering for a new dock capable of short-sea shipping of containers continues to advance with construction expected in 2026.

Pivotal year for the Port of Trois-Rivières

The Trois-Rivières Port Authority held its annual general meeting on 18 June, which provided an opportunity to review the past year and present the results. In 2024, 246 ships, including 21 cruise ships, docked at the Port and 3.5mt (million metric tonnes) of cargo were handled, generating a net profit of $4.46 million.

The most significant project in the history of the port

The year 2024 was a significant year for the Port of Trois-Rivières, as it marked the start of the most ambitious project in its history. With a total investment of $312 million, the project began with the reconstruction of dock 17, which will continue until 2026 with the filling of the basin, and the construction of a new dock 16. The project should be completed in 2027 with the construction of a new grain terminal. Ultimately, it will also provide 17,000m² of additional storage space.

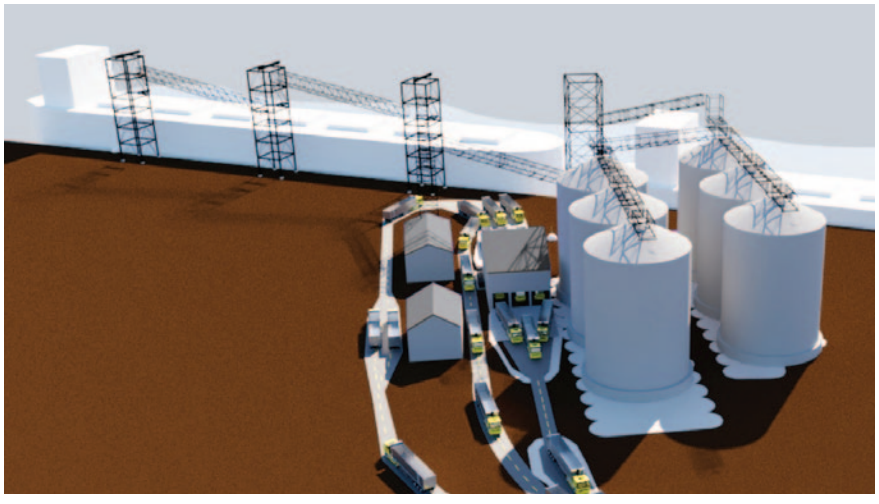
Alcoa and G3 Canada will also be installing new, fully electric covered loading and unloading equipment. This will result in significant environmental and productivity gains. The Québec-based company Pomerleau is the contractor for this ambitious project.

"We are extremely proud to see this major project, which is part of our 'On Course for 2030' strategic plan, come to life. With the port undergoing major changes, I would like to thank all port workers and our users who, every day, rise to the challenges posed by the construction work while continuing to carry out handling operations," said Gaétan Boivin, President and CEO of the Port of Trois-Rivières.

"[The year] 2024 marks a historic turning point for the Port of Trois-Rivières. Thanks to our partners' shared vision, our team's commitment and our community's trust, we are building a more innovative, sustainable and competitive port. This development will allow us to serve our customers more effectively, while also contributing to the economic and environmental vitality of the St. Lawrence–Saguenay corridor," said Véronique Néron, Chairwoman of the Board.

A strong St. Lawrence–Saguenay corridor

During the Québec Maritime Day, the port authorities of Montréal, Québec City and Trois-Rivières announced the expansion of their collaboration with the addition of the port authorities of Saguenay and Sept-Îles. This joint initiative aims to transform the St. Lawrence–Saguenay corridor into a high-performance trade route supported by resilient infrastructure and innovative services, thereby driving the economies of both Québec and Canada. The full potential of industries and communities depends on the competitiveness of the St. Lawrence–Saguenay corridor. By joining forces, the five port authorities will be able to strengthen this strategic supply chain and maximize the impact of improvements to their infrastructure and services.



A port firmly anchored in its community

The Port of Trois-Rivières has been actively involved in its community for many years, and 2024 was no exception. Thanks to the financial investments and volunteered time of team members, almost 60 organizations in sectors such as social and humanitarian causes, education, environmental protection, cultural promotion, and sports have been supported.

