Transurban

TRANSURBAN INSIGHTS: AUTOMATED TRUCK TRIAL

May 2023

Transurban Insights reports showcase research findings on issues relevant to road transport. Research findings are drawn from our own data, from research conducted by our business, and from commissioned surveys.

We share our research insights with government and industry and use them to inform our driver and community education campaigns.

In this report, we present learnings from our Australian-first automated truck trial that tested the interface between a highly automated heavy vehicle and high-tech road infrastructure.

Trial components

1 truck kitted out with an automated driving system (ADS)

3 safety drivers fully trained to operate the ADS

4 weeks proving ground testing and validation

4 weeks trial comprising 7 on-road ADS sessions

+370 km driven by ADS, largely at 80 km/h

1 dedicated operator in Transurban's traffic control room

Contents

Automated trucks are emerging world-wide as a future freight transport solution, with on-road automated heavy-vehicle pilots underway in the US and Europe – and now in Australia. This trial was Australia's first involving a highly automated truck in live traffic conditions on urban motorways.

The freight transport industry is under increasing strain in Australia and around the world, due to labour shortages, congested urban roads and growing demand.

The potential for automated trucks to deliver safe and efficient freight movements – on suitable routes and under appropriate conditions – is attracting interest as one of the more feasible applications of automated vehicle technology. Many Transurban roads form a critical part of major urban freight corridors, so we are keen to explore the role of automated trucks in improving freight efficiency in our cities.

Our on-road trial ran in Melbourne over seven nights in November and December 2022 with the truck operating in a dedicated lane. Extensive camera coverage (including 400 cameras on CityLink) and oversight from a sophisticated traffic control room provided an ideal trial environment.

The trial examined the:

- performance of a highly automated truck on a highly controlled and monitored urban motorway
- benefits of integrating real-time road infrastructure data into an automated driving system (ADS) in a truck
- steps needed to facilitate the safe adoption of automated vehicles on managed motorways.

The trial provided insights and learnings across:

- the safe and effective deployment and operations in live-traffic environments
- the Australian regulatory environment relating to highly automated vehicles
- expert truck drivers' feedback on the technology
- where and how smart infrastructure can best assist truck automation on Transurban and Victorian Department of Transport and Planning (DTP) roads.

Terminology

A **highly automated truck** is a truck designed to operate without a human driver.

An **automated driving system (ADS)** is the technology which uses data captured through sensors, such as road markings and objects ahead, to drive the automated truck.

For this trial, we also shared Transurban's **road infrastructure data** with the truck, including speed limit and lane closure data.

This trial leveraged CityLink and the Monash Freeway's highly instrumented, managed motorway environment and combined a highly automated truck with several innovative digital solutions developed for the trial, including:

- integrating data from the infrastructure (such as lane closures, speed limits and other vehicle movements) into the ADS, extending the automated truck's awareness of road and traffic conditions beyond its sensor range – to the extent of helping it see around corners
- implementing a dynamic dedicated lane around the truck as it operated, adding an extra layer of safety (by separating the truck from other traffic) and minimising disruption to other motorists (by reducing lane-closure impacts).

Our trial's results and learnings will contribute to wider consideration of the benefits of this operating environment and options for its potential implementation.

Preparing for connected travel

As connected and automated vehicle (CAV) development progresses, the challenges of safely introducing CAVs onto roads have become more evident across the industry. Introducing these vehicles in a controlled environment delivered via smart infrastructure, is a potential path forward.

Our insights from this trial build on learnings from our previous CAV trials, helping us assess potential paths towards realising CAVs' expected safety, efficiency and mobility benefits. Our trials are also helping us identify opportunities to enhance existing smart infrastructure; and to apply it in innovative ways that will support or optimise CAV performance.

A starting point for discussion

These findings are intended as a starting point for discussion, analysis and further steps towards improving efficiency of freight movements within Australian cities. Our findings reflect the performance of one specific truck and its sensors within one specific driving environment.

Our findings are informative in proving our asset, vehicle, and operational capability. However, the on-road distance covered (about 370 kilometres) was not adequate to draw general conclusions about automated truck performance and the trial route did not allow testing of every possible operational scenario.

