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Automatic Electrification Systems for RTG's

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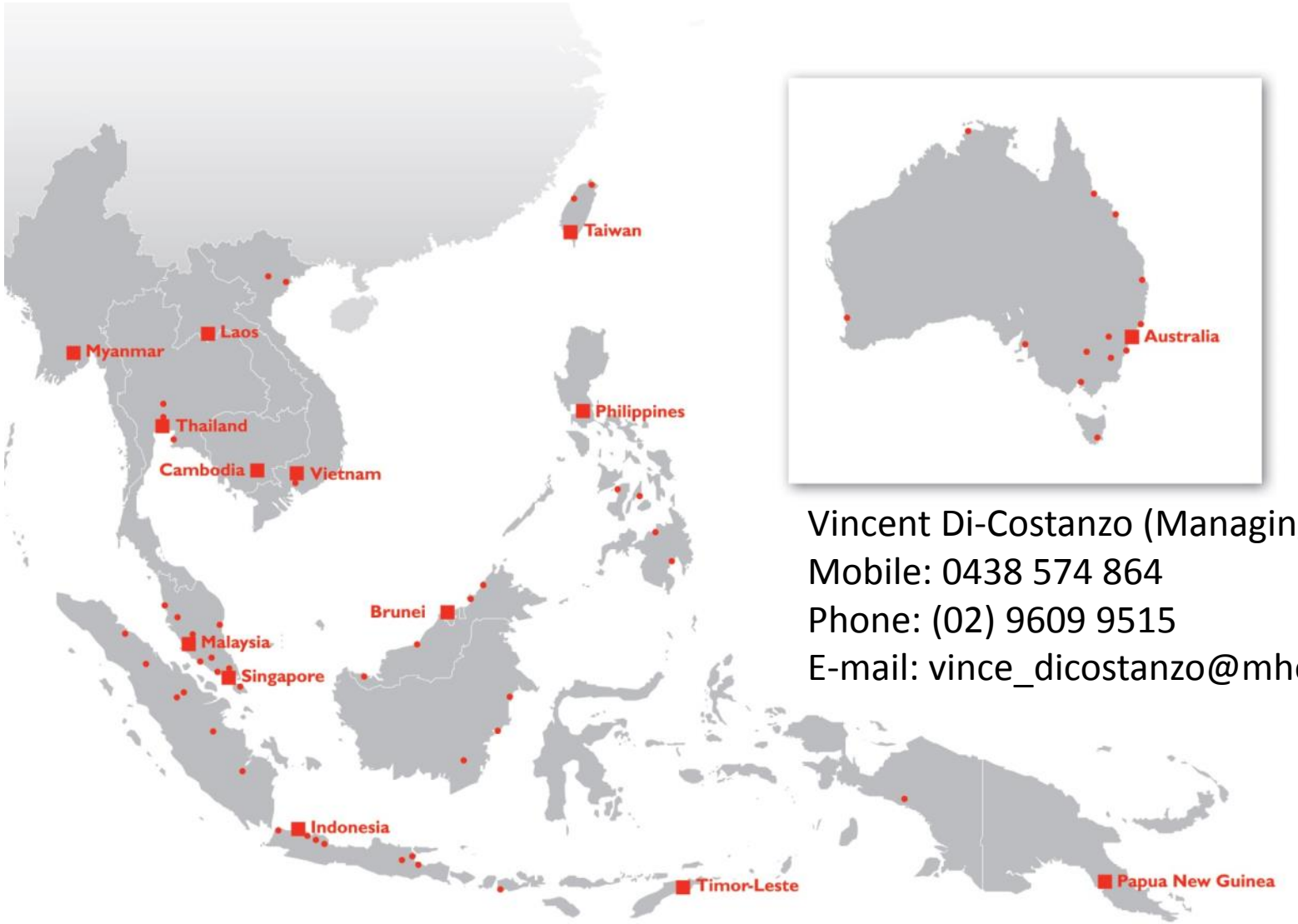

