Container Terminal Automation

- The step by step approach

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www.vahle.com

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Autorità di Sistema Portuale del Mar Tirreno Settentrionale
Port Network Authority of North Tyrrhenian Sea

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TRANSPORT EVENTS

Vahle Group
Chronicle

1912
Paul Vahle applies the first copperhead conductor for a patent

Foundation of the VAHLE OHG

1926
Paul Vahle dies and his wife Helene manages the company

1932
Son Paul Werner Vahle takes over his father's business

1936
VAHLE has 30 employees

1956
Property is acquired at Westicker Strasse, Kamen

1962
Production start of KSL, enclosed conductor system

1966
VAHLE becomes Paul VAHLE GmbH & Co. KG

Josef Hötte joins VAHLE and will be a member of company management for almost 30 years

1998
Contactless Power Supply (CPS®) is developed

2001
The Shanghai 'Transrapid', equipped with VAHLE conductors, starts its high-speed service

2007
FABA product line conductor systems acquired

2012
One hundred year anniversary

2013
Foundation of the VAHLE DETO GmbH and expansion of the product portfolio by mobile controllers

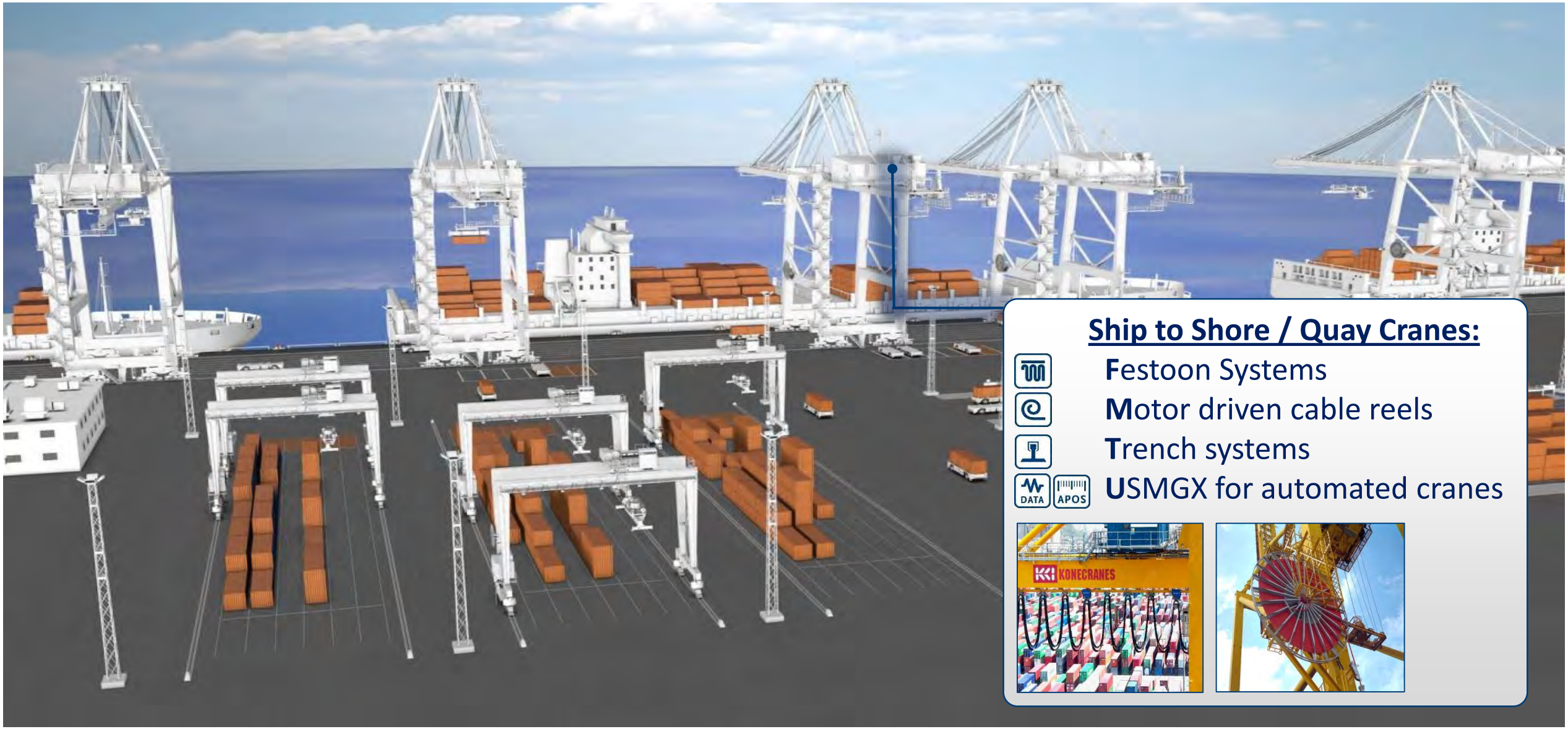
2015
The largest container port in the United Kingdom is electrified and automated by VAHLE

