



VISIONS

PORT TECHNOLOGY | NO. 2



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TERMINALS OF TOMORROW

MAXIMUM EFFICIENCY WITH ZERO EMISSIONS

Dear readers,

Welcome to the latest edition of VAHLE Visions, your exclusive insight into the world of our innovative products and solutions. In this issue, we delve extensively into the areas of ports, terminal automation, and container handling, which have long been marked by development, automation, and sustainable technologies.

The maritime logistics industry is at the forefront of shaping a sustainable future for port operations, setting the highest standards in environmental compatibility, emissions reduction, and efficiency. VAHLE is proud to be part of this evolution and will showcase the latest and most innovative solutions for sustainable and efficient terminal automation at TOC Europe in June. With our wide range of products, we actively shape the future of the port and present our solutions for more efficient operations in this issue.

A particular highlight of this edition is the opportunity to operate completely cableless in the area of STS cranes in the future. This advancement of the well-known VAHLE technology not only enables automation

through interference-free real-time data communication but also leads to significant cost savings through weight reduction of new cranes and reduced maintenance costs.

Furthermore, our proven electrification technologies for RTG cranes and their associated systems have received a comprehensive upgrade. We also provide insights into forward-looking applications, including a preview of predictive maintenance thanks to VAHLE's unique Predictive Maintenance Tool, the Smart Collector, which detects anomalies directly and enables planned maintenance measures to prevent unplanned downtime.

Additionally, this edition also looks at an innovative application in the field of intermodal terminal automation by CargoBeamer, where VAHLE's power transmission solution ensures the required energy.

Immerse yourself in the fascinating world of port terminals and join us on an exciting journey through VAHLE Visions. Enjoy reading and discovering new possibilities for a green port of the future.

STATE-OF-THE-ART TECHNOLOGY

THE FUTURE OF PORT TERMINALS IS CABLELESS!

Container terminals are the hubs of the global economy, where goods are moved around the clock. From loading and unloading container ships to transporting containers within the terminal, the global maritime supply chain requires reliable energy supply and secure data communication to ensure the safety of machinery and equipment, including at SIL level. Efficient solutions are essential to meet today's demands and tomorrow's sustainability and automation challenges.

Cutting-edge technologies for the future of container handling: SMGX Communication

With our future-proof product upgrades in the vCOM segment – secure data transmission – we are setting new standards for efficiency and sustainability in container terminals and the maritime supply chain. Using the innovative and secure SMGX (Slotted Microwave Guide Extreme) communication, we achieve an impressive data rate of up to 1 Gigabit. Our proven shielded slotted waveguide technology, which supports both ProfiNet and ProfiSAFE protocols for control data, ensures interference-free communication to and from the environment. In addition, a suitable retrofit solution is available for existing crane systems, enabling our customers to optimize their systems immediately.

VAHLE makes cableless container handling possible

Our slotted waveguide technology SMGX will be upgraded to the latest Wi-Fi 6 technology with a data rate of up to 1 Gigabit. This enables parallel communication of control data and multimedia data. In the time slot method, we deliver control data exactly and always at the same time, such as emergency stop or similar high-priority standard data. This solution will be available from the end of 2024. Our system, consisting of SMGX data transmission and power transmission via a conductor system, eliminates the need for a festoon, which not only reduces maintenance and service costs, but also results in significant weight savings. This provides a direct cost advantage for crane manufacturers when designing new cranes, especially in harsh and extreme weather conditions. Retrofits are also possible.

Our technology upgrades enable cableless operation not only in new crane installations, but also in the modernization of existing old crane systems. By integrating Profibus technology and real-time HTL encoder transmission, expensive and maintenance-intensive cable systems are a thing of the past.



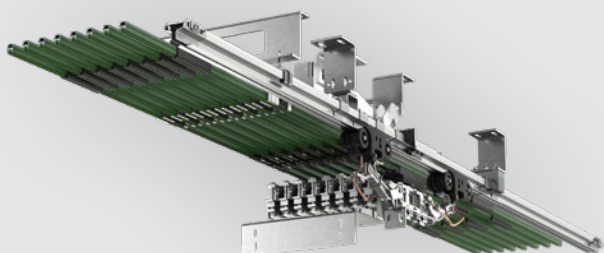
Pioneering innovation for the future

VAHLE is making the concept of a fully automated, environmentally friendly terminal a reality. From reducing weight to controlling operations remotely from the terminal tower, our solutions enable efficient, sustainable and future-proof

automation of container handling in global ports. All with the goal of ensuring a seamless and safe process. Choose VAHLE for the future of container terminals – cableless and future-proof!

