

CLEAN BULK PORTS



The next generation in clean bulk ports

Case Studies of bulk handling systems to stop dust pollution

Presented by: Frank van Laarhoven

RAM
SPREADERS

BLACK SEA REGION

22 Sea Ports & developed railroad infrastructure



Fast growing mineral & agricultural industry



Millions of tons of bulk cargo!



All create a number of environmental challenges



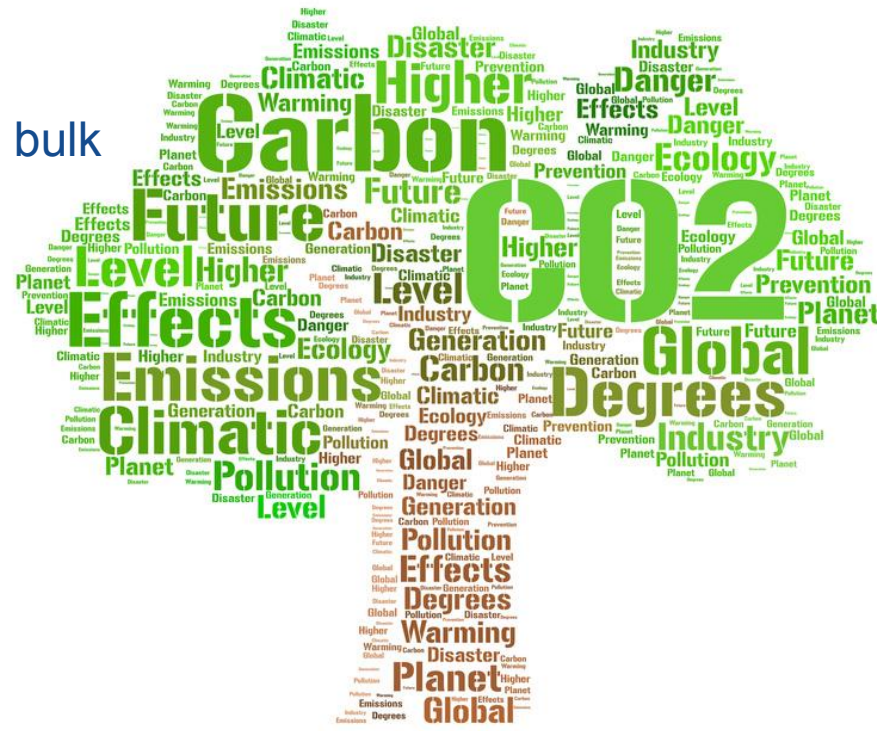
BULK HANDLING

In many cases, new bulk terminal will not be approved without lowering environmental impact.

Also

In order to remain competitive, many existing ports 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**



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

? £ € \$



SOURCES OF DUST

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



SOURCES OF DUST

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



Transfer Points



Open Wagons



Stockpiling Commodities



Ship Loading





A new method
to handle bulk
is available

Containerised **BULK HANDLING**

| FILL | TRANSPORT | STORE | LOAD |

CONTAINERISED BULK HANDLING

The CBH system uses:

Sealed containers
for **storage** and **transport**...

