VAHLE

BALTIC PORTS AND SHIPPING 2021

Terminal Automation for Next-Gen Ports

Electrification & data communication solutions for Port equipment

VAHLE Group – Key Facts

825 employees worldwide

100 %

Family owned since 1912

12 VAHLE subsidiaries worldwide and representations in 52 countries

€ 140 mil. in sales

Headquarter Kamen, Germany

- Engineering
- Production
- Sales

Technology Center Automation Schwoich, Austria

- Engineering
- Trend Scouting
- Training

VAHLE Group – Key Markets

AMUSEMENT RIDES
ROLLER-COASTER

PORT TECHNOLOGY
CONTAINER HANDLING

PEOPLE MOVER
APM, CABLELINER, TRAMS

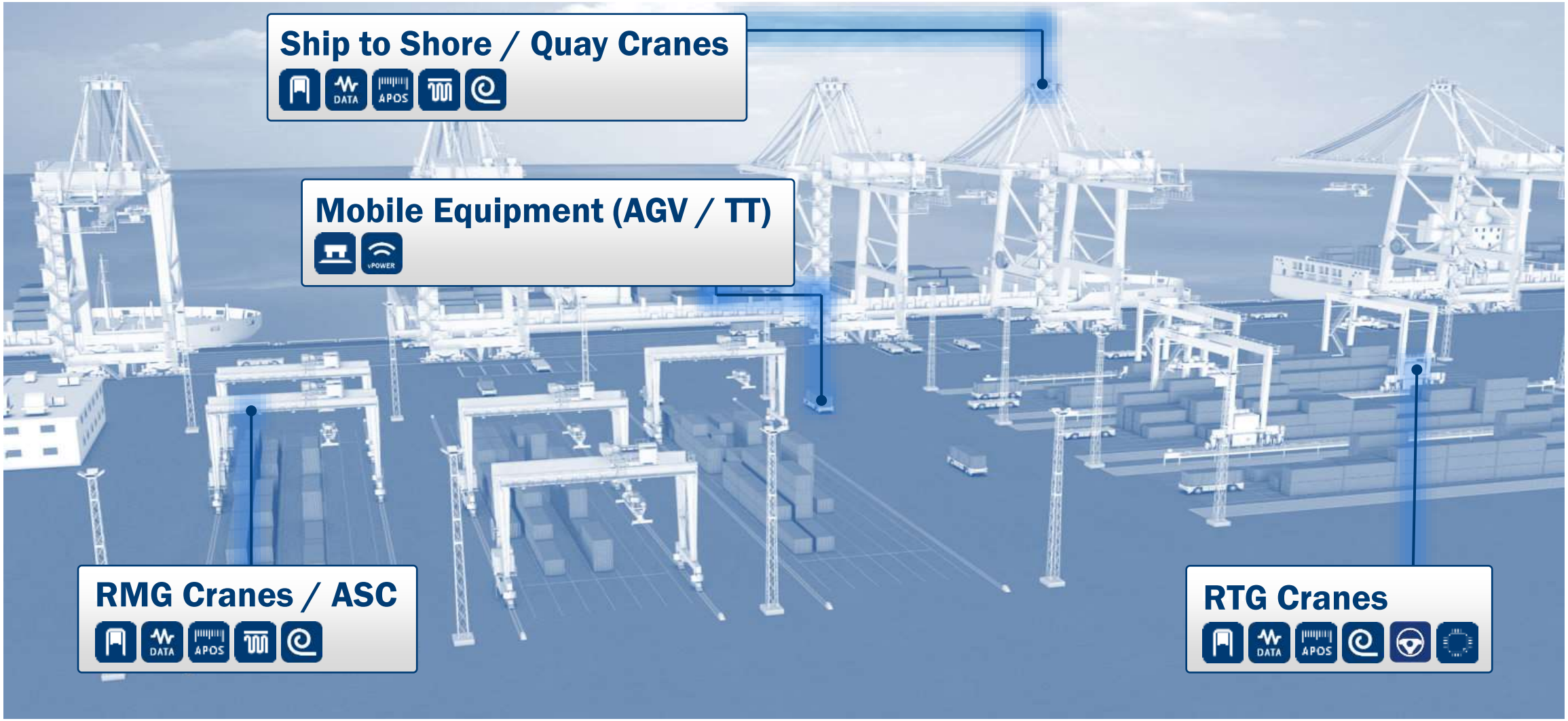
AUTOMOTIVE
EMS, SKILLET

CRANE TECHNOLOGY
STANDARD- AND PROCESS

INTRALOGISTICS
AS/RS, SORTER

Simplified Container Terminal Overview

Portfolio of Equipment



Hong Kong, Modern Terminals Limited

Project success stories

2011 - 2013

104 RTGs (retrofit & new cranes)

Electrification of 66 container blocks

