

MOVING PEOPLE, ENHANCING LIVES

SMRT is a multi-modal public transport operator in Singapore, providing a broad portfolio of services. Head of Signal & Communication Leow Wee Lee and Lieu Shi Yang, Senior Engineer, Applied Rail Technologies - Digital Systems outlined two exciting new projects that promote sustainability. Report by Phil Nicholls.

Alongside managing and operating multiple train lines around Singapore, SMRT also delivers multi-modal mobility services such as light rail transit, buses, taxis and private hire vehicles. The company is working hard to address the challenges of urban transport in Singapore and around the world.

"SMRT has a culture of always improving through Kaizen to Do Right, Do Good, and Do Well," said Mr Lieu.

As part of this process and a Kaizen mindset of continuous improvement, SMRT is leveraging technology and collaborating with partners to develop two innovative projects to enhance operations, maintenance and sustainability.

Do Right: Digital track access

The first project is the Track Access Management System (TAMS) deployed in SMRT Trains. TAMS is an integrated end-

to-end solution designed to digitalise and automate track access allocation for the planning and execution of engineering works.

"TAMS provides real-time visibility of track allocation and track access status," explained Mr Lieu. "This allows better utilisation of the very limited engineering window of only three hours. The efficient use of this window is critical for maintenance and project works, ensuring the safety and reliability of our rail service."

Improvements in efficiency delivered by TAMS directly reduce wastage during

maintenance works. The digitalised work process reduces the annual paper consumption by more than 375,000 sheets of paper (equivalent to 40 trees).

SMRT's TAMS system uses Artificial Intelligence (AI) to enhance the safety of track access. "The AI capability enhances track access efficiency in a safe and effective manner," continued Mr Lieu. "It does this through the safety interlocking of processes; checking that all parameters are deconflicted before authorising the track access.

"This contributed directly to our operational effectiveness and efficiencies. Through TAMS, SMRT has achieved a 30 per cent increase in the effective maintenance

window, from three to four hours every night. In addition, the end-to-end real time visibility of track access allows last-minute cancellation of allocated track access to be reassigned to other works, increasing our maintenance window utilisation."

Do Good: Developing Green CBTC

The second project explores the development and implementation of Green Communications-Based Train Control (CBTC) algorithms on the MRT lines, to reduce traction energy usage. SMRT is working with the signalling system providers, namely Thales and Alstom, for these efforts.



"For SMRT's North-South and East-West Lines (NSEWL) that run on Thales' Seltrac system, we are in the initial phase of data mining to understand the trains' power consumption," Head of Signal & Communication Leow Wee Lee said. "This is an important step for the team to validate the potential energy savings from the new Next Generation Green CBTC algorithm."

"The objective of this project is to enable an energy-optimised trains operation that does not affect headway significantly. We are confident that further optimisation of energy usage can be achieved through improving train movement profiles and tweaking some of our operational procedures. Commuters on our services would not feel any degradation in service."

Today, around 60% of NSEWL's total energy usage goes towards powering and moving the trains. SMRT and Thales plan to reduce the traction energy used to move trains on the NSEWL by 15%. SMRT is also working with Alstom to pursue similar efforts to reduce traction energy usage on Circle Line, which runs on Alstom's Urbalis 300 signalling system. These energy savings will translate to reductions in SMRT's greenhouse gas emissions.

Working with partners like Thales and Alstom, demonstrates SMRT's collaborative philosophy: "Railway systems typically have an asset lifespan ranging between 15 to 30 years," explained Mr Leow. "Having a good relationship with suppliers and OEMs is paramount to delivering a safe, reliable and sustainable railway service."

"One of our strategies to build these long-term relationships is through long-term service contracts with our partners. ▽

We also invite suppliers and OEMs to co-locate their teams and facilities in our depots. This enables better sharing of knowledge and cuts logistics waste, which reduces our Scope 3 greenhouse gas emissions."

Do Well: Future challenges

As Singapore's dominant rail operator, SMRT provides the greenest and most sustainable mode of commute today, and is committed to halving its 2010 greenhouse gas emissions by 2030. In the longer term, SMRT aims to achieve net zero by 2050.

"In addition to TAMS, SMRT Trains has embarked on other initiatives under the iTrains Digital Transformation roadmap, to fulfil our sustainability commitments," said Mr Lieu. "I'm very privileged to be involved in iTrains, and lead exciting projects such as the Green Station, where we leverage AI to better anticipate station cooling needs and reduce energy usage of our stations'

air-conditioning systems. These meaningful projects enable SMRT to move closer towards our net zero ambition and create sustainable futures for our communities."

"Besides reducing energy usage, we actively explore ways to pivot towards renewable energy usage," said Mr Leow. "In Singapore's public transport industry, we are pioneers in deploying solar photovoltaic systems. We installed our first solar photovoltaic system at Bishan Depot in 2016, with a 1MWp energy generation capacity. Since then, we have expanded the solar photovoltaic systems to Tuas West Depot, Mandai Depot and several Thomson-East Coast Line stations. Today, our total solar generation capacity is 4.8 MWp – generating about 5,760 MWh

of energy per year, equivalent to powering close to 1,270 households."

As well as providing sustainable train services, SMRT is also greening other aspects of its operations. Before the recent merger of SMRT's taxi business with Premier Taxis, SMRT had been operating a 100% hybrid-electric taxi fleet since 2020 and launched the first batch of MG5 electric taxis in August 2021. SMRT also aims to replace all internal combustion engine road vehicles with electric ones by 2030.

"Every day is a new challenge to work with the team to deliver a safe and reliable ride for two million commuters every day," concluded Mr Leow. "This is what excites me to go to work every day." ■