Vahle Group
Cooperate Data

- Founded 1912
- > € 120 mil. In sales
- > 750 employees worldwide (01.01.2018)
- 12 VAHLE subsidiaries worldwide (Vahle S.R.L. in San Giuliano Milanese – Italy)
- Representations in 52 countries
- 100 % family owned
- Production based in Germany

Vahle Group

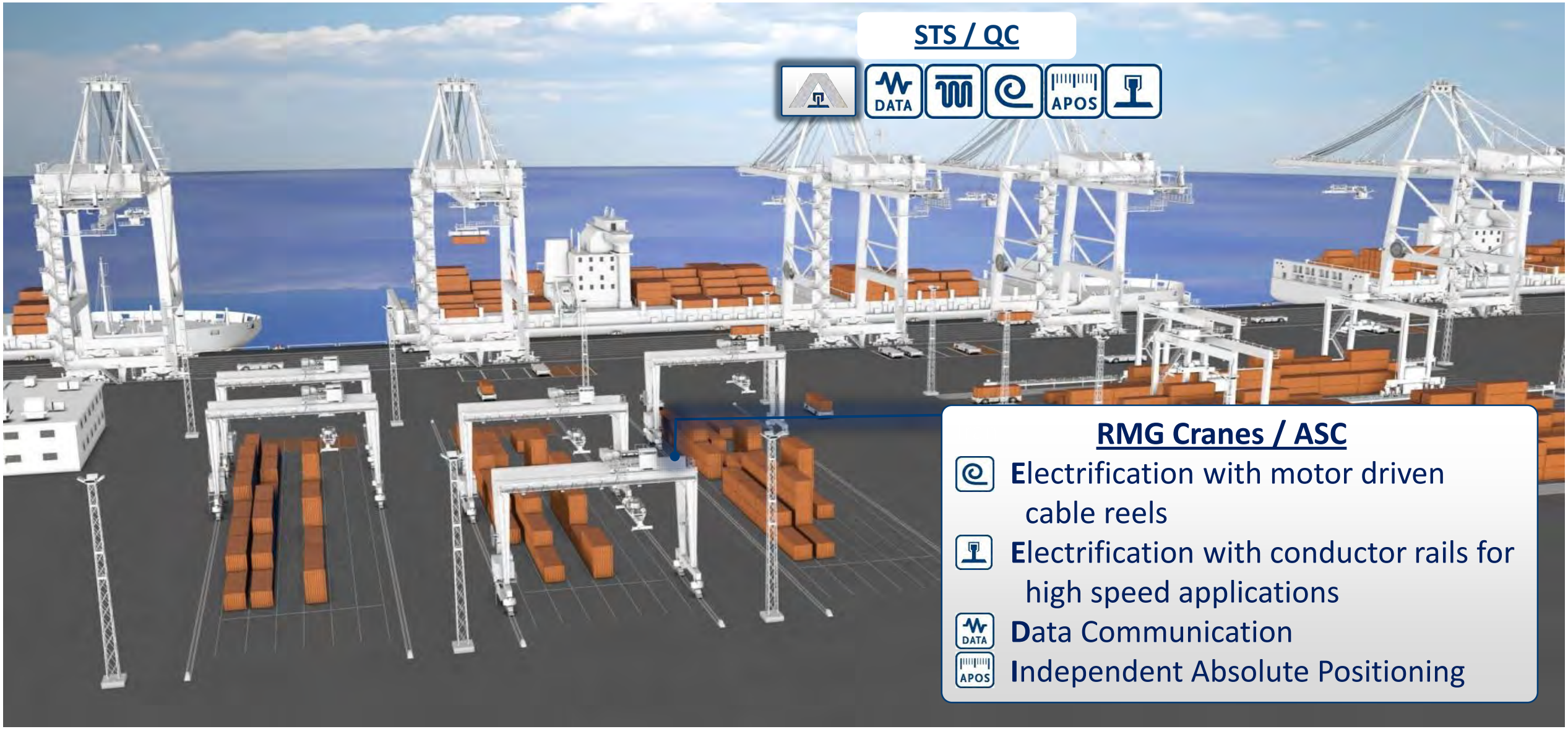
Product Portfolio Port Technology



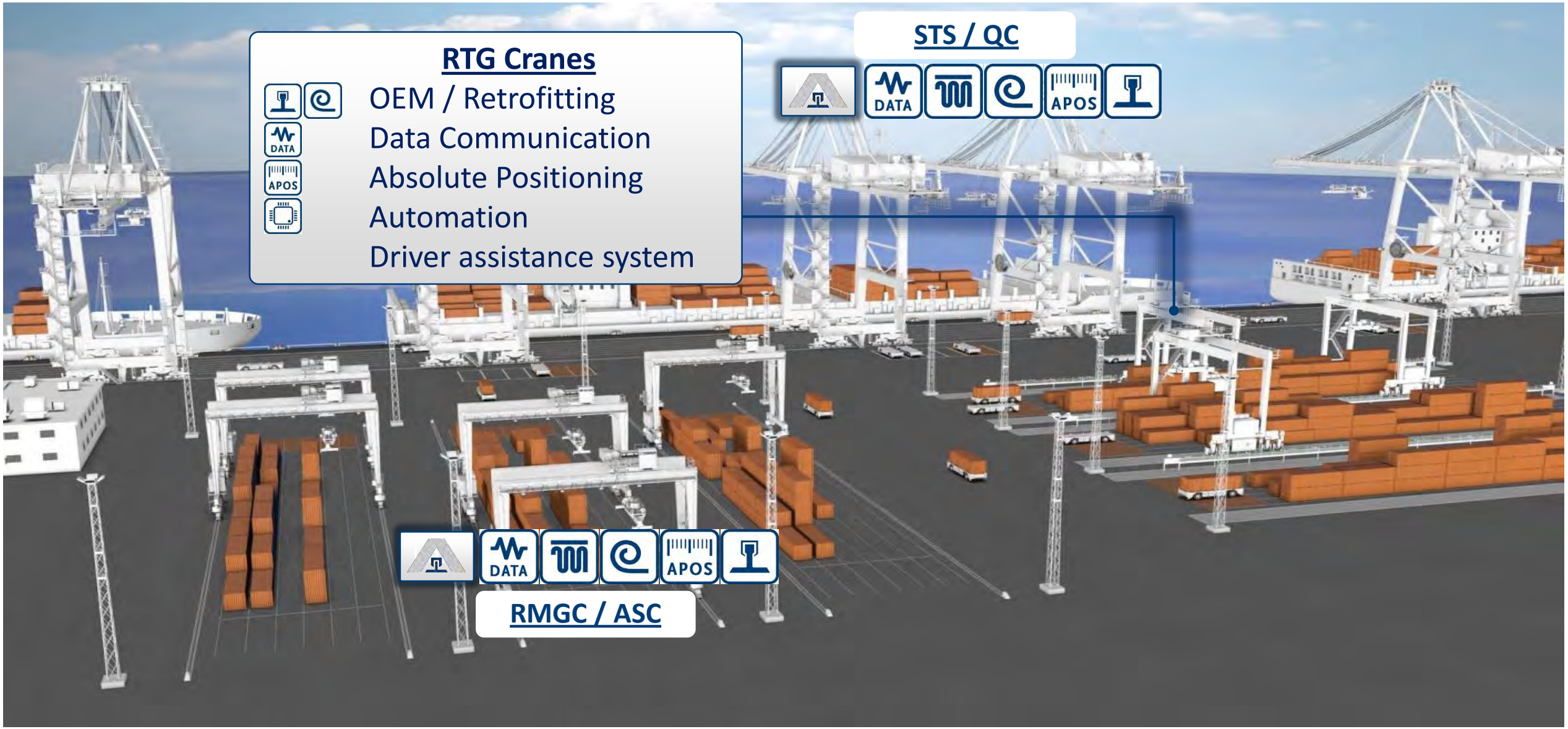
Ship to Shore / Quay Cranes:

- **F**estoon Systems
- **M**otor driven cable reels
- **T**rench systems
- **U**SMGX for automated cranes

