



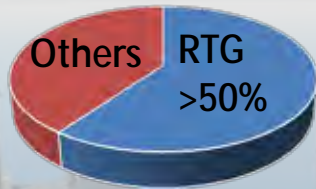
Tools and Technologies for Electrifying Container Terminals Yards





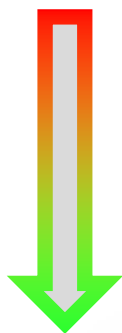


## Fuel consumption





- Saving Diesel
- Reducing Emission



- Improving Efficiency
- Improving Connectivity





## Liters per Move

2014 Liters / Move  
Average:

**RTG:** 1,33 Lt / Move  
**Vahle ERTG:** 0,14 Lt / Move



Source: 1 of World's Top 3 Terminal Operator



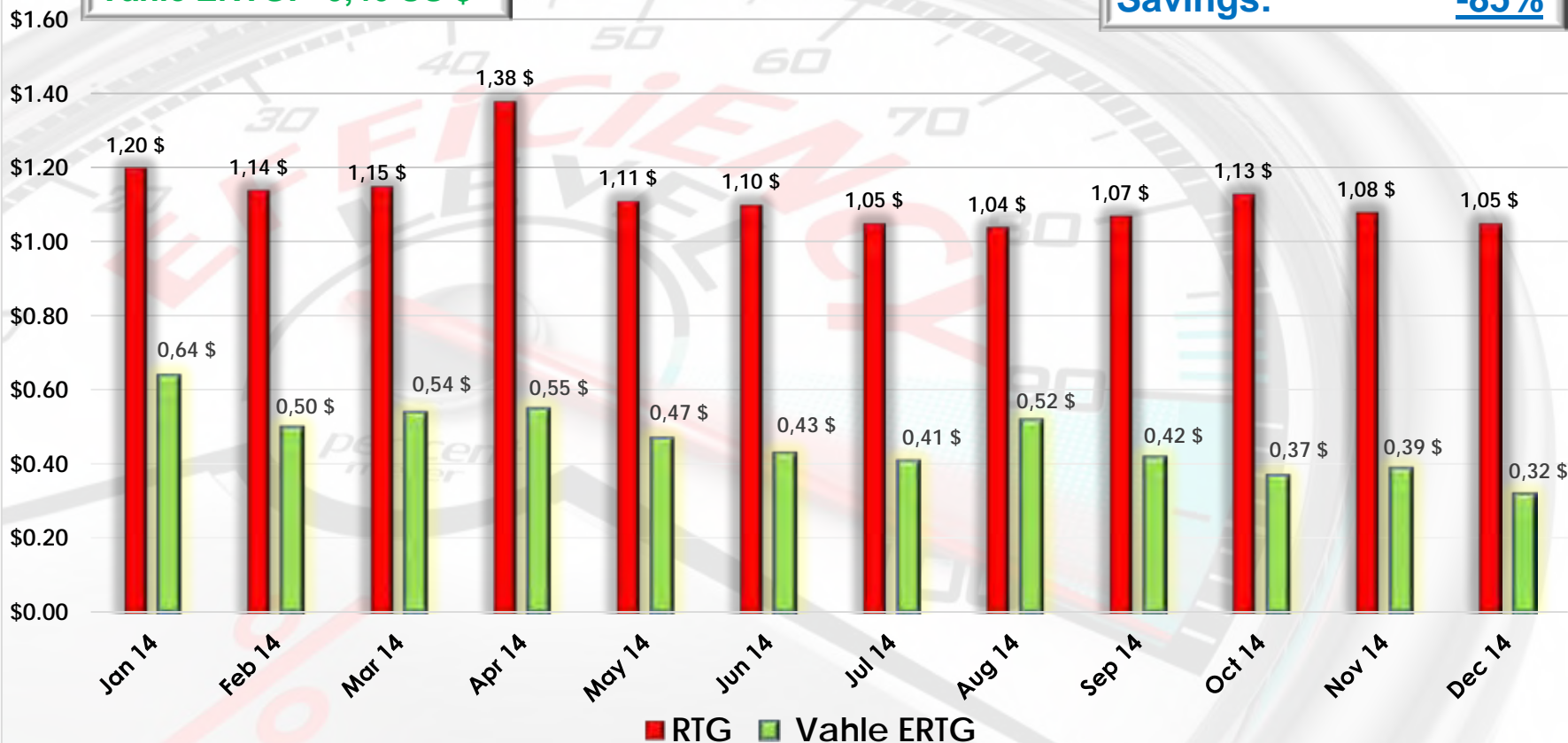


2014 Cost per Move Average:

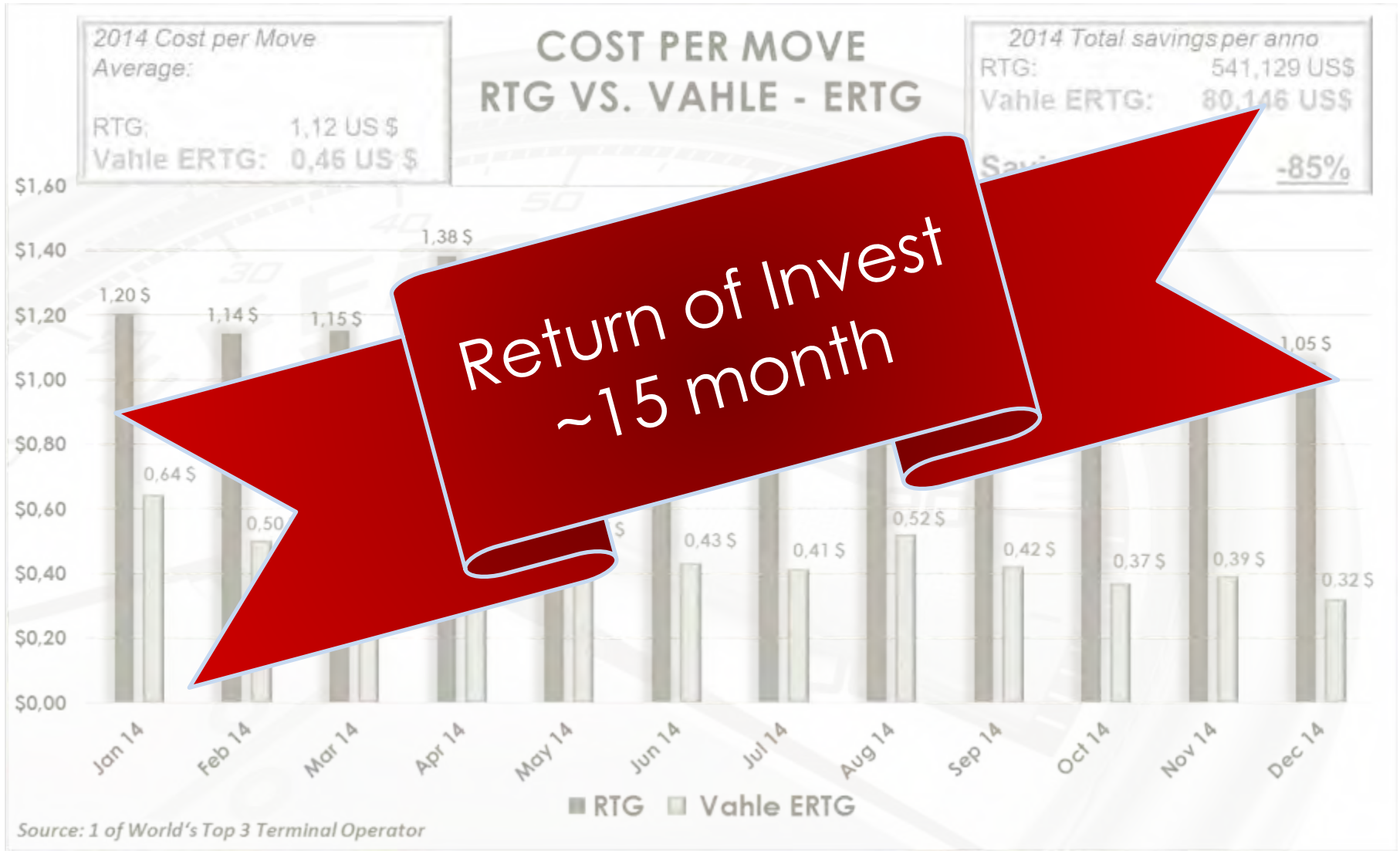
RTG: 1,12 US \$  
Vahle ERTG: 0,46 US \$