...by rail



CONTAINERISED BULK HANDLING



...by road

CONTAINERISED BULK HANDLING



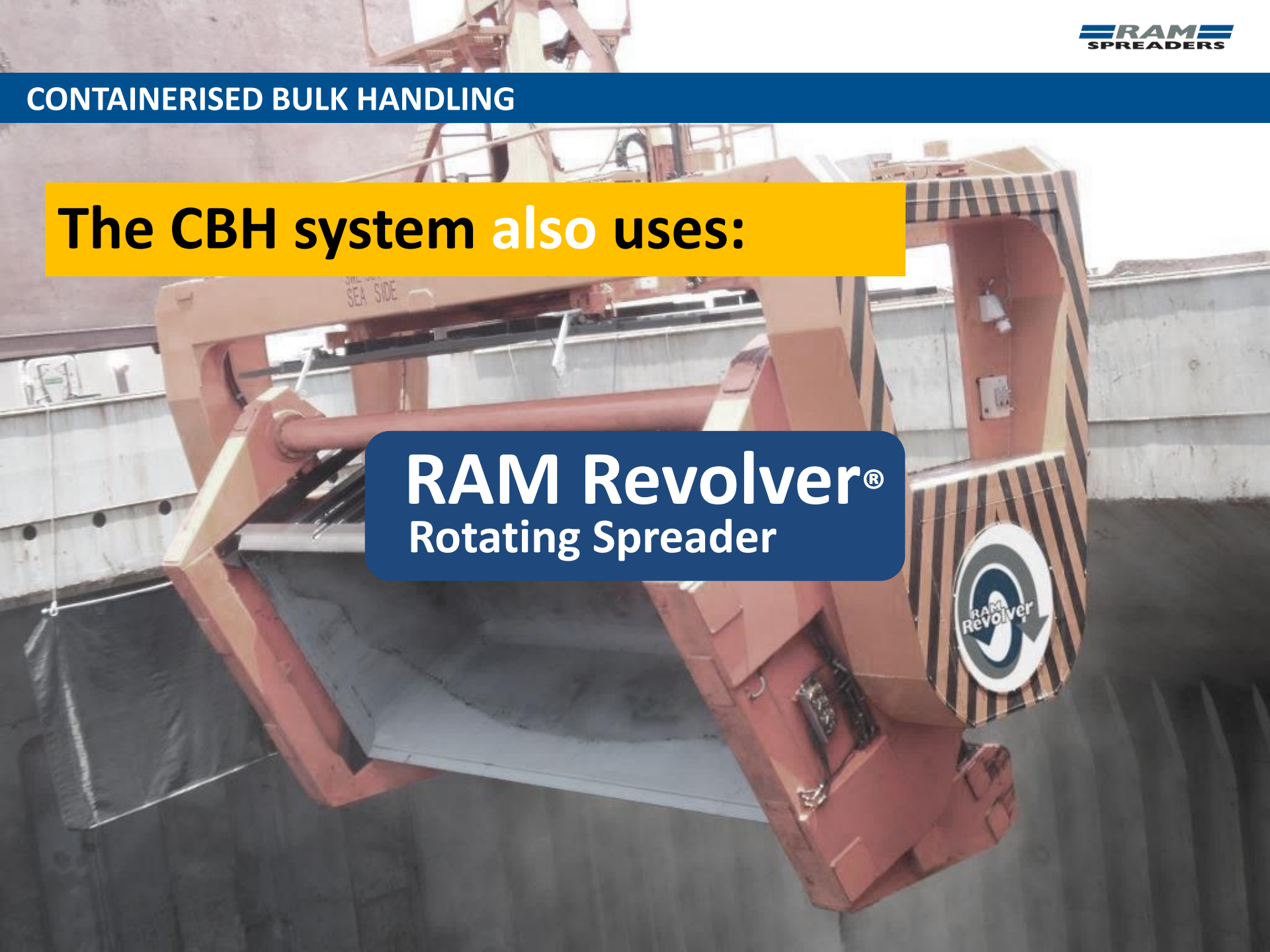
...or both

(bi-modal)

CONTAINERISED BULK HANDLING

The CBH system also uses:

RAM Revolver®
Rotating Spreader



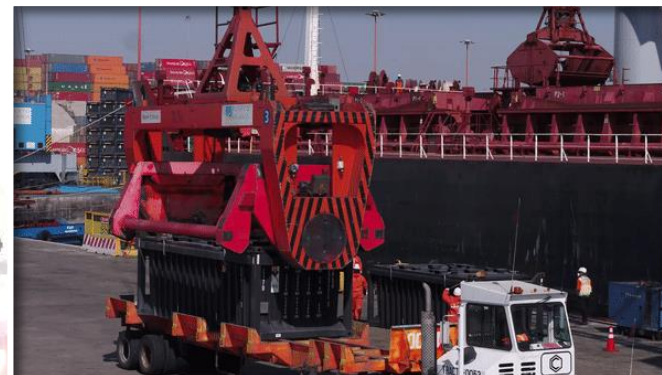
CONTAINERISED BULK HANDLING

That...

