



SIMOCRANE

Digitalization and Automated Crane Operation for Enhanced Productivity

Crane technology for all crane tasks

SIMOCRANE Solutions Strategy and Portfolio



Zero Harm

Increased safety and productivity resulting from a higher **safety** level.

Certified, state-of-the-art **cybersecurity** solutions for all levels of automation.



Cost Savings

Integration, standardization, and usability enable reduced hardware costs and shorter commissioning times.

Energy savings and CO₂ footprint reduction through eco-friendly solutions.



Faster Execution & Optimized Logistics

Logistics simulation enables early optimization of performance and material flow control.

Crane simulation shortens design and development time while providing a virtual training environment.



Higher Availability

Digital services help reduce downtime.

Predictive maintenance minimizes the risk of operational downtime.



Performance

Advanced technologies empower the development of innovative business models and automation solutions.

The use of advanced **artificial intelligence** technology enables high-performance pattern recognition systems.

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SIMOCRANE Solutions Zero Harm

Safety

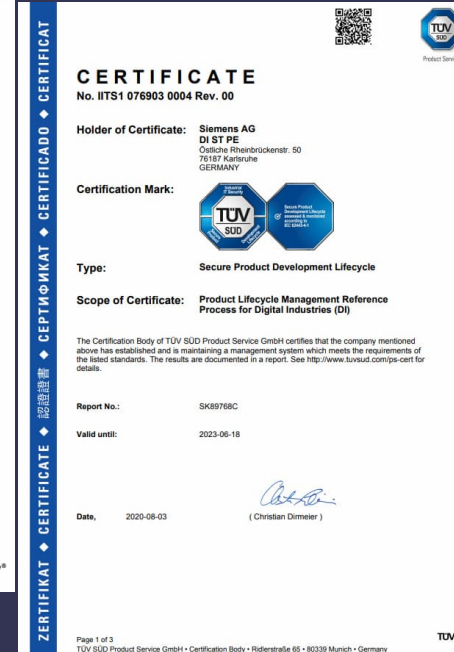
- Increase the safety level of crane applications.
- Boost productivity through enhanced safety measures.
- Sensor systems support precise control, accurate positioning, and collision prevention.



SIMOCRANE Solutions Zero Harm

Cyber Security IEC 62443-2

- Secure solutions
- Patch management
- Incident handling



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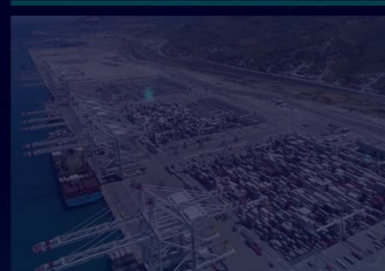
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SIMOCRANE Solutions Cost Savings

Integration & Standardization

- Reduction in hardware costs, such as sensors
- Rapid software engineering
- Short commissioning times



SIMOCRANE Solutions

Cost Savings

Integration & Standardization: Fully Modular Automation Solution for Terminals



Logistics Control



Equipment Logistics System Warehouse Management System



Full Automation



Basic Technology



Hoist



Grab



Trolley



Gantry



Slew



Boom

SIMOCRANE subsystem functions

Sway control



Skew control



Truck positioning



Remote control



Ship profiling



Crane Management



Stack positioning



Stack profiling



Container No. Recognition



Auto landing



Optimum path



Collision prevention

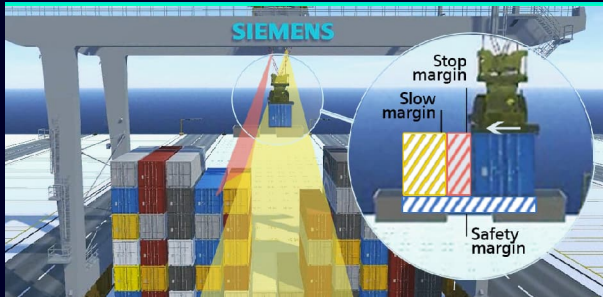


SIMOCRANE Solutions

Cost Savings

Integration & Standardization: Shared Sensor Concept

Load Collision Prevention System



- Collision detection & prevention between spreader and containers on the vessel
- Adjacent object detection: overlapping containers, catwalks, ship cranes, etc.
- Soft landing
- Load position measurement

Final Landing System



- Accurate stacking
- Improve performance and productivity
- Accurate landings
- Cost-saving with Final Landing System (FLS) in remote operations

Truck Positioning System



- Using the traffic light system, truck drivers are accurately guided to the target position
- An intelligent, laser-based measuring system detects the position of containers and transport vehicles for highly precise positioning applications

A unified hardware platform supports multiple subsystems.