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Industrial Cranes

Hoists & Winches

Electrification Systems

Warehousing Equipment

Safe Working at Heights

Car Parking Systems

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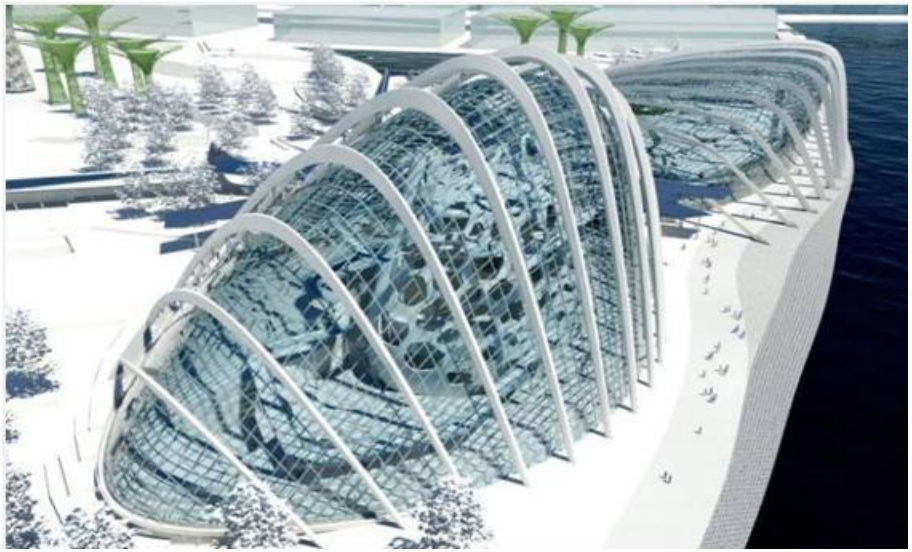
- Custom-Made Engineering
  - Conceptualisation and consultancy
  - Project specific designs & innovations
  - Manufacturing of custom components
- Flexible project management
  - Customer timelines
  - Requirements & specifications
  - Onsite manufacturing
  - Contractor collaborations



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Customer Need

- Rejuvenation and modernization of ship loader gantry cranes power supply
- Extending cranes working area
- Proven technology & product quality
- Strong local presence and commitment
- Fast and committed delivery

MHE-Demag Solution

- 6 cable reel drums of various types
  - LTM 15/38 4K240 for 10kV
  - LTM 10/28 N24M36 for 10kV
  - LTD 17/43 H4 K300-DM660 for 10kV
  - LTD 12/31 N24M15 for 10kV
  - LTM 12/32N 4M150 for 380V
  - LTD 12/31 N24M15 for 380V
- Special design

Port Electrification

Port electrification is a holistic approach integrating shorepower and advanced energy management, communication and transportation systems with port operations.