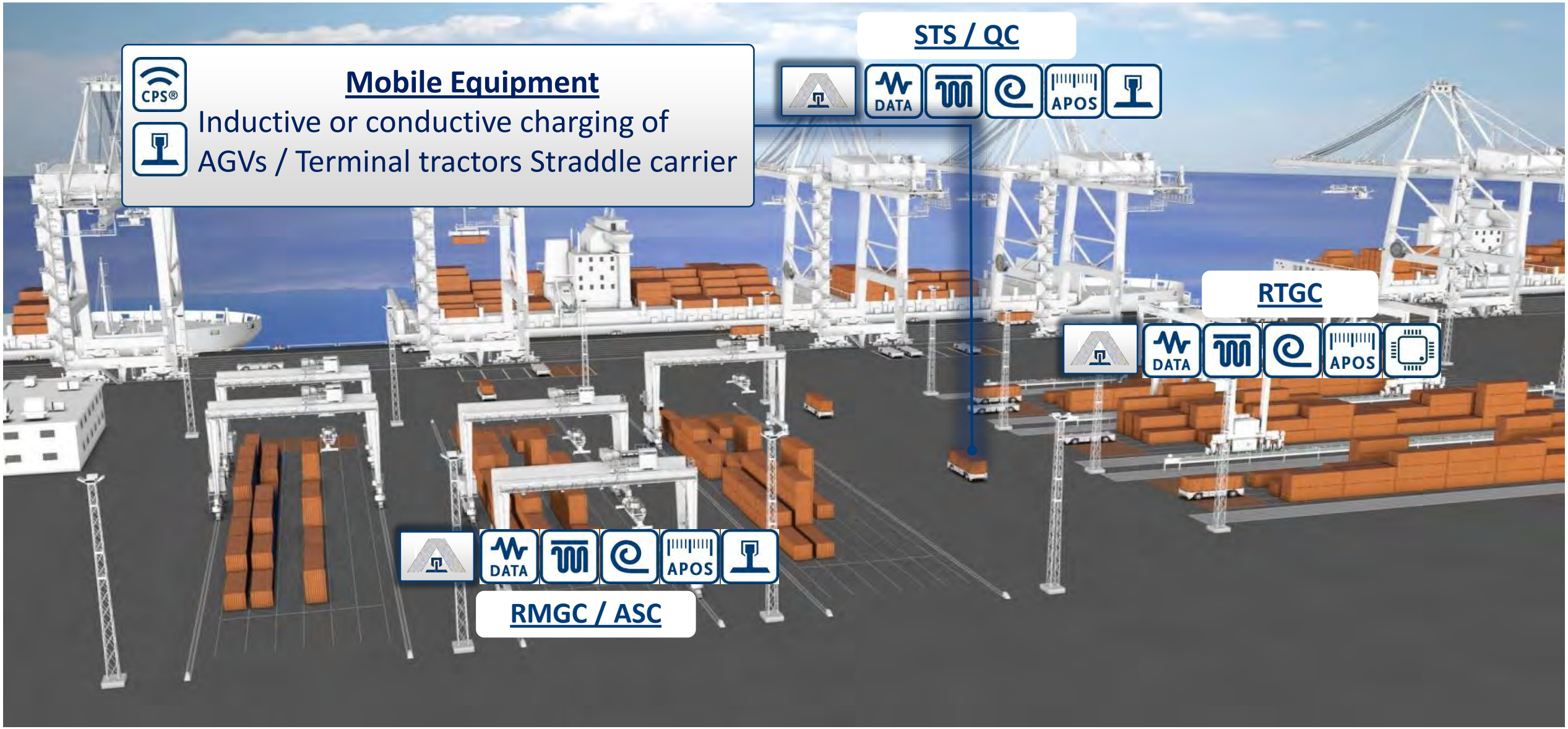
Vahle Group
Product Portfolio



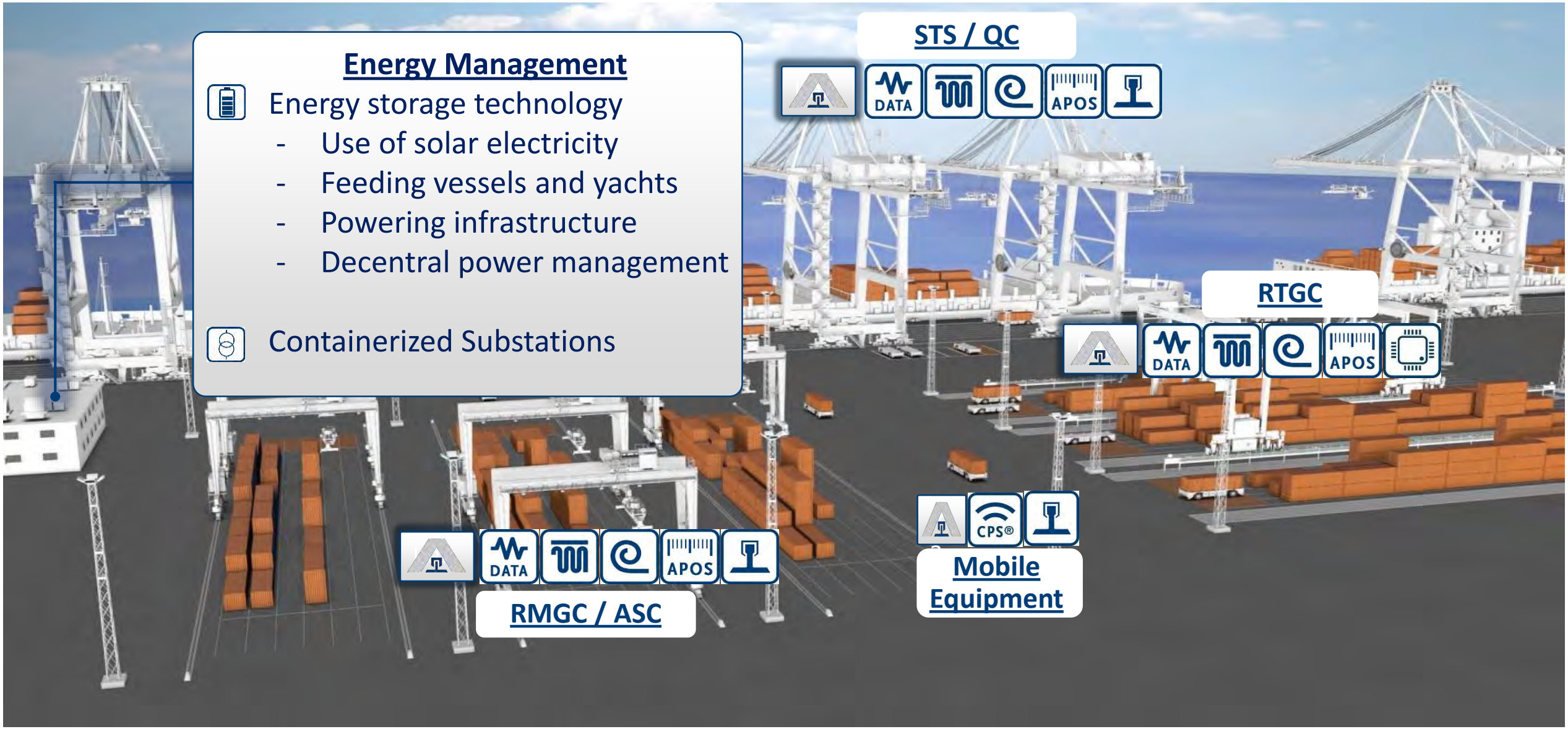
Vahle Group
Product Portfolio



Vahle Group
Product Portfolio



Vahle Group
Product Portfolio



Efficiency Improvement

1st Step – Electrification of existing Equipment

Electrification of RTG Cranes

Reduction of operational costs
Keeping the operational flexibility

References in eRTG convertion

Retrofitted RTGs:	247
New RTGs (OEM):	108
eRTGs in total:	**355**

Supply of turnkey solutions

Efficiency Improvement
Benefits with eRTG Cranes