Great Britain, HPH UK – Port of Felixstowe

Project success stories

2015 – today

Retrofit
66 RTGs
Greenfield
Berth 9: 8 new remote eRTGCs

Retrofit
59 blocks (15,322 m)
Greenfield
Berth 9: 8 container blocks

Automation ready with **SMGX data communication** and positioning

Thailand, HPT Laem Chabang – Terminal D

Greenfield Project Success Stories

2017 - today

Remote operation with 20 new AERTGCs

Automation of 20 container blocks
in phase 1 – 5,040 m

Including **SMGX data communication system**

World's first fully automated terminal

Norway, Yilport Oslo

Brownfield Project Success Stories

2014 - 2021

Plug-in solution for 8 new RTGCs + 3 RTGCs in 2021

Remote operation of 5 container blocks (1097 m) in Phase 1 + 2

Including **SMGX data communication system**

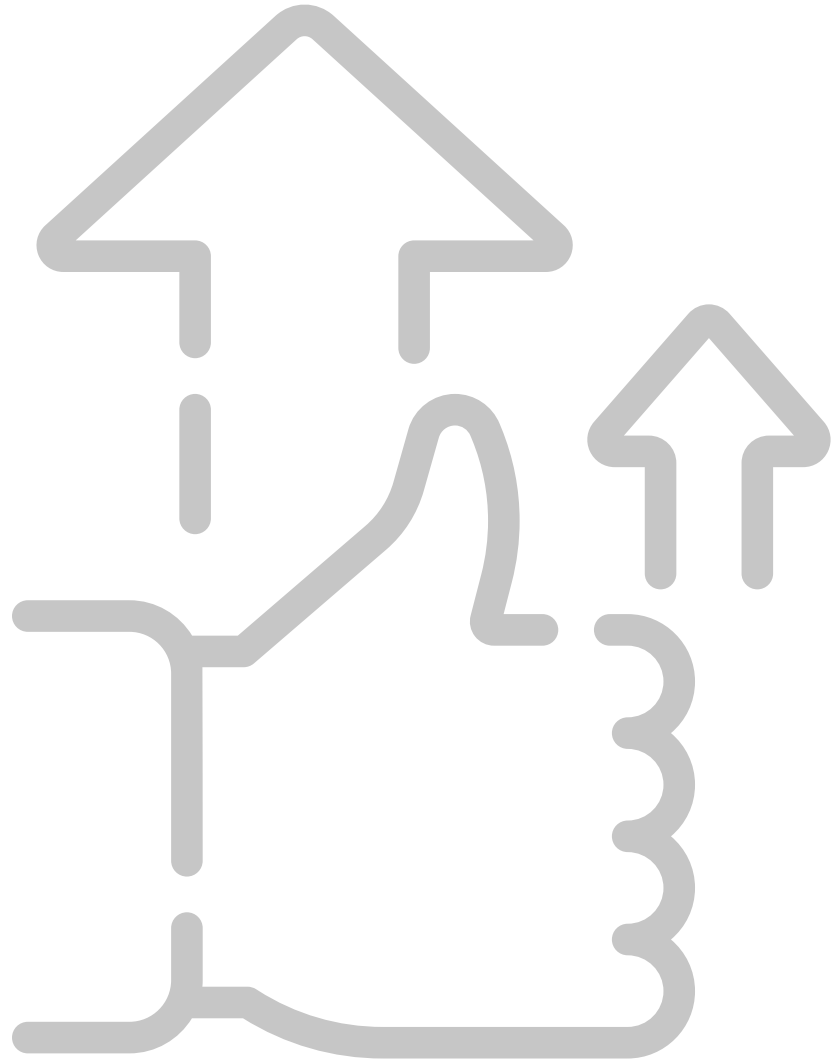
Remote crane operation

Benefits of VAHLE Automation Solution

ECONOMIC
- Reduction of OPEX
- Personnel costs are saved
- Productivity is increased