Handles the container

Lifts the lid

Rotates the container



Low Environmental Impact

Containerised Bulk Handling:

Reduces pressure from **Authorities** for compliance with environmental guidelines

Reduces material loss by up to **3%** with sealed container technology

BULK EXPORT

CONTAINERISED BULK HANDLING - EXPORT



CONTAINERISED BULK HANDLING - EXPORT

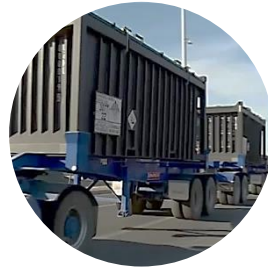
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Fill & Seal Container

- Existing equipment used
- Self locking lid system
- No loss of commodity
- No clean up
- No contamination

2



Send Container By Rail or Road

- Sealed containers – No dust!
- No contamination
- No loss of commodity
- Existing infrastructure used

3



Store at Port

- Fast & effective loading
- No stockpile – No dust
- No contamination of commodity
- Store multiple types of commodity in same area with no cross contamination

4



Unload using RAM Revolver

- For all types of reach stacker/bridge crane
- Loads of up to 1,000TPH
- SWL up to 45T
- Twistlock & grippers secure container during rotation

MISTING SYSTEM

CONTAINERISED BULK HANDLING

MISTING SYSTEM



MISTING SYTEM

OFF



MISTING SYSTEM

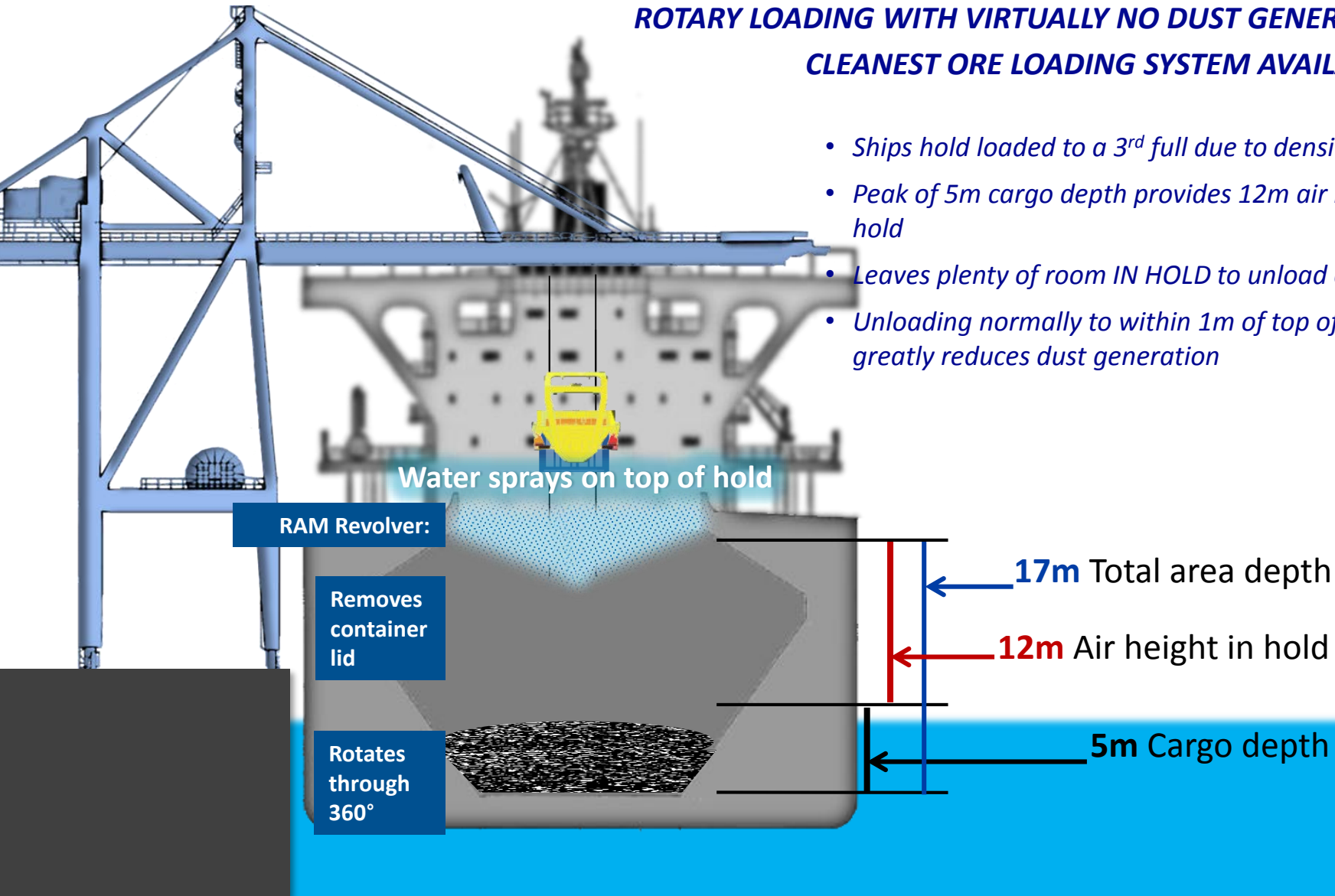
ON

contamination
material loss

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





CASE STUDY 2

COMPANY: Riga Universal Terminal

COMMODITY: Biomass

EQUIPMENT: MHC Crane



CASE STUDY 2

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 2

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

CUBIC METERS PER CYCLE 35.00
 MOVES PER HOUR 30.00

M³
 PER HOUR 1,050

CASE STUDY 2

“ *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: MMG Las Bambas, Peru

COMMODITY: Copper Concentrate

EQUIPMENT: Bridge Crane & Reach Stacker

CASE STUDY 1

At 4,000 meters above sea level, MMG's Las Bambas mine is the largest copper mining project in Peru.

Generating
1.4 million tons of
copper concentrate
per year.

CASE STUDY 1

Due to elevated remote location and distance of **over 1,150km** to the nearest port...

...the team at MMG came up with an innovative solution using **Containerised Bulk Handling** to achieve a **safe and effective** method of transporting the product to market.