All automated trucks have their own vehicle design and ADS capabilities, so learnings must be validated across multiple developers to identify any industry-wide trends.

Results overview

Our automated truck trial provided early indications of the potential for automated freight vehicles to operate successfully on Australian roads. The trial is one step forward in our exploration of pathways towards transitioning to this new technology.

A key focus of this trial was exploring the potential for infrastructure-to-vehicle (I2V) data to support a truck's ADS. This included identifying scenarios the trial ADS found challenging, and testing how sharing our infrastructure data with the ADS could address these challenges. Our trial findings suggest I2V communication is feasible and has the potential to be highly beneficial in deploying automated trucks on highly instrumented, managed motorways in Australia.

Terminology

Safety drivers were aboard the automated truck throughout the trial's operations. Drivers supervised the truck's automated operations (for example, monitoring the truck's lane positioning and speed-limit compliance), and taking back control of the vehicle in line with defined safety protocols.

Of more than 370 km travelled in ADS mode, 92% of travel was completed in automated mode. All up, safety drivers disengaged the ADS (took manual control) 54 times (in line with the trial's precautionary protocols).

Integrating our road-infrastructure data into the ADS enabled safer on-road deployment of the automated truck. For example, instead of training the ADS to read LED signs along the road, we provided a data feed that gave the ADS direct and reliable access to the information typically conveyed by signs along the motorway.

Well-instrumented managed motorways with mid-to-high freight volumes appear to be ideal candidates for early automated truck deployments. These roadways have enough freight demand to attract automated truck operators and enough instrumentation to generate infrastructure data to support the automated trucks.

Safety drivers benefitted from hands-on training. This gave the drivers time to familiarise themselves with the automated truck's behaviours and responses and ensured the drivers were sufficiently prepared for the on-road trials.

Developing and designing trucks, sensor kits and ADS functionality in line with local operational environments and regulatory requirements will support smoother transitions for on-road automated vehicle operations in Australia. Standardising road element naming conventions (such as lane numbering) will support developers in meeting these conditions at scale.

Safety driver supervising the automated truck's operations

Automation technology

The truck and ADS used in the trial were developed and provided by the Industrial Technology Research Institute (ITRI), based in Taiwan. ITRI has significant CAV experience across automated trucks, buses, and cars. Bringing an ITRI truck, already fitted with the necessary technology, for a temporary visit to Australia was the most time-efficient way to conduct the trial. An ITRI engineering team supported the trial's development and delivery, including safety driver training.

Vehicle and ADS specifications

The truck used in the trial was a left-hand-drive modified Hino 700 SH 4x2 tractor with built-in heavy-duty capability for towing a trailer with a shipping container. The full ADS kit (pictured at right), retrofitted to the vehicle by ITRI, included:

- two industrial computers and ADS monitoring equipment (installed in cab).
- a sensor suite comprising:
  - mounted lidars
  - inertial measurement unit (IMU)
  - cameras
  - radar.

Smart infrastructure

Our trial also tested new applications of smart infrastructure technologies. This technology enabled the sharing of road-operation data with the truck, with the goal of identifying which data sets delivered the most operational value for the truck's ADS. Data we provided extended beyond the truck's sensor inputs and included:

- road incidents ahead
- lane status changes
- speed limit changes
- real-time data on the movement of surrounding vehicles.

We also developed tools to help our control room monitor the trial operations.

Our dedicated traffic control room operator monitored the automated truck navigating the trial route and the road ahead of the truck in case of any incidents requiring intervention to maintain safety.

Truck with complete sensor suite fit-out

Dedicated traffic control room operator monitoring the road

Trial preparations

This trial was the first of its kind in Australia and involved both a non-standard, left-hand-drive vehicle and an ADS. Meeting state and federal government regulatory and safety requirements involved months of collaboration.

Road-user communication and engagement was delivered throughout to support regulator, industry and public endorsement.

Trial route

Our selected trial route enabled the effective assessment of the truck's sensor kit, ADS operations and road-infrastructure data sharing. We selected Melbourne's M1 corridor as our trial route because it:

- is a freight corridor
- is a highly instrumented managed motorway with capability to support dynamic dedicated-lane operations
- has broad CCTV coverage for effective control-room monitoring
- offers varying operational environments and situations (for example, open roads, tunnels, curves and straight sections)
- includes Transurban and DTP-operated roads.