SIMOCRANE Solutions

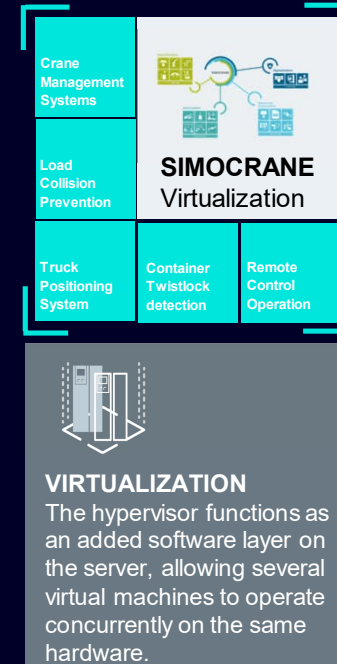
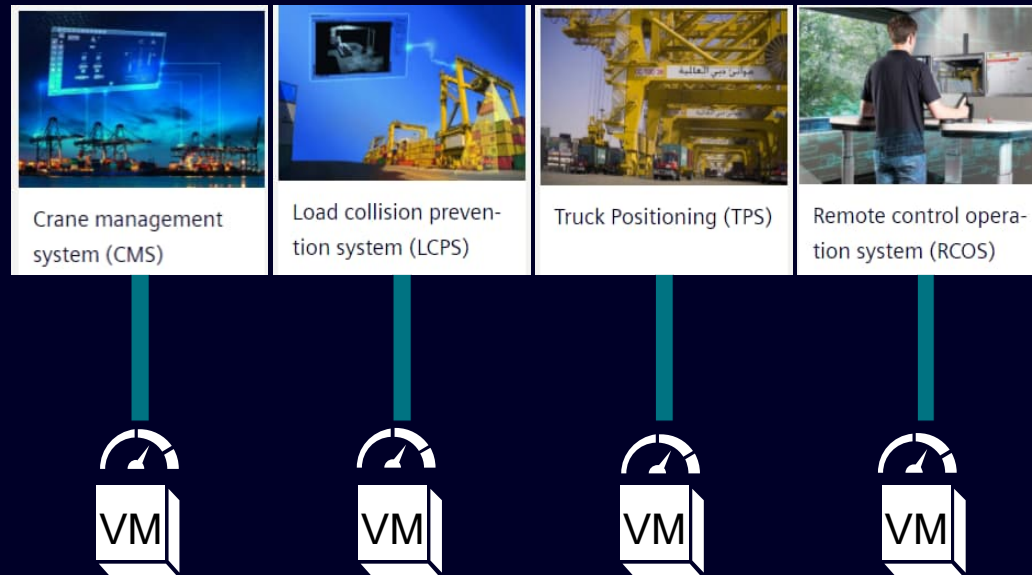
Cost Savings

Integration & Standardization: Virtualization

Virtualization support



- Virtualization support ensures that SIMOCRANE subsystems can operate within a virtual environment.



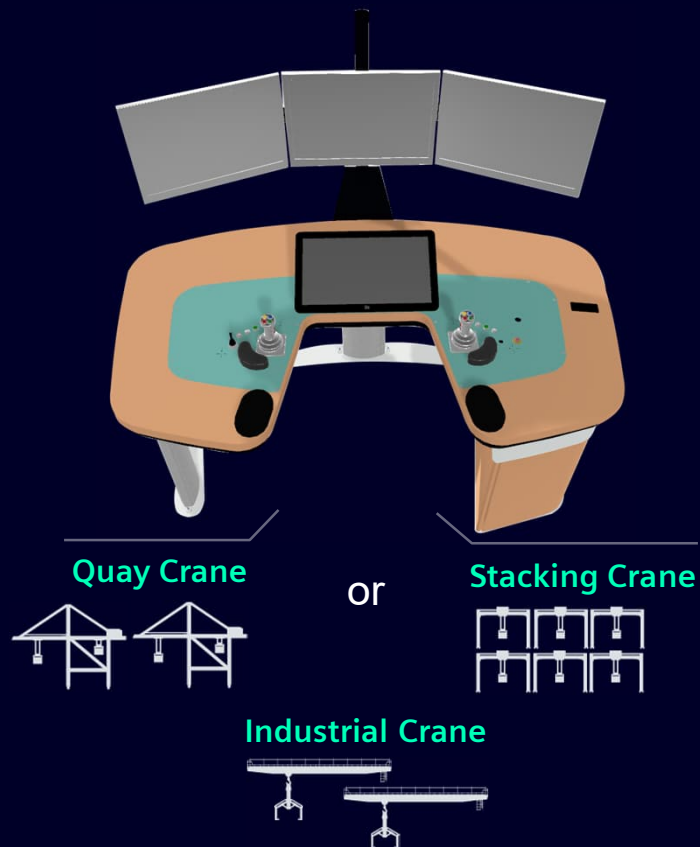
Hypervisor

Virtualization enables the following:

- A reduction in the number of industrial computers required on the crane
- Reduced maintenance effort
- Simplified installation processes

SIMOCRANE Solutions Cost Savings

Remote Crane Operating System (RCOS): Reduced labor costs and improved quality of life for crane operators



"Any to Any" operator connects to any crane from any desk.



