



Energy & Data Transmission Systems for Container Handling Equipment

CONDUCTIX
wampfler

Ⓞ DELACHAUX GROUP





Medium-voltage motorized cable reel on STS Crane at YICT in China

Solutions for Container Handling

Reliable Energy and Data Transmission

We move your business!

Especially in ports and terminals that move containers, everything needs to be reliable when operating 24/7/365.

Energy and Data transmission systems play a very crucial role in these operations and they receive special attention by the operators, as well as by the equipment manufacturers and consulting engineers.

Since the introduction of containers as the standardized method for transporting cargo, Conductix-Wampfler has provided engineered solutions

that enable the container handling equipment to operate safely and reliably.

Since the first use of containers in 1954, there have been dramatic developments in handling equipment and facilities. The enormous number of containers handled by some of the world's largest container terminals today were unthinkable only a few years ago.

Conductix-Wampfler has always been in very close contact with the industry to develop and to optimize the range of products for this vital industry.

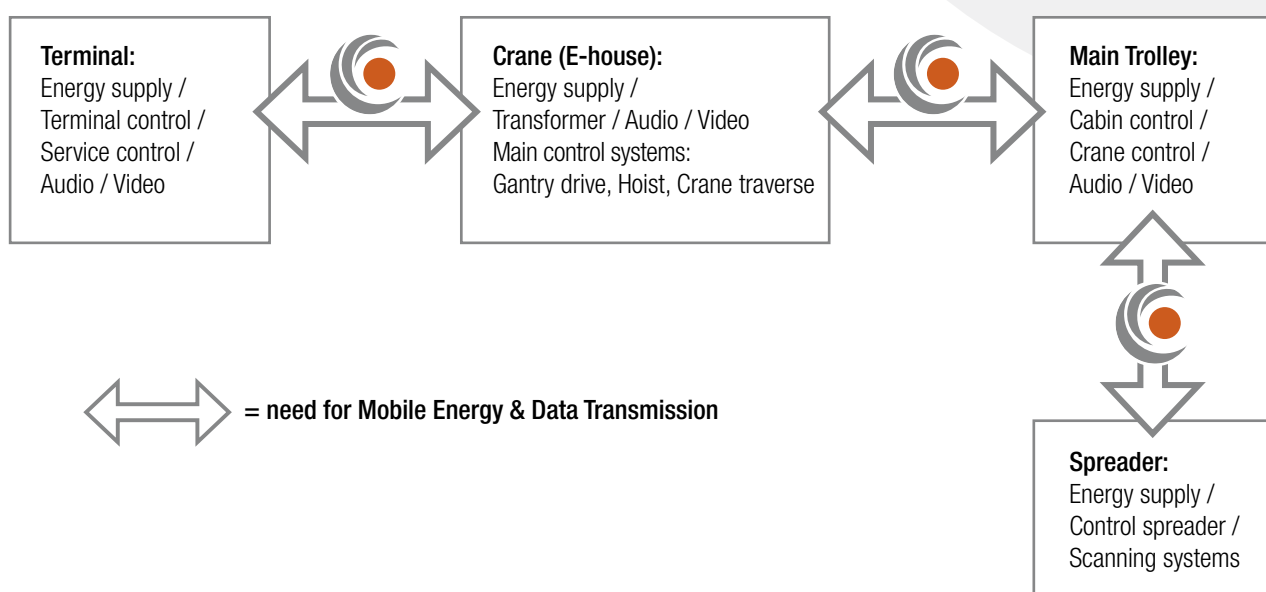
Today's modern container ports and terminals are focused on speed

and reliability. Automated container handling equipment is gaining more attention and fast becoming the main concern for many terminal operators.

Large ports and container terminals also have a significant environmental impact, which has driven a shift to more environmentally friendly equipment in the last several years.

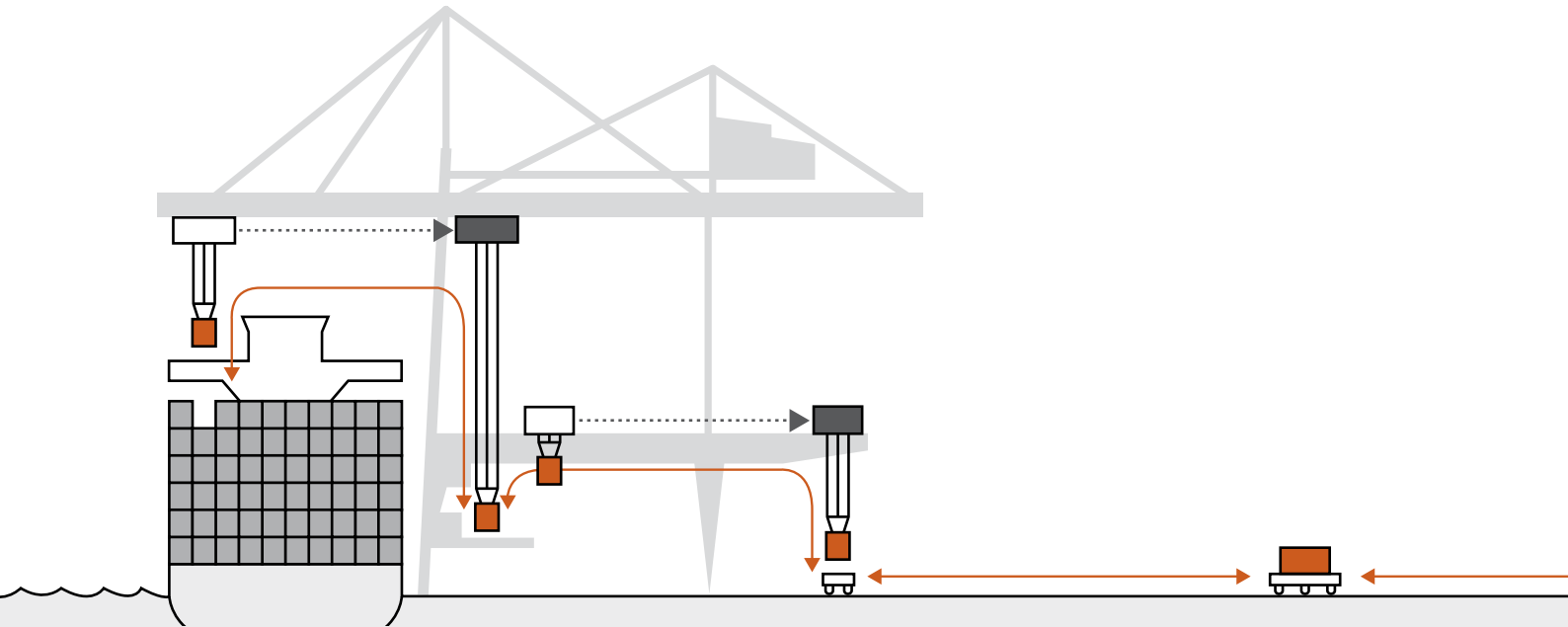
With the development of eco-friendly solutions like E-Shore, E-RTG and E-Mobility, Conductix-Wampfler is one of the key innovators and most trusted partners in deploying ecological technologies into the container handling industry.

