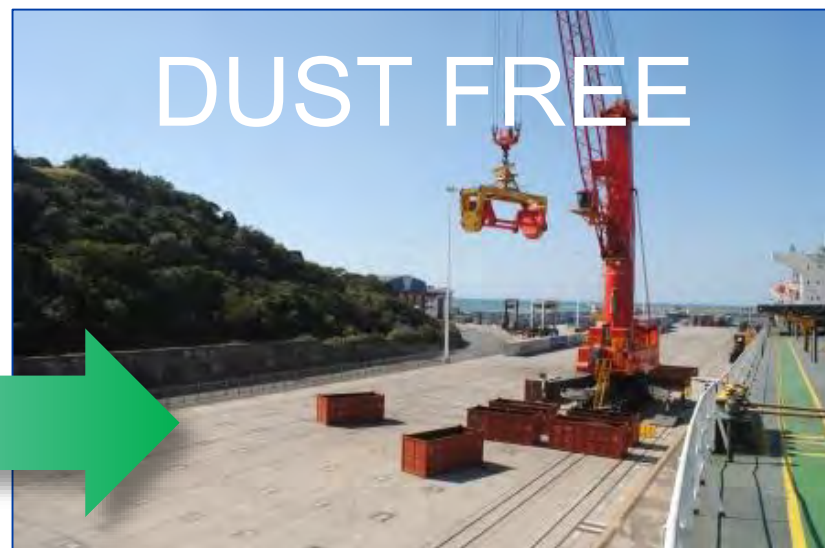


Containerised Bulk Handling

2nd BALTIC
PORTS & SHIPPING 2018



Case Studies of Ports adopting
innovative systems to stop dust pollution

Presented by:

Frank Van Laarhoven
Senior Sales Manager – Europe | RAM Spreaders



POLLUTION

Raising Environmental Profile

Activities at ports give rise to significant impacts of **emissions** and **noise pollution**.

Ports located closely to densely populated urban areas often have to balance development and management of their activities with preservation of natural habitats and the quality of urban life.



ENVIRONMENTAL MANAGEMENT POLICY

Raising Environmental Profile

In line with EU Air Quality Regulations, many European Ports have adopted an **Environmental Management Policy...**

...which encourages a balance between **Environmental Protection** and **Port Development**.



INNOVATIONS

Encourage Innovation

Over the years, the port industry has changed significantly as they are becoming increasingly dependent on technological innovations in order to remain competitive.

The competitiveness of European ports depends on their ability to **innovate** in terms of technology, organisation and management....

...and to also protect the environment that surrounds them.



BULK HANDLING

Long Term Competitiveness

In order to remain competitive, many standard container terminals are looking at ways to handle bulk commodities...

...but a number of factors can restrict their progress:

- **Lack of space** available to expand into bulk handling operations
- **Limited funds** to develop the port to accommodate stockpiling
- **Infrastructure** to cope with demand
- **Environmental Impact**



AIRBORNE POLLUTANTS

The exposure to harmful airborne pollutants

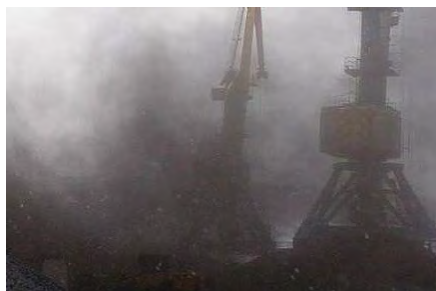
Workers involved in day to day handling of certain types of bulk are exposing themselves to harmful airborne pollutants.

Over time, this can lead to serious respiratory problems that can result in lung diseases such as:

**Silo-Filler's
disease**



**Black Lung
disease**



**Farmer's Lung
disease**



**Manganese Dust
Neurotoxin**



AIRBORNE POLLUTANTS

In order to reduce airborne pollution and meet global environmental guidelines...

...bulk ports, terminals and bulk commodity handling facilities are having to find ways to **reduce the levels of dust generated during the handling and unloading of bulk commodities.**



SOURCES OF DUST



SOURCES OF DUST



TRANSFER POINTS

OPEN WAGONS
OPEN STOCKPILES
SHIP LOADING



SOURCES OF DUST

TRANSFER POINTS

OPEN WAGONS

OPEN STOCKPILES

SHIP LOADING



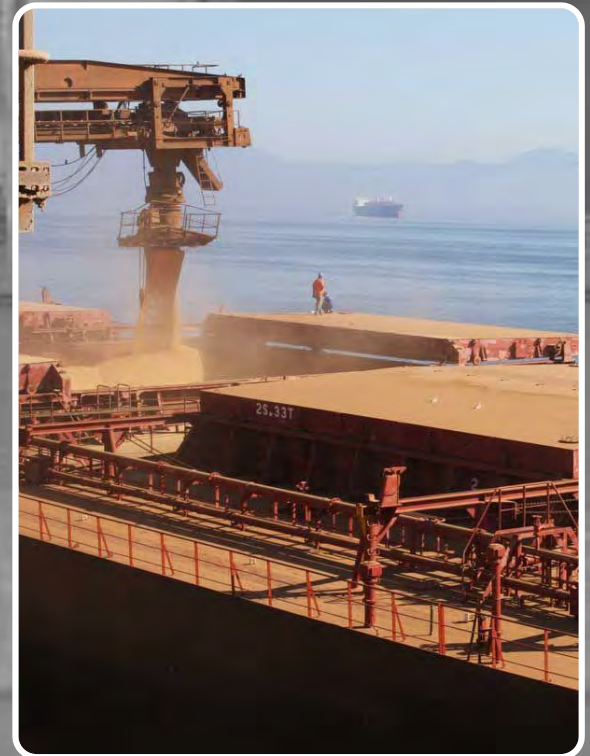
SOURCES OF DUST

TRANSFER POINTS
OPEN WAGONS
OPEN STOCKPILES
SHIP LOADING



SOURCES OF DUST

TRANSFER POINTS
OPEN WAGONS
OPEN STOCKPILES
SHIP LOADING



SOURCES OF DUST

During these processes the commodity is handled multiple times resulting in *losses and dust!*



Transfer Points



Open Wagons



Stockpiling



Ship Loading



SOURCES OF DUST

Dust is generated at any point
in the logistic cycle
when energy is added to materials