ECOLOGIC
- Reduction of CO_2 emissions and noise pollution
- Greenification

EFFICIENT
- Simplification of work
- Increasing effiency
- Human Safety



Container Terminal Automation

Step by step approach

Electrification

- Electrification by **conductor bars** (1000 V, 1000 A with aluminum / stainless steel)
- **Automated power** Connection for block changes
- Automated **seamless switching**

Positioning

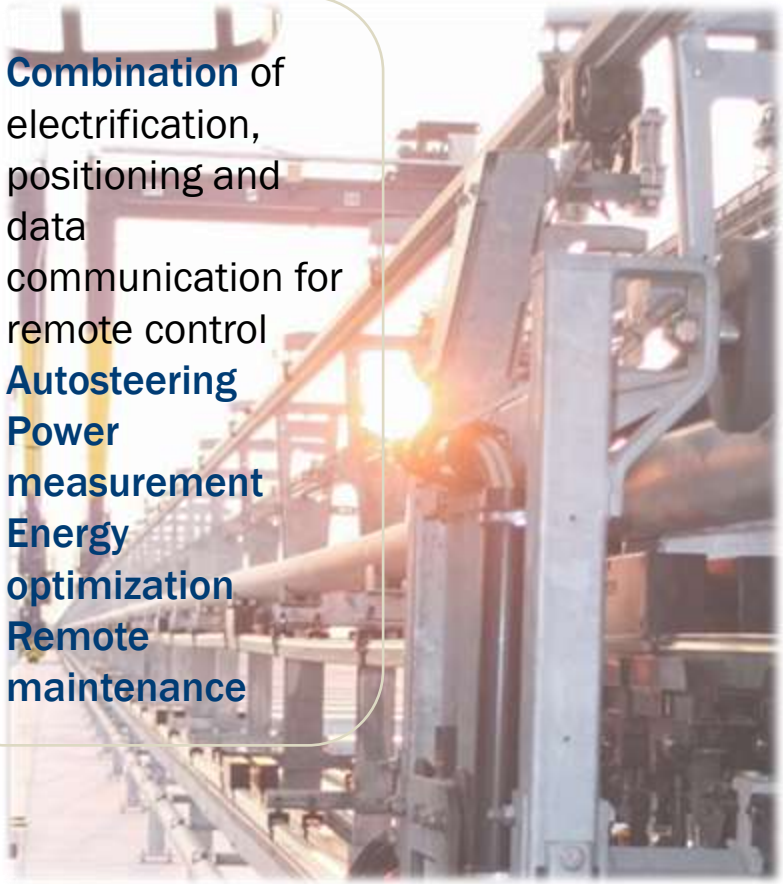
- **Absolute, precise positioning system**
- Independent from external influences
- Contactless reading head
- Position **accuracy** up to **± 1 mm**
- **PN / PB / Ethernet** Interfaces for Plug and Play integration

Data communication

- **Highly shielded** data communication
- Up to **700 Mbit/s** net rate
- **Low latency** times
- Interfaces **ready for automation** – Ethernet, Profinet and Profinet Safe

Automation

- **Combination** of electrification, positioning and data communication for remote control
- **Autosteering**
- **Power measurement**
- **Energy optimization**
- **Remote maintenance**