Typical electrical interfaces on Container Cranes:





Terminal-Solutions for Container Handling

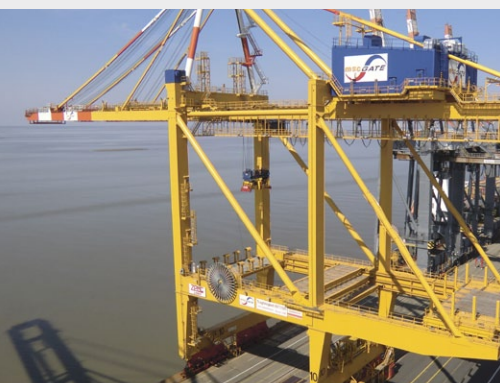


Waterside

The critical task of the equipment on the waterside is to load and unload the berthing vessel as fast as possible. Due to the large size of the container handling equipment and its exposure to the sea, accessibility may be limited.

Waterside Horizontal Transport

Containers are transported to and from the waterside operations to and from the container stacking yard by vehicles.



High-speed festoon system on a ship-to-shore container crane



Cable chain system on a trolley – Hamburg, Germany

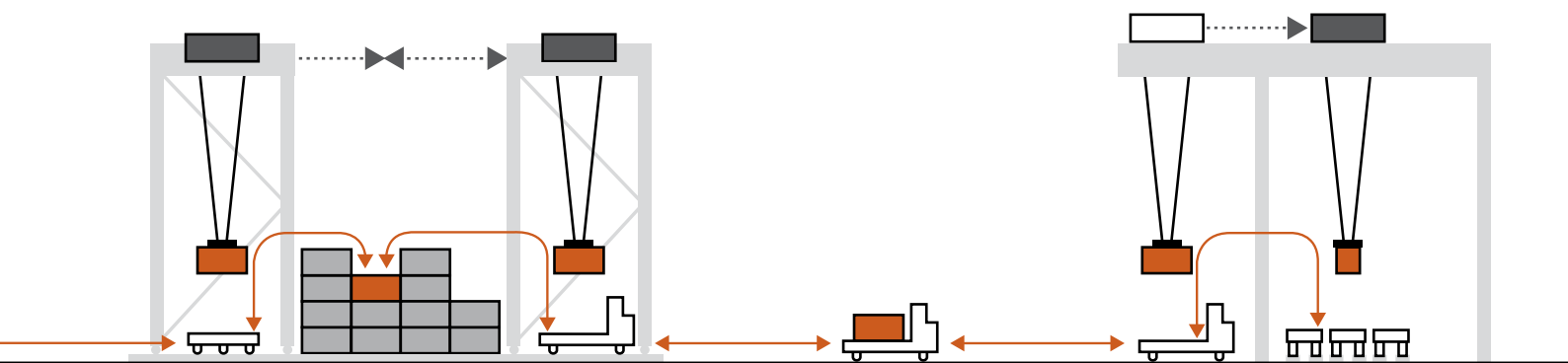


Cable chain system on a straddle carrier – Hamburg, Germany



Conductix-Wampfler offers the widest range of products in the industry to provide the best possible result for our customers.

Container terminals may be segmented into five main areas. All of them must be designed to handle containers in the most effective way. However, there are different requirements for the electrification systems in each segment.



Container Stacking Yard

The stacking yard is arguably the core element in operating a container terminal efficiently. Intelligent logistics planning as well as highly efficient and often automated equipment play a crucial role in the high performance of a terminal.

Due to the present use of diesel powered equipment, the demand for environment-friendly alternatives is becoming a major factor in the container handling industry.

Landside Horizontal Transport

Landside horizontal transportation distributes the containers to and from other nodes of transport (rail, road or sea).

Intermodal

This segment forms the critical interface between the container terminal and railway networks. Intermodal terminals depend on efficiency and robust planning when serving road and rail transportation.



Conductor Rail "Drive-In" System for E-RTG



Standard energy guiding chain system on a reach stacker's spreader



Standard festoon system and motorized cable reel on an intermodal crane

Waterside – Sea Terminal

STS

The largest container handling equipment, the Ship-to-Shore (STS) crane, is located on the waterside of a terminal: as container ships increase in size, larger, faster and smarter cranes are required for efficient container handling. Lifting and trolley speeds are critical factors for the capacity of this equipment. Conductix-Wampfler electrification systems handle the constant growing demand of the port and container terminal industry.

Trends of Crane development:

Trolley travel

- Higher speeds
- Longer boom lengths

Gantry travel

- Increased energy requirements
- Increasing installation heights

Data transmission

- Automation
- Video signals
- Remote-controlled STS Cranes

Ship-to-Shore Cranes (STS-CC)

Location of Interface

Conductix-Wampfler Solutions

Terminal - Crane

- Spiral or level-winding motorized cable reels for medium-voltage power lines
- Medium-voltage cables with integrated fiber-optic and control cores
- Conductor rail systems for energy transmission
- Protection devices for underground medium-voltage power lines and conductor rails

Crane - Main trolley

- Cable trolley systems (motorized/non-motorized)
- Cables for festoon systems
- Conductor rail systems for energy- and data transmission