CURRENT BULK HANDLING METHODS

Many companies are now looking at systems to reduce levels of contamination, but also cost effective systems to meet current environmental guidelines

? £ € \$



| FILL | TRANSPORT | STORE | LOAD |

Containerised BULK HANDLING



A NEW METHOD OF HANDLING BULK

A new method to export bulk is available

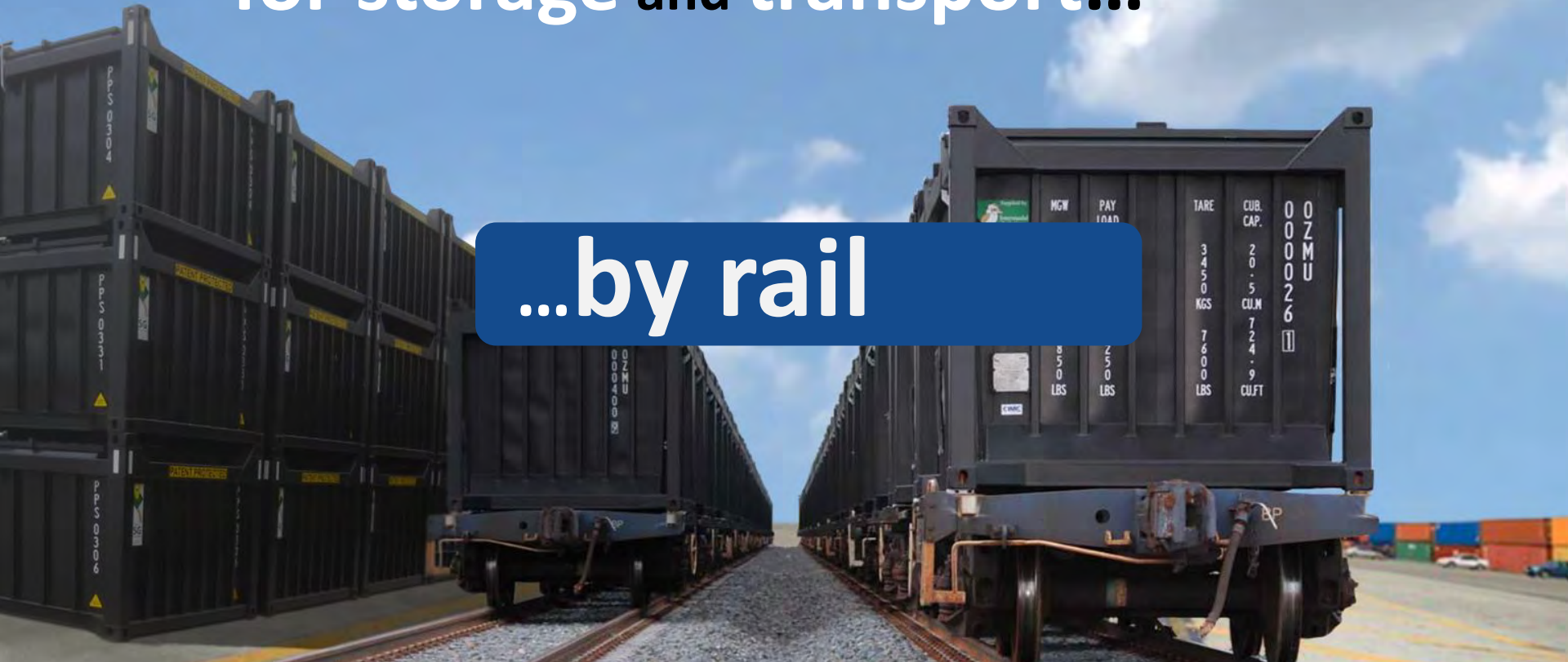
Containerised Bulk Handling is in operation at various bulk and standard container terminals and has already won 2 awards for its environmental benefits and innovative technology



CONTAINERISED BULK HANDLING

The CBH system uses:
Sealed containers
 for storage and transport...