"Pooling" connects crane to a free desk when assistance is required

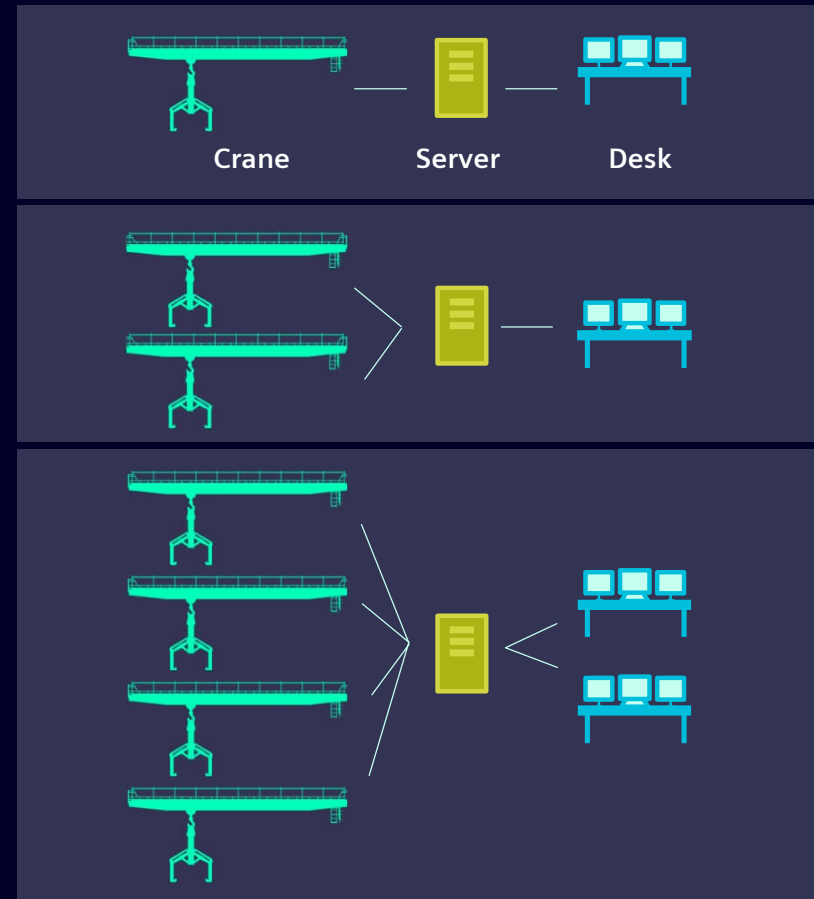


"Decentralized Concept"
Decentralized PLC software

- Redundant Server Pair
- No single point of failure



"Integration & Interfacing" can be applied to non-Siemens PLC's, offers interfacing with Terminal Operating System (TOS)



SIMOCRANE Solutions Cost Savings

Energy Storage System Management (ESSM): Reduced emissions & higher efficiency for mobile harbor cranes & e-RTGs

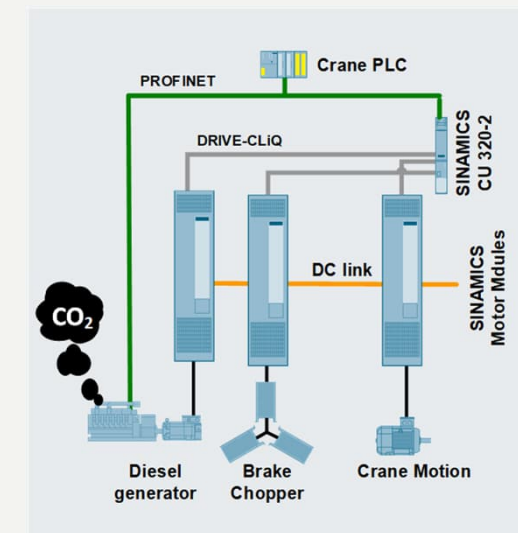
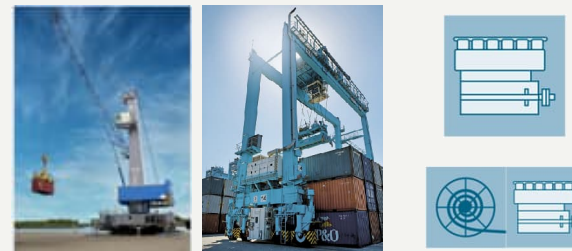
Features

- Active infeed technology (regulated DC-bus, regeneration mode)
- Peak shaving
- Manual charging/discharging
- Local GUI (HMI) with user management
- SINAMICS DCP - compact buck & boost converter with 15kHz pulse frequency direct battery connection
- Up to 480kW nominal infeed power

