_____

NEWS RELEASE
_____

9 January 2018

PSA Singapore showcases advanced port technologies at Intelligent Port of the Future Exhibition

Held at Pasir Panjang Terminal Building 3 from 10-14 January 2018, the PSA 'Intelligent Port of the Future' Exhibition will showcase PSA's future port vision, as well as the transformation of jobs through technology and innovation. Touching on elements of PSA's heritage and progress, the exhibition will feature technologies never before seen at container terminals in Singapore, including amphibious drones, automated quay cranes, exoskeletons for port staff, and robotic arms for related container activities.

Divided into three zones, the exhibition begins with a look back at PSA's early years in adopting technology, and takes visitors through its present-day innovation drive to show the progress being made in the use of automation, data analytics, robotics and other technologies to be implemented in our future port facilities (see Annex A for more information). A showcase of new and updated details of the future Tuas Port will also be available.

Mr Ong Kim Pong, Regional CEO Southeast Asia, PSA International, said, "The Intelligent Port of the Future exhibition presents an opportunity to showcase PSA's commitment to advanced technologies and innovation for port operations at both our current terminals and the future Tuas Port. We also look forward to the opportunities to upskill our people to handle the new systems coming on stream. These are key in ensuring that we continue to serve our customers well into the future as industry consolidation grows."

The week will also play host to other events, including the Launch of the Chartered Engineer Certification Programme for the Port & Marine Sector. The exhibition is open to the public from 10-14 January from 10 am - 5 pm. Admission is free. For other exhibition details, please visit the Facebook page at www.facebook.com/singaporepsa.

<End of Release>

Issued by PSA Corporation Limited

Background

About PSA Corporation Limited (PSA)

PSA Singapore, a fully-owned subsidiary of PSA International, operates the world's largest container transhipment hub in Singapore, linking shippers to an excellent network of major

shipping lines with connections to 600 ports globally. Shippers have access to daily sailings to every major port in the world at this mega hub. Its excellence in port operations has consistently been recognised by the shipping community. In 2017, it was voted the "Best Container Terminal (Asia)" at the Asian Freight, Logistics and Supply Chain Awards. PSA Singapore Terminals handled 30.59 million TEUs of containers in 2016. Visit us at www.singaporepsa.com and www.facebook.com/singaporepsa.

***Note to Editors:** PSA ceased using the name of "Port of Singapore Authority" in 1997 when it became a corporatised entity. The company should be referred to as "PSA Corporation Ltd", "PSA Singapore" or simply "PSA".*

For more information, please contact:

Matthew Webster
Manager
Corporate Communications Department
PSA Corporation Ltd
DID: +65 6279-5116
Mobile: +65 9154-9623
Email: mattheww@globalpsa.com

Annex A – Technology Showcased at PSA Intelligent Port of the Future Exhibition

Robotic Arm for twist lock handling

Currently, lashing specialists fix and remove twist locks during the container loading and discharging processes alongside the quay cranes. Advancements in technology will streamline this process, where automatic platforms or robotic arms could be used instead. PSA is looking to upskill workers performing such tasks, so that such work can be aided by mechanisation, allowing them to assume other higher value-add responsibilities. There is potential for a single trained operator to support multiple robotic arms in case of exception or error handling.

Unmanned Drones

PSA is considering new types of unmanned drones that fly autonomously through software controlled flight plans. The integration of drones and Internet of Things (IoT) technology has created numerous enterprise use cases. Drones can be used to fulfil ship-shore or shore-ship deliveries. Working with on-ground IoT sensor networks, drone surveillance can also help with terminal security, providing an easier, faster and cheaper method of data collection.

Inspections are a major application for drones. These can range from a basic port equipment structural inspection requiring images of a crane structural joint, to the complex inspection of an energy installation in the port infrastructure. Drones help to minimise disruption to operations as engineers can perform inspections at a safer distance, eliminating the need to work at height or enter operational areas. PSA is also looking towards the development of amphibious drones that can operate over and land on water to inspect wharf side fenders.

Future Command Centre

A one-stop command platform for co-ordination of automated port equipment, including Automated Rail-Mounted Gantry Cranes (ARMGs), Automated Guided Vehicles (AGVs) and Automated Quay Cranes (AQCs). A mock-up of how this future command centre may look in the future will be showcased at the exhibition.

Exo-skeleton

Powered exo-skeletons are wearable mobile machines driven by a system of motors and linkages allowing for limb movement with increased strength and endurance. Port specialists using exoskeletons would be able to perform strenuous and physically-demanding motions without fatigue. This would allow for increased productivity and reduced physical strain.

Data Analytics and Simulation

PSA plans to leverage data analytics in the future port in areas such as equipment specialist performance, crane maintenance and simulation models which allow PSA to simulate container port operations.

To enhance equipment specialists' performance, data analytics would work in tandem with machine learning to analyse work performance. It could be used to pinpoint specific areas of improvements for individual specialists with greater accuracy, via the recording of information through sensors mounted on port equipment.

Crane maintenance is a good example of the application of data analytics. Quay cranes used to load and unload ships undergo regular preventive maintenance to ensure they operate smoothly. Data analytics enables a more effective and just-in-time approach through predictive maintenance. Sensors on each crane provide vast data streams which are analysed, and along with machine learning algorithms, can better predict failure times for each crane. This results in more lead time to arrange for replacement parts, roster the service crew and identify operational lulls, optimising the use of cranes in the intervals between maintenance.

Simulation too will play a key part in the port of the future, with computer software utilised to imitate the behaviours and interaction of real-world actors – equipment, people and systems – in a virtual environment. Planners can predict outcomes before implementation. Beyond this, container terminal emulation models will allow PSA to predict, evaluate, and refine in high fidelity the behaviours of our future fully-automated terminals.

Smart Glasses

Using Augmented Reality (AR), smart glasses will provide port equipment specialists with live visual aids and off-site assistance. The AR technology facilitates the visualization of an equipment's components and the tracing of its defects. These will ease the troubleshooting process and reduce the downtime of faulty equipment. The ability to see visual indications and communicate with subject matter experts in a mixed reality space will also allow proper guidance and create an effective learning experience at every repair.