## COST PER MOVE RTG VS. VAHLE - ERTG

2014 Total savings per anno  
RTG: 541,129 US\$  
Vahle ERTG: 80,146 US\$  
Savings: -85%



Source: 1 of World's Top 3 Terminal Operator



**Return of Invest  
~15 month**

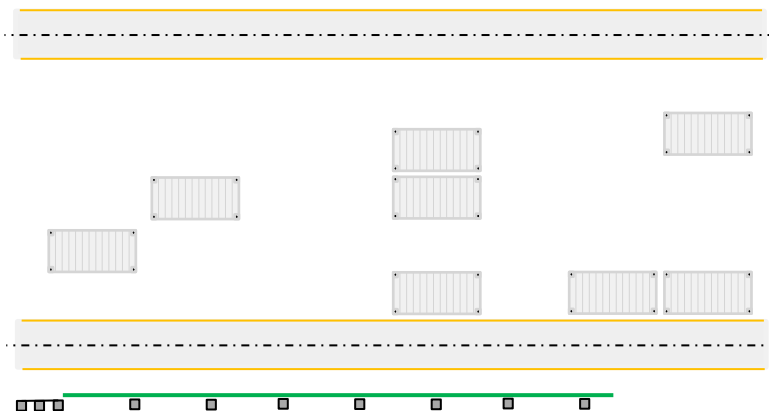
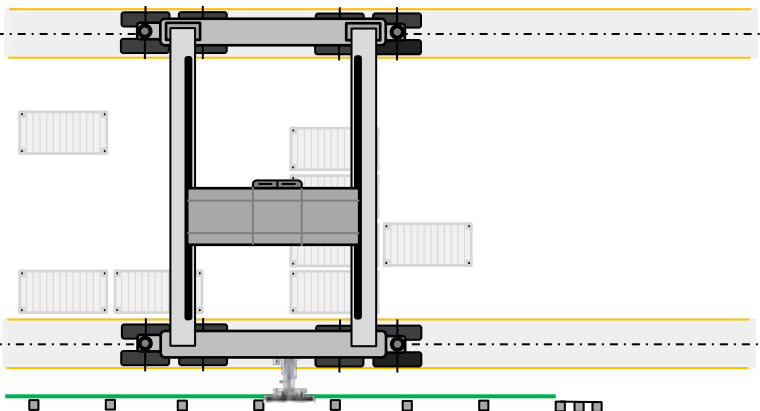