...by rail



CONTAINERISED BULK HANDLING

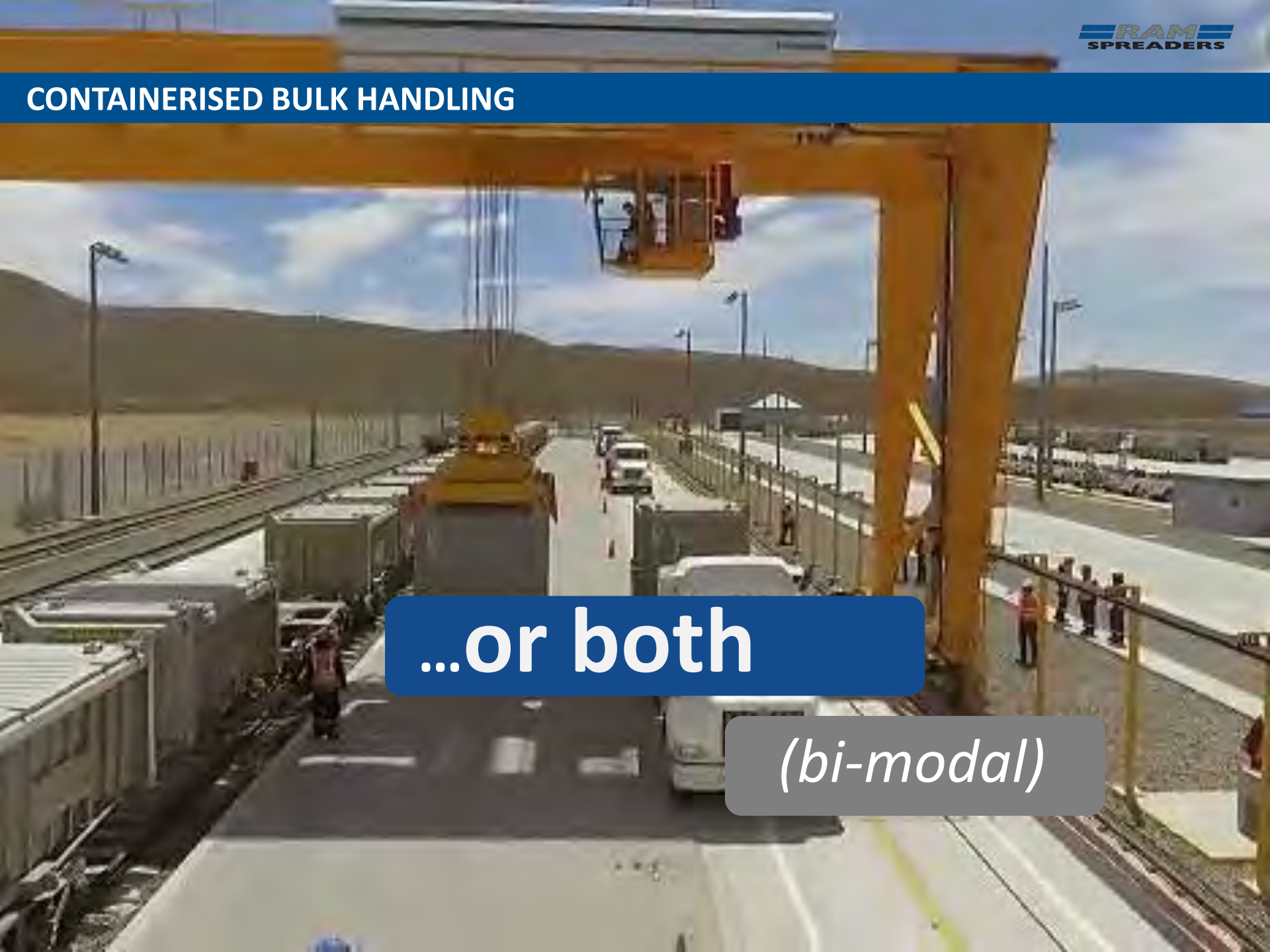


...by road

CONTAINERISED BULK HANDLING

...or both

(bi-modal)



CONTAINERISED BULK HANDLING

The CBH system also uses:

**RAM Revolver®
Rotating Spreader**



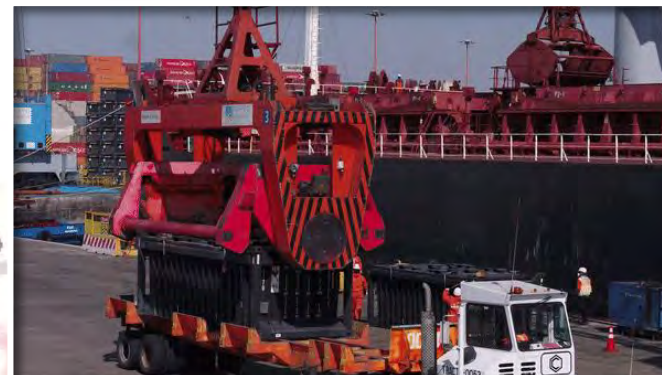
CONTAINERISED BULK HANDLING

That...