Making the most of our closed-course preparations

Conditions at the Australian Automotive Research Centre's (AARC) proving ground allowed us to run the automated truck through some robust scenarios we could not trial on the open road. For example, at the proving ground we tested the truck's ability to react to increasingly aggressive cut-ins – a manoeuvre we could not safely conduct in live traffic. In real-world operations truck drivers cannot predict when another motorist might aggressively cut in front of them – they can only prepare for the possibility. Sharing the road with others involves unpredictability so testing the truck's responses to unpredictable events was essential prior to live-traffic trial operations.

Approvals and validation (August 2022 – November 2022)

JULY 2022

Route selection and mapping

- Identified trial parameters and route criteria to inform route selection
- HD map developed for selected route.

AUGUST 2022

Truck importation

- Required a non-Register of Approved Vehicles (non-RAV) entry import approval.

SEPTEMBER 2022

Safety driver recruitment and training

- Recruited highly experienced Transport Driver Training heavy vehicle driver trainers with extensive local knowledge
- Conducted safety driver training (operation and safety protocol setting).

OCTOBER 2022

Proving ground validation testing

- 23 days vehicle readiness testing at the AARC, including extensive validation testing and driver training
- Testing progressed from basic checks to complete scenarios, including testing beyond on-road trial parameters.

NOVEMBER 2022

Trial operation permits

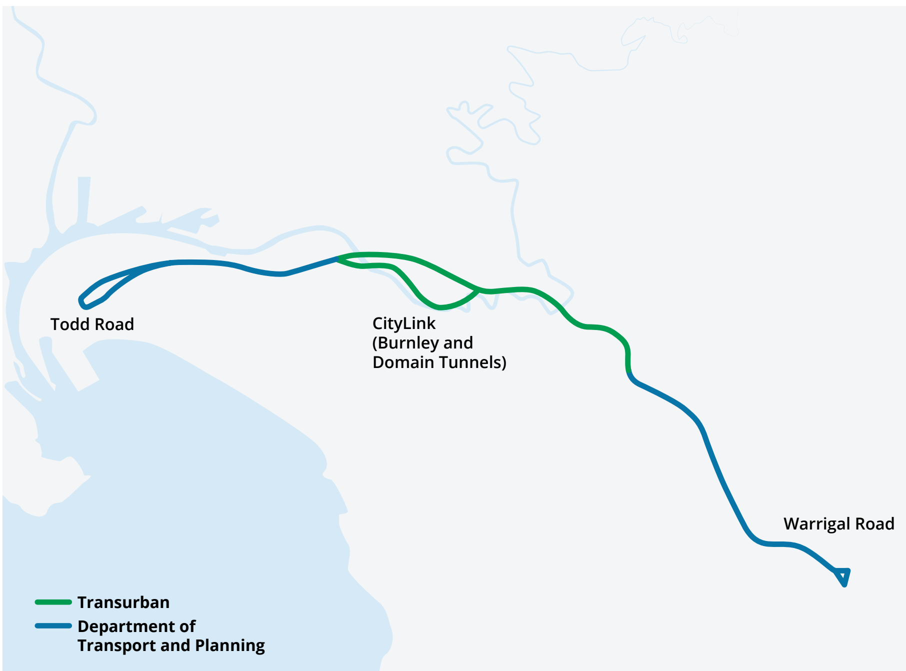
- Obtained permits needed to operate the trial in live traffic environment:
  - National Heavy Vehicle Regulator (NHVR): standards exemption and road access permits
  - DTP: ADS trial permit (supported by a safety management plan and evaluation vehicle registration).

DECEMBER 2022

On-road trials completed

- Seven nights of trials conducted over four weeks.

Trial route in Melbourne



On-road trial operations

The truck's operational performance was trialled progressively, starting with proving the truck's core capabilities before adding more complex manoeuvres and route extensions. We also tested how the ADS understood and responded to the real-time road-infrastructure data we provided. This data included information about traffic conditions and movements beyond the truck's sensor range.