- Reducing Emissions
- Saving Energy
- Reducing Maintenance

Major Port Equipment Groups with Cost Efficient Conductor Bar Solutions

- Ship-To-Shore Container Cranes
- Yard Container Cranes

Ship-To-Shore Container Cranes

Ship-To-Shore Container Cranes

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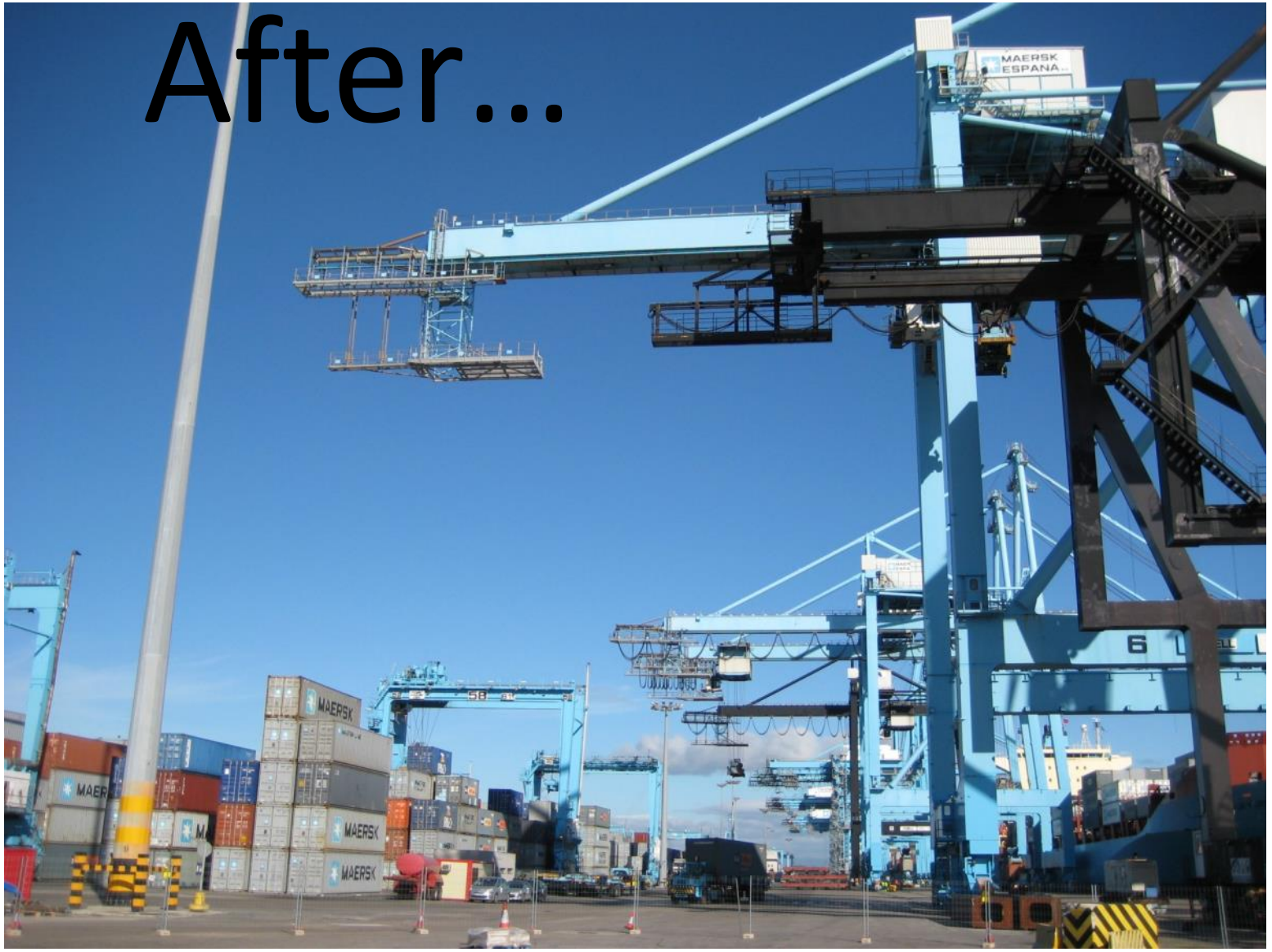
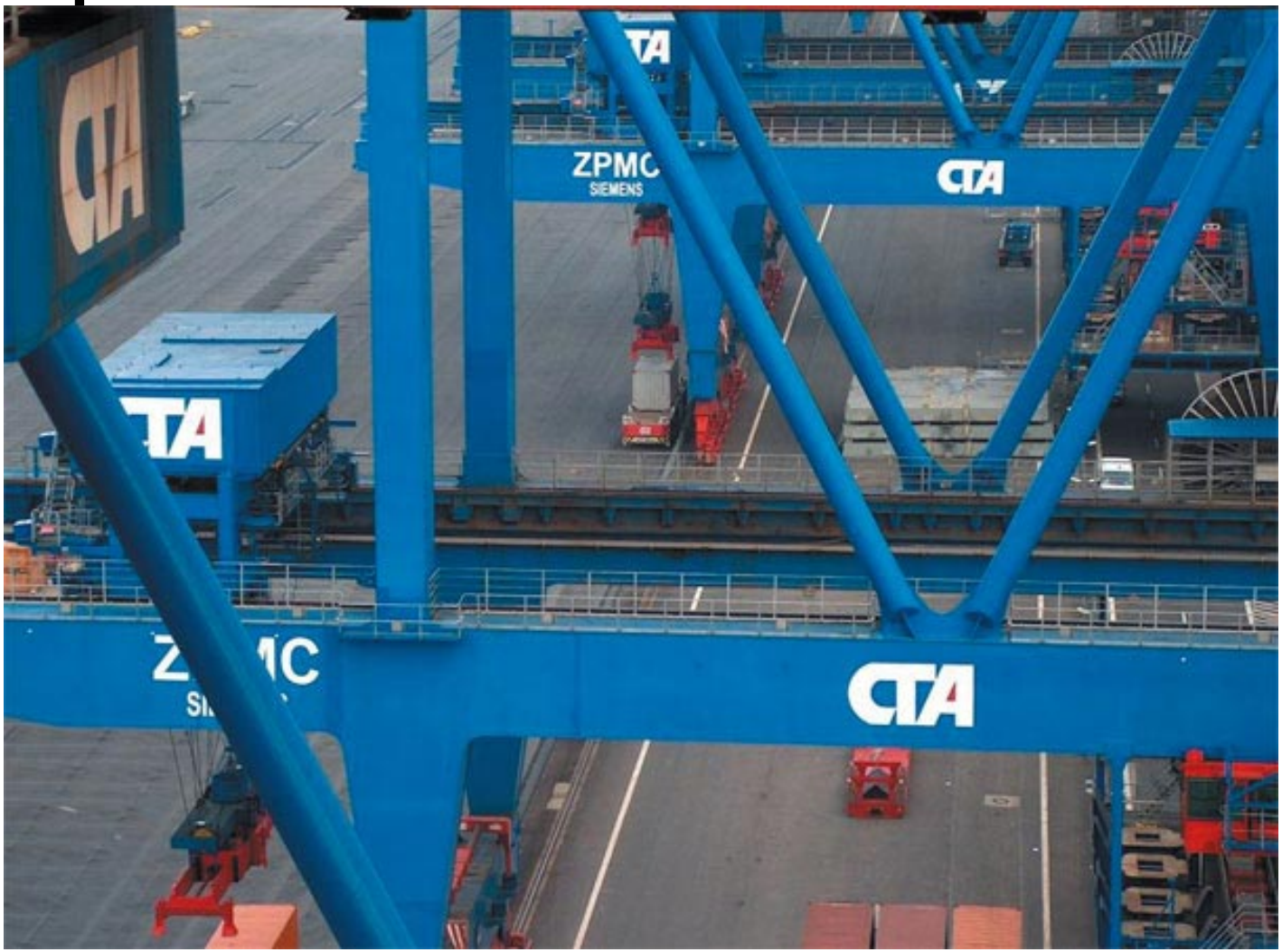