Handles the container

Lifts the lid

Rotates the container



CONTAINERISED BULK HANDLING



CONTAINERISED BULK HANDLING

THE PROCESS



FILL the CONTAINER at the MINE

- EXISTING SITE EQUIPMENT USED
- NO LOSS OF COMMODITY
- NO CLEAN UP REQUIRED

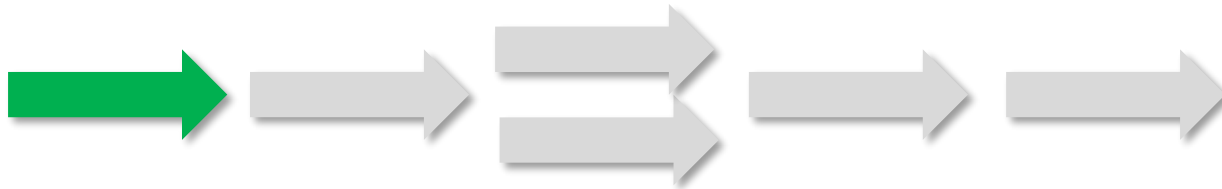
FILL

SEAL

TRANSPORT

STORE

LOAD



CONTAINERISED BULK HANDLING

THE PROCESS



SEAL the CONTAINER

- EXISTING SITE EQUIPMENT USED
- SELF LOCKING LID SYSTEM
- SEALS COMMODITY UNTIL LOADING
- NO CONTAMINATION

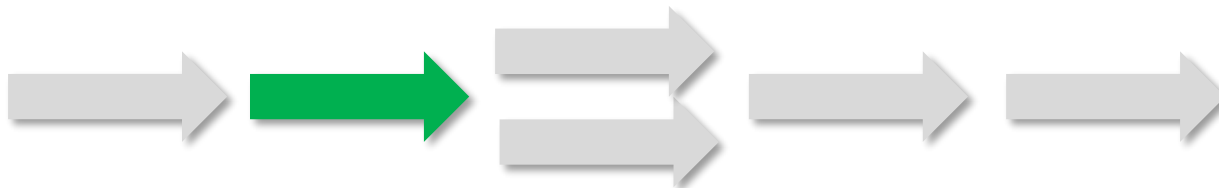
FILL

SEAL

TRANSPORT

STORE

LOAD



CONTAINERISED BULK HANDLING

THE PROCESS



SEND CONTAINER by RAIL

- *SEALED CONTAINERS – NO DUST*
- *NO CONTAMINATION*
- *NO LOSS OF COMMODITY*

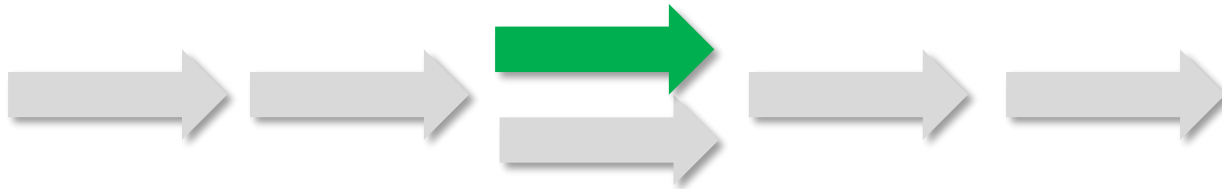
FILL

SEAL

TRANSPORT

STORE

LOAD



CONTAINERISED BULK HANDLING

THE PROCESS



FILL

SEAL

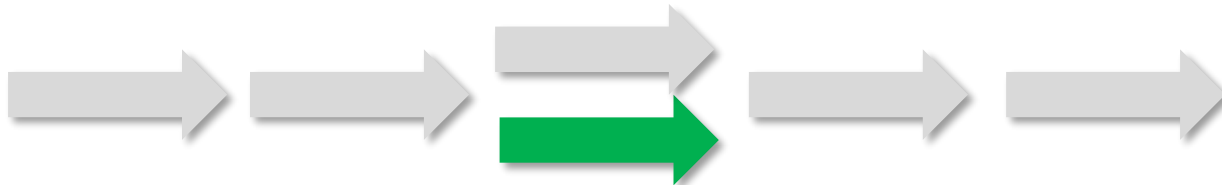
TRANSPORT

STORE

LOAD

Or SEND CONTAINER by ROAD

- *USING EXISTING ROAD NETWORK*



CONTAINERISED BULK HANDLING

THE PROCESS



FILL

SEAL

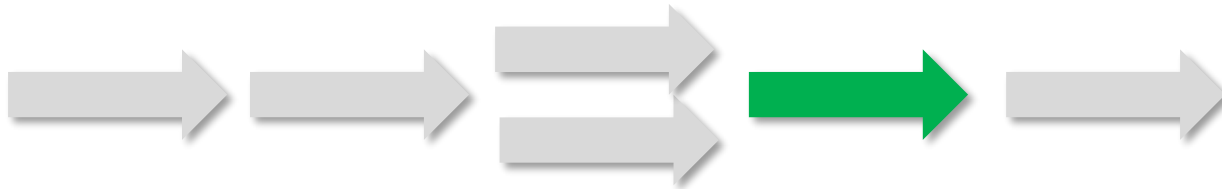
TRANSPORT

STORE

LOAD

STORE CONTAINERS AT PORT

- **NO STOCK PILE – NO DUST**
- **NO CONTAMINATION**
- **FAST & EFFICIENT LOADING**
- **STORE MULTIPLE TYPES OF COMMODITIES AT SAME AREA WITH NO CROSS CONTAMINATION**



CONTAINERISED BULK HANDLING

THE PROCESS

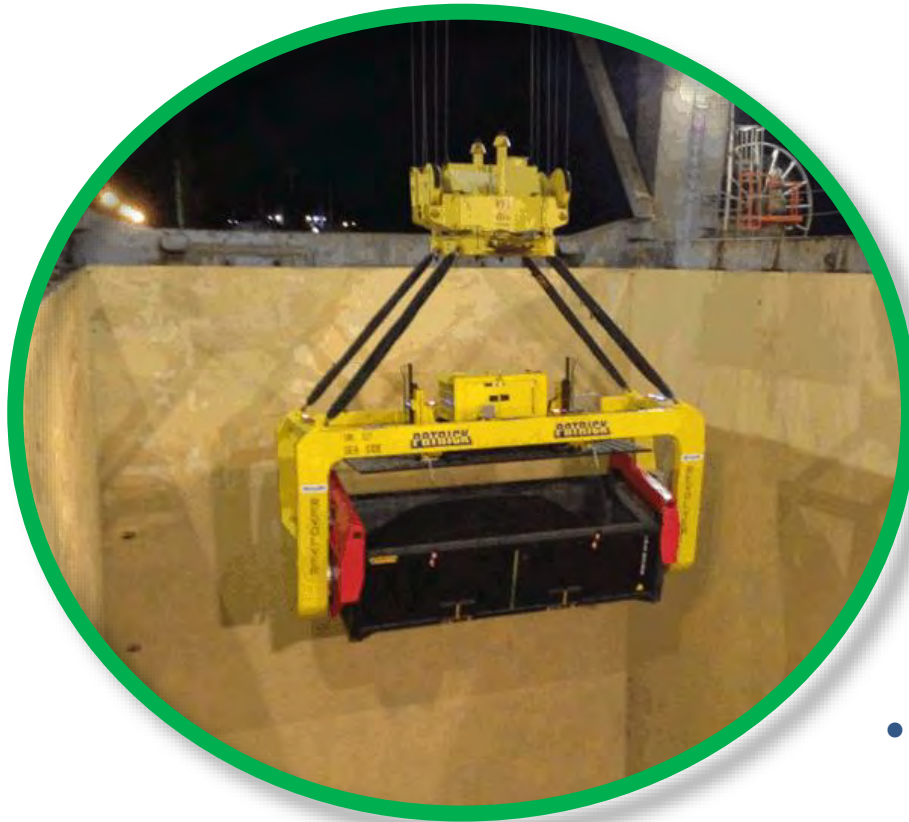
FILL

SEAL

TRANSPORT

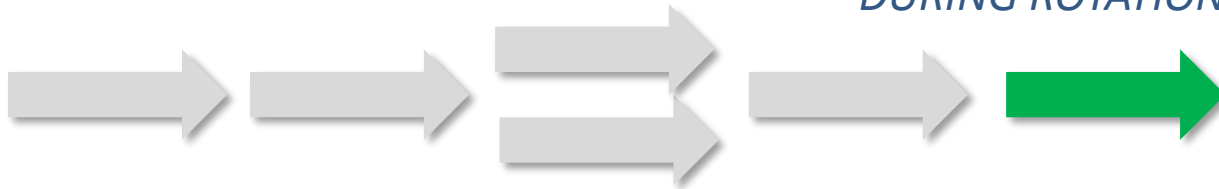
STORE

LOAD



LOAD using RAM Revolver

- FOR ALL TYPES OF CRANE
- LOADS OF UP TO **1,000 TPH***
*subject to commodity & loading conditions
- SWL – UP TO **45T**
- **LID LIFTER TECHNOLOGY – NO CONTAMINATION – NO DUST**
- **TWISTLOCK & GRIPPERS SECURE CONTAINER DURING ROTATION**



