

DUST FREE

# Containerised Bulk Handling

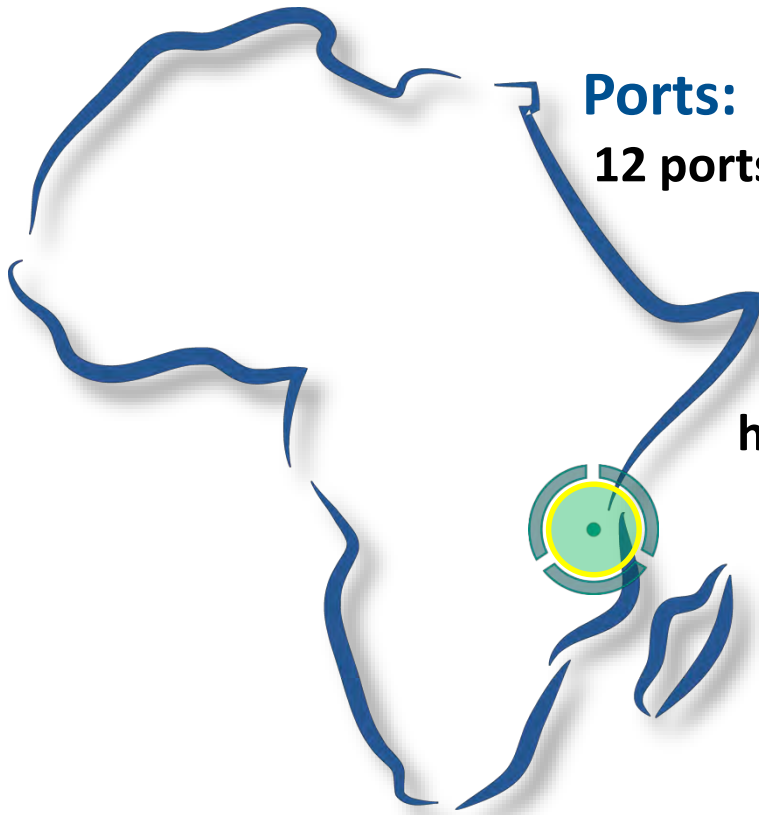
Case Studies of African Ports adopting Innovative Systems to stop dust pollution



# MOZAMBIQUE - AFRICA

## Mozambique:

In 2016 Shipped USD 3.4 billion worth of goods around the world



### Ports:

12 ports serve the Mozambique region

### Commodities:

Amongst other commodities, Mozambique handles mainly raw aluminium and coal

### Export:

Commodities are exported to South Africa, The Netherlands, India, Italy, China and Portugal