The truck operated on a dynamically implemented dedicated lane (see right).

Safety protocols

On-road

Safety drivers drove the truck manually until entering the motorway's right lane. Drivers activated the vehicle's ADS upon entering the dynamic dedicated lane environment. Safety drivers took back control of the vehicle when incidents such as lane closures and speed limit changes occurred.

Control room

A dedicated traffic control room operator monitored the automated truck from CityLink's traffic control room, alerting the truck's safety drivers of incidents or roadworks as testing progressed. When the truck operated on Department of Transport and Planning (DTP) roadways, a Transurban liaison was on-site in the DTP control room to enable coordinated lane closures.

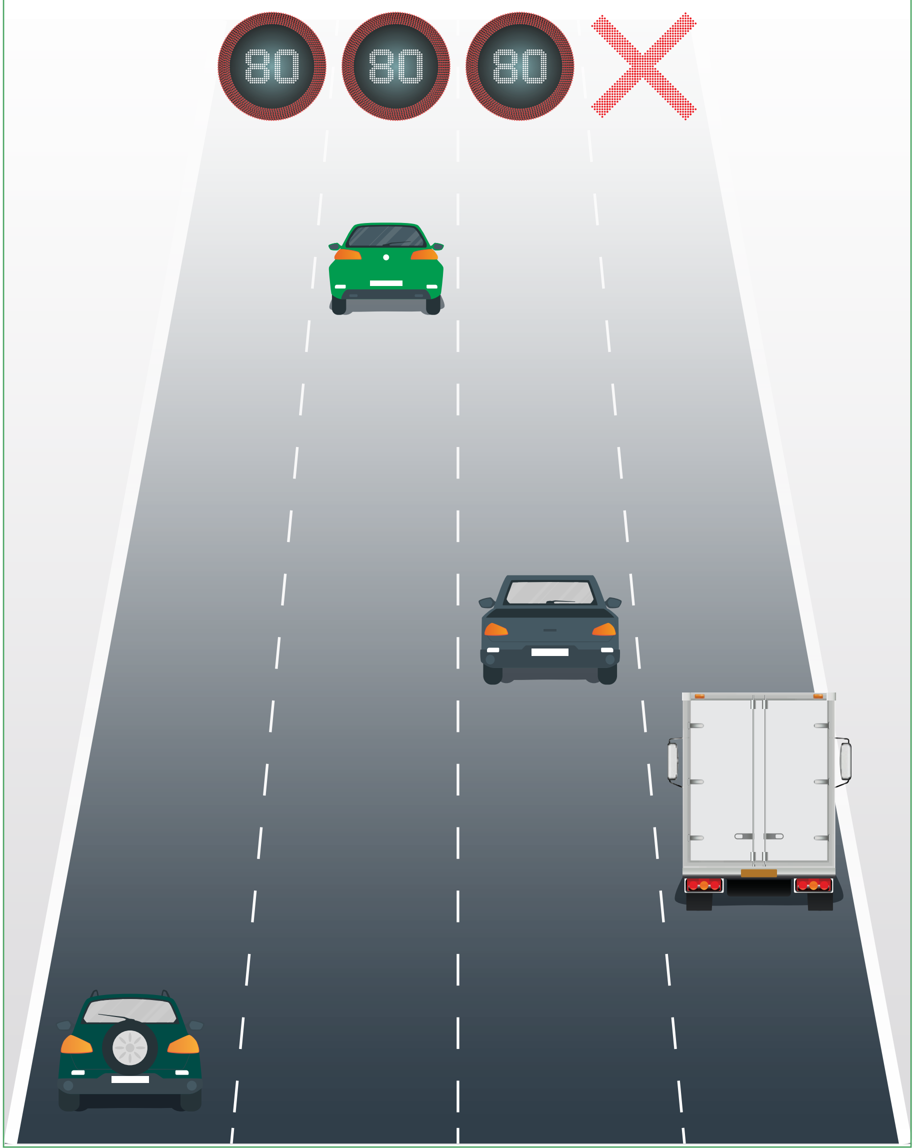
—New technology—

Testing the potential of a new lane-management solution

To simplify the truck's operating environment, and to provide added assurance for surrounding motorists, we separated the automated truck from other traffic on the road during the on-road trials.