CONTAINERISED BULK HANDLING

MISTING SYSTEM



MISTING SYTEM

OFF



MISTING SYSTEM

ON

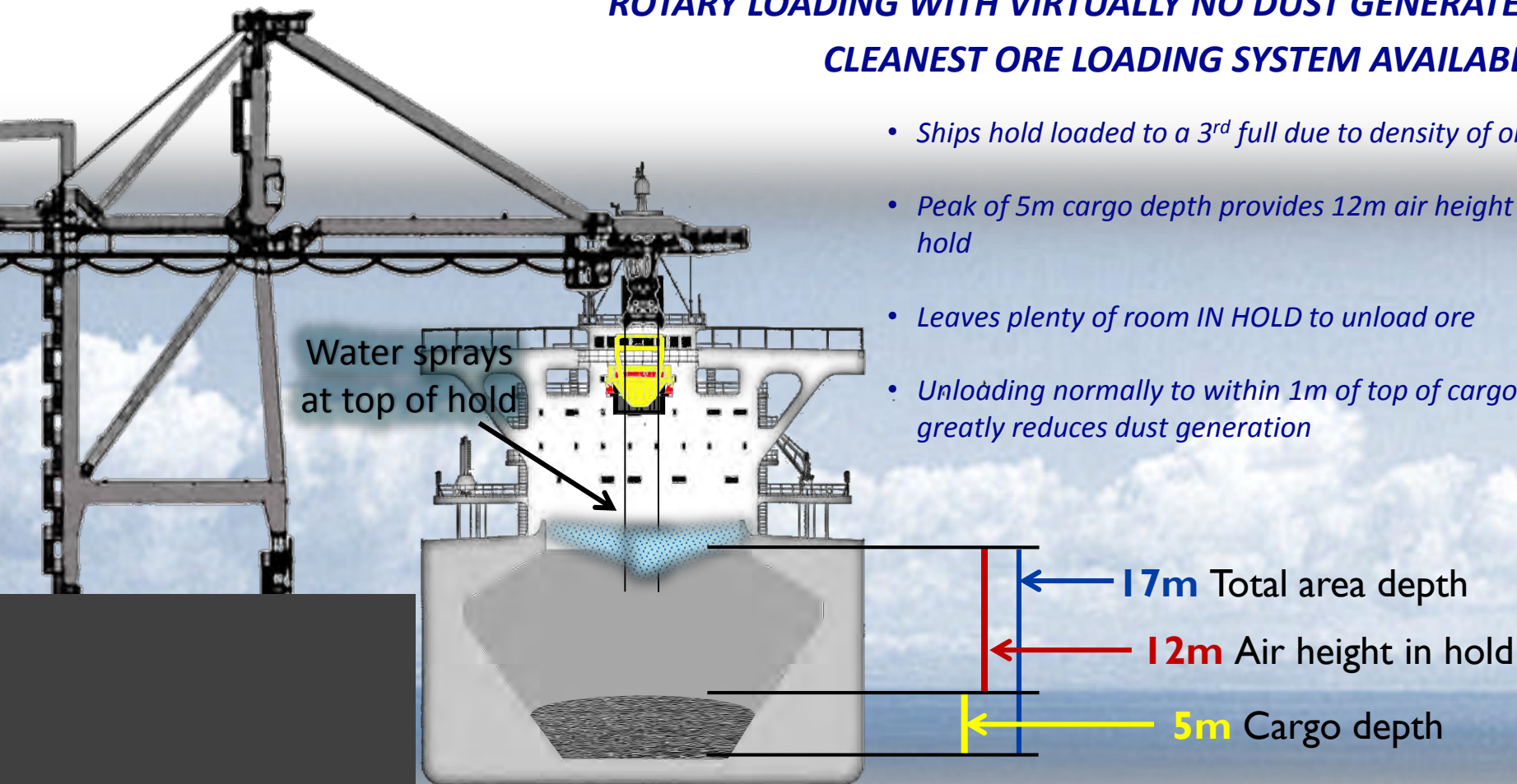
contamination
material loss

CONTAINERISED BULK HANDLING

LOADING PROCESS

**ROTARY LOADING WITH VIRTUALLY NO DUST GENERATED
CLEANEST ORE LOADING SYSTEM AVAILABLE**

- Ships hold loaded to a 3rd full due to density of ore
- Peak of 5m cargo depth provides 12m air height in hold
- Leaves plenty of room IN HOLD to unload ore
- Unloading normally to within 1m of top of cargo – greatly reduces dust generation



CONTAINERISED BULK HANDLING

CBH BENEFITS

COST

Lower set up costs

*No conveyor,
ship loaders or
storage sheds*

ENVIRONMENTAL

Zero Dust - No clean up

*Best practice by EPA
with fast approval*

SAFE & FAST

Virtually unmanned
operation

*With loading rates
of 1000 tonnes per
crane per hour*

PROVEN & REPRODUCIBLE

Providing a simple
proven turnkey
solution to
importers



CASE

STUDIES

CASE STUDY 1

COMPANY: Riga Universal Terminal

COMMODITY: Biomass

EQUIPMENT: MHC Crane



CASE STUDY 1

Riga Universal Terminal (RUT) became **the first** terminal in Europe to introduce the **Containerised Bulk Handling** system.

Since its introduction RUT have **doubled** their biomass export to cope with the increased demand and bring in new levels of revenue.

CASE STUDY 1

With the system capable of lifting 35m³ per cycle, RUT utilized their existing MHC

...and projected a **30 lifts per hour** capacity

allowing them to handle large volumes of biomass per hour

M³ PER CYCLE 35.00

MOVES PER HOUR 30.00

M³ PER HOUR 1,050

CASE STUDY 1

“ *The main benefit from introducing the new technology is a significant optimization of terminal expenses and an increase in performance.*

Now we can perform dry bulk handling operations involving a significantly smaller number of machines and human resources.

Saving on resources amount to almost 50%, he added.