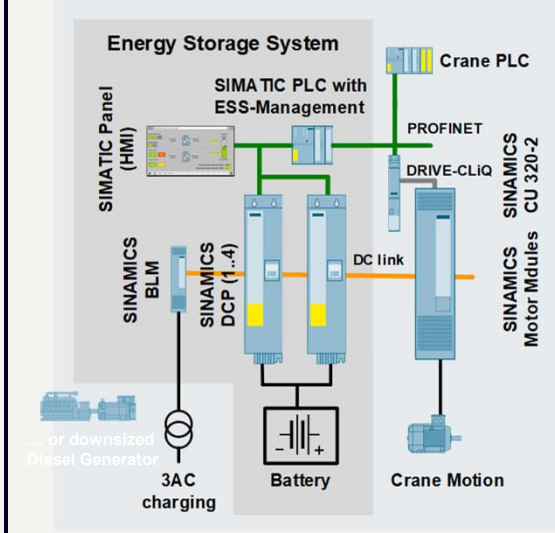
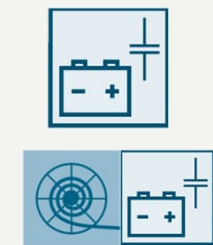
Benefits

- Reduced energy consumption & CO₂-Emissions
- One supplier for the drive system
- Standardized, modular, and scalable solution
- Highest possible battery utilization
- Highly flexible power management

Conventional solution



ESSM based solution



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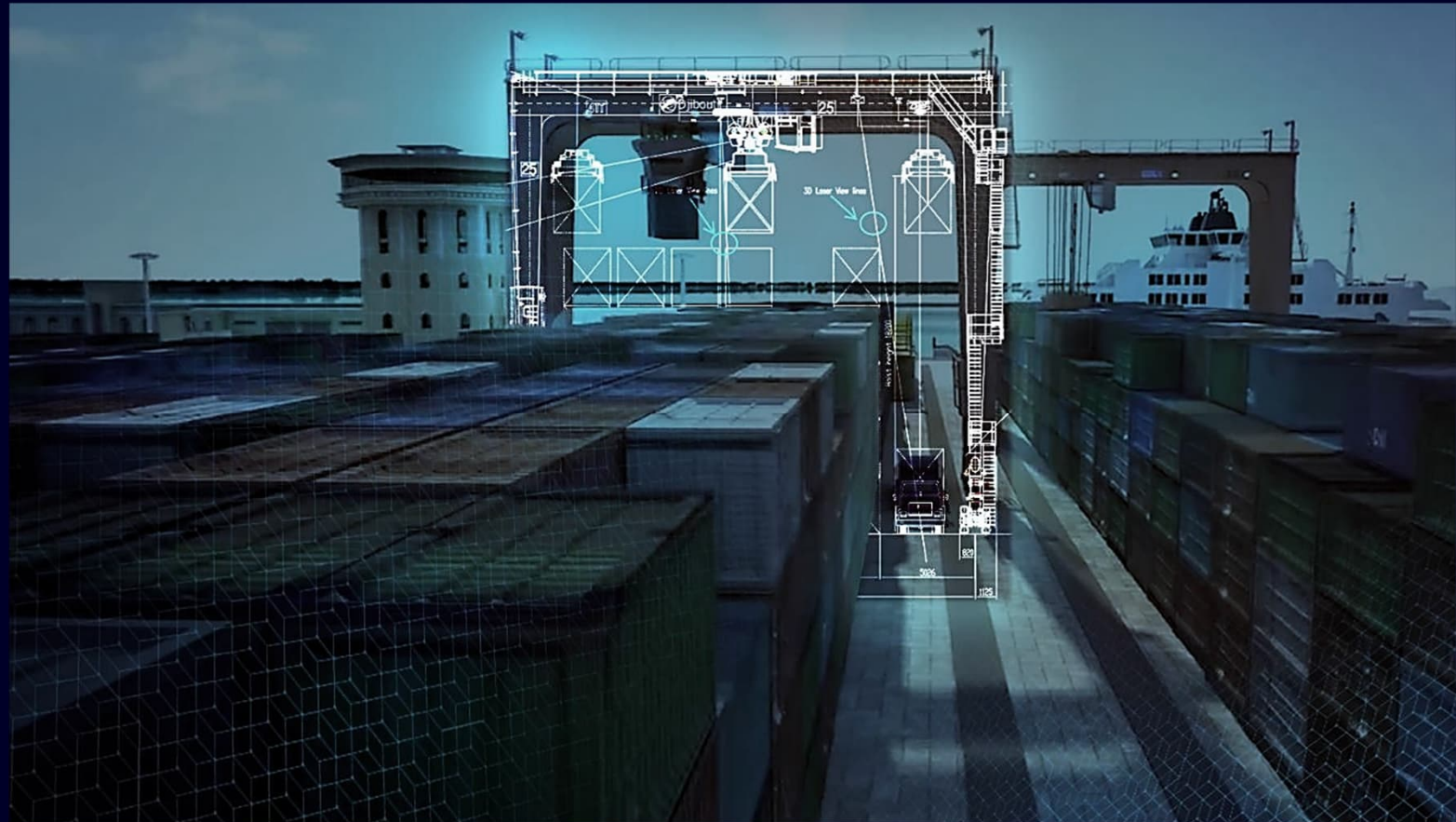
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SIMOCRANE Solutions