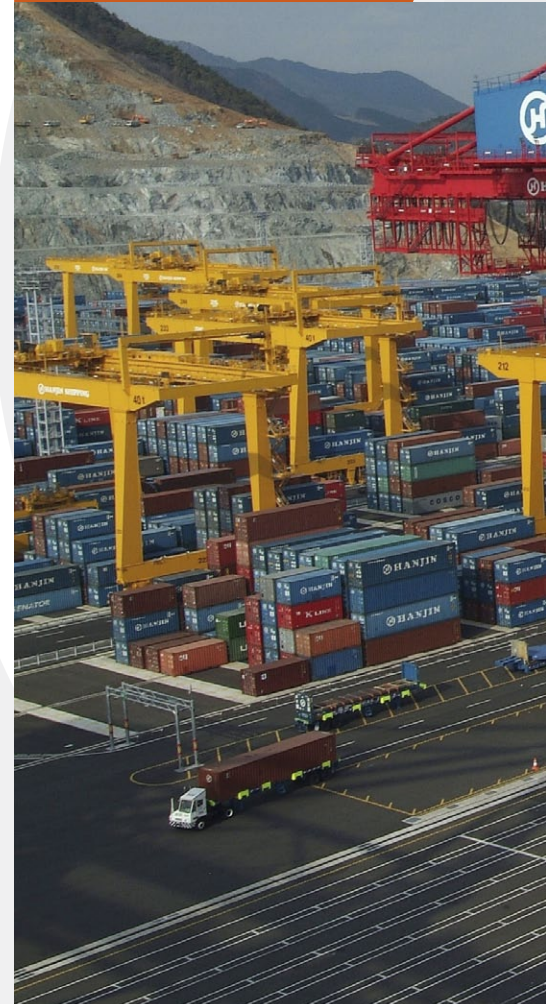
Crane - Platform trolley

- Conductor rail systems with data transmission
- Energy guiding chain systems with trolleys
- Cables for energy guiding chains

Main trolley - Spreader

- Spreader cable reels
- Spreader cables

Waterside



Container terminal – Busan, Korea



Medium-voltage motorized cable reel with magnetic coupler



Conductor rails with inductive data transmission



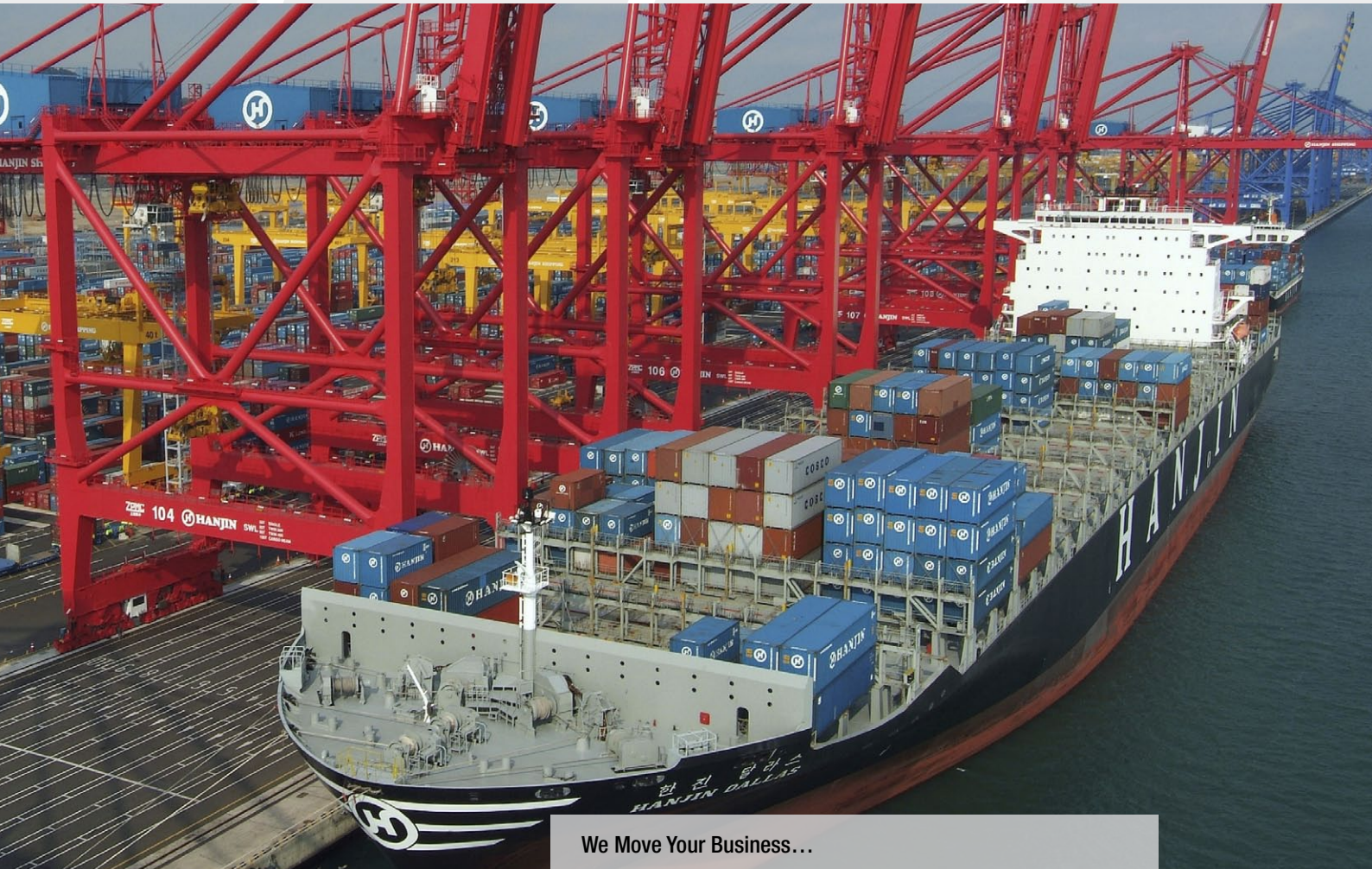
Motorized cable reel for spreader with variable frequency drive

Side Horizontal Transport

Container Stacking Yard

Landside Horizontal Transport

Intermodal



We Move Your Business...

