

## SUCCESS STORY

# Transforming Port Operations: Stäubli's Quick Charging Connector at Tianjin Port

Tianjin Port, northern China's largest, processed 22.8 million cargo containers in 2023, ranking among the world's top ten busiest ports. Its innovative zero-carbon terminal, featuring Stäubli's Quick Charging Connector Solution (QCC), exemplifies its commitment to sustainability.

As the global economy continues to expand, the logistics and shipping sectors face increasing pressure to enhance efficiency and reduce environmental impact. Ports, being critical nodes in the supply chain, must adapt to these challenges. Automation has emerged as a key strategy for improving operational efficiency, minimizing labor costs, and enhancing safety. Tianjin Port's innovative approach incorporates the use of Autonomous Transport Robots (ARTs), which are designed to handle cargo movement without human intervention.

The ARTs at Tianjin Port must operate under a variety of challenging conditions, including

extreme temperatures, humidity, and dust. These vehicles are expected to function continuously, necessitating a robust and reliable charging infrastructure that can keep pace with their operational demands. This is where Stäubli's QCC becomes a vital component of the port's automated systems.

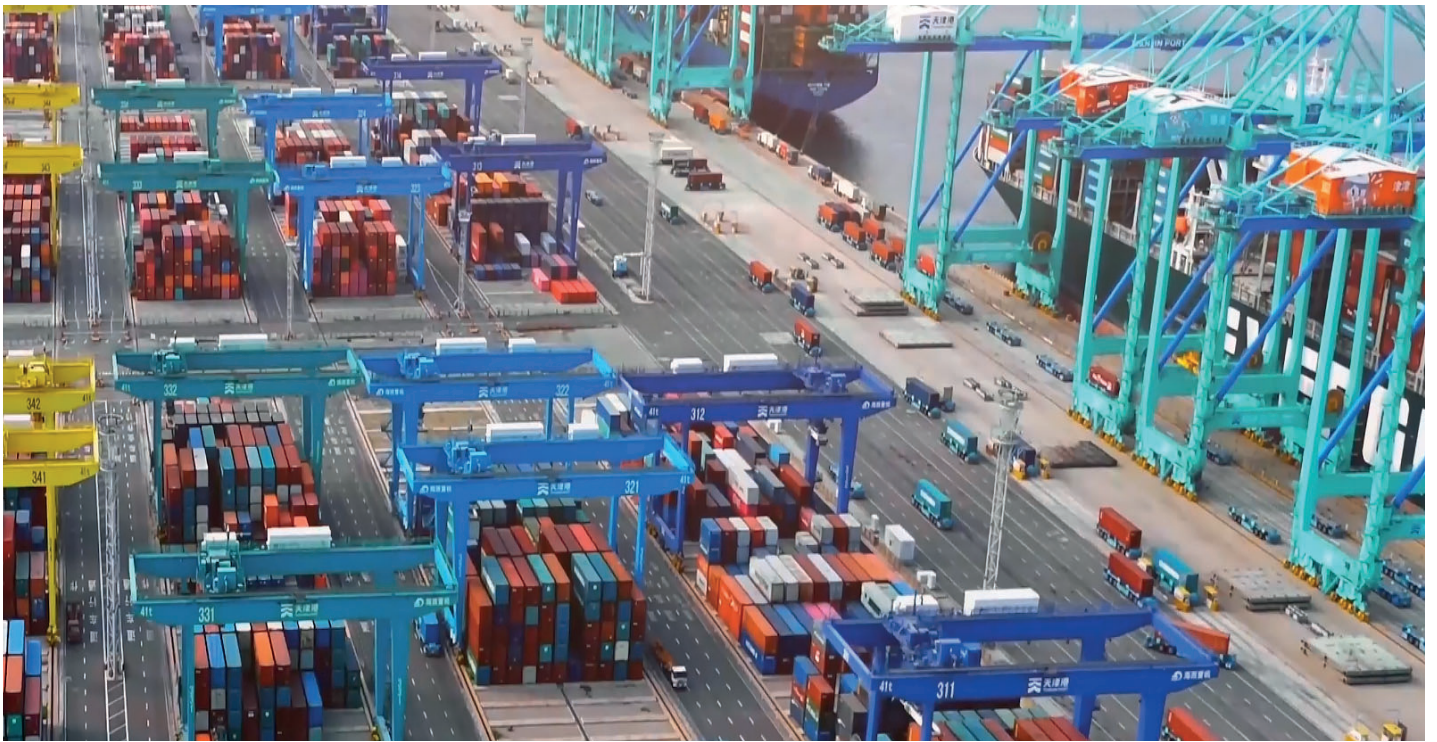
### Engineered for Rigorous Demands of Port Operations

Stäubli's Quick Charging Connector Solution is engineered specifically for the rigorous demands of port operations. The QCC is a fully automated rapid charging system that offers several advantages over traditional charging solutions. It is designed to be

**Application:** high-voltage fast-charging of heavy duty vehicles

- Completely touch-protected and fully automated.
- Waterproof and resistant to harsh environment.
- Designed for high numbers of mating cycle.

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## E-Mobility

compact and easy to install, with a focus on durability and long service life.