Faster Execution & Optimized Logistics

Simulation

- Reduced development and commissioning time
- Virtual testing
- Early performance optimization
- Operator & maintenance personnel training

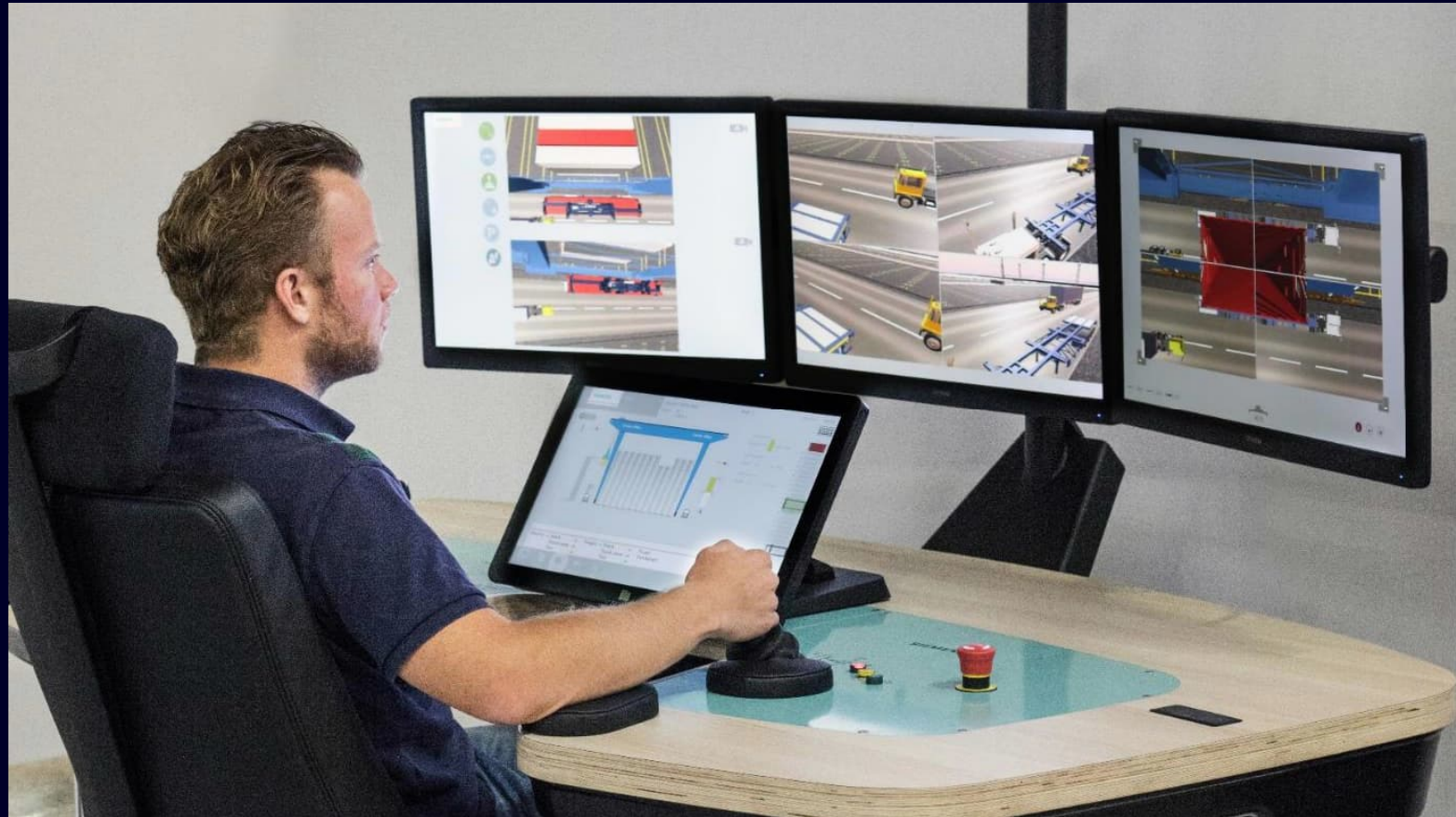


SIMOCRANE Solutions

Faster Execution & Optimized Logistics: Crane Simulation

Training on a Digital Twin

- Ship-to-Shore (STS), Rubber-Tired Gantry (RTG), and Rail-Mounted Gantry (RMG) crane training conducted in a simulated environment prior to plant start-up.
- SIMOCRANE Remote Crane Operating System (RCOS), Simulator (SIM)