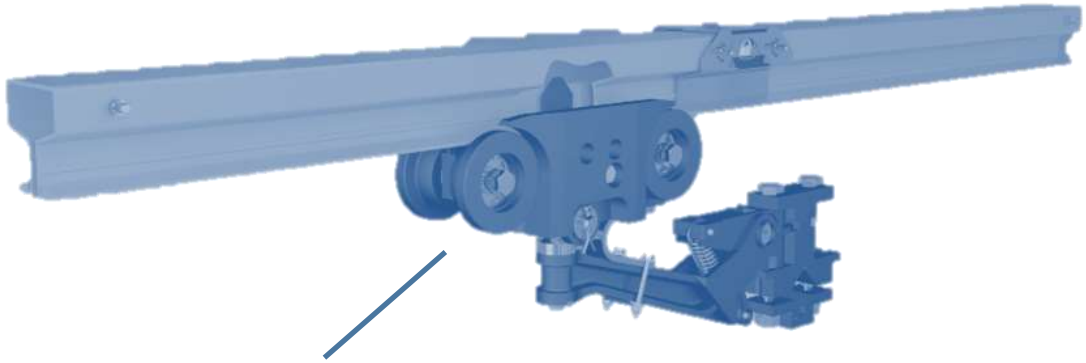
SMGX Data Communication

Facts & Figures

SMGX data communication waveguide
installed at the steel support structure

Characteristics

- EN55022 Class A certified: **no radio frequency device**
- Lowest emission for safe and reliable operation
- Simultaneously video and data transmission with one device
- Coexistent with other radio systems
  - Antenna driving in/out of the rail without influencing the remaining devices
- Frequency band 2,4 or 5 to 5.8 Ghz
- Up to **400m**



SMGX antenna
installed at the current collector trolley

SMGX Data Communication

Facts & Figures

Bandwith

- Scaleable by modular design
  (up to **700 Mbit/s** (net rate))
  - Profinet
  - Ethernet (Video / TOS / Data)
  - **ProfiSafe** (PROFIsafe SIL 3) cycle time 3 - 8 ms
    - **Emergency-OFF category 3**

Low latency

- For remote operation (automation)
- SMGX latency for video data = **< 5 ms**
- Average latency for video camera = **260 ms** (e.g. brand **Axis**)
- Average latency for SMGX + camera = **265 ms**
- PLC data latency = **3-8 ms** (Cycle time SMG Transceiver)

Ship to Shore Crane

Operators benefits

- Faster container handling through speed increase of the main hoist (trolley & lift)
- Higher container stacking level
- High availability and absolute reliable
- Optimized Total Cost of Ownership

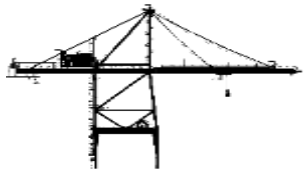
Technical benefits

- Minimize weight movement
- High trolley speed, up to 600 m/min
- No influences by wind / heavy rain / ice
- No cable loops and no storage area
- Extremely low maintenance

The next Generation of crane technology neither uses Festoons nor Cable Chains for the trolley power supply