Ship-To-Shore Container Cranes



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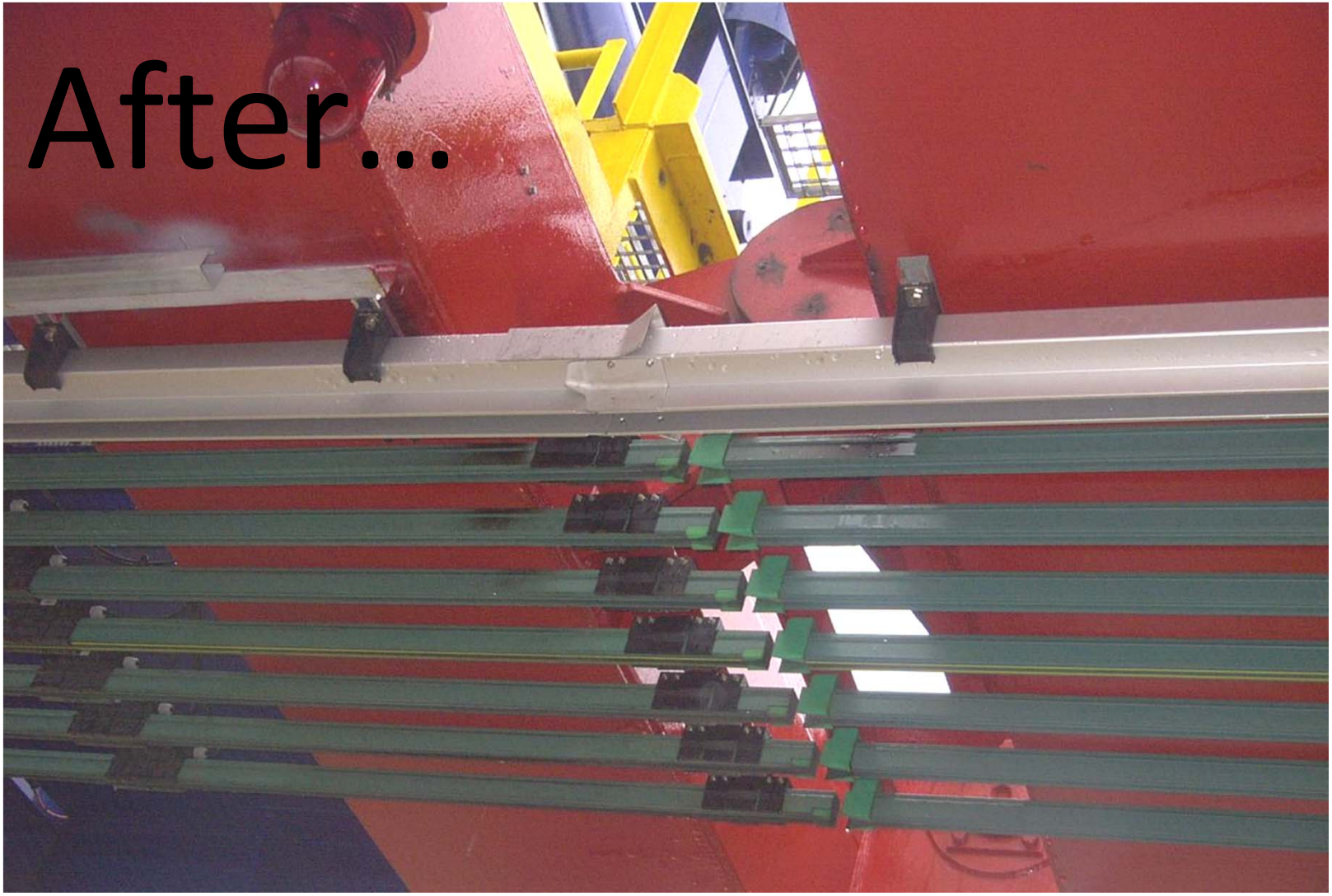

Yard Container Cranes

E-RTGs

- The 1996 Kyoto Accords brings world attention to the environment
- In 2006 first developments have started to convert diesel powered RTGs to electrical RTGs.
- The first electrification of RTG Cranes has been done by using Cable Reels.
- In 2007 first developments in China have seen the use of conductor rail systems with plug connections.
- More recently fully flexible Drive-In solutions, such as those first developed by Vahle have been successfully been implemented in major terminal operations.
- In 2013 marketing of automated RTGs by crane OEMs