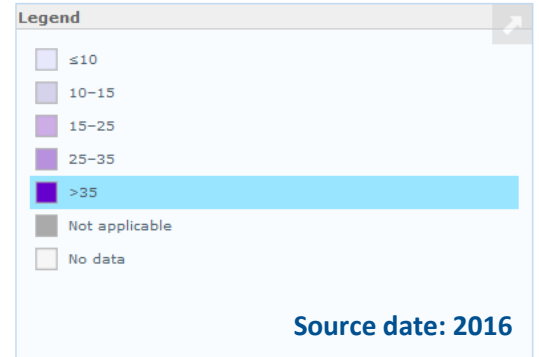
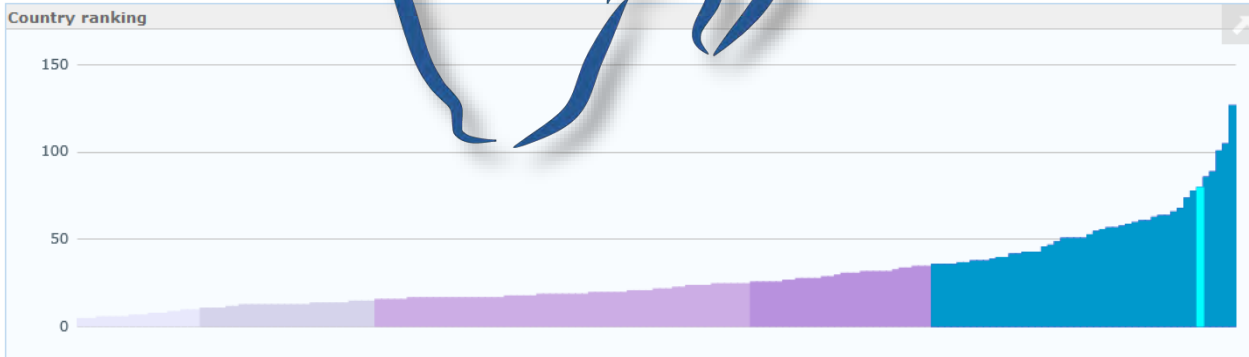
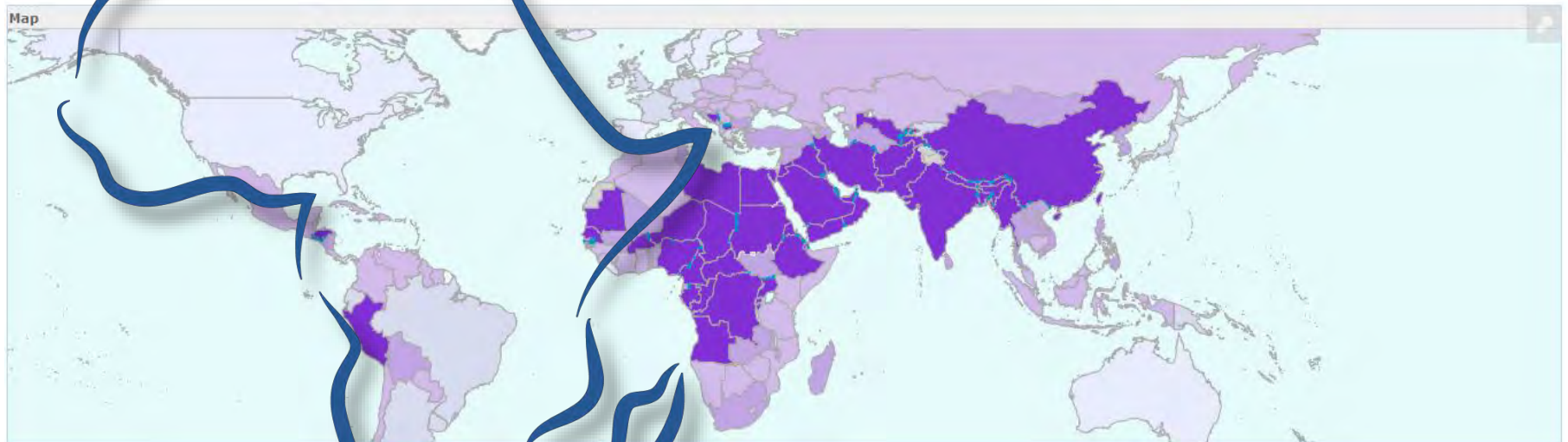
### Intermodal Links:

The Ports of Nacala, Beira and Maputo all have good railroad links

# AFRICA

## Pollution:

The World Health Organization maps indicates a large percentage of Africa suffers from high levels of airborne pollution along with Asia with the **dark blue** segments showing the most polluted regions.



Source date: 2016

## AFRICA

# In order to meet global environmental guidelines,

bulk ports & terminals 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

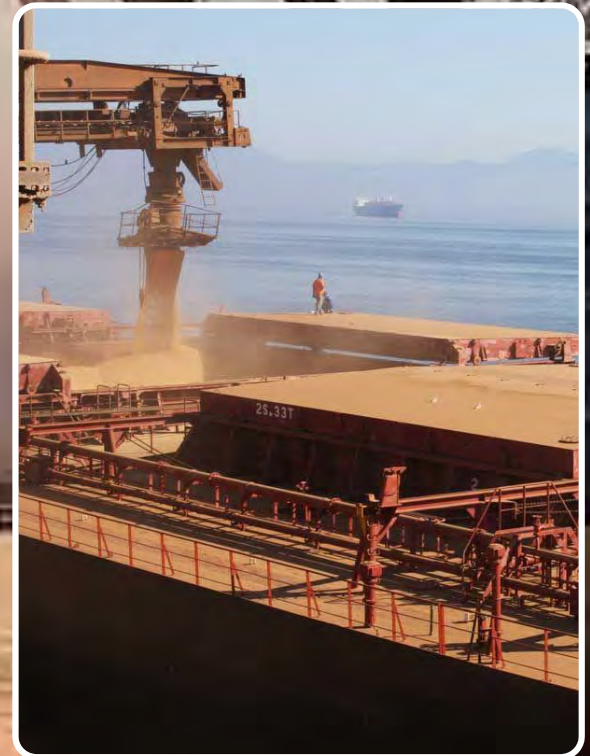
TRANSFER POINTS  
OPEN WAGONS  
**OPEN STOCKPILES**  
SHIP LOADING





# 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!*



## 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



# Containerised BULK HANDLING

FILL | TRANSPORT | STORE | LOAD



## 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 as a method of storage and transport** with a rotating spreader which handles the container, lifts the lid and rotates the container, gently tipping the commodity out