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SIMOCRANE Solutions Higher Availability

Digital Services

- Preventive maintenance
- Reduction of downtime
- Optimization of operational efficiency
- Performance improvement through system and equipment simulation



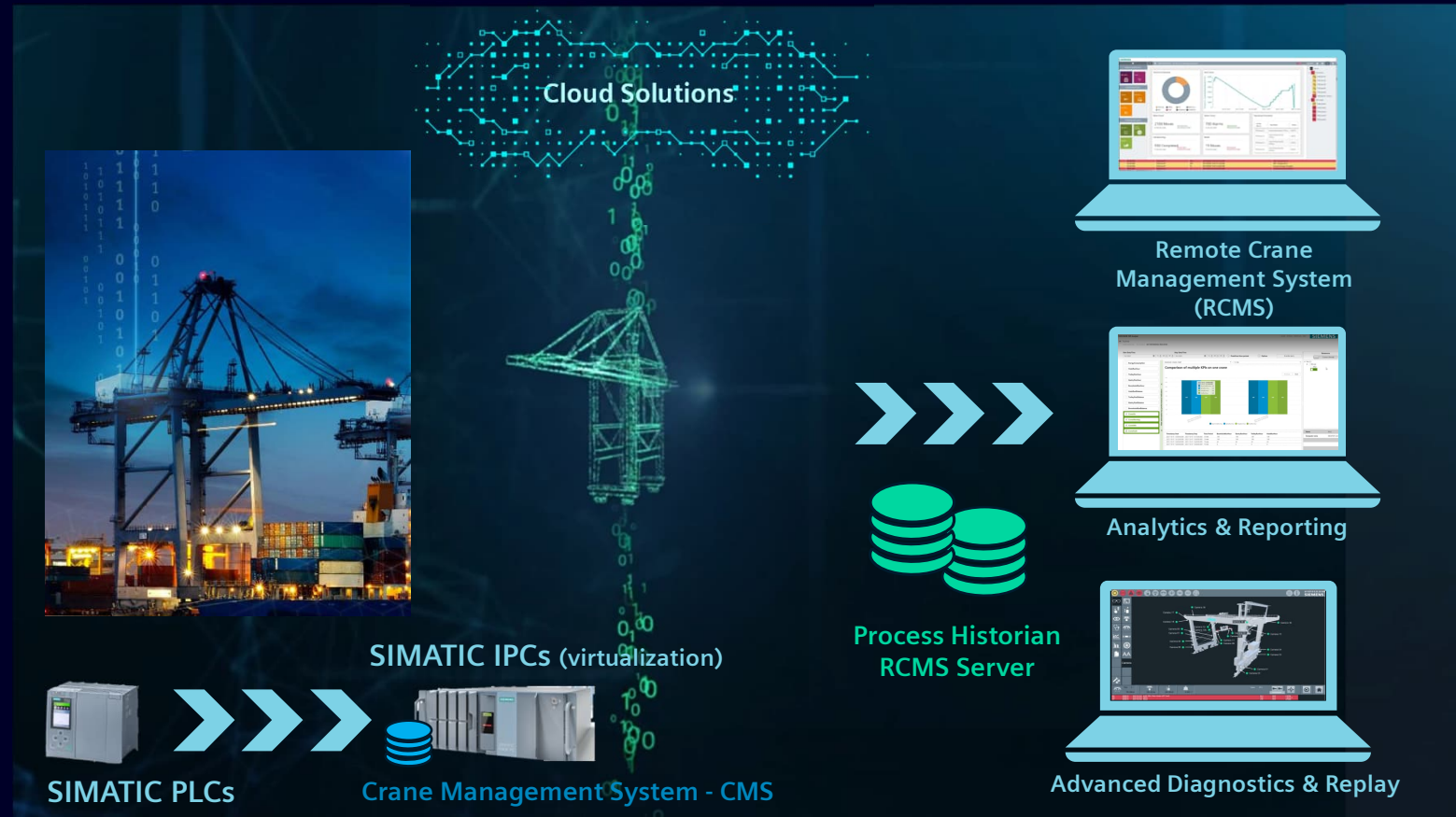
SIMOCRANE Solutions

Higher Availability

Crane Management System (CMS): Remote Monitoring & Diagnosis

Logging & analyzing of subsystem operations

- Centralized logging framework developed for Crane Subsystems
- CMS: Crane diagnostics, preventive maintenance, and crane performance
- Remote CMS: Share information, analytics & reports, and manage crane KPI's



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SIMOCRANE Solutions Performance

Advanced Technologies

- Artificial Intelligence
- New automation applications
- Higher performance
- Faster development cycles