We did this via a new lane-management technology solution – a dynamic dedicated lane. Trials were conducted overnight, when a lane could be closed without causing congestion in the remaining lanes. But rather than close an entire lane for the trial's duration, we automatically closed the lane a few kilometres ahead of the truck and reopened it behind the truck as it travelled along its route. Deploying this dynamic lane-management technology within the trial allowed us to assess its effectiveness, including by monitoring other road-users' compliance. It also minimised disruptions to other road users.

In the future, if automated trucks are introduced on to urban motorways, operating in a dedicated lane overnight may offer similar assurance to the community. This option would also shift some truck movements to overnight and potentially relieve congestion during the day.



Trial results

Our trial tested the performance of the automated truck and its ADS, as well as the performance of the dynamic dedicated lanes.

Highlights

- The ADS successfully navigated the full trial route and repeatedly demonstrated the ability to negotiate lane changes among other drivers.
- When ADS disengagements occurred they were brief – less than 30 seconds on average – and they did not impede our ability to accomplish our trial goals.
- Data collected during the trial suggests the dynamic dedicated lane reliably delivered a simplified operating environment for the automated truck, with good compliance by other road users.

Automated truck and ADS performance

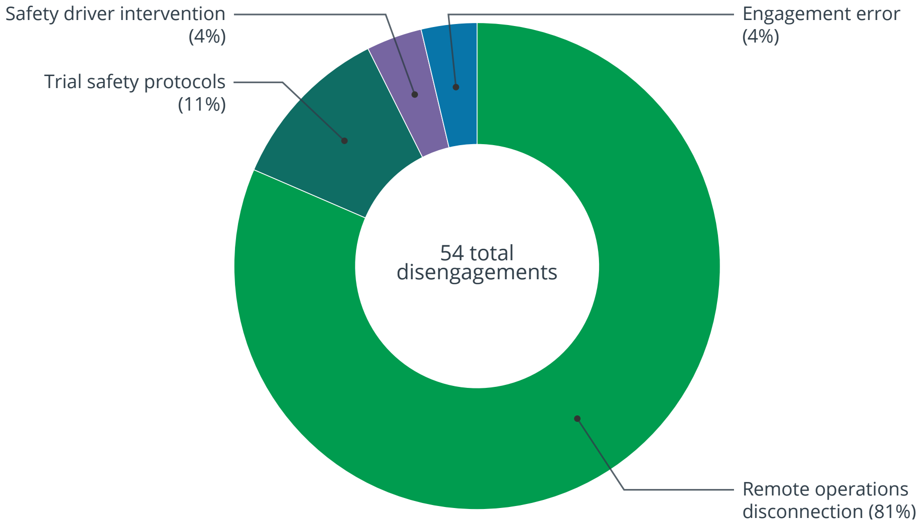
The automated truck used in this trial performed extremely well: 92% of the truck's on-road test-environment travel was driven in automated mode. Further, the automated truck consistently performed as expected and the ADS safely handled the specific driving tasks we gave it. No safety incidents occurred at any stage of the trial. Data captured across the seven trials showed the ADS successfully navigated multiple operating environments, including:

- travelling in a dedicated lane alongside live traffic on a public motorway
- navigating the full extent of both the Domain and Burnley tunnels
- performing lane changes in mixed traffic conditions, including multiple instances where the automated truck waited for other road users to pass before merging.

ADS disengagement

The ADS was disengaged 54 times during the on-road trial operations for the reasons shown in Figure 1. Most disengagements (81%) were a precautionary response to the loss of connection between the ADS engineer's remote monitoring software and the truck's on-board industrial computers.

Figure 1: Reasons for disengagement of ADS



- **Remote operations disconnection:** ADS engineer requested safety driver take back control when the remote monitoring connection dropped out.
- **Trial safety protocols:** Safety driver took back control in line with established trial safety protocols, for example if another driver cut in front of the truck.
- **Safety driver intervention:** Safety driver felt unsure of truck behaviour and reverted to precautionary manual driving, for example if another vehicle drifted too close alongside the truck.
- **Human-engagement error:** Safety driver incorrectly engaged or accidentally disengaged the ADS.