**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

MHC Crane Application



RUT Latvia - Grain



South Africa- Coal



Chile – Copper/ Potassium Salt



Maputo - Coal



Congo – Iron Ore



Chile – Copper/Zinc



Cuba - Zinc



USA – Wood Chip/Pellet



Mexico – Lead/Copper/Zinc

CASE STUDY – FURTHER EXAMPLES

Bridge & Reach Stacker Application



Peru - Copper



Mauritania - Magnetite



Bolivia - Urea



Turkey - Copper



Chile - Copper



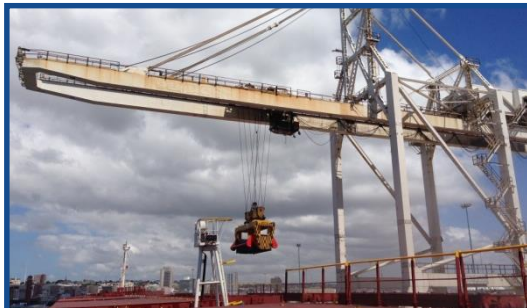
Arizona/Mexico - Copper

CASE STUDY – FURTHER EXAMPLES

Ship Crane and STS Crane Applications



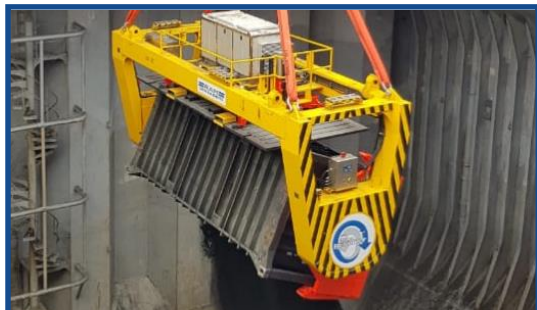
Argentina – Soya/Rice



South Africa- Manganese



Australia - Copper



Chile - Zinc



Argentina - Grain



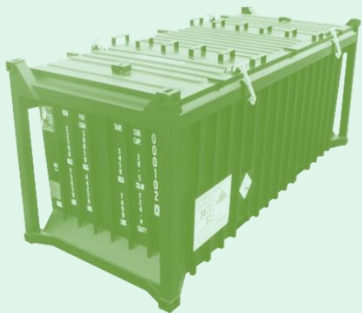
Australia – Iron Ore



USA – Wood Chip/Pellet

CONTAINERISED BULK HANDLING - BENEFITS

Containerizes the bulk
Low set up cost
Environmentally friendly
Award winning solution
No contamination



COST



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

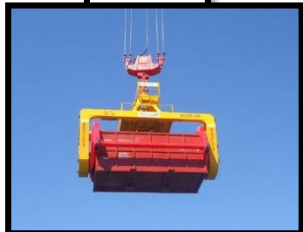
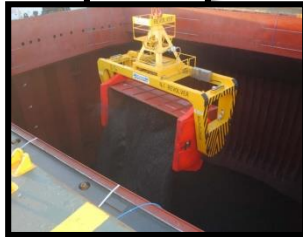


EQUIPMENT APPLICATION

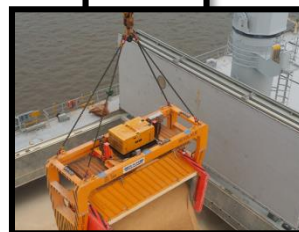
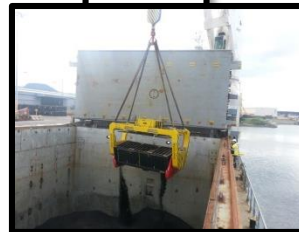
Ship to Shore Crane



Mobile Harbour Crane



Ship Crane



Reach Stacker

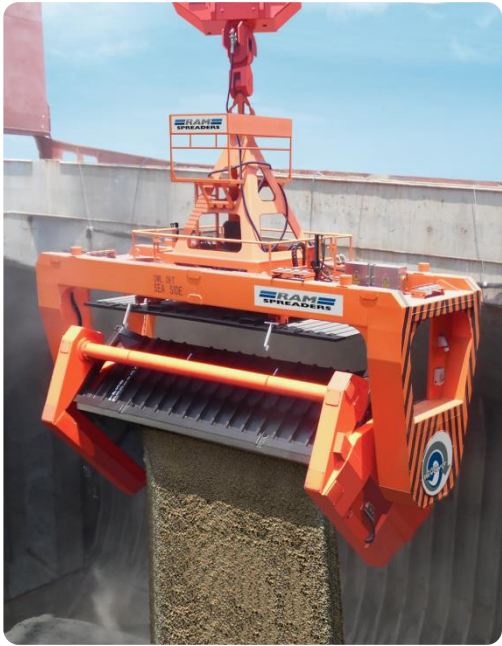


Bridge Crane



COMMODITIES HANDLED

LOAD & DISCHARGE



Grains



Mineral Sands



Soya



Wood Chip



Copper Concentrate



Scrap Metal



Coal



Iron Ore



Bagged Materials



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



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