Atis Šulte
Sales & Business
Development Director



CASE STUDY 1

COMPANY: Transnet Port Elizabeth

COMMODITY: Manganese

EQUIPMENT: Ship to Shore Crane



CASE STUDY 1

PORT ELIZABETH

South Africa



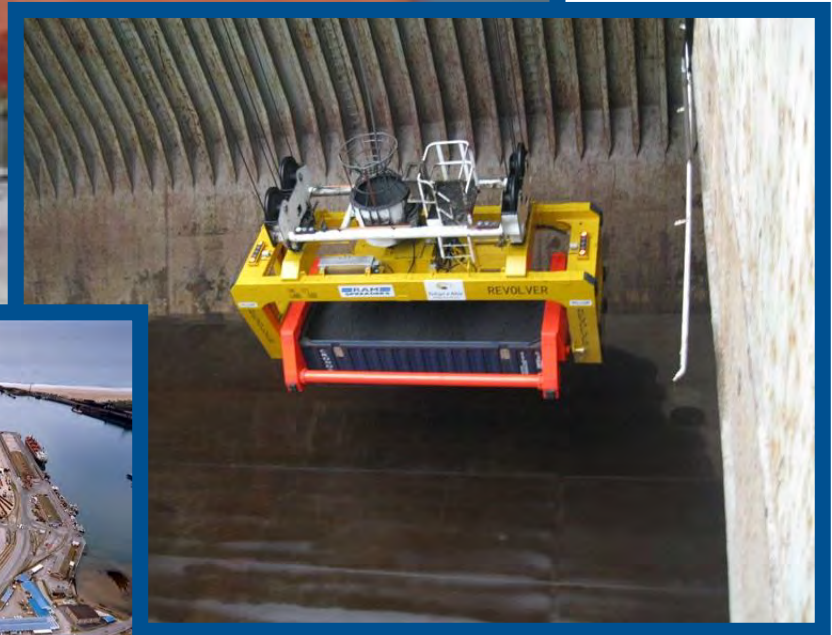
CASE STUDY 1

PORT ELIZABETH

South Africa



Tshipi é Ntle
Manganese Mining



CASE STUDY 1

PORT ELIZABETH

South Africa



Tshipi é Ntle
Manganese Mining



CASE STUDY 1

PORT ELIZABETH

South Africa



Tshipi é Ntle
Manganese Mining



CASE STUDY 1

PORT ELIZABETH

South Africa




Tshipi é Ntle
Manganese Mining

Transnet's introduction of Containerised Bulk
Handling delights customers and is breaking bulk handling records in South Africa

12
145,230

= *A record breaking 14,230 tonnes of manganese was loaded in just 12 hours*

CASE STUDY 2

A yellow RAM spreader is being lifted by a ship crane. The spreader is suspended by cables and is positioned over a large, open area, likely a ship's hold or a storage area. The background shows the structure of the ship and some equipment.

COMPANY: TPR Rosario
COMMODITY: Grain
EQUIPMENT: Ship Crane

CASE STUDY 2

TPR Rosario - Argentina

Overview

TPR Rosario is the first terminal in the world to utilize Containerised Bulk Handling.

The terminal is a key gateway hub for Argentina, handling all types of import and export cargo.



CASE STUDY 2

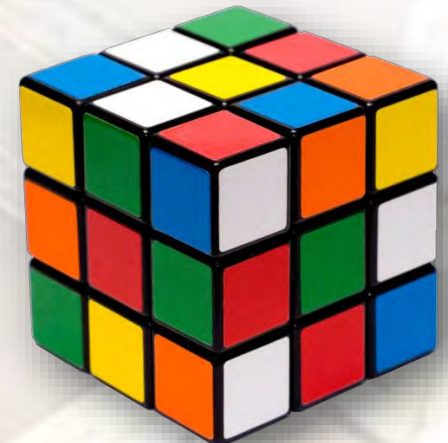
TPR Rosario - Argentina

Challenges

Growing business of exporting grain required TPR to find a method to improve productivity whilst also simplifying the operation.

Limited investment capacity – existing equipment has to be used or modified.

Traditional contamination of commodity from open stockpiles.



CASE STUDY 2

TPR Rosario - Argentina

Fill at the Farm

Agri-bulk loaded into specially designed high cube 20ft containers



Containers as Transport **and** Silo

Multipurpose use:

Fill | Transport | Store | Empty | Re-use



CASE STUDY 2

TPR Rosario - Argentina

The Problem

Contamination of Commodity

Open stockpiles at risk of “spoil” due to:

- **Contamination** from vermin & birds
- **Moisture**
- **Airborne contaminants**
- **Open top transport** from farm to port
- **Other physical** external contaminants



The Solution

Contamination free

CBH contamination free process down to:

Commodity

- Being stored in **sealed** containers
- Kept secure and dry throughout the process

Lid on Container

- Lifted **only** during rotation of commodity into the ships hold



CASE STUDY 2

TPR Rosario - Argentina

Benefits

- **Fast loading rates with CBH**
- **Handling process can be as high as 25 cycles per hour**
- **Up to 1,000 tons per hour can be achieved**
- **Minimal material loss**
- **Innovative lid system means no material loss during CBH process**



CASE STUDY 2

TPR Rosario - Argentina

Solution

Any container terminal

- *CBH allows exporters to take the grain to any container terminal*

Storage – Sealed Container

- *Grain stored in high cube 20ft or 40ft containers with lids*
- *No material loss*

Portable

- *Containers can be re-located to other operation port **with the rotating spreader***



CASE STUDY 3

COMPANY: Patrick Ports & Stevedoring

COMMODITY: Copper Concentrate

EQUIPMENT: Ship Crane



CASE STUDY 3



15 Lifts per hour

Tonnes per crane per hour

400

2 Cranes

18000

Tonnes per day



**CASE
STUDY**

TESTIMONIALS

CASE STUDY - TESTIMONIAL

Environmental Benefits

“Turning DP World Adelaide from a standard container terminal into a bulk handling terminal raised an interesting reaction”.

“The sailing squadron next to the terminal came to me one day to protest about the new system of bulk export being introduced at the terminal, and they wouldn’t allow us to operate the system as it would create red dust on their sailing boats”.

*“They had slack jaws when I told them **the system had already been running for six months with zero emissions**”*

DPW Adelaide



Ray Lee

Regional Director
DPW Australia | 2009-2011

CASE STUDY - TESTIMONIAL

...and terminal growth

“DPW Adelaide was an under utilized terminal with low berth occupancy and little growth prospects”

“...to grow the terminal we needed to think outside traditional income sources”



Ray Lee
Regional Director
DPW Australia | 2009-2011

DPW Adelaide

CASE STUDY - TESTIMONIAL

Low capital expenditure

*“Patrick was able to utilize this new revolving spreader technology to export copper concentrate for our client **with very little capital**”*