ZPMC STS cranes – Colombo International Container Terminal, Sri Lanka

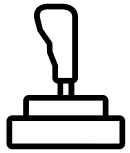
Retrofit Success story



Each with 117 m system length
Ready for remote operation

3 Phases + PE U35/230 AE
3 Phases U25/125 AE
1 SMGX data communication rail
With Ethernet Interface

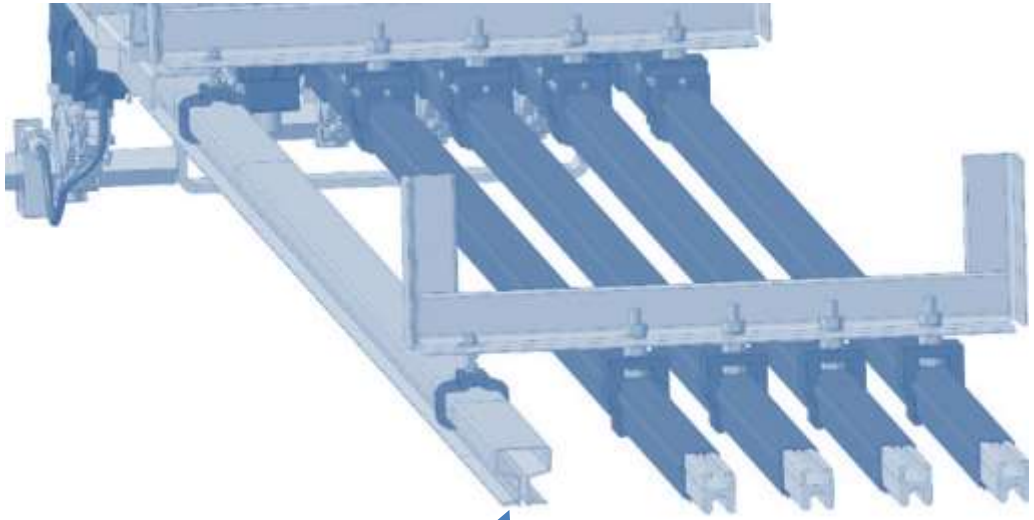
Upgrade of existing infrastructure



Including **SMGX data communication system**

Upgrade your Yard Cranes | Increase of flexibility

Unipole Conductor Rails + Data Communication for STS cranes



Capacity: 1000V, up to 1000A

Protective insulation according VDE 0100

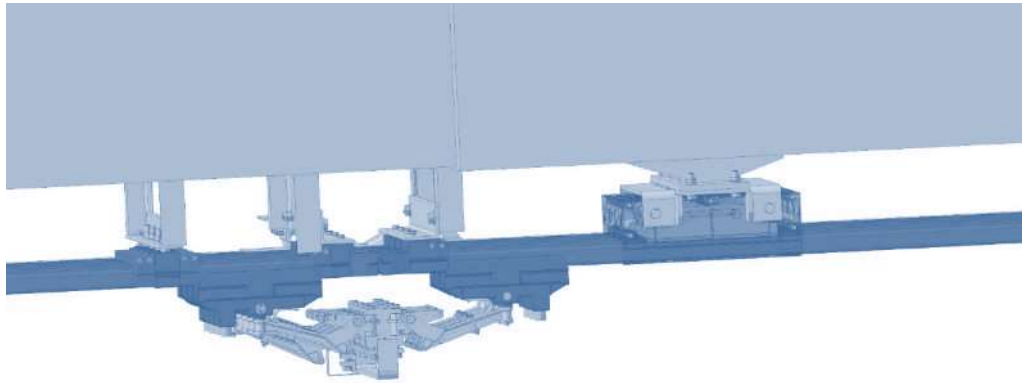
Shock-hazard protection according DIN VDE0470 (EN60529)

Multiple combinations available e.g: 4-pole, 6-pole, 8-pole, 12 pole etc.

USMGX schematic overview

Minimum 1 Slotted Microwave Guide Extreme (SMGX) to transfer PLC control and safety commands to the trolley.

Minimum 4 Unipole conductor rails for the trolley power supply. Quantity of conductor rails depends on STS type/ electrical requirements!



Upgrade your Yard Cranes | Increase of flexibility

Unipole Conductor Rails + Data Communication for STS cranes

Generell usage of rope hoists

- **Automation** of STS cranes
  - Higher turnover rates through speed increase of the main hoist (trolley & lift)
  - Scalable sytem
  - 40% higher productivity

Remote operation of STS cranes

- 2-phase arrangement:
  1. with driver in the cabin; 2. Driver at the remote desk
- Already realisied through ABB (Laem Chabang, Thailand, Maasvlakte II, Netherlands, DP World …)

- High availability and high travel speeds (up to 300 m/min.) in conjunction with continuous **process monitoring** are very important

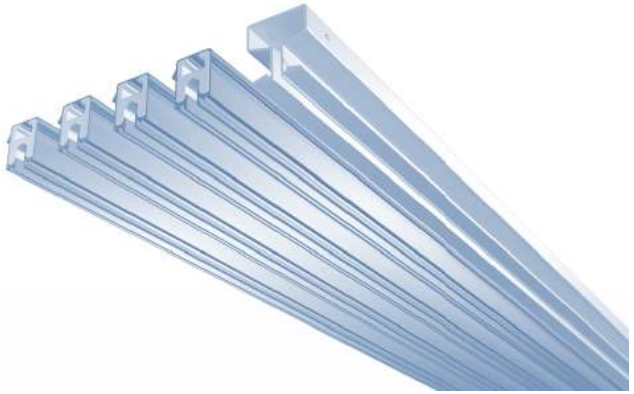
Upgrade your Yard Cranes | Increase of flexibility

Unipole Conductor Rails + Data Communication for STS cranes

Cable carrier festoon system for Super Post Panamax STS cranes

- 125 – 140 m system length
- Travel speed of the hoist -> 240 m/min. (wire rope hoist)

Material price range between **90 – 130.000 €** per crane
(depending on cable package)



USMG for Super Post Panamax STS cranes

- U35/230 AE (8 poles)
- Heating system (if needed)
- SMGX

Material price range between **60 – 80.000 €** per crane
(depending on amount of signals)