Dynamic dedicated lane performance

The dynamic dedicated lane was effective in both delineating the environment around the trial vehicle and reducing lane closure impacts for other road users. The dedicated lane greatly reduced the amount of interaction between the trial vehicle and other road users.

Additionally, our analysis found road-user compliance was strong throughout the dynamic closures. Compliance with closures on road sections immediately ahead of and behind the truck (the most important road section to keep clear for safety) is shown in Figure 2 – almost all motorists complied with the lane closure.

These findings provide an early indication of motorists' compliance with dynamic lane closures – noting our trial was conducted at night, and compliance with lane closures generally drops during busier periods. This suggests overnight operations may be preferable for the future introduction of automated vehicles onto urban motorways using this approach.

Figure 2: Dedicated lane compliance

Average number of vehicles per lane within 30 seconds of the automated truck's dynamic dedicated lane (Lane 1) at various points in its journey along CityLink (data averaged from three sample inbound runs). Vehicle data was captured by lane-use management technology at the locations shown below.

	Lane 4 (left)	Lane 3	Lane 2	Lane 1 (right)
Enter CityLink (Toorak Rd)	4.3	4.7	4.0	0.0
●	3.7	6.0	4.7	0.0
●	2.0	1.7	6.7	0.0
●	5.7	6.3	7.3	0.0
●	3.3	6.3	7.3	0.0
Domain Tunnel entry	4.7	6.3	4.3	0.0
●	3.5	6.0	3.0	0.0
●	3.3	5.7	6.7	0.0
●	1.0	8.3	7.0	0.0
●	2.0	6.3	7.3	0.0
●	0.0	5.7	4.3	0.3
Domain Tunnel exit	0.0	8.7	6.3	0.0

Trial learnings

Our trial planning and delivery captured data relevant to vehicle manufacturers, road designers, operators and regulators. What we learned will help support overall advancement of automated trucks and road infrastructure technology and contribute to preparations for their arrival on Australian roads.

Highlights

- When operating on a new corridor, road-surface conditions matter to the ADS and can impede performance. For optimal performance, sensors must be calibrated to accommodate applicable road conditions.
- Testing in realistic environments is essential for preparing for on-road operations. Some improvements to proving ground capabilities would be beneficial in fully supporting I2V testing.
- Safety drivers played an important role in this early deployment, including by providing ADS performance feedback throughout the validation testing and on-road trials.

1 Road infrastructure and environment

Reading motorway lane striping

The ADS demonstrated consistent localisation performance – that is, the truck remained safely within its lane throughout the trial. However, lane detection accuracy was somewhat reduced when detecting lane markings farther ahead. The ADS had some difficulty interpreting the location of vehicles travelling ahead – it sometimes 'saw' vehicles travelling in adjacent lanes as travelling in the dedicated lane. As the vehicles were far ahead, this did not pose a safety risk, but it did make it harder for the truck to plan its behaviour.

The trial ADS was configured to 'read' Taiwan's longer (4 metre vs Australia's 3 metre) and closer together (6 metre vs Australia's 9 metre) lane striping patterns. Automated vehicles need to 'see' what is ahead to decide how to react and an automated truck must look particularly far ahead when travelling at motorway speeds (70+ km/h).

Our Australian lane-striping dimensions appeared to make it harder to detect lane striping at a distance. Our ADS engineers suggested longer dashes with shorter gaps would increase lane-location accuracy, particularly when navigating around bends. We would be interested in learning from other ADS developers if this is a shared challenge that could be factored into lane-striping standards.

Operating on unlit roads

The automated truck used for this trial was not equipped to operate on unlit roads at night – its sensor suite was not designed to detect objects ahead without roadside lighting. This set-up was appropriate for our trial as our selected route was an urban motorway with suitable lighting.

All automated trucks have specific capabilities and limitations – currently no one-size-fits-all technology exists. In some cases, operational requirements will lead vehicle/ADS selection. Design solutions may also be available for adapting to a specific use case. Where limitations on specific routes are common across multiple ADS developers, it may be more viable to change infrastructure (for example, installing suitable lighting) to support automated operations. Government, private road operators and ADS developers would benefit from working together to identify opportunities to address common challenges and support safe deployment of CAVs on key corridors.