## References in eRTG

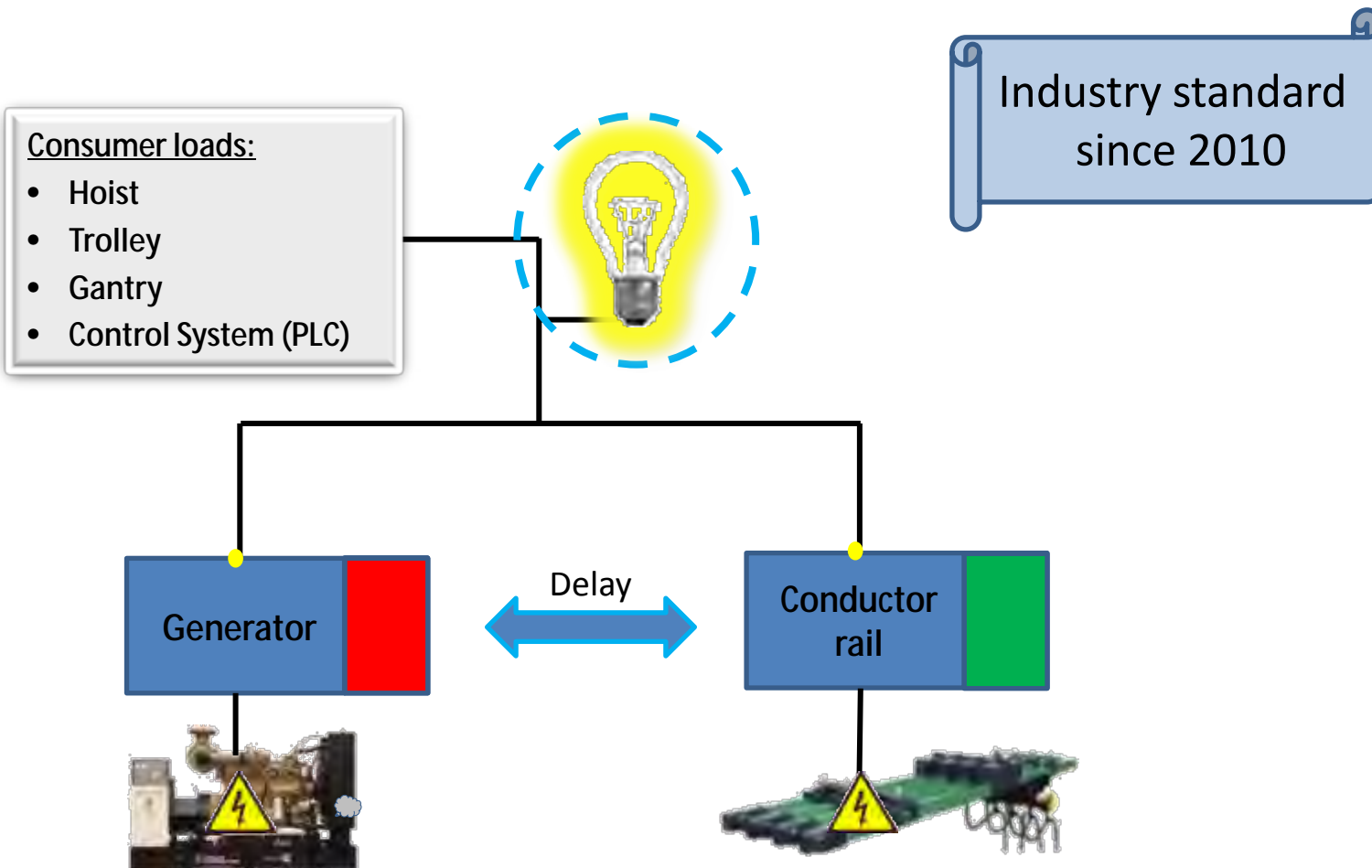
- ü Retrofitted RTGs:  
247
- ü New RTGs (OEM):  
108
- ü eRTGs in total:  
355
- ü > 240km  
conductor rails installed
- ü Biggest single order:  
102 retrofit RTGs



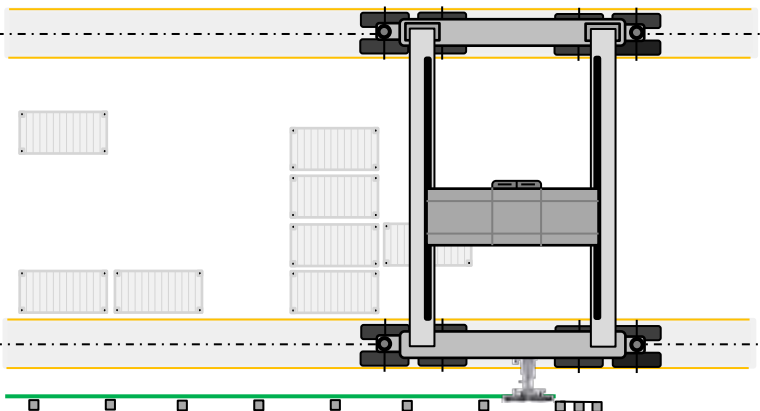
## RTG crane status:



Powered by conductor rails







## RTG crane status:



Powered by conductor rails

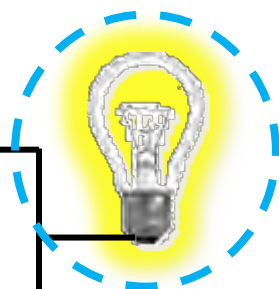


For example: 650KVA → 100KVA

Efficient combination with „small“ genset

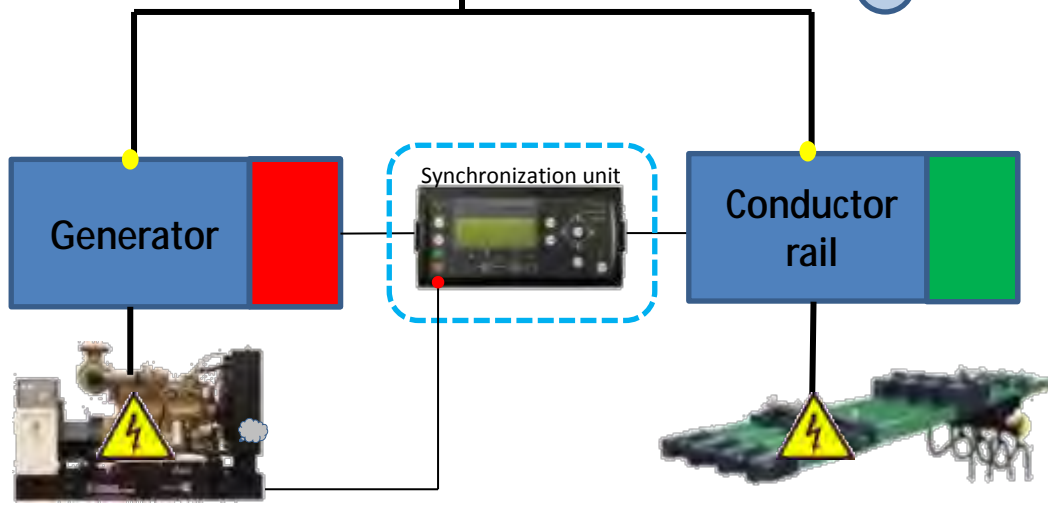


- Consumer loads:
- Hoist
  - Trolley
  - Gantry
  - Control System (PLC)



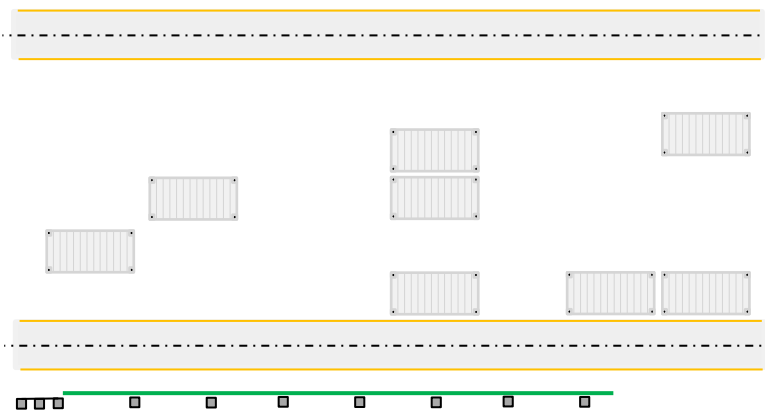
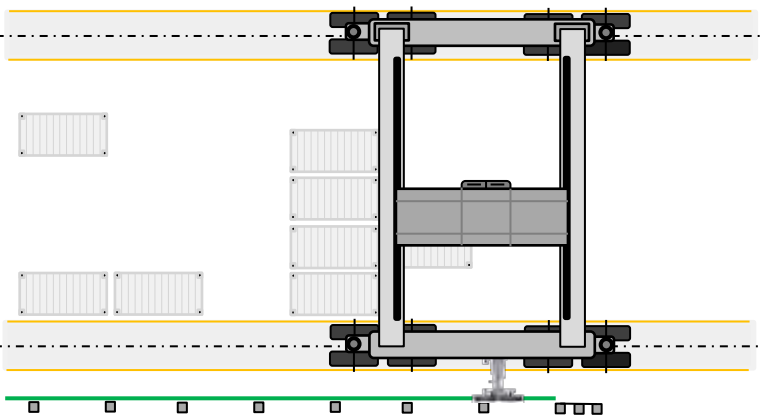
**Vahle standard since 2011**

