On track for outstanding outcomes

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Swinburne's work on the Melbourne train fleet has saved money, prevented poor environmental impacts and even helped trains run on time.

A problem with train door handles could potentially force Metro Trains Melbourne to retire 200 trains.

Comeng passenger trains, run by Metro Trains Melbourne, have power-operated partially automated doors that are electrically closed before the train starts moving, then electrically released by the driver once the train is standing still. This allows passengers to open the doors manually.

The original design of the train door handles allowed passengers to force open the doors when the train was moving. Passengers would try to board a moving Comeng train by running along the platform and forcing the doors open – a highly dangerous behaviour that led to safety

incidents. After several such incidents, Transport Safety Victoria (TSV) demanded the problem be fixed or around 200 trains would be ordered out of service.

Enter Swinburne

In 2012, Metro Trains Melbourne engaged researchers from Swinburne's Design Factory Melbourne to look at the problem.

In collaboration with Metro Trains Melbourne, Public Transport Victoria and TSV, Swinburne conducted user analyses, predictive modelling, concept development and handle prototyping to develop a simple new handle shape, which was trialled in late 2014 and rolled out across the fleet in 2015. The new shape is easy to open when the train is standing still, yet too hard to lever open when the train is in motion.

The Swinburne solution

The Swinburne solution has significantly improved safety. Passengers can no longer force open the doors, and in addition, the new low profile handles remove the foothold used by people trying to reach the carriage roof to 'train surf' – another dangerous practice. The redesign also means passenger clothing and bags aren't caught by the old protruding handles, avoiding yet another danger.

The Swinburne solution saved millions of dollars. The cost of implementing the new door handle design was just $400,000. The cost of replacing 7000 doors with fully automatic models – the other option – would have been $10 million. In addition, the redesign allowed the Comeng train fleet to stay in use for longer. The fleet was originally scheduled to be replaced by High Capacity Metro Trains from 2018, at a substantial cost. The new handles were one of the main reasons that the fleet will now stay in use until 2022/25.

It didn't stop there

There are numerous other benefits and cost savings. Fewer safety incidents also means reduced stress on train drivers, and lower costs for driver psychological support, lost work time and WorkCover outlays. In addition, the environmental benefit of replacing the handles is that 7000 new doors were not produced and 7000 old ones did not need to be disposed of.

The Swinburne solution also contributed to overall train network performance. Preventing doors being opened on moving trains has helped to increase train punctuality, and reduced the impact of forced doors on network performance.

The Public Transport Ombudsman annual reports show that the number of service delivery complaints for Metro has fallen significantly, from 399 in 2013/14 to 190 in 2015/16 – a

reduction of more than 50% after the handles were installed. Improved performance measures have also had economic benefits to Metro, which suffers penalties when performance targets are not met.

The Design Factory

Swinburne's Design Factory Melbourne is a transdisciplinary platform for industry-engaged, design-based research. Established in 2011, the Design Factory Melbourne has partnerships with other Swinburne groups – including the Factory of the Future and the Centre for Design Innovation – and with CSIRO, the Australian Nuclear Science and Technology Organisation, Stanford University in the United States, Aalto University in Finland, and the European Organization for Nuclear Research and IdeaSquare in Switzerland.

The Design Factory Melbourne is a foundation member of the Design Factory Global Network, a collaboration of 24 design factories worldwide engaged in industry-partnered projects with researchers, academics and students focusing on innovation.

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