The future is cableless

Our SMGX data transmission and energy transfer via conductor system is the best solution for cableless crane operation.



- **Instant use** without configuration
- **Optimized space utilization** for seamless integration in existing systems
- **Secure data transmission** through transparent and shielded technology
- **Rugged design** for reliable operation in harsh environments
- **Compatibility with leading protocols**, support for additional protocols upon request

Technical data

Protocols	PROFINET/PROFIsafe, PROFIBUS, HTL
HTL tracks	4x per module (A, B and Z track)
Interfaces	RS485, Ethernet
Data rates	1 GBit/s (PROFIBUS 1.5 MBit/s)
Network side	1000BaseT (M12, 8-pin, X-coded)
Latency time	<1µs
Protection class	IP 54

THE TIMELESS VAHLE LEGACY IN PORT OPERATIONS

ELECTRIFICATION AND AUTOMATION OF RTG CRANES

Since the early 1930s, VAHLE has been actively supplying energy transmission solutions to ports. From the first copper conductor system in the port of Königsberg to cranes in the port of Hamburg, VAHLE has a long tradition of developing customized solutions for the maritime industry.

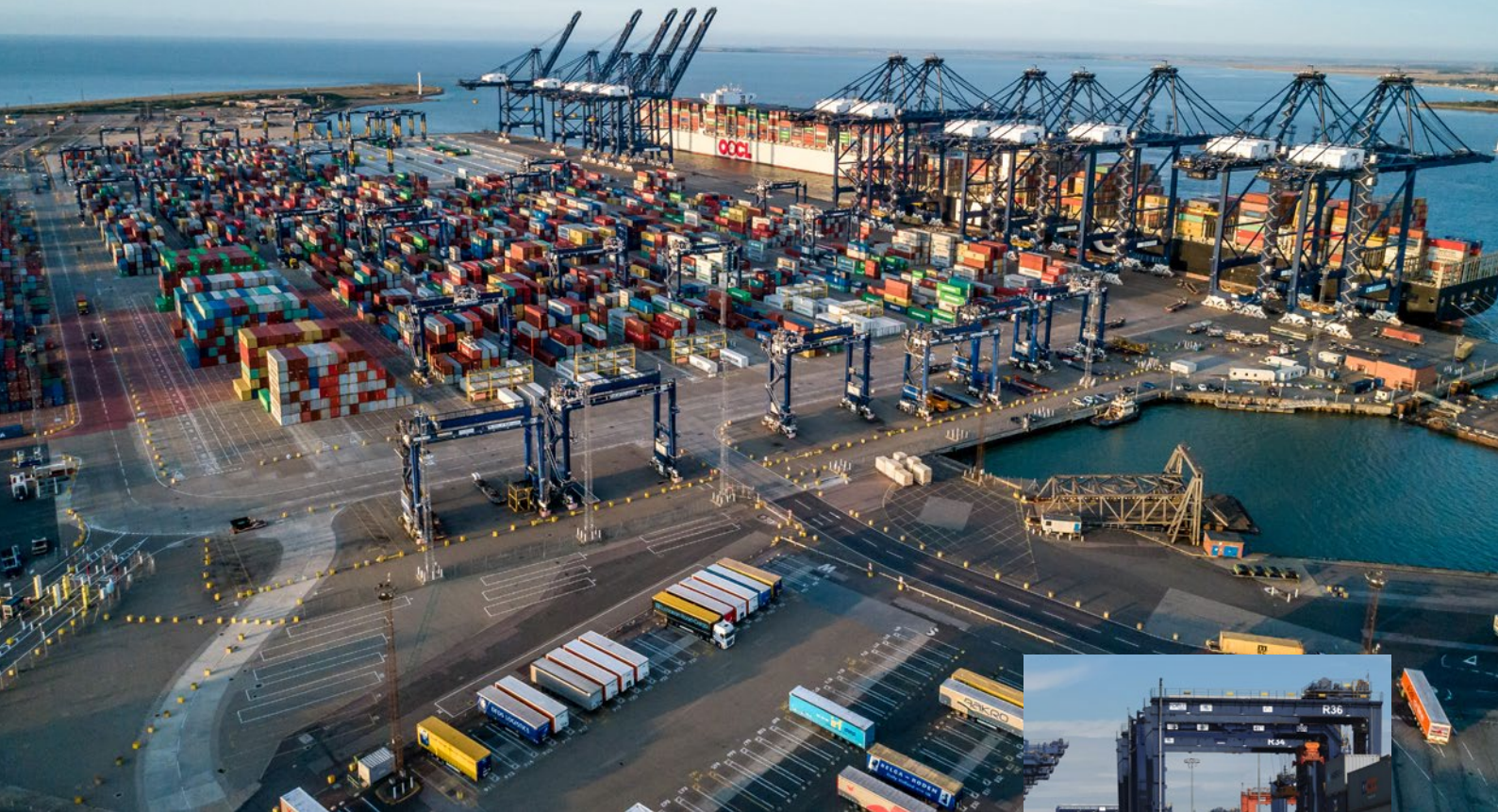
The establishment of the VAHLE Ports division in 2011 marked the beginning of a new era. A milestone in this phase was the electrification of 81 RTG cranes at Modern Terminals, the largest container port in Hong Kong. This solution was not only a breakthrough in terms of efficiency, but also made a significant contribution to environmental protection and zero emissions. Since then, VAHLE has proven its reputation as a pioneer of sustainability in ports. Our eRTG solutions have saved over 950 million kilograms of CO₂ emissions to date (May 2024), making VAHLE the enabler of zero emissions.