- Motorized cable reels for medium-voltage power lines with electromechanical or electronic drive technology
- Optical and mechanical fiber optic rotary joints for data transmission
- Optimized conductor rail systems for high energy density
- High speed festoon systems, motorized or non-motorized
- Mechanical damping systems for longitudinal and transverse cable movements
- Compact conductor rail technology combined with inductive data transfer technology (cDAT / iDAT2)
- Energy guiding chain systems with trolleys
- Monospiral or level-wind high speed motorized cable reels controlled by frequency converters
- Elastic damping devices for dynamic cable protection
- Medium-voltage power lines with sensor-guided load limiters
- Optimized energy and data cables with integrated fiber optic cores



Standard festoon system with catenary trolley

Waterside – River Terminal

STS and Mobile Harbor Cranes

Most terminals operate large gantry cranes to load and unload container vessels. However, the use of mobile harbor cranes is significantly increasing in smaller size ports or terminals with multi-purpose cargo (container, bulk).

The requirements for the energy and data transmission is very similar to large STS cranes; however, due to the different designs and size, solutions are adapted to the special needs of these cranes.

| Crane Type | Conductix-Wampfler Solutions |
|----------------------------|--|
| Barge Crane | <ul style="list-style-type: none"> - Monospiral motorized cable reels for medium-voltage power lines - Compact CoverZIP cable protection systems - Highly flexible medium-voltage reeling cables for motorized reels - Standard heavy festoon systems with specially designed trolleys - Highly flexible round or flat cables - Conductor rails with electronic or inductive data transmission |
| Mobile Harbor Crane | <ul style="list-style-type: none"> - Motorized cable reels for medium-voltage power cables with magnetic couplers or frequency converters - Highly flexible high-voltage power and data cables for motorized reels - Slip ring assemblies for energy and data transmission - Motorized cable reels for spreaders with magnetic or hydraulic drive units |



Container terminal on the Rhine river – Weil am Rhein, Germany



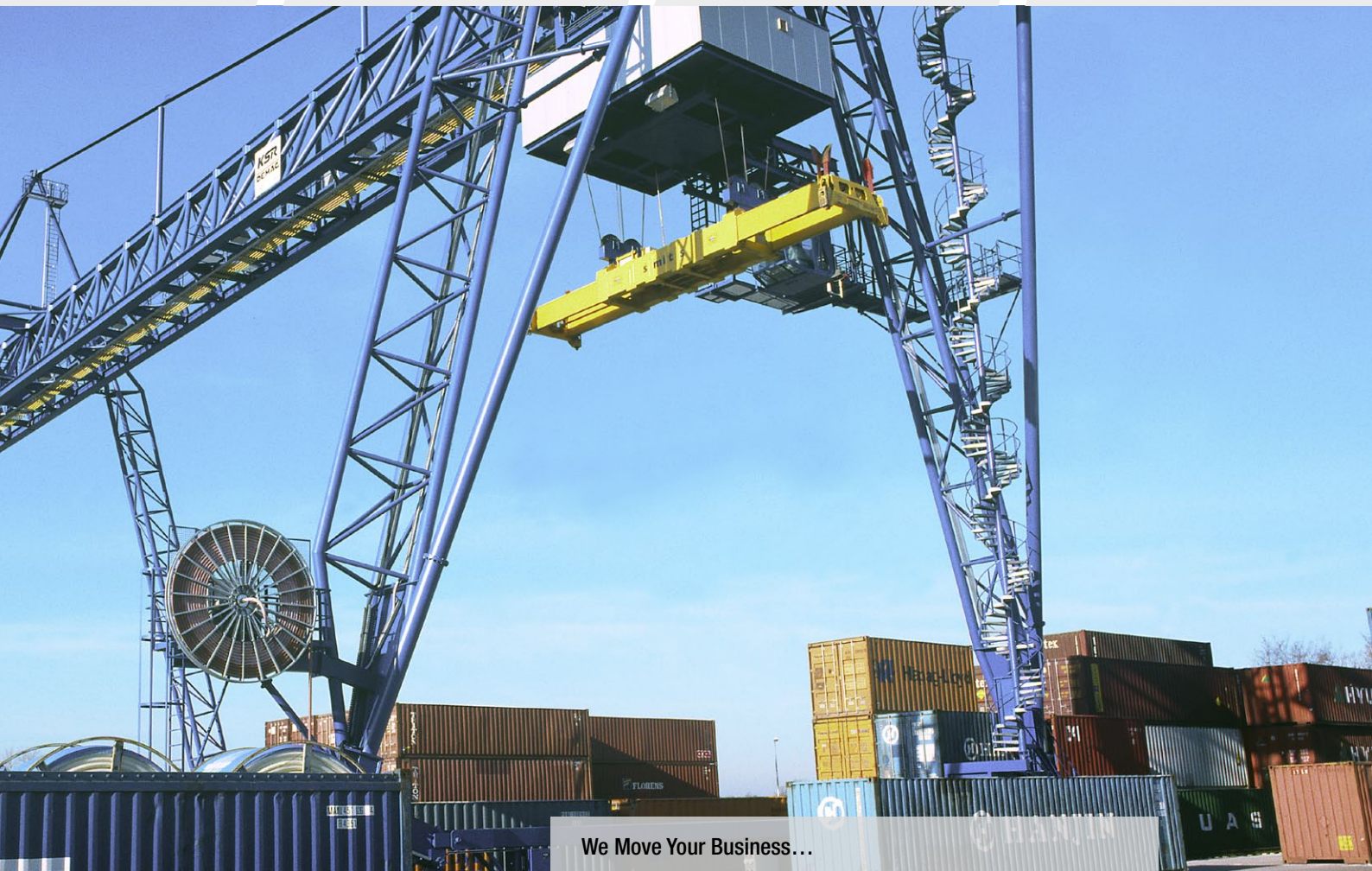
High-voltage main reel cable



Conductor bar with Data Transmission system PowerTrans® 1b

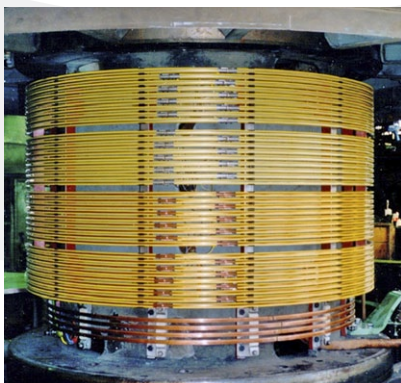


Spreader cable reels for Mobile Harbor Cranes



We Move Your Business...