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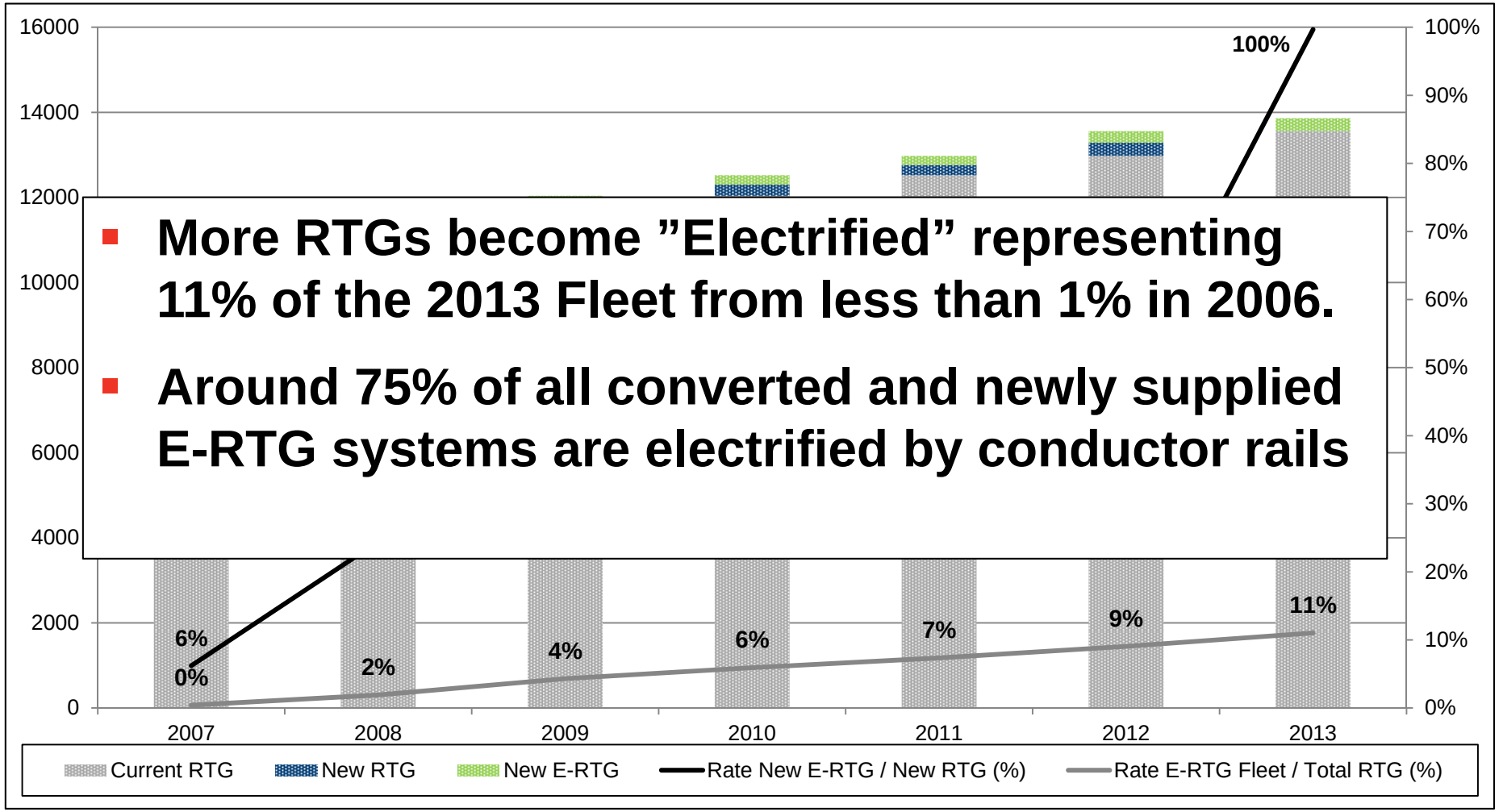

- **More RTGs become ”Electrified” representing 11% of the 2013 Fleet from less than 1% in 2006.**
- **Around 75% of all converted and newly supplied E-RTG systems are electrified by conductor rails**

