

Terminal Automation for Next-Gen Ports

Using data communication to increase efficiency

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

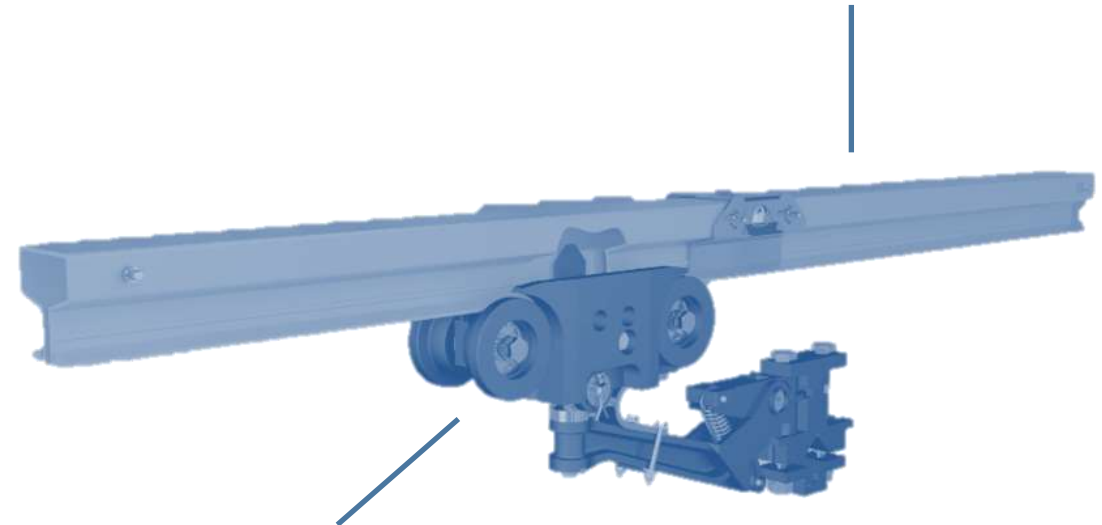
- **Combination** of electrification, positioning and data communication for remote control
- **Autosteering**
- **Power measurement**
- **Energy optimization**
- **Remote maintenance**



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 data communication waveguide
installed at the steel support structure



SMGX antenna
installed at the current collector trolley

Bandwidth

- Scalable 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

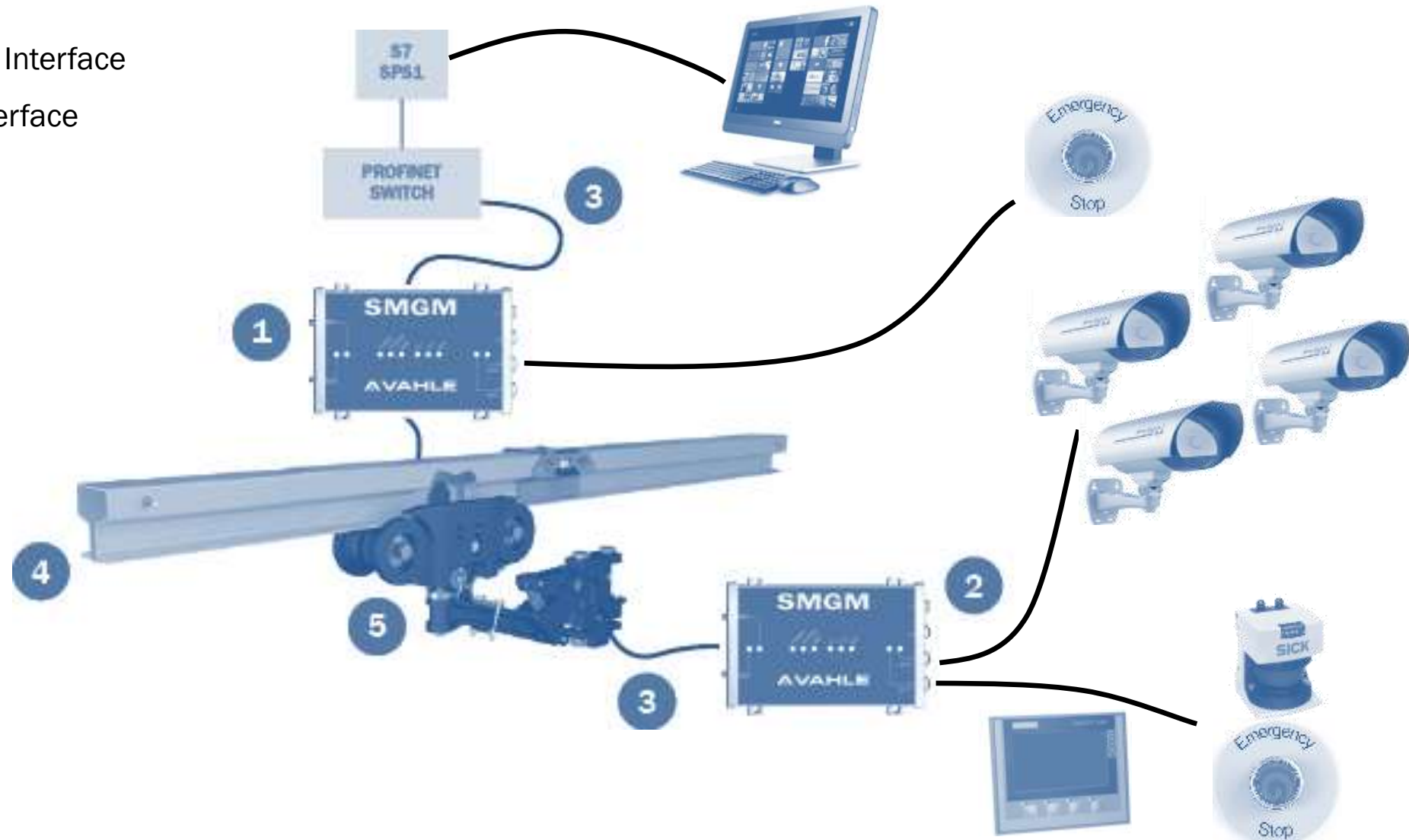
- For remote operation (automation)
- SMGX latency for video data = **< 5 ms**
- Average latency for video camera = **260 ms** (e.g. brand Axis)
- Average latency for SMGX + camera = **265 ms**
- PLC data latency = **3-8 ms** (Cycle time SMG Transceiver)