Over the years, electrification solutions for Rubber Tired Gantry (RTG) cranes have become a cornerstone for zero emissions and automation of container terminals. VAHLE has continuously worked on the further development of these systems to meet changing requirements. In addition to electrification, our technology now offers interference-free data communication via the slotted waveguide SMGX, which withstands even extreme conditions.

This functionality enables fully automated control of RTG cranes, safely and conveniently from an operator's desk. This advanced technology is in use around the world in ports such as Laem Chabang in Thailand and Mexico, and has proven to be an essential part of smooth handling operations.







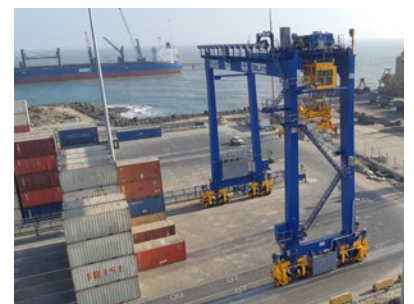
Felixstowe, Great Britain



Balboa, Panama



Laem Chabang, Thailand



Mundra, India

ALL OVER THE WORLD

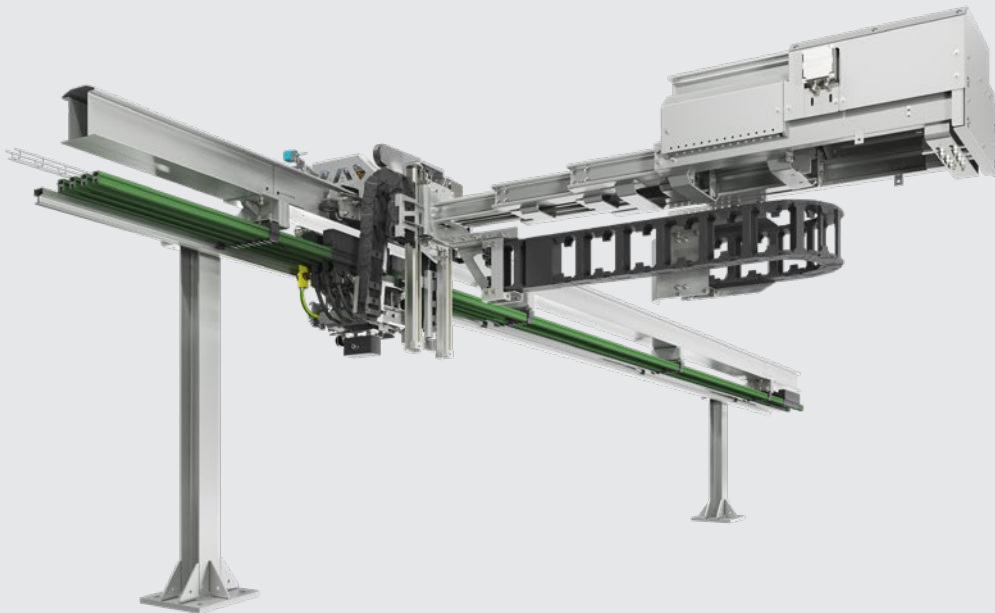
The electrification and automation of RTG cranes have led to increased efficiency and reduced environmental impact in port terminals worldwide. VAHLE has contributed to equipping numerous port terminals around the world with state-of-the-art energy transmission solutions.