- Motorized cable reels for medium-voltage power cables with frequency converters or magnetic couplers
- Cables are protected against mechanical damage by compact designed Trenchguard or CoverZIP trench systems
- Optimized heavy festoon systems designed to reduce diagonal cable oscillation
- Combined energy and data transmission with conductor rails and innovative contactless data transmission
- Compact designed and high-capacity slip ring assemblies for energy and data transmission
- Highly reliable motorized cable reels for booms



Slip Ring Assembly for Mobile Harbor Cranes

Horizontal Transportation (Waterside/Landside)

As part of the ever increasing electrification and automation of the marine terminals, a particularly rapid development in transportation technology can be observed. In addition to the optimization of manned trucks and straddle carriers, the possibility of automatically charging AGV batteries is important to terminal operators.

This effort towards modernization of the charging process is complicated by the variety of automated container handling processes at the terminals. The constant refinement of energy and data transmission systems to accompany these technological and technical changes is a matter of course for Conductix-Wampfler.

| Vehicle Type | Conductix-Wampfler Solutions |
|---------------------------------------|---|
| Automated Guided Vehicle (AGV) | <ul style="list-style-type: none"> - Inductive charging stations to provide “opportunity charging” to the AGV - Floor-embedded inductive charging points |
| Straddle Carrier | <ul style="list-style-type: none"> - Conductor rails with Drive-In solution (see Pg. 14 for details) - Inductive charging stations to supply contactless power - Energy guiding chains to supply spreaders with energy and/or data |
| Reach Stacker | <ul style="list-style-type: none"> - Energy guiding chains to supply spreaders with energy and/or data |
| Trucks | <ul style="list-style-type: none"> - Inductive or conductive charging stations to recharge onboard batteries |



AGV with inductive recharging solution



Fully automated AGV with electrical drives



E-Straddle Carrier with Battery Charging Systems



Battery Charging Systems for Reach Stackers



We Move Your Business...

- Installation of high-performance, field-proven battery-charging stations
- Inductive or conductive power supply systems to charge onboard energy storage systems
- Electrification of straddle carriers on the basis of Drive-In L-systems solutions (see Pg. 14 for details)
- Reinforced energy guiding chains for safe and reliable energy and data transmission



Electric Terminal Trucks

Container Stacking Yard

RMG and ASC

The increasing automation of container handling in the yard area requires a continuously high reliability and low maintenance of installed energy and data transmission systems.

The technology of Conductix-Wampfler is fully consistent with these high requirements, even under extreme weather conditions.

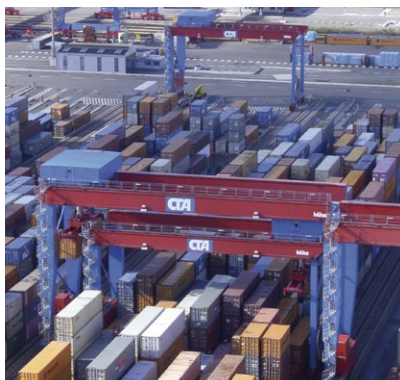
Our technical solutions are being continually developed in close coordination with crane manufacturers and terminal operators.

Modern drive and control systems for motorized cable reels ensure highly dynamic operations, maximum cycles as well as minimal wear during operation of fast-moving/accelerating Rail Mounted Gantry Cranes.

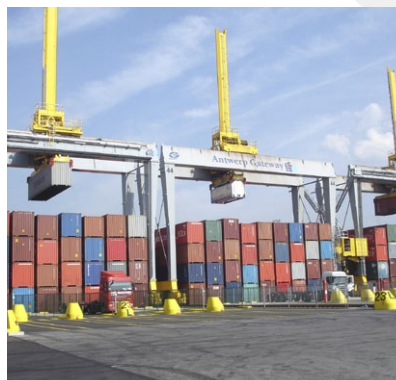
| Crane Type | Conductix-Wampfler Solutions |
|--|--|
| Rail Mounted Gantry Crane (RMG) | <ul style="list-style-type: none"> - Monospiral motorized cable reels for medium-voltage power cables - Medium-voltage power cables with fiber optic cores - Energy guiding chains with or without trolleys - Special cables for energy guiding chains, motorized cable reels, and festoon-systems |



Automated Stacking Cranes – Antwerp Gateway, Belgium



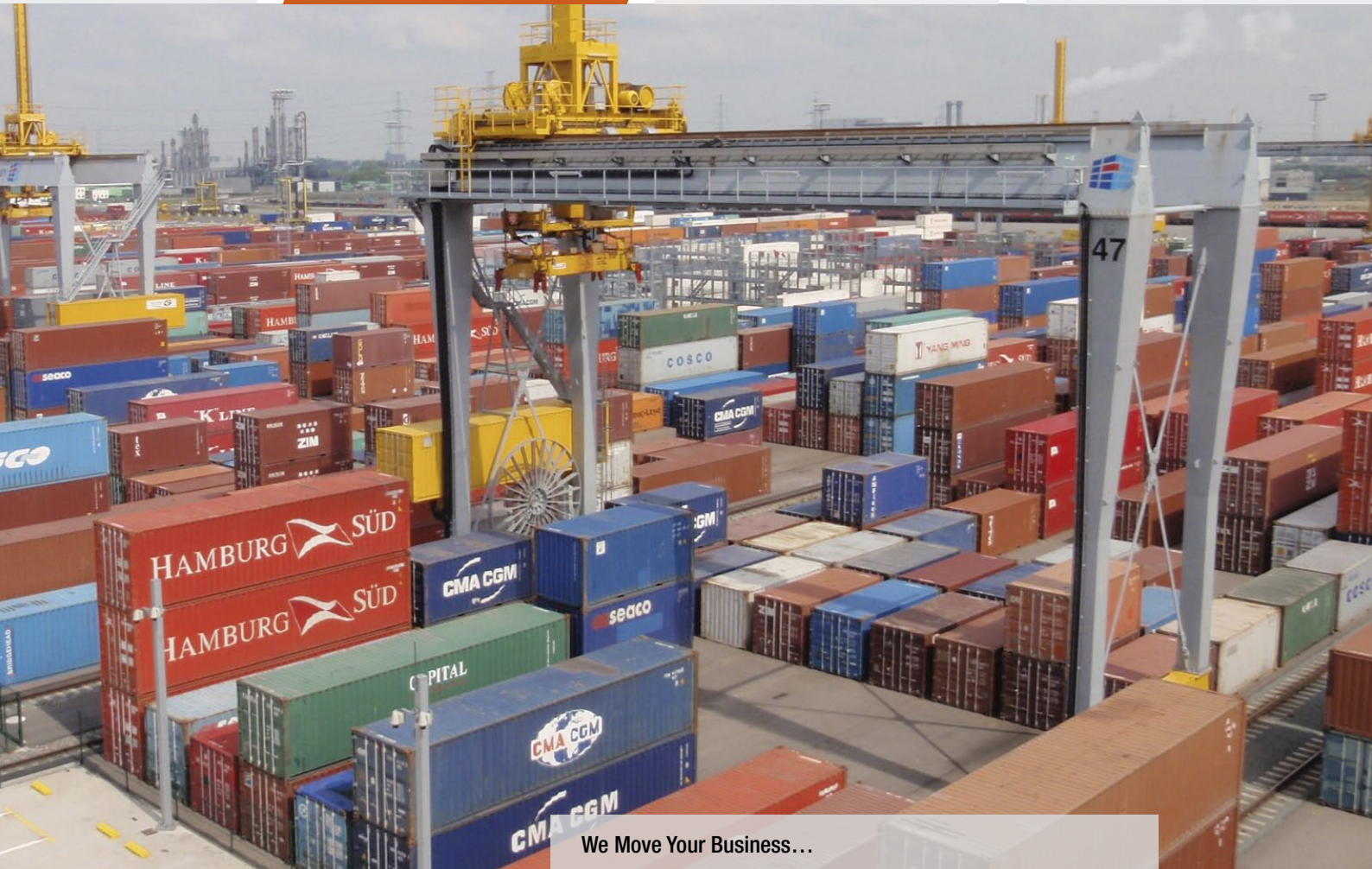
Energy guiding chains for the main trolleys on automated RMGs