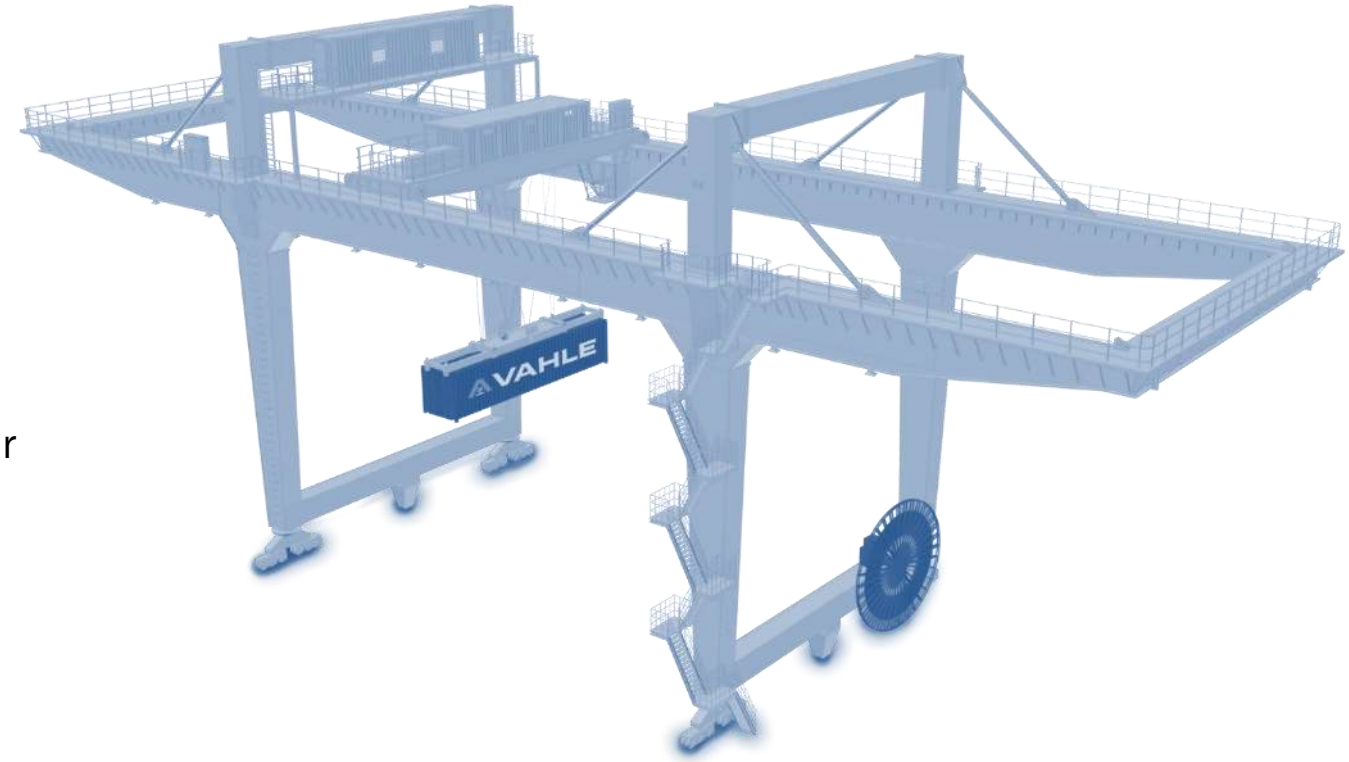
RMG / ASC

Operators benefits

- Faster container handling through increased travel speed
- High availability and absolute reliable data communication and positioning system
- Optimized Total Cost of Ownership

Technical benefits

- Reduce weight on board of the ASC and cost of the ASC
- Reduce cost of control system
  - no cable reel drive
  - considerable smaller transformer and switch gear
- Increase speed and performance
- Extremely low maintenance



eRTG

Operators benefits

- Flexible yard operation
- Optimized OPEX by reduced fuel cost and idle time
- Reduction of CO_2 and noise pollution
- Smart / remote maintenance
- Optimized Total Cost of Ownership

Technical benefits

- Flexible yard operation
- Automatic connection system
- Autosteering
- Seamless synchronization
- Reduced GenSet maintenance cost

THANK YOU FOR YOUR ATTENTION