Here is an overview of our electrification and automation references:

- Hutchison Ports, Port of Felixstowe, Great Britain
- Hutchison Ports, Panama Port Company, Balboa, Panama
- Hutchison Ports, PPC Cristobal, Cristobal, Panama
- Hutchison Ports, Lazaro Cardenas, Mexico
- Hutchison Ports, ICAVE, Port of Veracruz, Mexico
- GulfTainer, Wilmington, USA
- Port of America, Chesapeake, Baltimore, USA
- Modern Terminals Ltd., Hong Kong, P.R. of China
- PSA, Keppel Terminal, Singapore
- Hutchison Ports Thailand, Laem Chabang, Thailand
- PSA International, Tanjung Priok, Indonesia
- APMT, Port of Tanjung Pelepas, Malaysia
- Mardas, Istanbul, Turkey
- Kumport, Istanbul, Turkey
- Asyaport, Tekirdag, Turkey
- Yilport, Oslo, Norway
- ADANI Port Terminals spread across the entire Indian subcontinent in
 - » Kattupalli
 - » Mundra
 - » Gangavaram

INTRODUCING THE NEW TRIMOTION COMPACT GENERATION

In response to increasing demands, our products and technologies are constantly evolving, and our eRTG solutions are no exception. With the introduction of Trimotion Compact, we present the latest iteration in eRTG automation, promising increased efficiency, reliability and flexibility for the electrification and control of RTG cranes – and thus terminal automation – in port terminals worldwide.



- **Fast delivery and supply chain optimization** through reduced DIN parts
- **Streamlined and fast installation** thanks to light-weight design and plug & play commissioning
- **Seamless integration of positioning and data communication systems** after installation
- **Automatic control from the control panel** and automatic connection to the power grid
- Increased safety for port personnel
- Suitable for Retrofit and new RTGs

Technical data

Rated current	up to 1000 A
Rated voltage AC	400–1000 V
Conductor material	Aluminum-stainless steel
Hub Length	up to 1700 mm
Vertical tolerance	± 150 mm
Tolerance in all Directions	5 °
Conductor system height above ground	1800–2600 mm
Operating temperature	-15 °C to +50 °C
Relative humidity	max. 100 %



PREDICTIVE MAINTENANCE FOR CONDUCTOR SYSTEMS

THE FUTURE OF PORT MAINTENANCE

In a dynamic port operation, the reliability of the energy transmission systems in each terminal is critical and a key factor for efficient supply chain management. VAHLE's Smart Collector sets a new standard for efficient and predictable maintenance of conductor systems. The predictive maintenance tool combines state-of-the-art sensors, various testing techniques and learning analysis methods to eliminate unplanned downtime.

How does the Smart Collector work in a container aisle?

The Smart Collector is a unique predictive maintenance tool for conductor systems that is already setting new standards in the automotive and intralogistics industries. Using advanced sensors and analysis techniques, it enables precise monitoring of movement and temperature parameters to detect

potential problems and anomalies early and accurately.