Energy guiding chains (horizontal/vertical) for automated RMGs



Medium-voltage cable reel



We Move Your Business...

- High-speed motorized cable reels with dynamic frequency control units
- Sensor-guided pendulum cable guide
- Medium-voltage power cables with overload protection against tensile stress
- Energy guiding chains with guiding channels
- Highly durable and reliable reeling and chain cables for power and data



Energy guiding chain in guiding channel

Container Stacking Yard

RTG and E-RTG

Rubber Tyred Gantry Cranes

Modern rubber-tired gantry cranes (RTGs) are equipped with diesel generators that transform diesel fuel into electrical energy. This energy powers the electric motors that are necessary for the smooth movement and positioning of containers at the port.

to shut down or remove the diesel generator and power the RTG with electric power only.

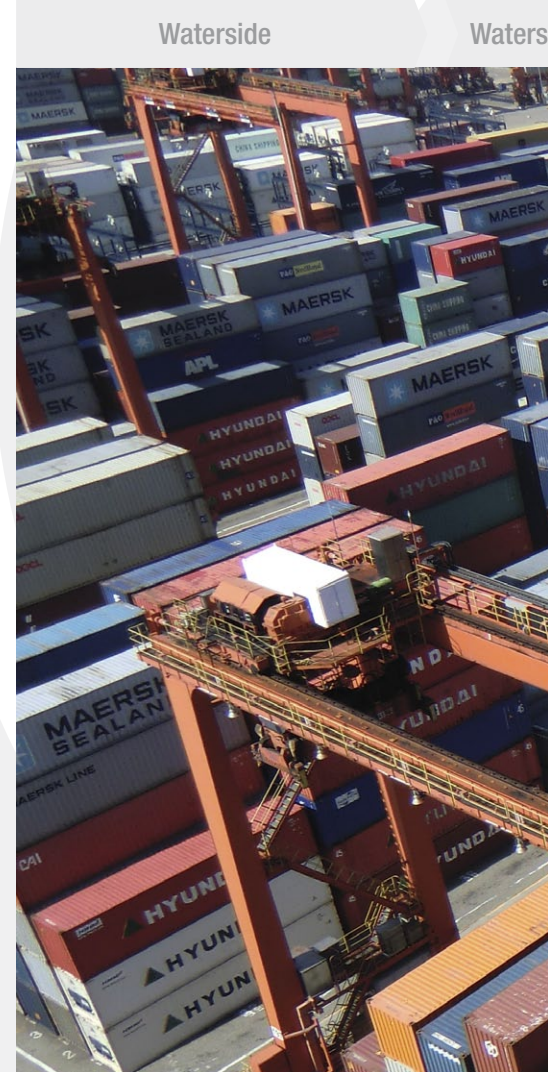
The E-RTG conversion is made possible with one of three different unique electric power systems developed by Conductix-Wampfler:

Electrified Rubber Tyred Gantry Cranes

Converting a conventional RTG into a fully electric RTG (E-RTG) means

- Motorized Cable Reel System
- Conductor Rail “Plug-In” System
- Conductor Rail “Drive-In” System

| Crane Type | Conductix-Wampfler Solutions |
|--|---|
| Rubber Tyred Gantry Crane (RTG) | <ul style="list-style-type: none"> - Energy guiding chains - Standard heavy festoon systems designed to reduce cable sway - Special cables for energy and data transmission used on festoon systems or in energy guiding chains |
| Electrified Rubber Tyred Gantry Crane (E-RTG) | <ul style="list-style-type: none"> - Motorized cable reels for medium-voltage power cables with magnetic couplers or variable frequency drives - Medium-voltage power cables with plug-type connection (Plug-In Version) - Conductor rails with collector trolley (Plug-In Version) - Conductor rails with retractable collector trolley (Drive-In Version): pantograph design or linear Design |