# 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

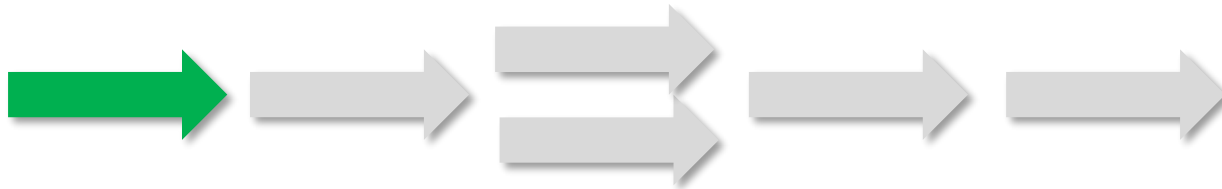
FILL

SEAL

TRANSPORT

STORE

LOAD



# CONTAINERISED BULK HANDLING

## THE PROCESS



FILL  
**SEAL**

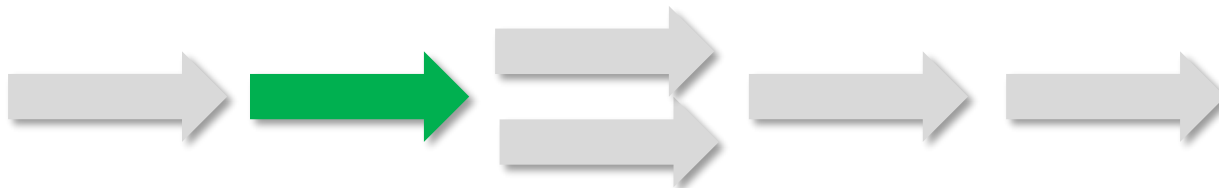
TRANSPORT

STORE

LOAD

### SEAL the CONTAINER

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



# CONTAINERISED BULK HANDLING

## THE PROCESS



### *SEND CONTAINER by RAIL*

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