2015 Cost per Move Average:

RTG: 1,12 US $

Vahle eRTG: 0,46 US $

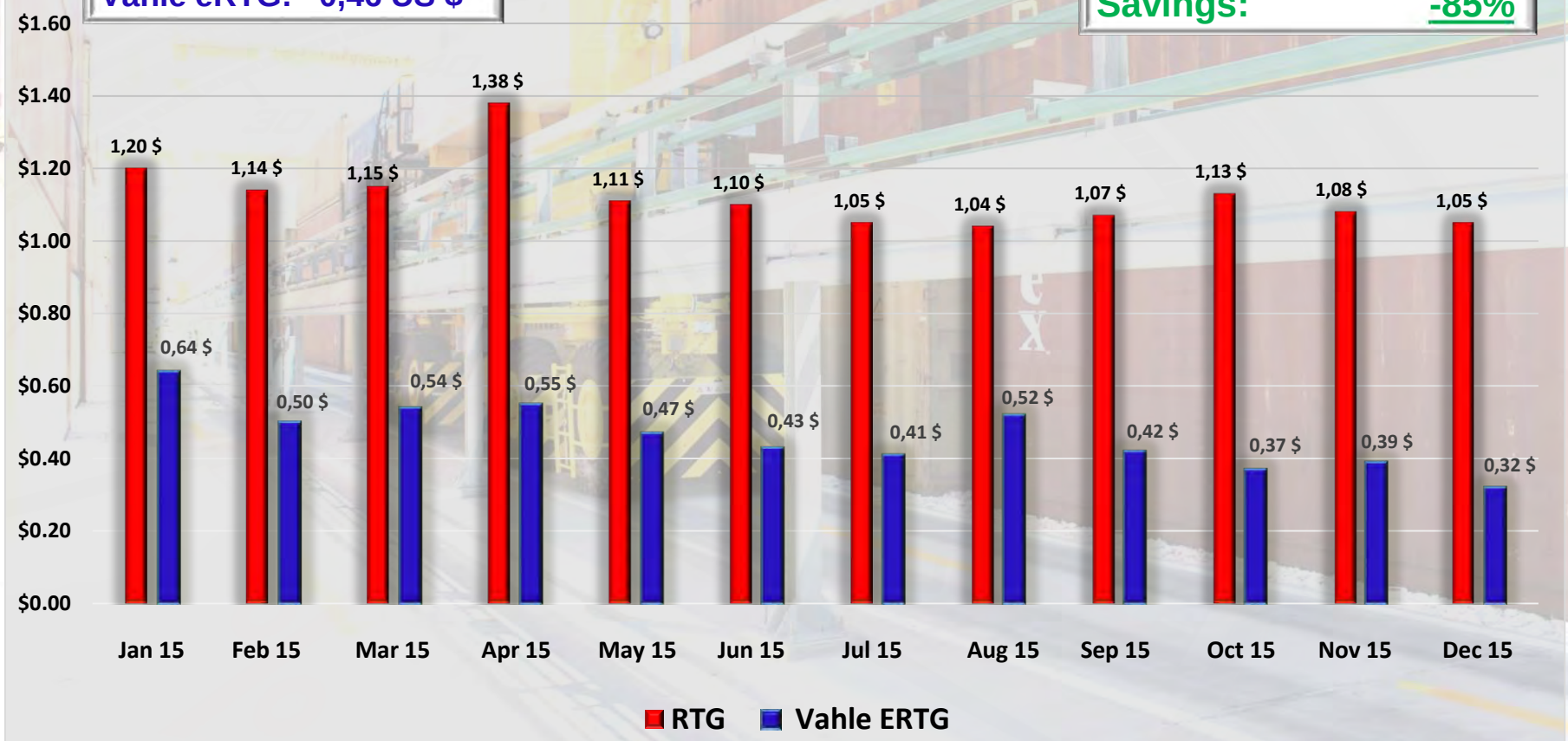
COST PER MOVE RTG VS. VAHLE - ERTG

2015 Total savings per anno

RTG: 541,129 US$

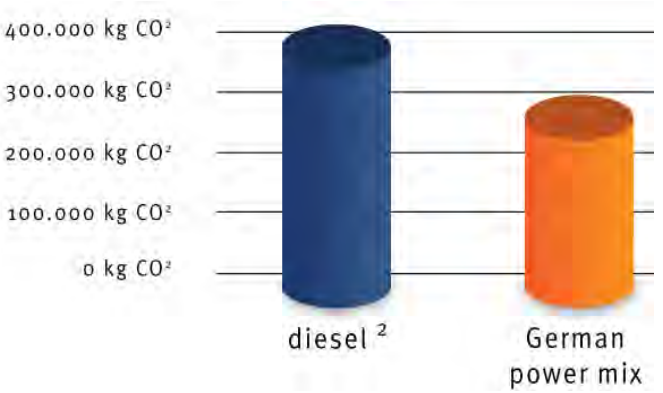
Vahle eRTG: 80,146 US$

Savings: -85%



Source: 1 of World's Top 3 Terminal Operator

Reduction of carbon footprint



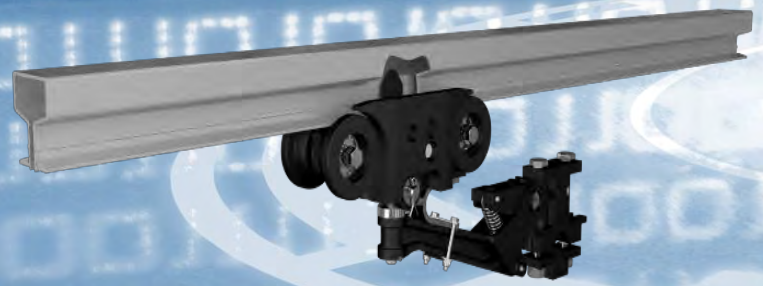
² : based on 13L Diesel engine; 12h/d operations

Battery supplied RTG
reduce CO2 and saving money

- **Mobile Battery Storage on the RTG**
  - Battery storage system replaces the generator on the RTG
  - Batteries get charged during the operation in the conductor rail system
  - <u>Benefits:</u>
  - Generator gets redundant, therefore no CO2 emission and fuel consumption of the RTG
  - Saving maintenance cost
  - Saving expansive load peaks, which can be reduced by the batteries

Efficiency Improvement

2nd Step – Integration Data Com & Positioning



Data communication

Different technologies available
- Radio frequency, Cable, Waveguide

Positioning Systems

Different technologies available
- GPS, D-GPS, Position Beacons, Optical Systems, RFID