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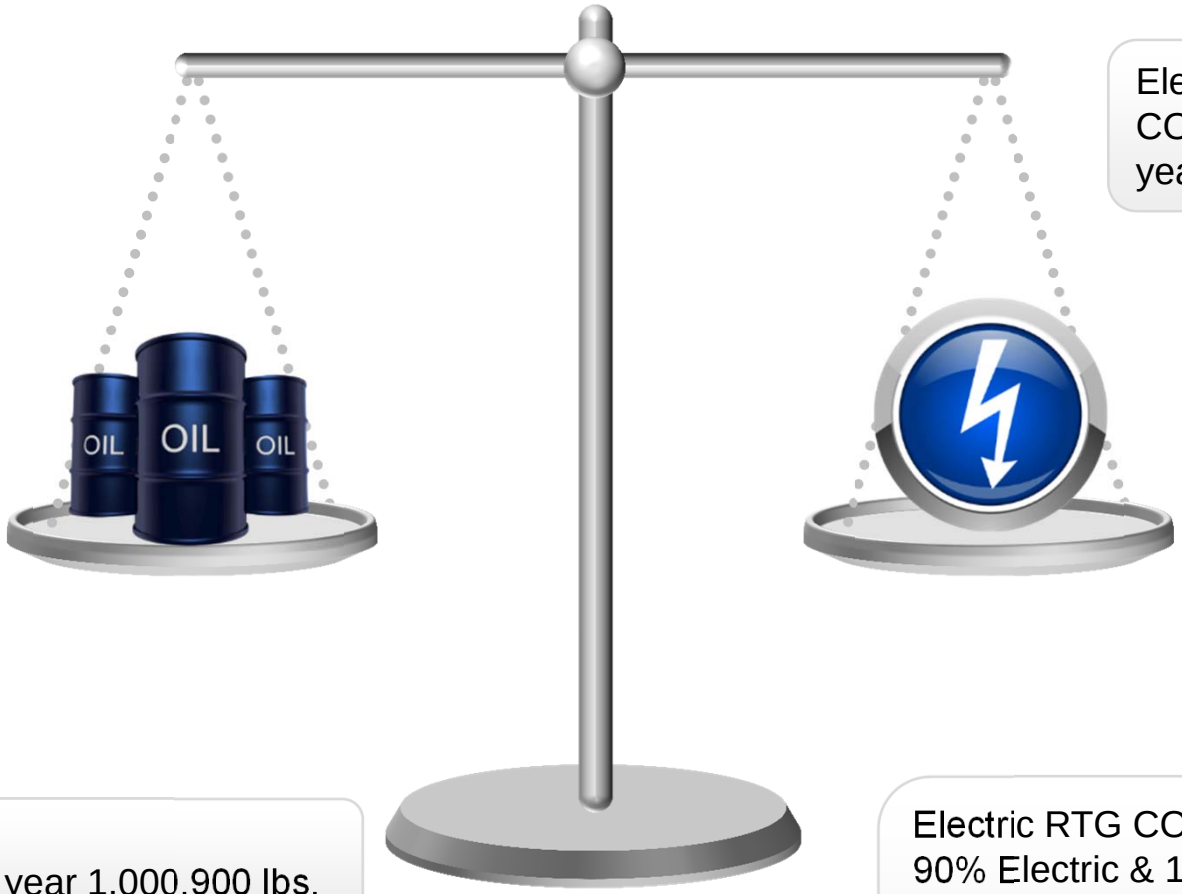
Eco'Logical' facts from an eRTG solution from a container terminal operator



Electric RTG
CO_2 emission per year 414,470 lbs.

Diesel RTG
CO_2 emission per year 1,000,900 lbs.

CO_2 reduction of ~ 52%

Electric RTG CO_2
90% Electric & 10% Diesel (due to Maintance & Block Changing) emission per year 447,000 lbs.

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RTG Type	Conventional RTG	EcoRTG	EcoRTG w/supercapacitors	eRTGs
Fuel / Energy consumption (15 moves / hour)	20,9 lit/hour	13,1 lit/hour	6,8 lit/hour	35kWh
Energy cost / h	$17,2	$10,80	$5,63	$3,15
Operating hours 3600, cost / year	$62 199,36	$38 874,60	$20 282,40	$11 340,00
Additional savings for reducing maintenance costs associated with diesel generators:				
Maintenance costs per operating hours ($2.55 / hour) : $9 180 per yr.				
Tier 4 Diesel replacement @ 25000 hours ($6 / hour) : $150 000				

*Reference: Innovation for future generations conference, ”GPA’s eRTG demonstration project”, Aug. 5-7, 2012.

Solutions: Electrification to reduce fuel and maintenance for achieving savings of up to 85%

3_VAHLE eRTG references.mp4

What to look for ?

- Space savings due to vertical arrangement (330mm single sided and 600mm double sided)
- Electrification of two aisles from one steel structure
- Lightweight and robust tubular steel structure
- Diabolo roller design for multi-dimensional guidance
- Minimized moving wear parts (3 rollers only)
- Fully Automated Connector System
- Automatic synchronization during switch-over
- One or two arms per RTG to maximize operational flexibility