One of the standout features of the QCC is its ability to deliver high charging power of 650 kilowatts for a 100 per cent duty cycle, allowing for rapid charging times of under 20 minutes. This capability enables ARTs to operate for approximately five to six hours on a single charge, significantly reducing downtime and increasing productivity. In a busy port environment, this rapid turnaround is critical for maintaining smooth operations.

### **Safety and Reliability Features of the QCC**

Safety is a paramount consideration in any automated environment, and the QCC is designed with this in mind. The system features a touch-proof and waterproof construction, ensuring reliable performance even in harsh operating conditions. This design helps mitigate risks associated with electrical components, particularly in environments where moisture and dust are prevalent.

Additionally, the QCC incorporates advanced tolerance management, allowing it to handle positional and angular misalignments. This feature ensures seamless automated connections and disconnections, eliminating the need for additional positioning sensors or complex adjustment mechanisms. As a result, the QCC simplifies the charging process and enhances the overall safety of automated operations.

Moreover, the QCC is built to maintain optimal contact integrity, enabling it to withstand high mating cycles. This robustness is essential for reducing maintenance needs and associated operational costs. By minimizing the frequency of maintenance interventions, port operators can focus on optimizing other aspects of their operations.

### **Enhancing Operational Efficiency and Sustainability**

The integration of nearly 90 ARTs at Tianjin Port, all powered by Stäubli's QCC, has led

to significant improvements in operational efficiency. The rapid charging capabilities of the QCC not only decrease charging times but also enhance the overall productivity of the terminal. With faster turnaround times, the port can accommodate more vessels and increase its throughput, which is essential for meeting the demands of global trade.

In addition to operational efficiency, the QCC contributes to the port's sustainability objectives. The implementation of ARTs powered by a quick-charging solution aligns with the port's goal of reducing emissions and minimizing its environmental footprint. The QCC enables a transportation model that is not only efficient but also silent and free from emissions, further supporting the vision of a green and sustainable port operation.

The QCC's ability to operate reliably in extreme temperature conditions enhances its applicability in a range of environments. This adaptability is crucial for ports like Tianjin,



which face seasonal weather fluctuations that can impact operational consistency. By ensuring reliable charging regardless of external conditions, the QCC helps maintain continuous operations, contributing to the overall resilience of the port.

### The Broader Impact of Stäubli's QCC

The successful implementation of Stäubli's QCC at Tianjin Port has broader implications for the shipping and logistics industries. As ports around the world seek to modernize and automate their operations, the QCC sets a benchmark for effective charging solutions that prioritize safety, reliability, and efficiency. Its features address the common challenges faced by automated systems in various environments, making it a versatile solution for ports globally.

Furthermore, the QCC exemplifies the potential for technological innovation to drive sustainability in logistics. As environmental regulations become stricter and stakeholders demand greener practices, the integration of advanced charging solutions will be essential for ports aiming to reduce their carbon footprints. Stäubli's QCC not only facilitates this transition but also demonstrates how technology can support operational goals while addressing environmental concerns.

### Advantages of Stäubli's QCC for Port Operators

Stäubli's Quick Charging Connector Solution offers a multitude of benefits for port operators, establishing itself as a leading choice in the industry:

- 1. Proven Reliability:** The QCC has been successfully deployed in some of the largest and busiest ports in the world, demonstrating its capability to perform effectively under demanding conditions.
- 2. Enhanced Safety:** Fully automated features minimize risks associated with manual charging processes, contributing to a safer operational environment.
- 3. Scalable Technology:** The QCC is designed to be scalable, accommodating evolving operational demands and techno-

logical advancements in the port sector.

**4. Tolerance Management:** The ability to handle positional and angular misalignments ensures seamless operation, reducing the likelihood of operational disruptions.

**5. Maintenance Efficiency:** The system's self-cleaning mechanism promotes clean connections, extending the lifespan of the connectors and minimizing maintenance requirements.

By offering these advantages, the QCC positions itself as a forward-thinking solution that meets both current and future operational needs in port environments.

### A New Era in Port Automation

The successful establishment of the world's first smart zero-carbon terminal at Tianjin Port marks a significant advancement in maritime logistics. The Quick Charging Connector Solution powered by Stäubli plays a pivotal role in this achievement, facilitating efficient, safe, and sustainable port operations. As Tianjin Port continues to innovate and set new standards in automation, it serves as a model for ports globally. The implementation of Stäubli's QCC not only enhances operational efficiency but also promotes a transition toward more sustainable practices in modern port management. With such advancements, the shipping industry can look forward to a future characterized by improved logistics, reduced environmental impact, and enhanced operational resilience.



The QCC charging connector and the ART in mated state for charging.

#### Customer benefits

- High level of safety.
- Reliable operation, low-maintenance and a long service life without loss of performance.
- Fast and fully automated high voltage and high current charging process during ongoing for highly efficient processes

#### About Stäubli

Stäubli is a global mechatronics solution provider with three core activities: Connectors, Robotics and Textile. The international Group has a presence in 28 countries.

Stäubli Electrical Connectors is a specialist for advanced contact technology and technically mature solutions with a product portfolio ranging from miniature connectors up to high-power connectors for various industries.

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