Road surface variations and sensor performance

The trial truck ADS was calibrated for the road surface conditions it had previously encountered. It was not calibrated for expansion joints and other standard construction elements that can alter how a road surface feels. These non-uniform elements created ADS-sensor noise, causing the truck to drift within its lane. While the truck never left its lane, the safety drivers noticed the issue and reported it. The ADS developer re-calibrated the sensors and performance in later trials was greatly improved.

Communication between safety drivers and the ADS developer is essential for identifying and addressing on-road variables. As an infrastructure owner, Transurban recognises collaborating with ADS developers will continue to be important in the future, as will monitoring for severe road surface degradation that may not be sufficiently resolved through calibration.

Localisation within tunnels

On the M1's open road, the automated truck used nearby features and road furniture such as the large, distinct, regularly positioned speed-limit signs for localisation (or how the truck understands where it is on the road in relation to everything else). In a tunnel environment, with uniformly smooth walls, localisation is more challenging. For the trials, we improved ADS localisation within the tunnel by shifting reliance to another part of the truck's sensor suite, the IMU. This allowed the ADS to continually contextualise its location based on its previous location, speed, and heading.

Installing clearly legible markers, distinct from overhead signs, at regular intervals along the walls of the tunnel would improve localisation performance. Lidar-detectable 3D markers would allow the ADS to more reliably determine its position and reduce the potential for excessive IMU drift.

2 Infrastructure-to-vehicle (I2V) communications

Opportunity to standardise lane numbering

When we transitioned the trial vehicle from simulations to closed-course testing at the Australian Automotive Research Centre (AARC), we identified the ADS was interpreting lane-specific data differently than intended, due to differences in Transurban and ITRI (the Taiwan-based ADS developer's) lane numbering systems.

We resolved this misalignment with the ADS engineer, but the experience showed that I2V communication platform testing should include near real-world scenario testing. Comprehensive testing in a closed-course environment (for example, testing vehicle responses when approaching closed lanes) is needed to confirm both the ADS's responses and the provided data's alignment with actual conditions.

Lane numbering is standardised for most infrastructure management purposes. We recommend extending this standardisation to real-time data communication activities. Looking ahead, national standardisation of lane information such as emergency bays, entry and exit ramps and shoulders will enable the necessary compatibility for data providers and data recipients wherever they are operating in Australia.

Test in a representative environment for best results

AARC's highway circuit served as representative environment for ADS validation testing. The physical infrastructure of the circuit was similar enough to on-road conditions to enable testing of multiple live-traffic scenarios and we tested the ADS performance in managing these scenarios at motorway speeds. Results from these initial tests provided a valuable baseline for assessing the ADS's on-road performance. Yet the digital infrastructure data communications coverage was vastly different from the highly instrumented motorway environment.

To enable more realistic I2V testing, the proving grounds could be enhanced with stronger cellular service (minimum 4G) and ITS equipment. Without this, our I2V testing was slowed and relied on simulated data which did not accurately reflect the on-road operating environment. It is preferable to be able to effectively test I2V in controlled environment prior to moving to live-traffic operations.

Sharing speed and lane status data

Reading traffic signs, particularly LED signs, is a well-documented CAV challenge. Our trial ADS was not trained to read Australian road signs (this takes months of training and can be unreliable). We used a technology solution to enable ADS understanding of speed limits and lane status – sharing real-time speed and lane data with the ADS through an I2V communications platform developed for the trial.

Given LED-sign-reading is a common limitation across ADS developers, establishing and maintaining real-time speed limits and lane availability data sources will support future automated vehicle deployment. Another option for accessing this data is via a developer-accessible API. For example, DTP has a Lane Use Management Signals (LUMS) API available.

3 Safety driver and ADS operation experience

Predictable vehicle behaviour and potential safety benefits

Highly automated trucks have great potential to reduce drivers' mental load. Human motorists driving an identical route are constantly adjusting to conditions: varying speed and lane positioning and other behaviours. The automated truck behaved the exact same way at the same points on every route circuit.