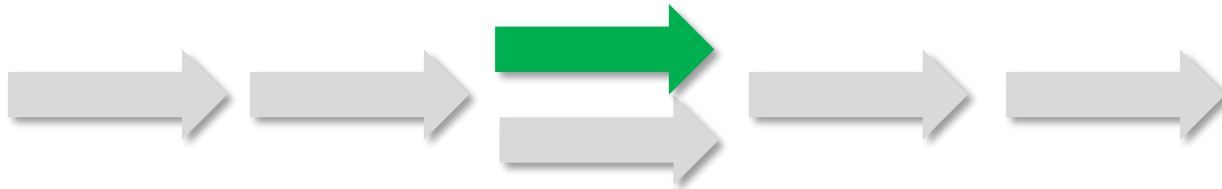
FILL

SEAL

**TRANSPORT**

STORE

LOAD



# CONTAINERISED BULK HANDLING

## THE PROCESS



FILL

SEAL

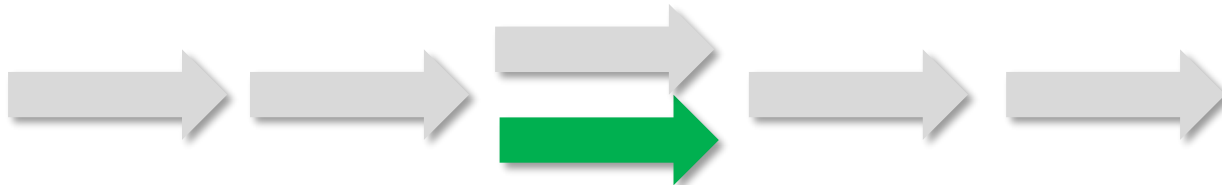
**TRANSPORT**

STORE

LOAD

*Or SEND CONTAINER by ROAD*

- *USING EXISTING ROAD NETWORK*



# CONTAINERISED BULK HANDLING

## THE PROCESS



FILL

SEAL

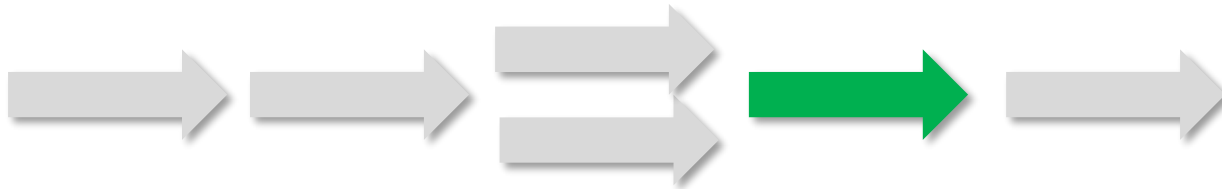
TRANSPORT

**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

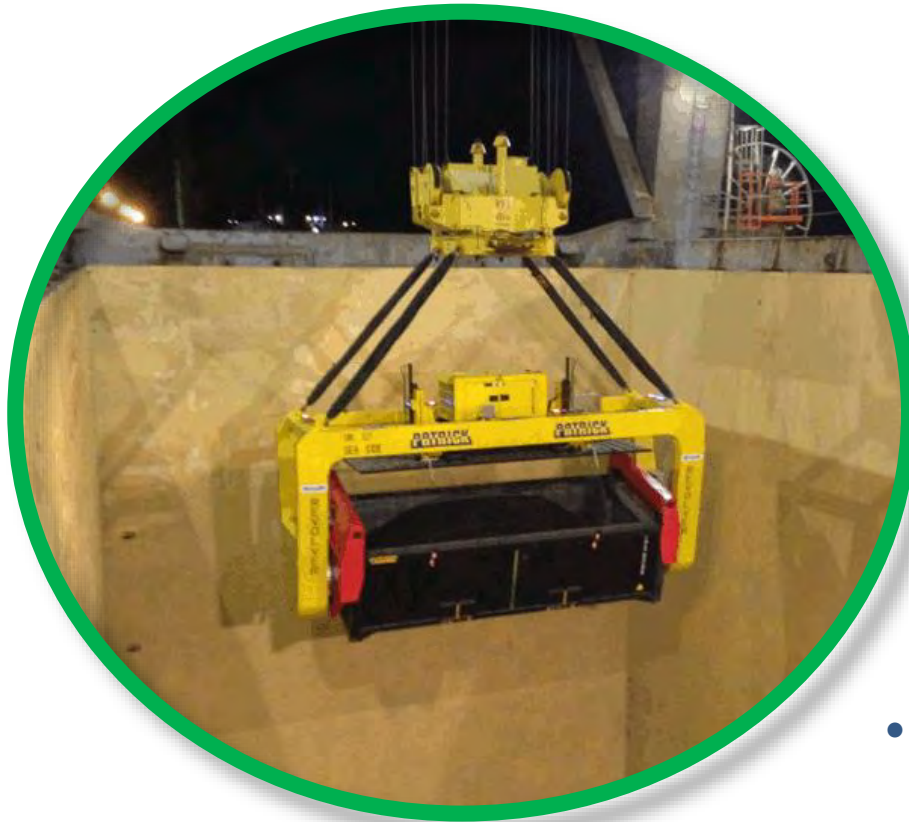