*“Our Client was **extremely pleased** with the dust free solution”*



Adrian Howard
Commercial Director
Patrick Ports & Stevedoring

Patrick | Asciano

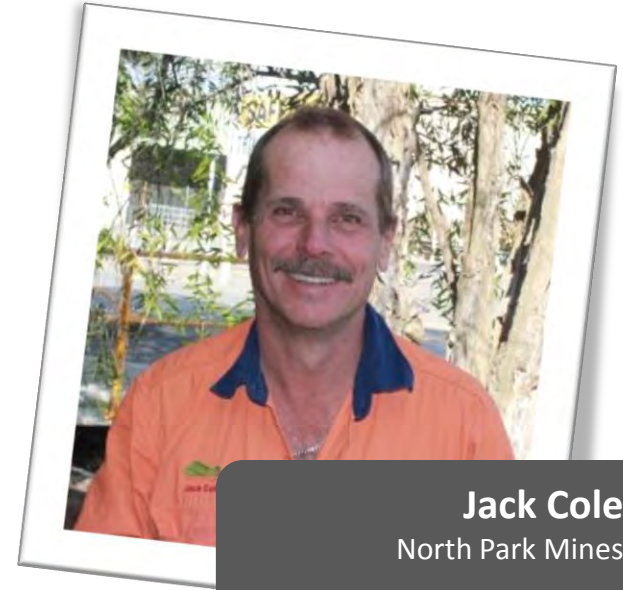
CASE STUDY - TESTIMONIAL

High loading rates minimize shipping costs

Miners Perspective

*“Environmentally **it is a very clean system** due to containers being emptied directly into the ship’s hold thereby **minimizing a number of dust generating points**”*

*“Loading rates of 15,000 wmt/day being achieved are such that it **helps to minimize shipping costs**”*



Jack Cole
North Park Mines

North Park Mines

CASE STUDY – FURTHER EXAMPLES

LATVIA



COAL
IRON ORE
MANGANESE
COPPER

GRAIN

MHC CRANE

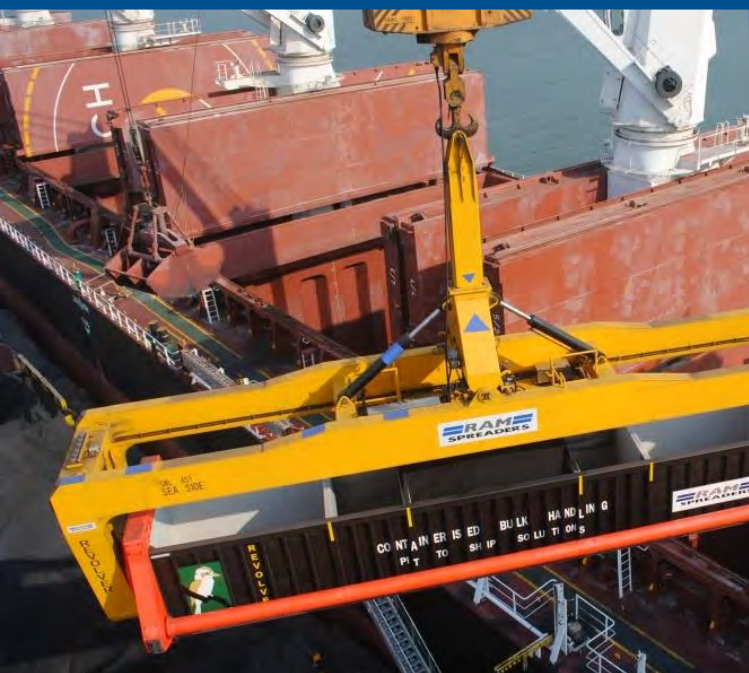
SHIPS CRANE
STS CRANE
BRIDGE CRANE
REACH STACKER

CASE STUDY – FURTHER EXAMPLES

MAPUTO



DP WORLD



COAL

IRON ORE

MANGANESE

COPPER

GRAIN

MHC CRANE

SHIPS CRANE

STS CRANE

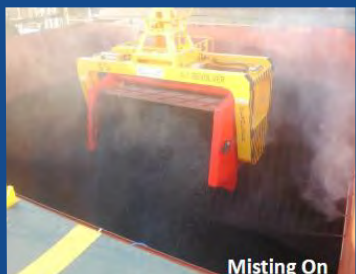
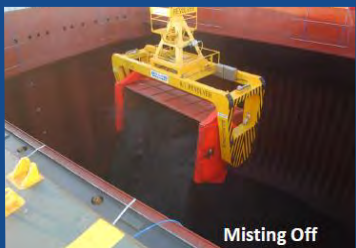
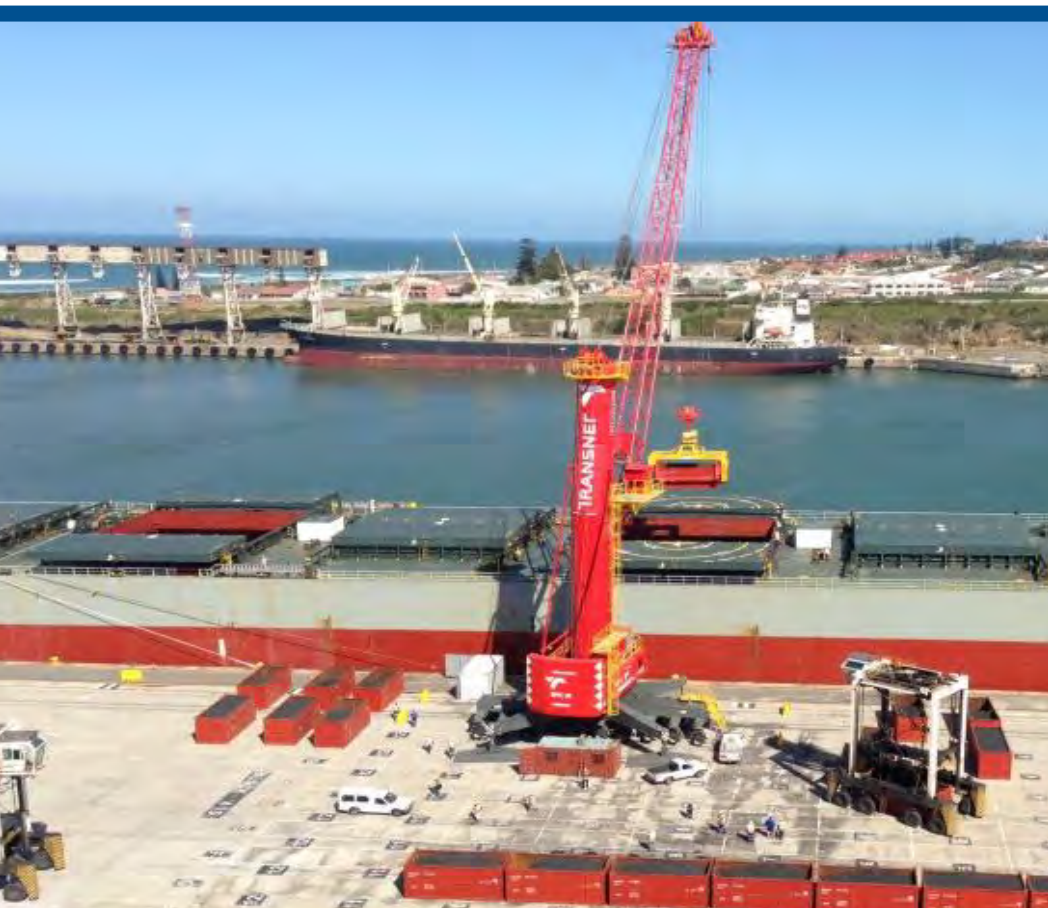
BRIDGE CRANE