E-RTGs at YICT in China



Standard festoon system for RTG-Main trolley



Standard energy guiding chain for RTG



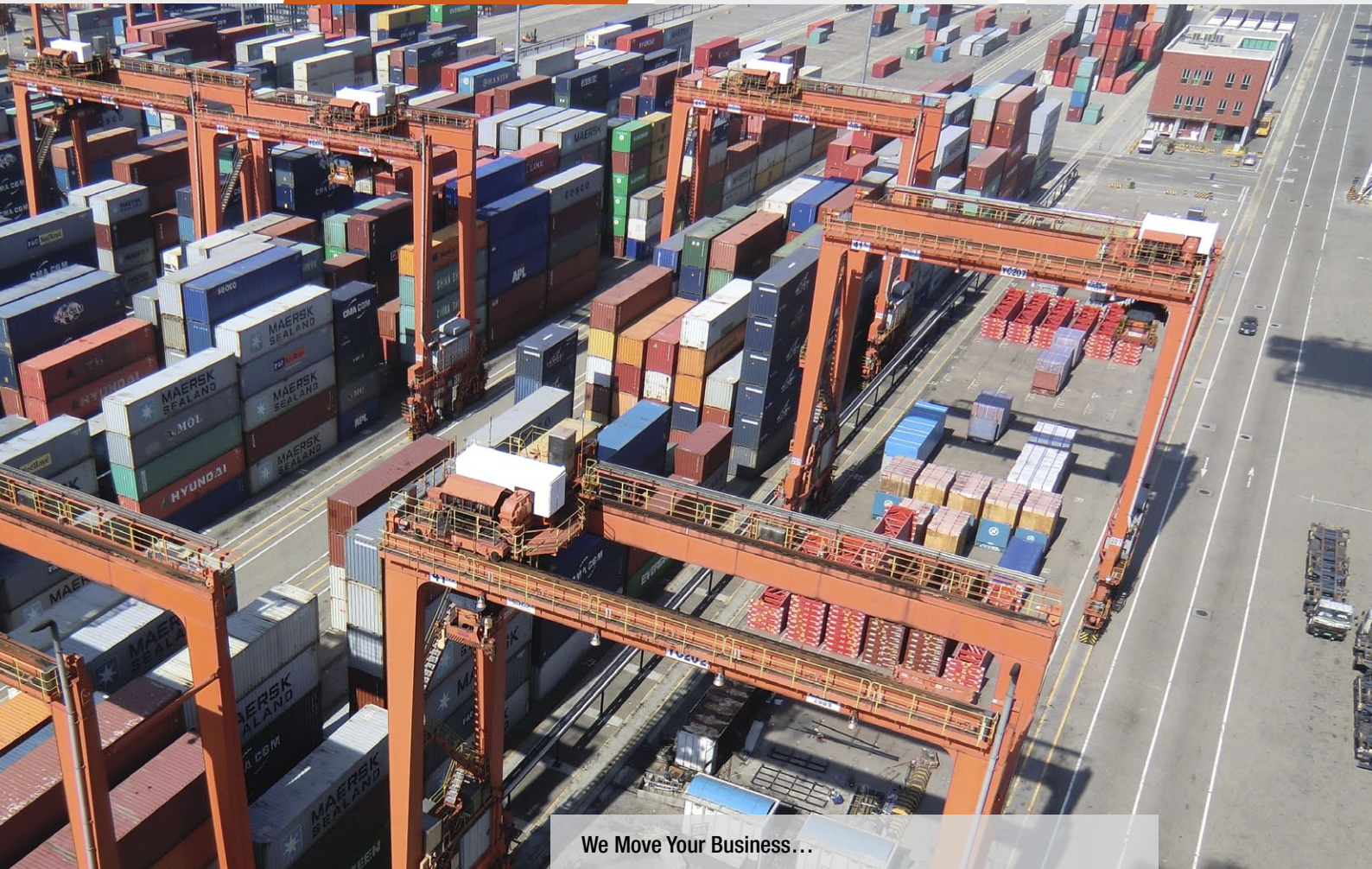
E-RTG (Plug-in-version) with cable reel solution

Side Horizontal Transport

Container Stacking Yard

Landside Horizontal Transport

Intermodal



We Move Your Business...

- Easy to implement E-RTG-solution
- 100% emission-free RTG solution
- High flexibility for terminal logistics
- Possibility for fully automated crane to drive into the blocks
- Drive-In time less than 30 seconds
- Camera and sensor controlled for collision-free movement
- Easy and fast block changes of cranes
- Productivity improvement of yard equipment
- Less down time for crane maintenance
- Customized system to fit different space requirements
- Cost saving of up to 80%



Fully automated E-RTG (Drive-in-version)

Intermodal

Intermodal Container Cranes are similar to RMGs in design and operation. Their main purpose is to place containers on trucks and/or rail cars. Additional booms extend their operating range between road and rail.

Special attention is paid to controlling lateral tilting or swinging movements of

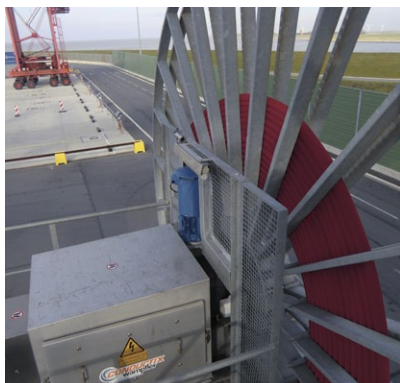
energy and data transmission systems during accelerated crane and crab travel.

Cranes with turning crabs allow for non-directional loading of containers. Special festoon systems ensure the safe transmission of energy and data flow.

| Crane Type | Conductix-Wampfler Solutions |
|--|--|
| Intermodal Container Cranes (RMG) | <ul style="list-style-type: none"> - Motorized cable reels for medium-voltage power cables - Compact designed trench systems for protection of cables - Highly flexible medium-voltage power cables with integrated fiber optic cables - Standard heavy festoon systems - Energy guiding chains - Special cables for Chains, motorized cable reels and festoon systems - Special cables for spreaders |



Intermodal crane at container terminal – Bremerhaven, Germany



Main medium-voltage cable reels



CoverZIP cable protection



Standard festoon system for trolley



We Move Your Business...

- Motorized cable reels for medium-voltage power cables with magnetic coupler or electronic drive technology
- Optimized cable reel control systems for travelling over cable-feeding points
- Electronic cable guiding and monitoring
- CoverZIP/Trenchguard solutions for cable protection
- Heavy festoon systems with reinforced trolleys to reduce cable sway
- Energy Guiding Chains with floating driver units and tensile force control combined with trolleys and channel covers
- Special cables with integrated fiber optic lines
- Special spreader cables for basket operation



Energy guiding chain solution for trolley –
Railway terminal, Weil am Rhein, Germany

Custom Services you can count on!



You can count on us to meet your specific service needs and requirements. With Conductix-Wampfler everything is possible, from initial design and development to long term service contracts.

The more complex your system is, the greater your expectations are in terms of service life and operational reliability, and the more sense it makes to take advantage of our after-sales service.

