

# Transforming transport

Nicholas Daly from Yarra Trams shares how the largest tram network in the world is tracking towards using platforms made from recycled polymers.



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Melbourne's tram stop platforms could soon be made from recycled plastic materials, potentially making them more sustainable, more accessible for people with disabilities, and easier to maintain.

Yarra Trams has partnered with the Monash Institute of Railway Technology (Monash IRT), and various industry groups (Pact Group, GT Recycling, DKSH Australia and Integrated Recycling) to research, design and develop recycled plastic modular components that may be used to progressively replace tram stop platforms across Melbourne.

The project was funded under the Circular Economy Research & Development Fund, delivered by Sustainability Victoria under the Victorian Government's circular economy policy, *Recycling Victoria: a new economy*.

Nicholas Daly, Head of Innovation and Passenger Experience at Yarra Trams, spoke about the initiative at the recent Rail Decarbonisation and Resilience conference in Sydney, organised by Informa Connect Australia.

## A UNIQUE NETWORK

Not only is Melbourne's tram network the largest in the world, it also shares more space with vehicles than any other tram network.

The network is not just city-based, but spreads deep into the suburbs, and carries just 15 per cent fewer passenger than the city's heavy rail lines – with about half a million people hopping on a tram on an average weekday.

"All of these factors make our tram network unique, but they also bring challenges," Daly said.

"Melbourne is growing – it's going to become Australia's fastest-growing capital city, and public transport is going to have to do more and more heavy lifting."

In December 2024, Yarra Trams began MR5 (Melbourne Rail 5), its latest franchise period. Before this, in MR4, the operator collaborated with the State of Victoria to deliver a set of best practice design guidelines for tram stops.

This included undertaking a review of its

own practices, as well as 17 other sets of guidelines from around the world.

"The outcome of this research delivered us a set of guidelines that had both an engineering and a passenger experience focus, and in that we had some really granular points that we needed to deliver on regarding weight tolerances, materials, distance and safety," Daly said.

"This also led to the passenger outcomes that we wanted to see from each stop, which focused on the above-platform design, which was led quite closely by the Department for Transport.

"This allowed us to focus on what innovations we could look at below the platform."

## ACCESSIBLE STOPS FOR EVERYONE

One of Yarra Trams' goals is to deliver level access tram stops, promoting accessibility, reducing delays and reducing the risk of trips, falls and wheel entrapment.

"For wheelchair users, mobility aid users, people with prams or walking difficulties,

boarding and alighting without assistance promotes dignity and autonomy," said Daly.

"Uniform access across the network also helps passengers with visual impairments, neurodivergence and cognitive disabilities, as well as children and older passengers.

"But it's actually easier for all passengers – when you start thinking about passengers with luggage, bicycles, or even just a latte and a laptop in each hand, level access stops are going to make sure you can board a tram without difficulty and reduce congestion at the doors."

Currently, only 475 of Yarra Trams' 1665 stop platforms meet level access requirements.

Daly said that as there are numerous stops that "should be condensed" as part of a modern network, that means the operator has a goal of delivering 834 accessible stops, or 417 pairs.

"We did have a commitment to make all of our stops level access by 2022, and for those of you who have been paying attention, it's now 2025 and we have missed that target," he said.

"We know that a significant portion of the population with accessibility concerns are unable to access a very large part of our network.

"We need a solution that's easy to install, cost-effective, and stands up to the harsh, open tram network that is Melbourne."

## MOVING AWAY FROM CONCRETE

Daly said one of the key barriers to upgrading all of Yarra Trams' stops is the high cost and time involved when working with traditional materials such as concrete.

As sustainability is also a key driver for the operator, they have turned to recycled materials as a potential solution.

"Without intervention, the transport sector is projected to become Australia's largest source of emissions," Daly said.

"Trams generate significantly less carbon dioxide than cars and require a much smaller road allocation per passenger.

"So we know that trams have an important role to play in reducing

emissions and achieving our legislative target of net zero greenhouse gas emissions by 2050."

Daly said cement manufacturing accounts for about eight per cent of global carbon dioxide emissions, and every cubic metre of concrete for a tram stop nets hundreds of kilos of carbon dioxide before it's even poured.

"Some traditional concrete platforms also act as runoff generators, with stormwater being channelled into drains rather than soaking into the ground, increasing our load on urban drainage systems and carrying oils and microplastics into our waterways.

"We're also looking at the concrete being a large expanse of light absorption, raising our local surface temperatures."

## AN INNOVATIVE SOLUTION

Working in partnership with industry, Yarra Trams and the Monash Institute of Railway Technology co-designed, developed and validated modular next-generation tram stops under control proof-of-concept conditions.

Back in 2021, the project received \$300,000 from Sustainability Victoria's Circular Economy Research & Development Fund. The team has spent the past four years undertaking rigorous research and development including desktop study, structural design, material development and prototyping.

They focused on four innovation pillars throughout the development phase – pre-fabrication (designing complete sub-assemblies off-site), alternate materials (evaluating advanced composites with a recycled focus), modularity (creating standardised plug-and-play modules), and reducing hydrological impacts (looking at incorporating permeable surfacing and integrated stormwater channels).

The team used sustainable fibers, such as basalt and timber, to improve the mechanical properties of recycled polymers. They found that incorporating just a small amount of these fibres increased strength by 60 per cent and doubled the stiffness when

compared to the raw material. The use of a recycled glass coating for the tram stop platform is still being explored, to improve surface characteristics.

Yarra Trams has a secondary goal of being able to use the next-generation stops in temporary scenarios.

"That comes back to some of our large events like the Formula One or the St Kilda Festival, where we have high patronages required in areas that are outside of our typical stock requirements, for a short period of time," Daly explained.

Yarra Trams and Monash IRT began by focusing on trafficable, easy-access stops, because they endure the highest dynamic loads from vehicles and have the most complex pedestrian/vehicle interfaces.

"Success on this type of stop design de-risked our rollout across simpler platform types, so the folks at Monash applied some new thinking to stock designs, and we landed on some key features," said Daly.

"We leaned on the benefits of cross beams to improve support and drainage, and modularities became a no-brainer to reduce costs and drive efficiencies.

"Reinforced plastic polymers passed the test for our significant loading requirements, and we're looking towards permeable designs for abating some of our flood issues."

With strong support from the government, Daly said this project is going from strength to strength.

The next steps include further validation of the platform to ensure it meets all necessary engineering and operational standards, and identifying suitable locations to test the prototype – in the depot and then out in real-world conditions.

"There's a bit of extra work that we need to do in partnership with Monash, to validate how this will behave on the network," said Daly.

"We're excited by the results we've seen so far, and we're now looking to take the initiative to the next level and get this out into the world." 🚊



Currently only 475 of Yarra Trams' 1665 stop platforms have level access.