IMPORTANT ASPECTS

- ✓ Reliability of safe data communication
- ✓ Average availability of data
- ✓ Protection against external influences

Data communication SMGX

Shielded communication (slotted waveguides)

Automation of Equipment
RTG Cranes

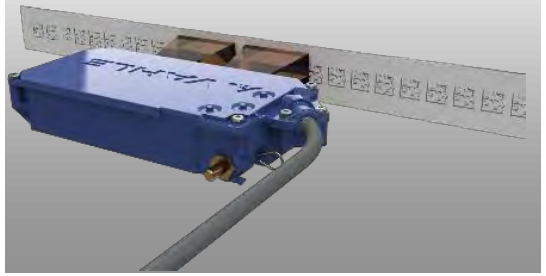
Electrification:
flexible

- Electrification by **Conductor Rails**
- **Automated Power** Connection for block changes
- Automated **seamless switching**

Positioning:
accurate

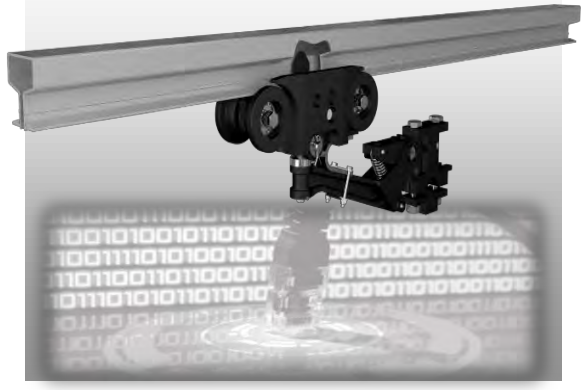
- **Absolute Positioning System** independent from external influences
- Position **accurancy** up to **± 1 mm**
- **PN / PB / Ethernet** Interfaces for Plug and Play Integration

PLUG & PLAY



Data Communication:
safe

- **Highly shielded** data communication
- Up to **100Mbit/s** gross rate
- **Low latency** times
- Interfaces **Ready for Automation** - Ethernet, Profinet & Profinet Safe



Control systems:
modular

- **Autosteering**
- **Power measurement**
- **Remote Maintenance**
- **Operating data acquisition**