FILL

SEAL

TRANSPORT

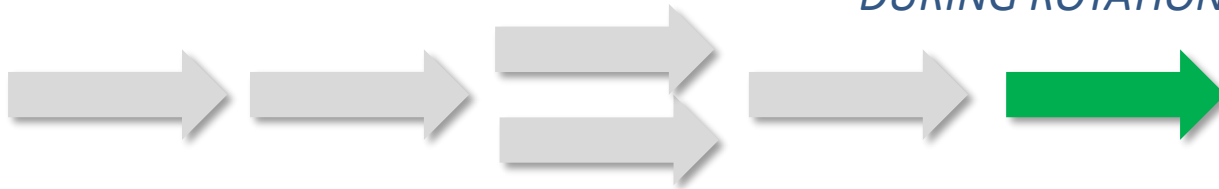
STORE

**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**

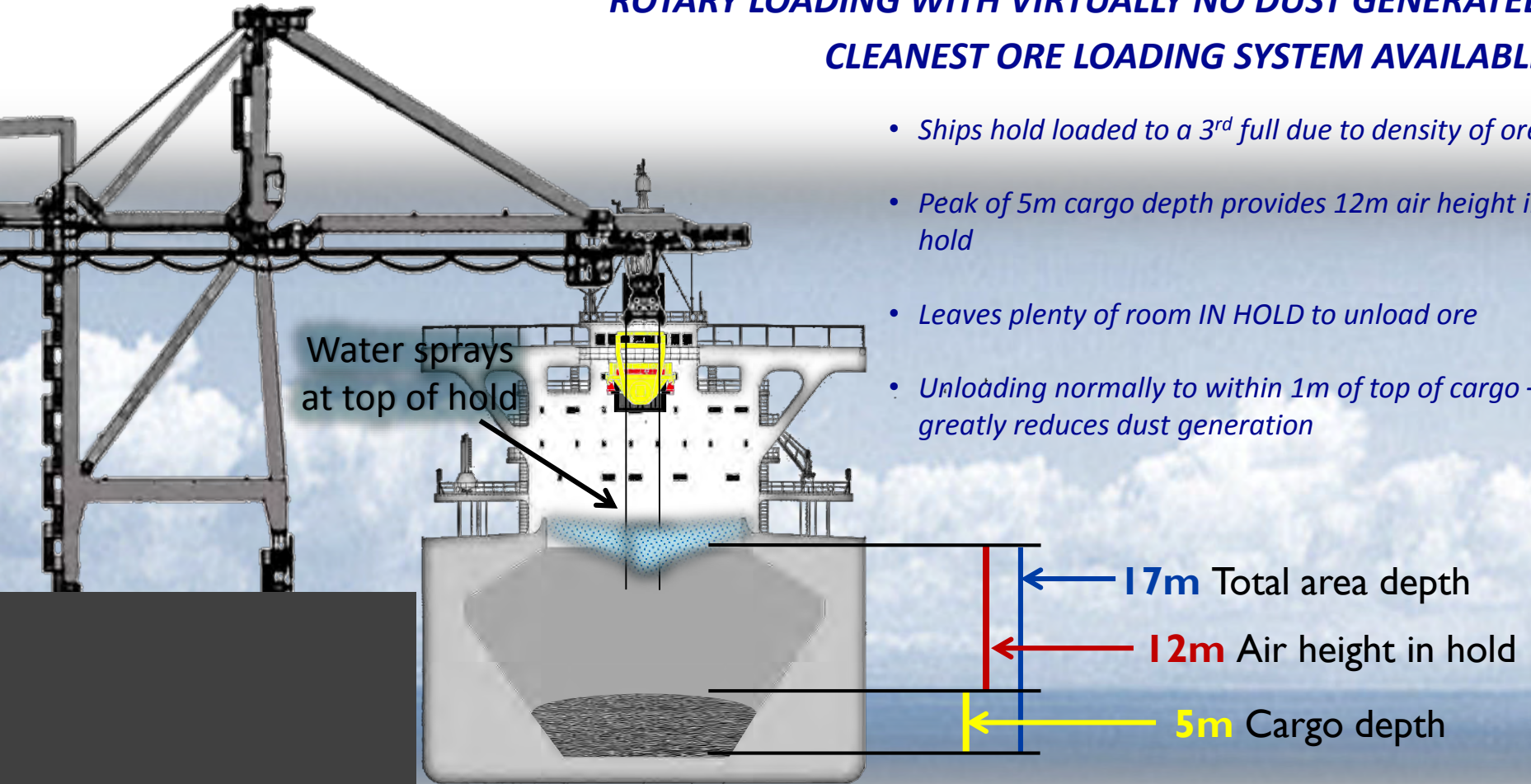
**NO**  contamination  
 material loss

# CONTAINERISED BULK HANDLING

## LOADING PROCESS

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

- Ships hold loaded to a 3<sup>rd</sup> 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 STUDY 1

