



SUCCESS STORY

The world's largest container transshipment hub: quick and reliable connections for AGVs

PSA Singapore is preparing to meet the future growth in global trade by constructing a new port with fully automated terminal operations to revolutionize the future of shipping. Self-driving platforms are automatically charged during the operation process. During maintenance their battery systems are exchanged automatically.

PSA Singapore is ranked the world's largest container transshipment hub. Its excellent network services link shippers to shipping lines with connections to 600 ports globally. In 2019, PSA Singapore terminals handled 85.2 million TEUs of containers (TEU: twenty-foot equivalent units). The new mega port at Tuas will feature totally automated terminal operations and the buildup of a wider supply chain ecosystem to further Singapore's connectivity.

In the preparation for this new automated

mega port, PSA has been testing these processes in their current operations at the Pasir Panjang Terminal. A part of this development is the evaluation of fully battery powered AGVs (automated guided vehicles), which have a carrying capacity of 65 tons and a cruising speed of 25 km/h. With electrical drive, they are more energy efficient, need less maintenance and have a positive effect on reduced CO₂ emissions for port operations.

The business needs and challenge

The project for these new vehicles combines new technology, new suppliers and a new design specified by PSA. The AGVs are supposed to provide as much operation time as possible, therefore the charging of the energy supply needs to be fully automated, reliable and efficient – in terms of both time and costs. Should a battery replacement be required during maintenance, downtime needs to be as short as possible.



Market Segment: E-Mobility



QCC solution for AGV charging during operation

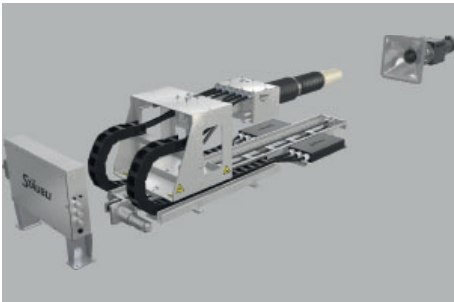
MCS for battery pack connection during maintenance

QCC:

- fully automated and touch-protected
- waterproof and resistant to harsh environment
- designed for high numbers of mating cycles

MCS

- Custom-made and configurable according to customer specifications
- Combination of different energy sources; fluids and electricity
- Take-up of misalignment at connection



The solution

The fastest and reliable way to recharge the battery during operation time is the automated Quick Charging Connection solution (QCC) by Stäubli, which provides a long service lifetime. Designed for high numbers of mating cycles it features a fully enclosed design to protect the contact elements and ensures low maintenance. The high level of safety is guaranteed by a completely touch-protected and waterproof design. This electrical connection supplies power to enable four to five hours of continuous operation of the AGVs with less than 20 minutes charging time.

The latest adaptations on the functionalities have been implemented by the engineering experts of Stäubli in very close cooperation with PSA engineering team. This approach made sure that the integrated angular and positioning misalignment compensation at the QCC charging station suits the automated arrival and departure of the AGVs. To meet the operating outdoor environmental challenges at the port, leak-tightness has been enhanced according to the customer's specifications.

To maintain high availability for the operating AGV fleet, quick battery pack replacement is implemented to allow battery maintenance to be carried out off-board the AGV. Here, the Stäubli quick Multi Connect System (MCS) for battery connection convinced the PSA engineers. The connection and disconnection to the power supply has to be handled quickly, safely and easily without any human intervention. The Stäubli Multi Connect System (MCS) centralizes different energy sources and connects them in one single movement. Therefore, this system is the perfect fit for such automatic and quick operations.

The added-value provided

The Stäubli engineering experts thoroughly supported the implementation on-site and interacted closely with both PSA engineering team and involved technology suppliers to deliver a safe and dependable, high power electrical transmission solution for PSA battery-powered fleet.

Customer benefits

QCC:

- High level of safety and reliability
- 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 operation for higher productivity

MCS:

- Combination and simultaneous connection of all circuits: all-in-one solution
- Optimized efficiency and safety in many processes: no possibility of circuit cross-connection
- Productivity gains and optimized space

About Stäubli

Stäubli is a global mechatronics solution provider with three core activities: Connectors, Robotics and Textile. The international Group has a presence in 29 countries.

As a world market leader in the field of connectors, Stäubli manufactures quick connector systems for all types of fluids, gases and electrical energy for various industries.

www.staubli.com/connectors