SIMOCRANE Solutions Performance

Vision-based Systems Toolbox

Multi-object Detection

Object Character Recognition

Object Tracking

Segmentation

Video Recording System

GUI

Logging

Monitoring

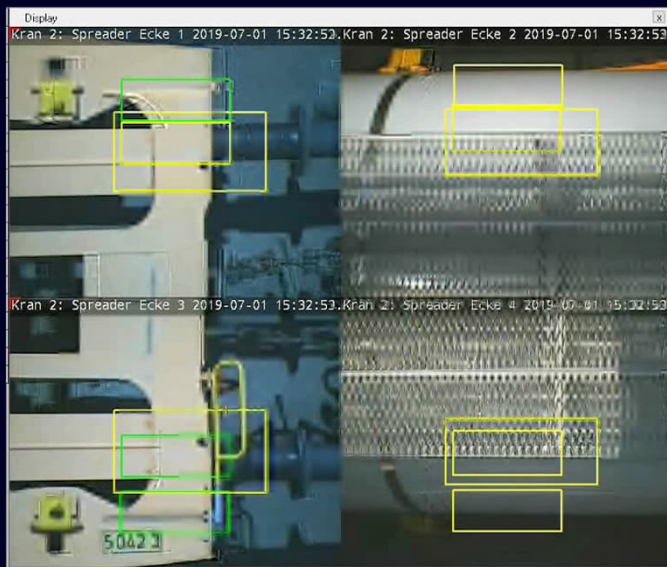
Example: Container Handling assisted by FLS-C

Final Landing System Camera (FLS-C)