*COMPANY:* Transnet Port Elizabeth

*COMMODITY:* Manganese

*EQUIPMENT:* Ship to Shore Crane

# CASE STUDY 1

**PORT ELIZABETH**

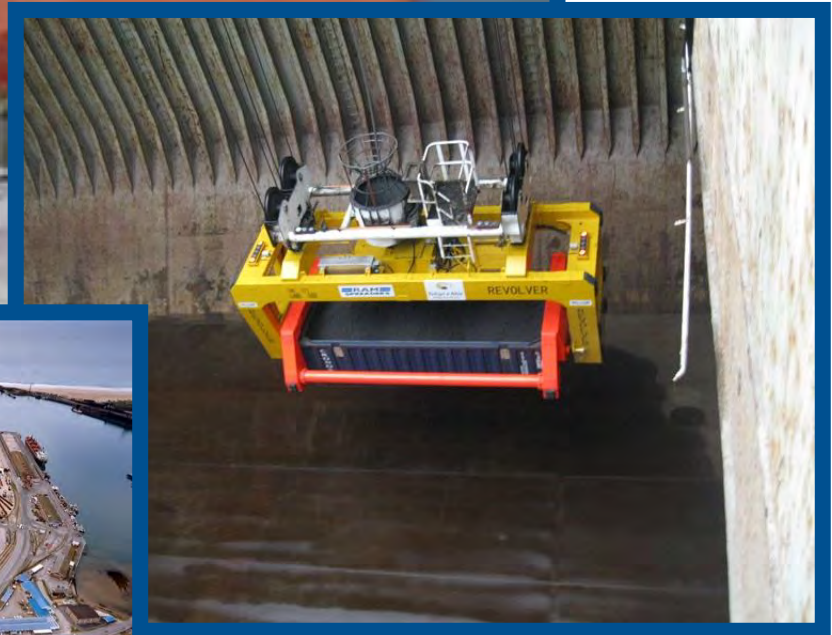
South Africa



# CASE STUDY 1

## PORT ELIZABETH

South Africa



# 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 lowered by a ship crane. The spreader is suspended by cables and is positioned over a large, open hold in the hull of a ship. The background shows the interior of the ship's hold, with various structural elements and a ladder visible. The overall scene is brightly lit, suggesting an outdoor or well-lit indoor environment.

*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

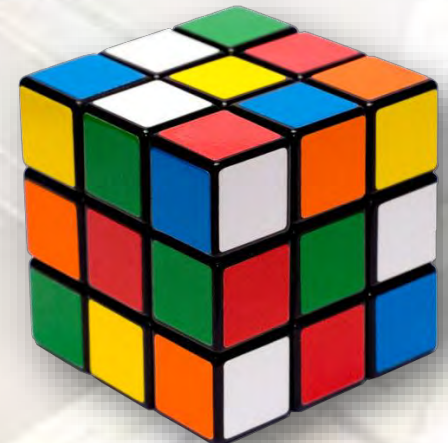
# TPR Rosario - Argentina

## 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

A faded background image of a port terminal. A large yellow and red ship crane is visible on the left, lifting a yellow and red container. In the foreground, two workers in yellow high-visibility jackets and white hard hats are looking at a document. The ground is wet and reflective. In the background, there are stacks of containers and other port infrastructure.