- **Maximize equipment availability:** Avoiding unplanned process downtime maximizes equipment uptime.
- **Improve efficiency:** Preventive maintenance reduces operating costs and increases port efficiency.
- **Plug-and-play installation:** Easy and fast installation eliminates lengthy downtime, minimizes downtime, and ensures business continuity.

The Smart Collector gives your equipment the security it deserves – no more relying on chance, but on knowing what will happen tomorrow. The reliability and safety of any system is paramount, and with Predictive Maintenance for conductor systems, VAHLE is setting new standards for quality and system safety.



Intelligent current collector



User-friendly dashboard



Secure data communication



Intelligent and learning main unit

Become one of the first container terminals

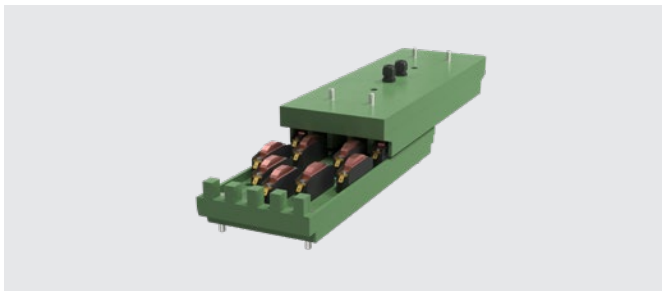
The Smart Collector sets new standards for quality and system safety in port operations. It provides operators with a comprehensive view of the condition of their conductor systems and enables them to react to potential problems in a timely manner. Applications become not only more efficient, but also more sustainable, as predictive maintenance automatically extends the life of the system.

SUSTAINABLE TRANSPORTATION SOLUTIONS FOR INTERMODAL LOGISTICS

ROAD TO RAIL: CARGOBEAMER AND VAHLE

When it comes to efficiently moving semi-trailers out of terminals, CargoBeamer offers an intermodal transportation solution that moves all types of semi-trailers by rail in an intelligent, reliable and environmentally friendly way.

The CargoBeamer system allows fully automatic loading of all wagons in parallel, eliminating unnecessary waiting times. The semi-trailer is driven by a terminal vehicle onto a ready-to-use transport tray next to the transfer track and uncoupled. When the freight train arrives, the loaded wagons are transferred to the freight cars in a record-breaking 20 minutes. A craneable wagon top allows CargoBeamer trains to be handled in standard crane terminals as well as with reachstackers, further enhancing the flexibility and efficiency of this system.



The CargoBeamer system reduces CO₂ emissions by approximately 85% compared to road transport. CargoBeamer is currently operating on routes from Calais to Perpignan and from Kaldenkirchen to Domodossola, as well as a connecting route to Bari. The terminal network is constantly growing and will eventually connect the whole of Europe.

What is the role of VAHLE?

VAHLE has been an integral part of this vision of sustainability and efficiency from the very beginning. A key challenge in the development of the CargoBeamer system was the power supply of the shuttle bars, which had to withstand extreme environmental conditions. In close collaboration, VAHLE delivered a pioneering and globally unique solution: the use of stainless steel in addition to conventional copper in the shuttle bar technology.

At the CargoBeamer terminal in Calais, there are currently more than twelve of these shuttle bars in use, each equipped with a twelve-pole current collector to ensure faultless power transmission. The voltage is only activated when the system is completely closed, which ensures safety. During movement, the bar is free of voltage.

Visions become reality with VAHLE solutions.



VAHLE SERVICE – FOR A TROUBLE-FREE FUTURE

MAXIMUM AVAILABILITY, MINIMAL DOWNTIME

Whether eRTG Cranes, STS Cranes, Straddle Carriers, RMG Cranes or Automated guided vehicles (AGV) – regular maintenance, professional cleaning, and precise inspection ensure reliable and future-proof port operations.

With preventative and predictive service, seamless spare parts supply, and our protect programs, we keep your systems efficient, safe, and consistently powerful.



Schedule a System Check Now!

Simply scan the QR code or visit vahle.com/globalservice



Paul Vahle GmbH & Co. KG

Westicker Str. 52
59174 Kamen
Germany

+49 2307 7040
info@vahle.com
vahle.com

You can find your local contact at: vahle.com/contact

IMPRINT

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