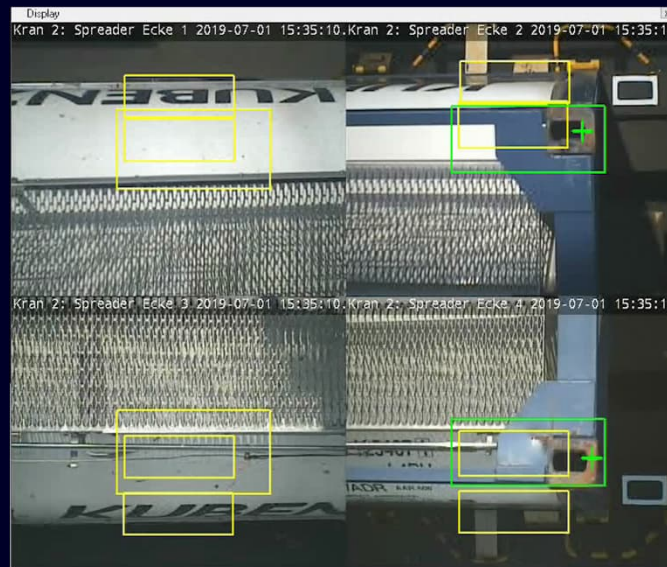
Container Handling with Sensor System

SIMOCRANE Solutions Performance

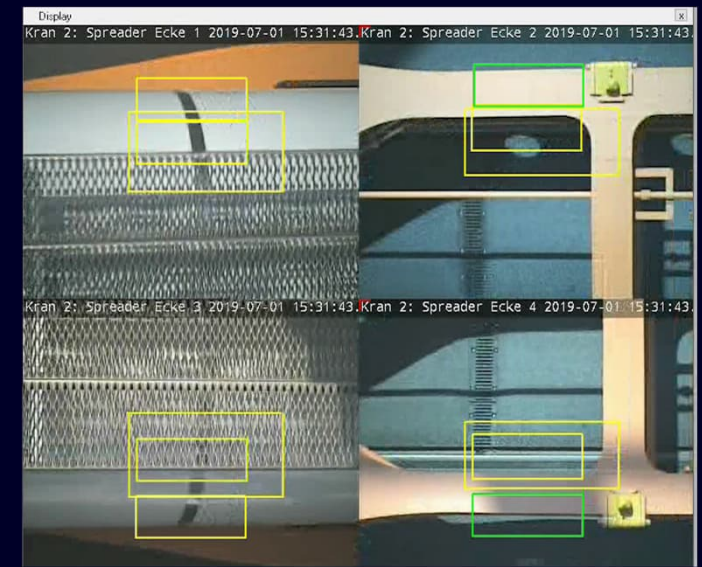
Buffer Detection



Corner Cast Detection



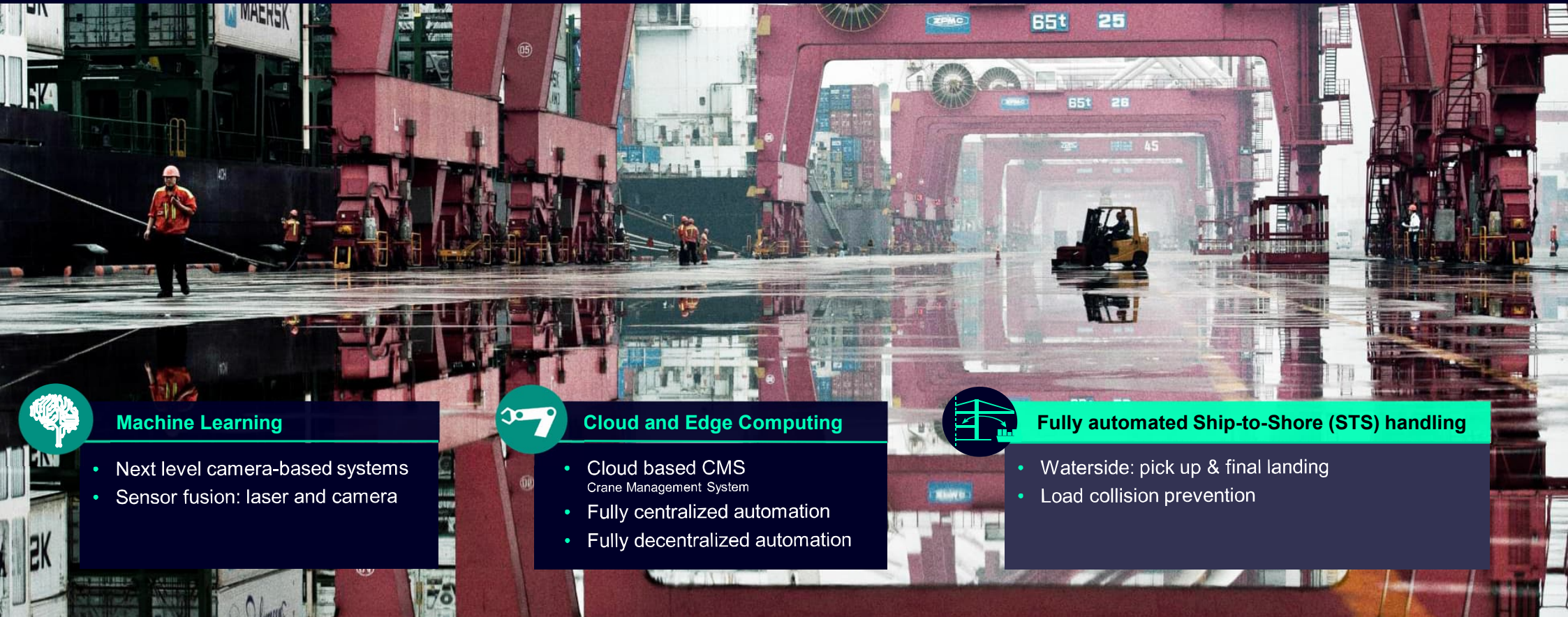
Pin Detection



Artificial intelligence enables smart and robust solutions with shorter time-to-market and reduced costs.

SIMOCRANE Solutions

... next steps



Machine Learning

- Next level camera-based systems
- Sensor fusion: laser and camera



Cloud and Edge Computing

- Cloud based CMS
Crane Management System
- Fully centralized automation
- Fully decentralized automation



Fully automated Ship-to-Shore (STS) handling

- Waterside: pick up & final landing
- Load collision prevention

| Contact

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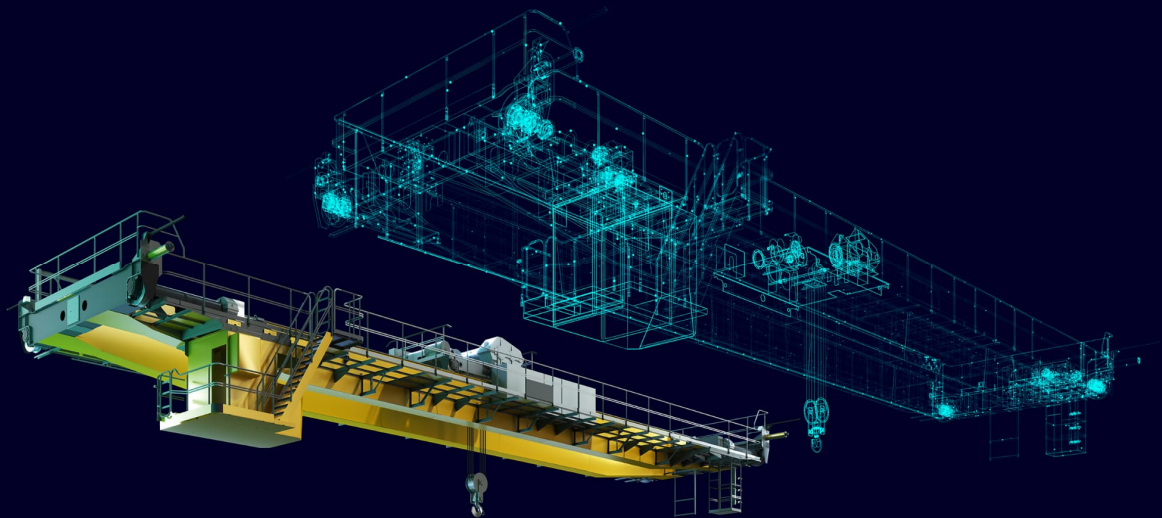
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