SMGX Data Communication

Overview

- 1 SMGM Stationary Segment Interface
- 2 SMGM Mobile Segment Interface
- 3 SMGM HF Cable
- 4 SMGX Profile
- 5 SMGX Mobile Coupler



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



Upgrade your Yard Cranes | Increase of flexibility

Retrofitting ready for remote control



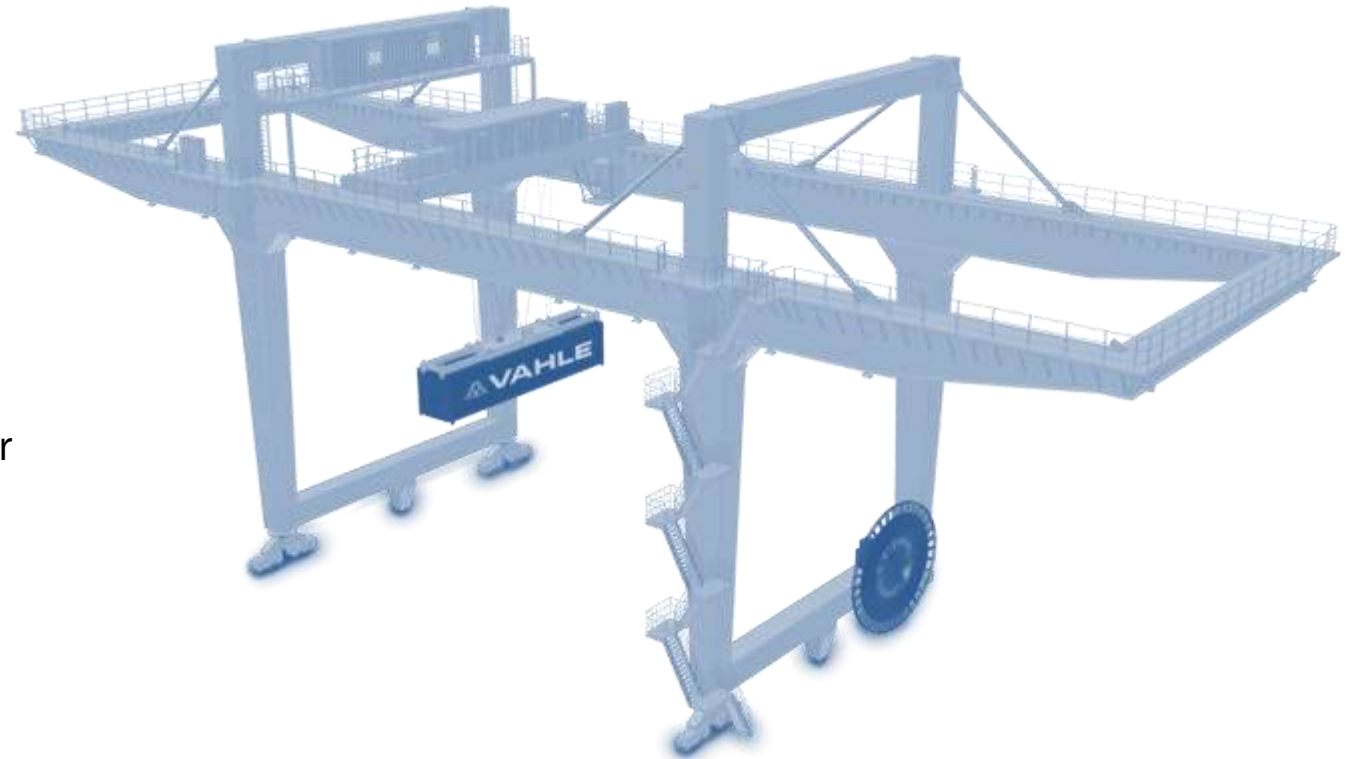
RMG / ASC

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



Upgrade your Yard Cranes | Increase of flexibility

Retrofitting ready for remote control



eRTG

Operators benefits

- Flexible yard operation
- Optimized OPEX by reduced fuel cost and idle time
- Reduction of CO₂ 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





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