*COMPANY:* Patrick Ports & Stevedoring

*COMMODITY:* Copper Concentrate

*EQUIPMENT:* Ship Crane



**CASE STUDY 3**



**15 Lifts per hour**  
**400 Tonnes per crane per hour**  
**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**”*



**Ray Lee**  
Regional Director  
DPW Australia | 2009-2011

**DPW Adelaide**

## 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**

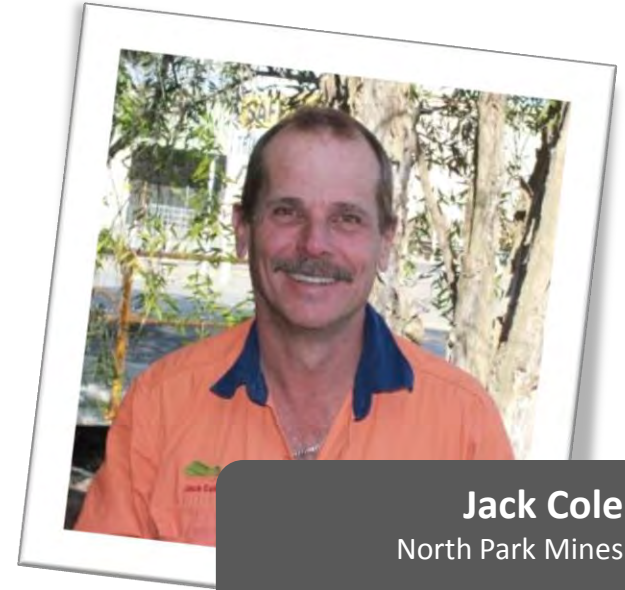
## CASE STUDY - TESTIMONIAL

# 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**”*

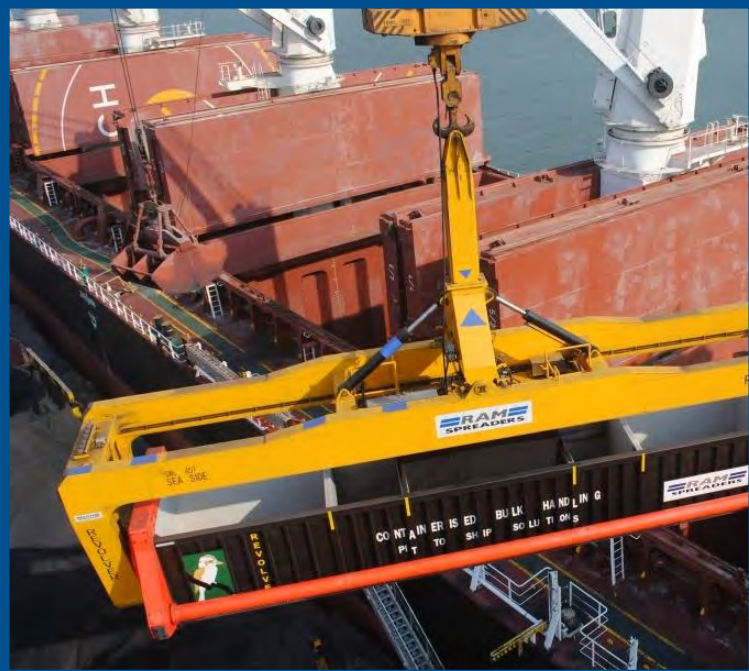


**Jack Cole**  
North Park Mines

**North Park Mines**

# CASE STUDY – FURTHER EXAMPLES

## MAPUTO



### COAL

- IRON ORE
- MANGANESE
- COPPER
- GRAIN

### MHC CRANE

- SHIPS CRANE
- STS CRANE
- BRIDGE CRANE

# CASE STUDY – FURTHER EXAMPLES

## EAST LONDON



### COAL

- IRON ORE
- MANGANESE
- COPPER
- GRAIN

### MHC CRANE

- SHIPS CRANE
- STS CRANE
- BRIDGE CRANE



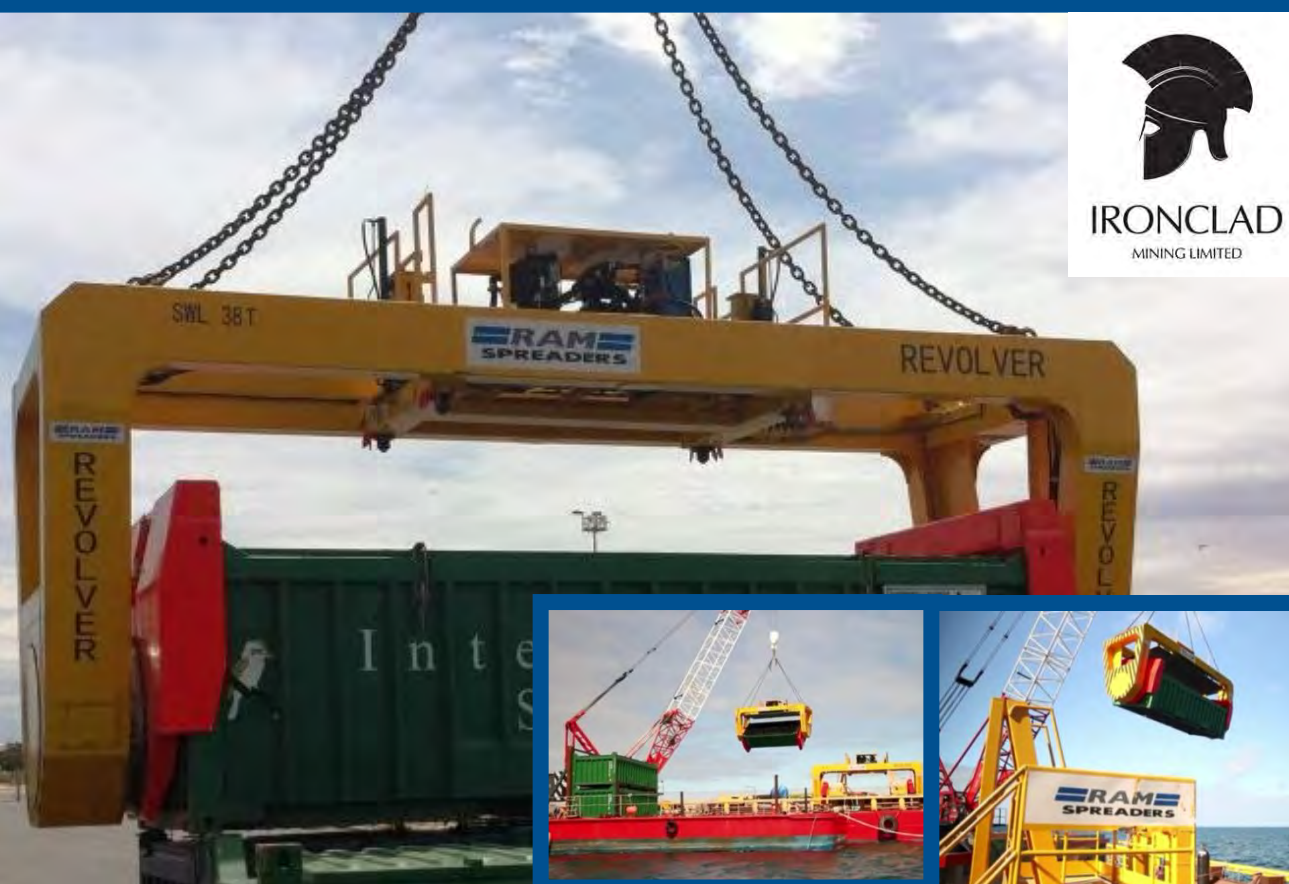


# CASE STUDY – FURTHER EXAMPLES

## ADELAIDE



IRONCLAD  
MINING LIMITED



COAL

**IRON ORE**

MANGANESE

COPPER

GRAIN

MHC CRANE

**SHIPS CRANE**

STS CRANE

BRIDGE CRANE

## CASE STUDY – FURTHER EXAMPLES

CONGO



COAL

**IRON ORE**

MANGANESE

COPPER

GRAIN

**MHC CRANE**

SHIPS CRANE

STS CRANE