REACH STACKER



CASE STUDY – FURTHER EXAMPLES

EAST LONDON



COAL

- IRON ORE
- MANGANESE
- COPPER
- GRAIN

MHC CRANE

- SHIPS CRANE
- STS CRANE
- BRIDGE CRANE
- REACH STACKER

CASE STUDY – FURTHER EXAMPLES

ADELAIDE



COAL
IRON ORE

MANGANESE

COPPER

GRAIN

MHC CRANE

SHIPS CRANE

STS CRANE

BRIDGE CRANE

REACH STACKER

CASE STUDY – FURTHER EXAMPLES

CONGO



COAL
IRON ORE

MANGANESE

COPPER

GRAIN

MHC CRANE

SHIPS CRANE

STS CRANE

BRIDGE CRANE

REACH STACKER

CASE STUDY – FURTHER EXAMPLES

CHILE



COAL
IRON ORE
MANGANESE

COPPER

GRAIN

MHC CRANE

SHIPS CRANE
STS CRANE
BRIDGE CRANE
REACH STACKER

CASE STUDY – FURTHER EXAMPLES

MAURITANIA



COAL
IRON ORE
MANGANESE
COPPER
GRAIN



MHC CRANE
SHIPS CRANE
STS CRANE
BRIDGE CRANE
REACH STACKER

CASE STUDY – FURTHER EXAMPLES

LAS BAMBAS - PERU



COAL
IRON ORE
MANGANESE

COPPER

GRAIN

MHC CRANE
SHIPS CRANE
STS CRANE

BRIDGE CRANE

REACH STACKER

CASE STUDY

BOLIVIA



COAL
IRON ORE
MANGANESE

COPPER

GRAIN

OTHER

MHC CRANE
SHIPS CRANE

STS CRANE

BRIDGE CRANE

REACH STACKER

CASE STUDY

TURKEY



COAL
IRON ORE
MANGANESE

COPPER

GRAIN

OTHER

MHC CRANE
SHIPS CRANE
STS CRANE

BRIDGE CRANE

REACH STACKER



CASE STUDY

ARIZONA / MEXICO



COAL
IRON ORE
MANGANESE

COPPER

GRAIN

OTHER

MHC CRANE

SHIPS CRANE

STS CRANE

BRIDGE CRANE


REACH STACKER

COSTINGS

CBH - COMPARISONS

MHC model




- *Cranes x 2 = USD\$ 8,000,000.00*
- *Containers x 30 = USD\$ 300,000.00*
- *CHE = USD\$ 500,000.00*
-  *Revolver's = USD\$ 1,500,000.00*

= 10 MILLION

Ships Crane model



-  *Revolver's x 2 = USD\$ 800,000.00*
- *Misting System = USD\$ 200,000.00*
- *Container = USD\$ Leased*
- *Fork Truck = USD\$ Leased*

= 1 MILLION

CONTAINERISED BULK HANDLING - BENEFITS

- ✓ *Flexible Berths* – No fixed bulk berths
- ✓ *Fast to start*
- ✓ *No dust*
- ✓ *Low cost*



CONTAINERISED BULK HANDLING - BENEFITS



Cost

- Lower set up costs (No conveyor, ship loaders, storage sheds)



Environmental

- Zero dust, no clean up
- Best practice by EPA with fast approval



Safe & Fast

- Virtually man less operation with loading rates of 1700 TPH per crane



Proven & Reproducible

- Providing a simple proven turnkey solution to exporters



EQUIPMENT

INTEGRATED APPROACH

Revolver®



Cranes



Dust Suppression



Container Handlers



Containers



REVOLVER trailer system

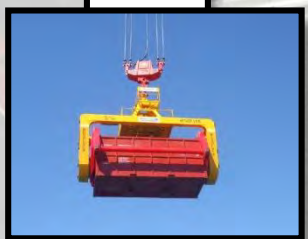


EQUIPMENT APPLICATION

Ship to Shore
Crane



Mobile Harbour
Crane



Ship
Crane



Reach
Stacker



Bridge
Crane



COMMODITIES HANDLED



Grains



Mineral Sands



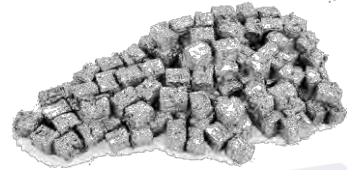
Soya



Wood Chip



Copper Concentrate



Scrap Metal



Bagged Materials



Coal



Iron Ore



CBH COMPANIES

Exxaro

Grinrod

DP World

Eletheni/ SNR

BHP B

Oz Minerals

Hillgrove Copper

Transnet

FQML

TPR Argentina

Ironclad

Patrick

MMG Las Bambas

Riga Universal Terminals

ETI Bakir

Port of Quijarro

HPH Timsa

exxaro



IRONCLAD
MINING LIMITED

bhpbilliton





“Not often do you get a solution that is the **lowest cost** but also **best practice environmentally**”

RAM
SPREADERS

AWARD WINNING



Containerised Bulk Handling with RAM Revolver® is recognized by the bulk handling industry as an innovative and environmentally friendly solution

IBJ - 2014

Environmental Protection Award



RAM Spreaders & Patrick Ports and Stevedoring Australia



For contamination & dust free Containerised Bulk Handling

IBJ - 2016

Innovative Technology Award

RAM Spreaders & MMG Las Bambas Peru



For Bi-Modal Containerised Bulk Handling from Las Bambas Mine to Matarani Port