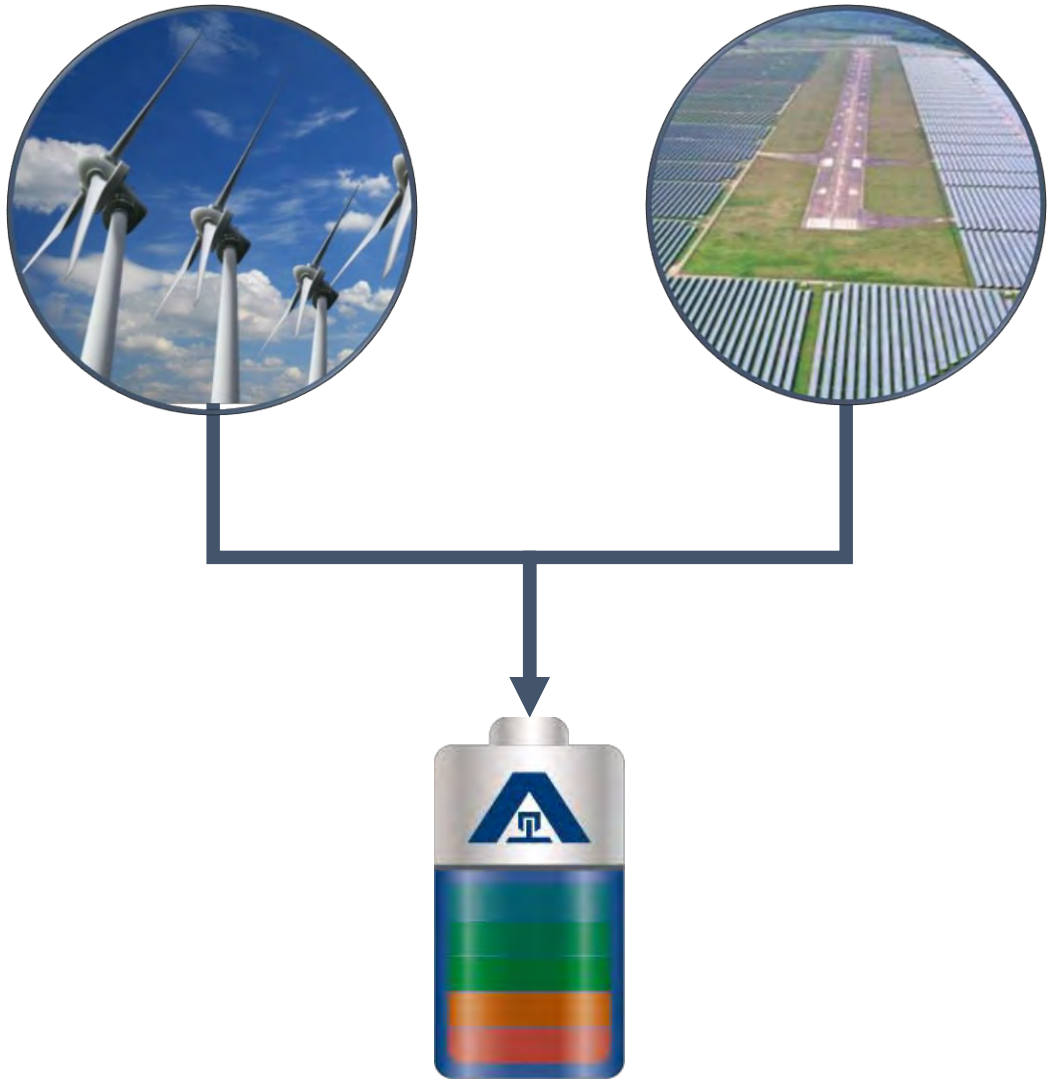
Terminal Operation in a changing world

Automation of Equipment

VAHLE's Vision 2030
renewables and battery storage systems

- **Stationary Battery storage System**
  - Stores energy produced from wind turbines
  - Stores energy produced from photovoltaic

- **The idea of a greener port**
  - Battery storage system is perfect to store the renewable energy which is not needed in this moment
  - An intelligent load management ensures a perfect load distribution
  - The renewables are the main energy suppliers



Thank you very much for your attention!

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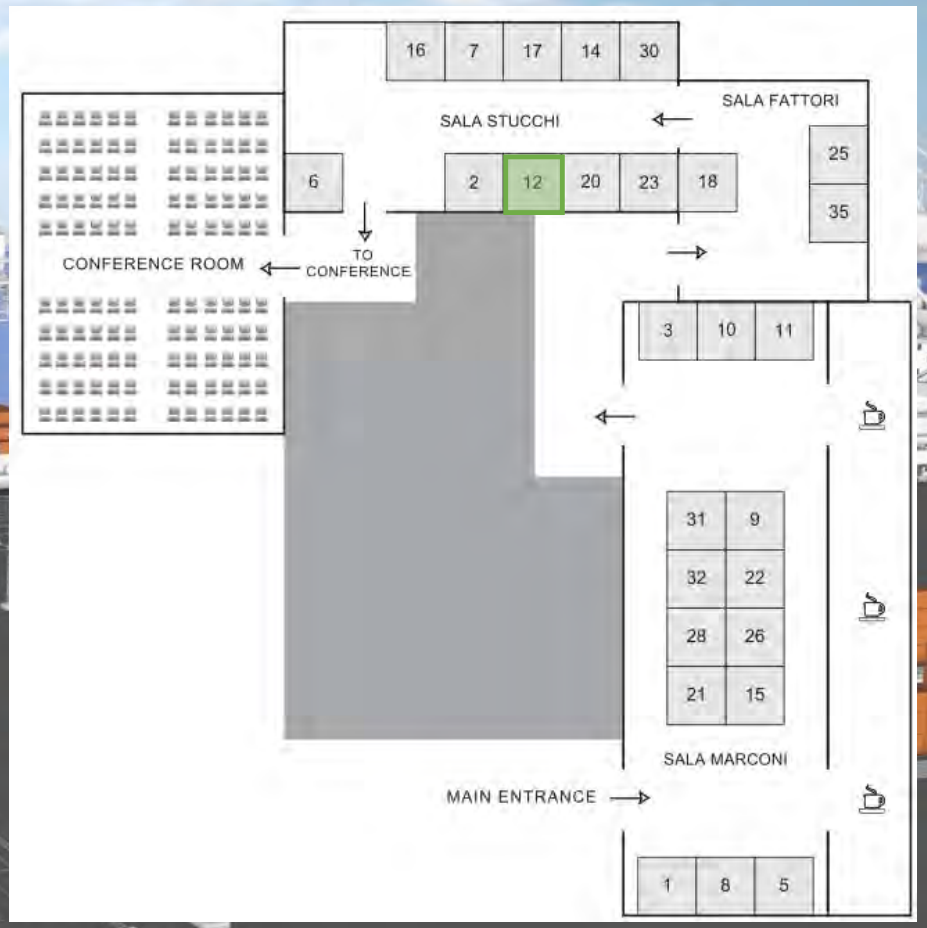

For more detailed information, please visit us at booth 12.