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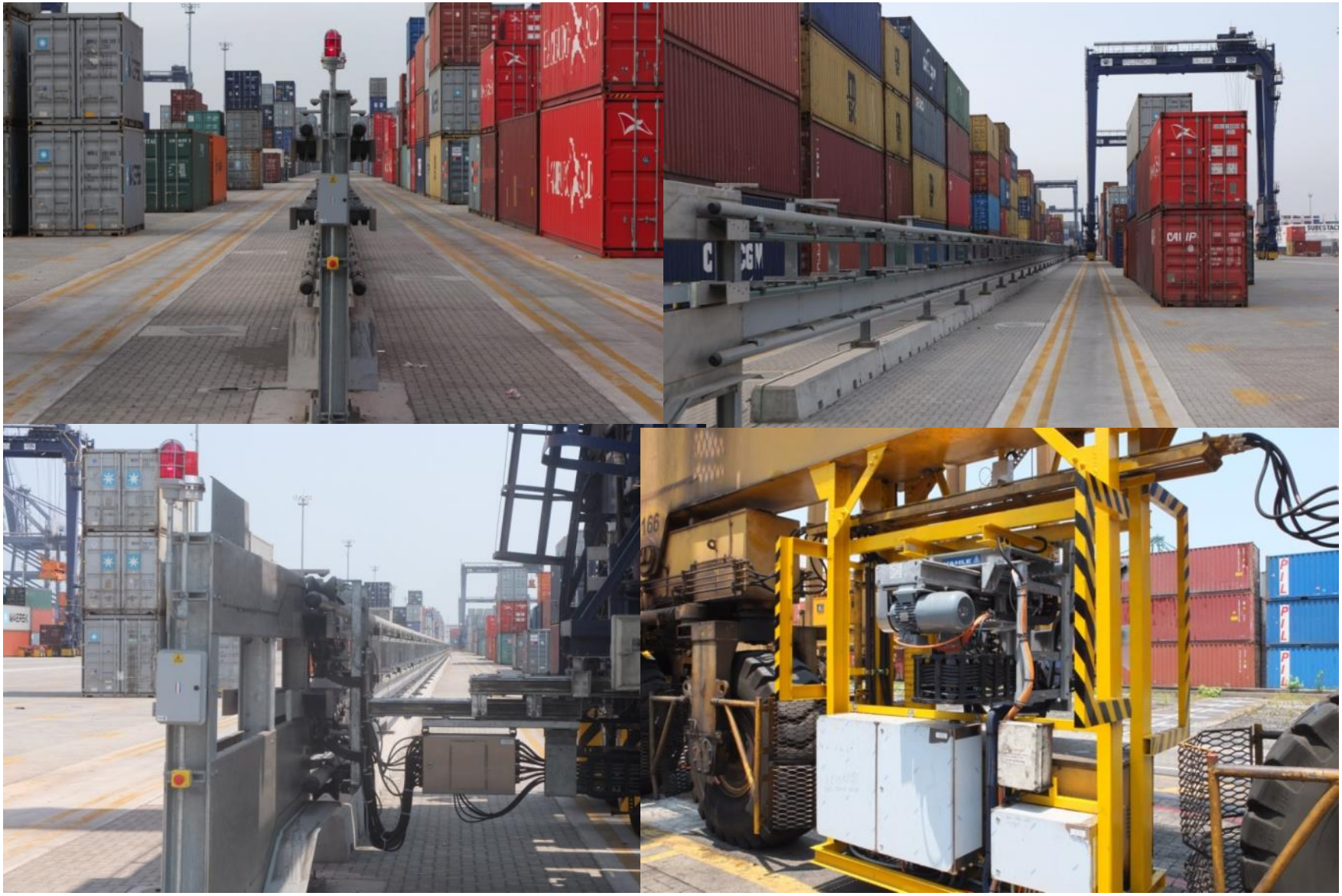
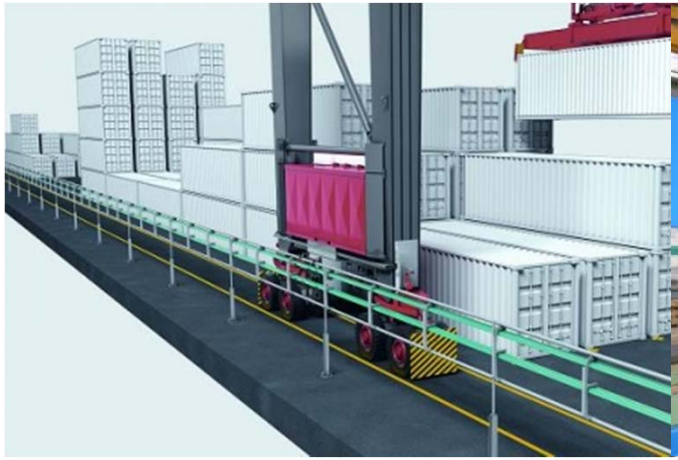


What to look for ?