More than 80 RTG cranes equipped





# Block change with Lithium Ion battery pack



**RTG crane status:**



Powered by battery pack



No genset required





- Peak load management
- Power oscillation damping
- Voltage support and control

Ø Modular Energy Storages from kW up to 50 MW capacity available



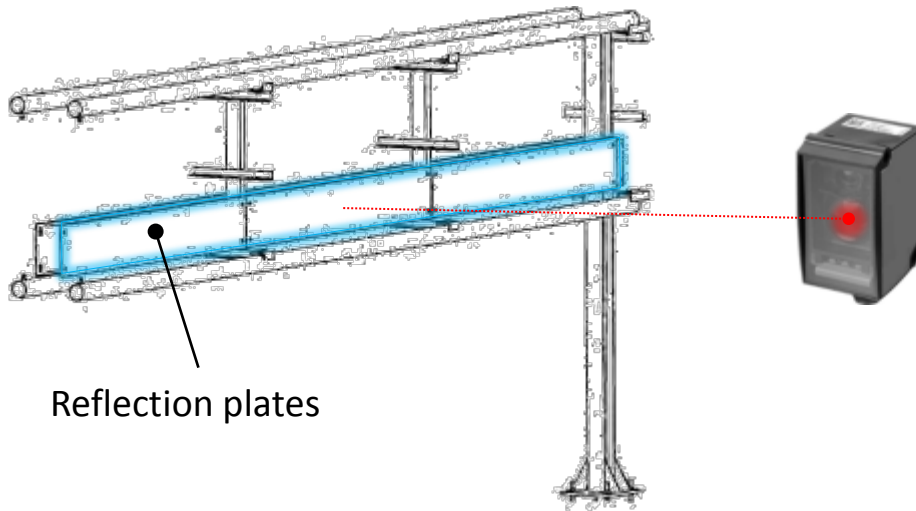
## Vahle WCS Positioning System

- Positioning System inside each block
- Stainless steel code rail
- RTG Crane position  $\pm 0,8\text{mm}$  w/o use of GPS
- Interface to TOS system with Profinet / Profibus
- Unsusceptible to external interference (GPS jamming)



## Autosteering by Laser guiding system:

- ▲ Up to 160 m / min
- ▲ By digital steering signals (left/right)
- ▲ Gantry straight tolerance  $\pm 50$  mm







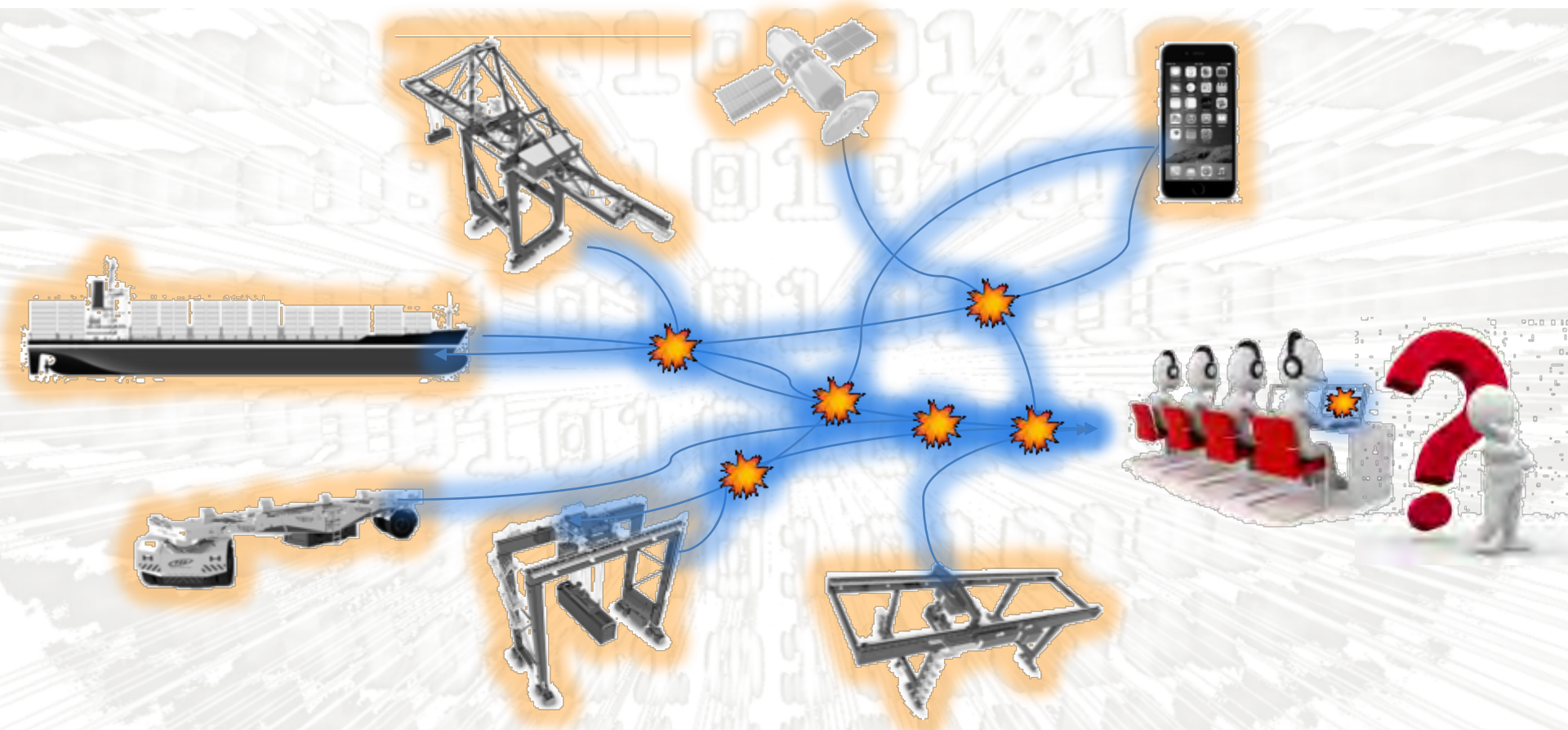
Increase of energy and resource efficiency