When it comes to service, you can count on Conductix-Wampfler to perform!

The Turnkey Solution

As a system supplier, Conductix-Wampfler offers you complete turnkey solutions. This includes the delivery of all necessary parts to complete your project.

We consider qualified consulting, project engineering of the complete system, the choice and selection of the right components, optimizing the accessories, the adequate logistic concept, and the commissioning on site to be important elements of Conductix-Wampfler's business activities.

Planning and Development

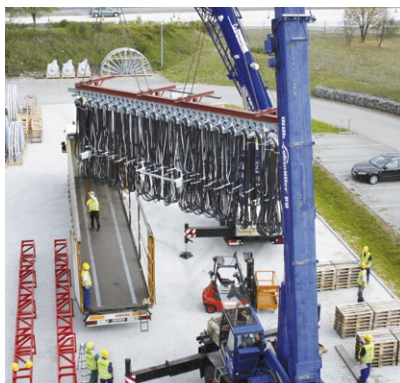
- Definition of the application parameters
- Selection of the proper components for the required system – optimized to your requirements, application parameters, and environmental factors
- Selection of the optimum energy supply solution in cooperation with you, our customer, as a function of all considerations including cost, service life, operating parameters, installation, and site requirements

Final Assembly

- Supervision of construction, assembly, and mounting on site, or
- Complete installation by our trained specialists

Service Agreement

- Regular maintenance and inspections to increase the operational life of your facility, ensuring long-term performance and availability
- All services required on site in the event of an incident, including spare parts and replacement materials
- Conductix-Wampfler service agreements: The "Worry-Free Package"



Pre-assembled festoon system

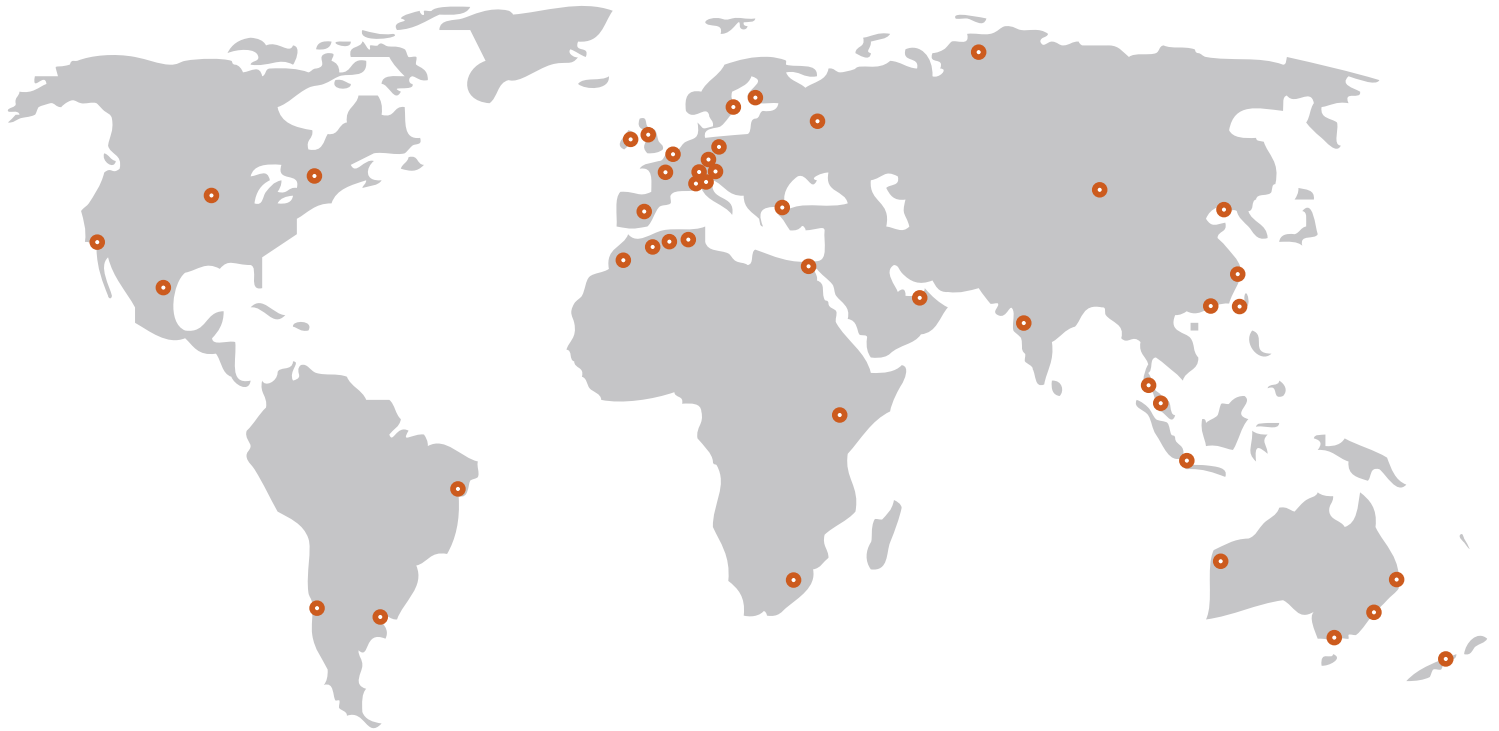


Energy guiding chain assembly on an intermodal crane



State-of-the-art test center at our plant in Weil am Rhein, Germany

... just a call away



For contact details please see our website: www.conductix.com

Ten Good Reasons for Using Conductix-Wampfler Energy & Data Transmission Systems:

At Conductix-Wampfler, we will:

- Supply the latest technical solutions for container crane electrification
- Optimize your system regardless of which configuration you use
- Provide state-of-the-art hardware and software to interact with your crane
- Deliver the best value in our industry with the best systems technology and service
- Provide the best system durability and lowest product life cycle costs
- Meet your most demanding requirements and conditions
- Comply with stringent product quality measures (we are ISO 2001:2008 certified)
- Deliver on short notice and provide fast assembly times
- Offer worldwide, comprehensive pre-sale and after-sale service

And last, but not least:

- Apply our more than 50 years of successful port and container terminal industry expertise and experience to your project!

www.conductix.com

Conductix-Wampfler has just one critical mission: To provide you with energy and data transmission systems that will keep your operations up and running 24/7/365.

To see how we can help you, contact us at www.conductix.com