BRIDGE CRANE

## CASE STUDY – FURTHER EXAMPLES

**CHILE**



COAL  
IRON ORE  
MANGANESE  
**COPPER**  
GRAIN

**MHC CRANE**  
SHIPS CRANE  
STS CRANE  
BRIDGE CRANE

## CASE STUDY – FURTHER EXAMPLES

### LAS BAMBAS - PERU



COAL  
IRON ORE  
MANGANESE

**COPPER**

GRAIN

MHC CRANE

SHIPS CRANE

STS CRANE

**BRIDGE CRANE**

## CASE STUDY – FURTHER EXAMPLES

### MAURITANIA




### IRON ORE

# 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

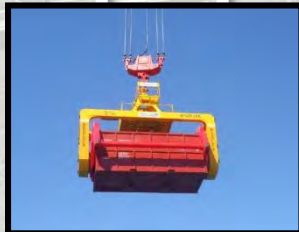


# EQUIPMENT

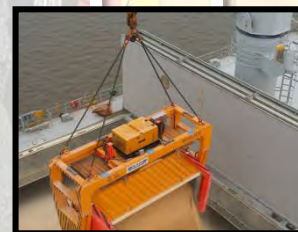
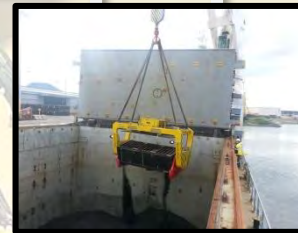
## Ship to Shore



## Mobile Harbour



## Ship Crane



## Reach Stacker



# COMMODITIES HANDLED



Grains



Mineral Sands



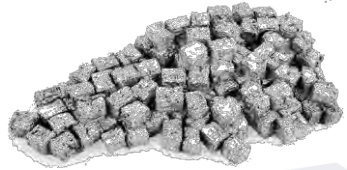
Soya



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**



LAS BAMBAS



exxaro



Riga  
Universal  
Terminals

FIRST QUANTUM



IRONCLAD  
MINING LIMITED



Energy Efficiency



DP WORLD



TPR

Terminal Puerto Riego, S.A

REVOLVER

HILLGROVE  
COPPER

REVOLVER



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



Revolver

RAM  
Revolver

SWL 38T  
SEA SIDE

Revolver

**AWARD WINNING**



*Containerised Bulk Handling with RAM Revolver® is being 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*