Increase of flexibility

- M2M cross-linking
- Remote system monitoring
- Semi automation
- Automation





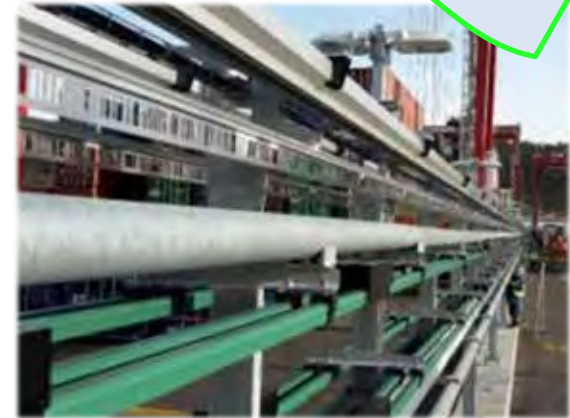


# Wireless Shielded Data Communication (waveguide)

Evolution 2015



- ü EN55022 Class A certified: no radio frequency device
- ü Lowest emission for safe and reliable operation
- ü Use of none WiFi channel!
- ü Bandwith up to 100 MBit/s
  - ü Profinet
  - ü Ethernet (Video / TOS / Data)
  - ü Profinet Safe
    - Ø Emergency-OFF category 3
- ü Scaleable bandwith by modular design
- ü Low latency for remote operations (automation)



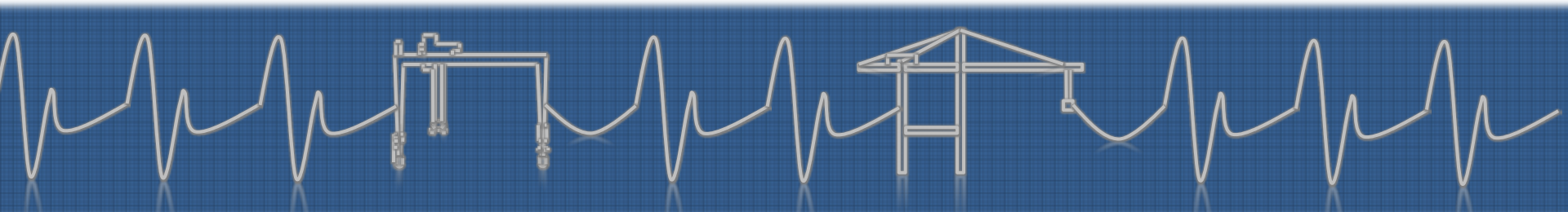


Thank you for your attention !

Slide 21



The heartbeat of Electrification Systems!



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