In terms of sports, the port has announced a major partnership with the Québec Games, which will be held in Trois-Rivières next summer. The objective is to support a landmark event that unites the whole community, promotes healthy lifestyles through sport and stimulates the local economy.

About the Port of Trois-Rivières

The Port of Trois-Rivières is one of Canada's 17 port authorities and has been operating since 1882. It offers a wide range of facilities and services to the maritime industry all year round. The port is an important player in the regional, national and international economic development of major industrial sectors such as aluminium, forestry and agri-food.

Every year, the Port of Trois-Rivières handles 55,000 trucks, 11,000 railcars and over 240 merchant and cruise ships from about 100 ports located in over 40 countries throughout the world. It handles 3.5mt and generates nearly $220 million in economic spin-offs and more than 2,000 direct, indirect and indirect jobs. DCi

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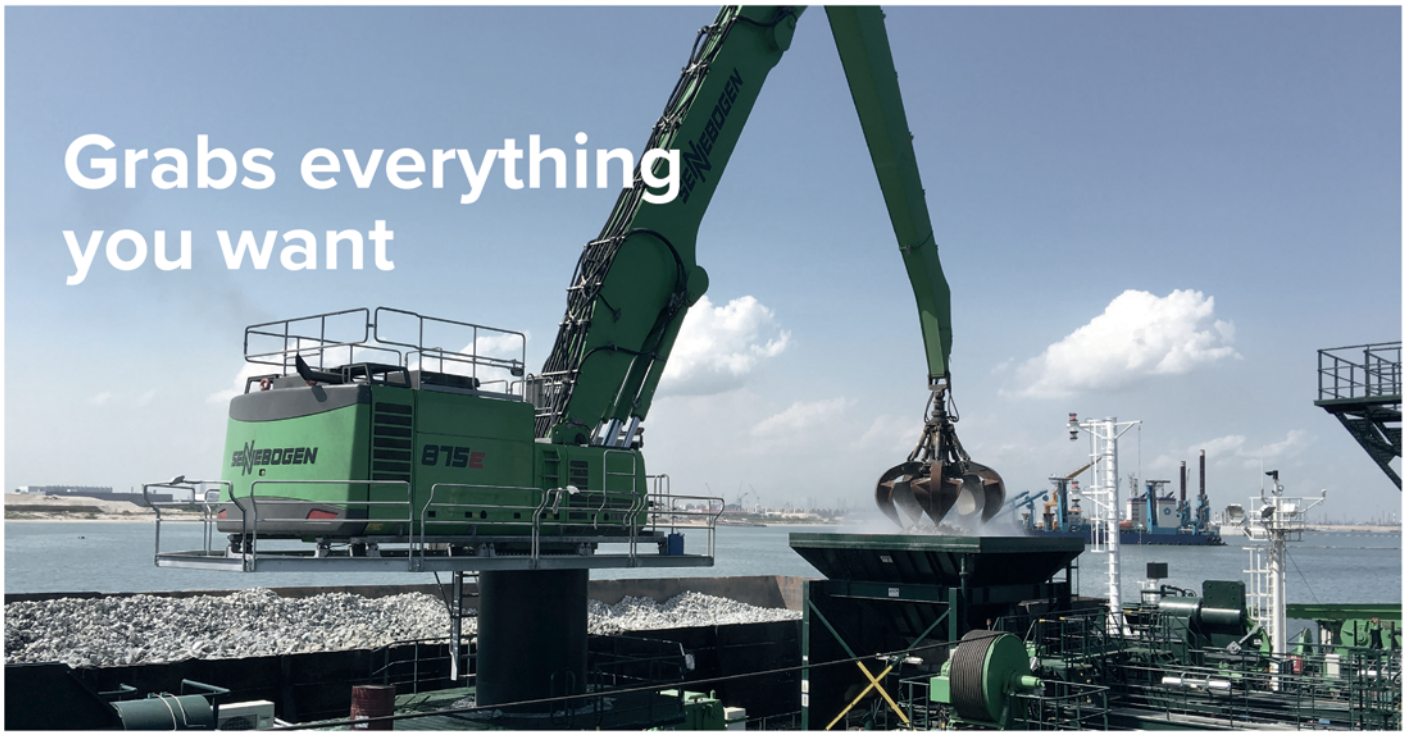

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