With the ADS taking over minor driving adjustments, automated truck drivers gain capacity to better monitor surroundings and identify potential hazards.

Hands-on safety driver training enhanced ADS calibration

Driver training comprised classroom and hands-on exercises, including ADS engagement and disengagement, and identifying deviations from standard truck behaviour. The training was effective: all three drivers consistently followed protocols during on-road trials, including reliably engaging and disengaging the ADS at appropriate points.

As Australia's first on-road automated truck trial, the drivers' hands-on training was invaluable in capturing data for ADS calibration. For example, based on safety driver feedback, we adjusted the ADS programming to create a larger gap between the truck and stopped vehicles ahead to allow safe manoeuvring into adjacent lanes.

Hands-on experience also informed the trial's safety protocols and enhanced ADS operations. For example, the drivers could compare the automated truck's behaviour with how a manual truck would behave, and this allowed us to make ADS adjustments that improved the automated truck's performance.

We anticipate continuing hands-on protocol reinforcement training for any future trials. We will also, where feasible, simulate complex real-world scenarios (such as navigating additional cars) to increase driver confidence and safety protocol application.

4 Regulatory environment, planning and coordination

Conditional approvals for manual and automated operations

During its time in Australia, the automated truck navigated public roads both manually and under ADS control. Some of the restrictions applied to the vehicle to ensure safe manual operation impacted its automated operations. For example, the truck is left-hand drive (LHD) – and the Australian standard is right-hand drive. An approval condition was that an appropriately licensed driver remain in driver's seat – and another in the passenger seat – while the truck was operating on public roads. As the truck only had two seats and the ADS engineer was not appropriately licensed, they needed to monitor the ADS remotely.

Most ADS disengagements during trials occurred when the connection between ADS engineer and the trial vehicle was temporarily (and briefly) lost. When this happened, the safety driver was required to intervene (as a precaution) – and this impacted our trial outcomes.

Manual operation permit requirements can impact automated operations. We would like to see regulators coming together to consider allowances when a trial's manual vehicle operational requirements are minimal. For example, allowing an ADS engineer to complete specific training in assisting the safety driver when navigating environments LHD vehicles find challenging, such as right-hand turns and motorway merging.

Sensor mounting and overwidth classification

Currently, in Australia, heavy vehicles must be no wider than 2.5 metres at their widest point. Our trial truck was 2.45 metres wide before being retrofitted with its sensor kit. The lidar sensors affixed to the sides of the front bumper increased the truck's width to 2.7 metres, giving it an overwidth classification. This classification meant the truck had to carry additional signage to warn other road users. Current vehicle signage requirements do not include consideration of sensor locations, and strict compliance with these requirements would have degraded sensor performance. NHVR gave permission to deviate slightly from published standards to avoid obstructing the sensors.

In this trial context, regulators considered the unique characteristics of the automated truck, for example, by allowing slight deviations from its signage standards to accommodate sensors. Noting NHVR width-limit regulations may increase in the future, developers with an eye on the Australian market will need to align their sensor suite with Australian standards to avoid the current overwidth vehicle restrictions. Mounting sensors to fit within standard widths or affixing the sensors so that they will break off in the event of a collision are both viable options. Developers may want to engage with relevant state transport agencies to explore suitable design solutions.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Conclusion

This trial was the first time a highly automated truck was operated on an Australian motorway. The trial was an important first step towards understanding how we can adapt our infrastructure to facilitate the safe adoption and operation of automated trucks.

The trial's findings and learnings on:

- vehicle's overall performance
- safety driver feedback
- other road users' behaviour around the automated truck
- our road infrastructure's data-sharing capabilities

all suggest that managed motorways in urban environments could be suitable locations for the eventual introduction of automated freight operations in Australia.

Our dynamic dedicated lane and I2V communication platform both yielded encouraging results – giving early indications of how we might best leverage the unique capabilities of our roads to support safety when operating highly automated trucks.

Automated trucks can contribute to more efficient handling of the growing freight task in our cities. We will use our findings in exploring, with government and industry, possible approaches for safely introducing automated trucks onto our roads.

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