- Upgrade for automatic / remote operation to include data communication and positioning systems



The Busbar power connection converts the RTGs to fully electric operation. **Image: Konecranes**

Integrated Positioning and Data Communication System.
Image: Vahle

Challenges

- Retrofit
  - Interface definition
  - Adaption to all RTG Types and port layouts

- Greenfield
  - Clear Interface
  - Off site test track with major RTG suppliers

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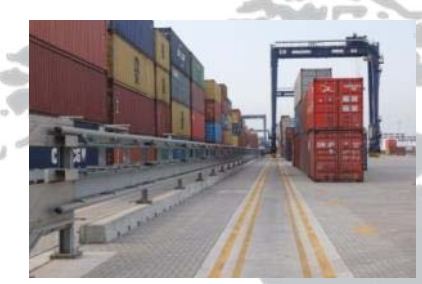


UK

VAHLE

Turkey

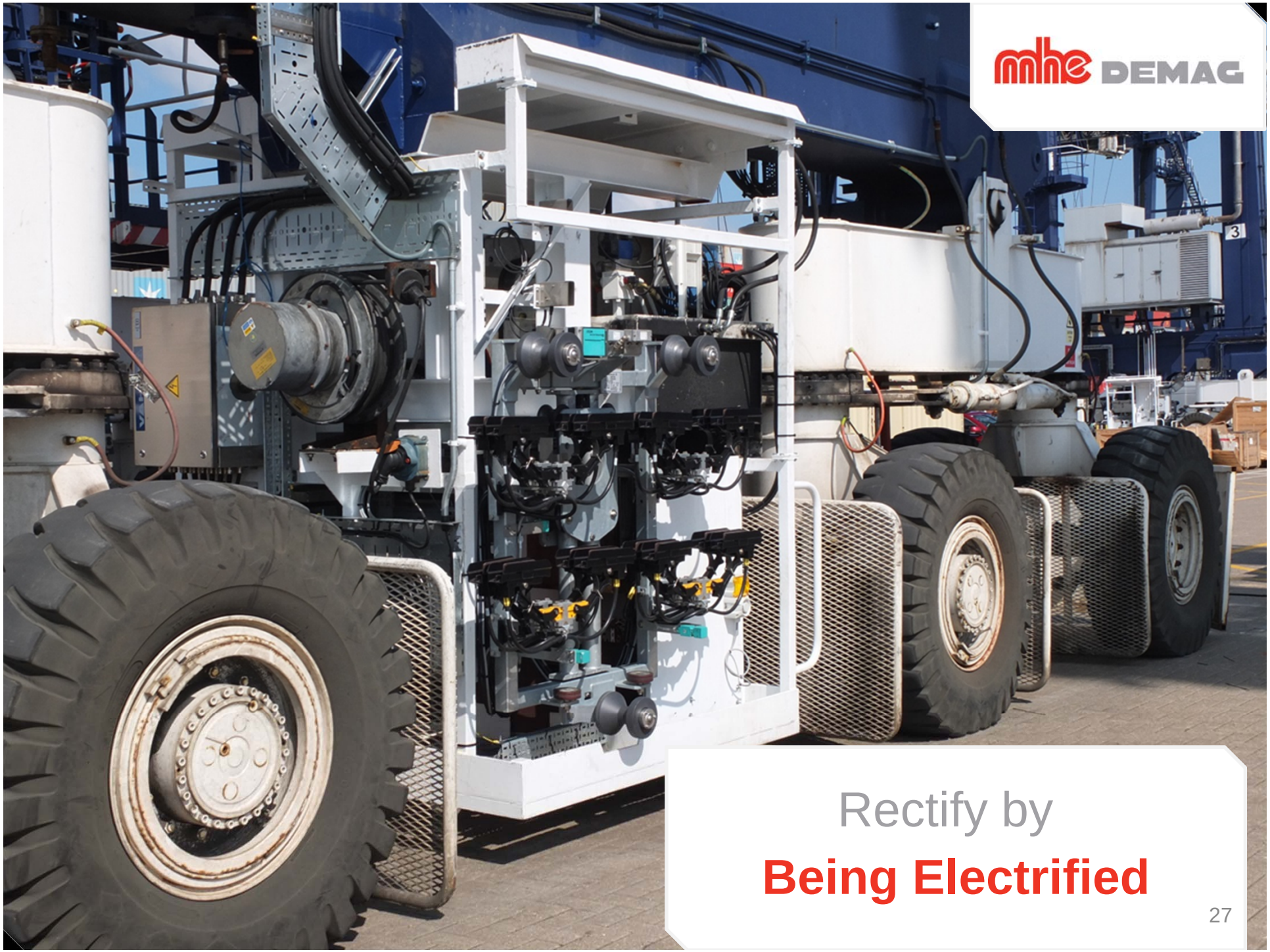
Hongkong

Mexico

Panama

Singapore

Indonesia



Rectify by

Being Electrified

Click the link below for video:

www.transportevents.com/presentations/melbourne2016/3_VAHLEeRTGreferences.wmv