

DECEMBER 2021

The Role of ADAS Performance in New Zealand Road Safety



In the 1970s, New Zealand was facing an unacceptably high death rate on our roads. Laws were introduced for wearing seat belts, using helmets on motorbikes, changing drink driving behaviour and reducing speed.

As a result the road toll decreased significantly over a forty year period before stalling and starting to climb again. It has only been in the last 3 years that the rate of fatalities has begun to drop once more. 2020 saw New Zealand's lowest number of road deaths in five years* - and prior to that, it was at the same level as 1956².

The most recent change is attributed in part to rapidly increasing technology in cars, designed to make them safer for drivers, passengers and pedestrians. It is expected technology will continue in helping reduce road accidents and fatalities. New Zealand (along with many other countries) has committed to Vision Zero - an ambitious target of zero road deaths by 2050³. Crash avoidance technology is recognised as one of the key tools for getting there⁴. A better understanding of the use of these technologies is required to ensure they contribute rather than detract from improved road safety for New Zealanders.

*Road deaths reduced from an average of 32 to 9 in April but returned to normal levels in May and June.

Increasing automation in vehicles

Today's vehicles are very different from those driven just a decade ago. Electronics now account for forty percent⁵ of the cost of a new car, showing where the focus of vehicle improvements now lies. Over the last six years alone, the percentage of cars with autonomous emergency braking (AEB) as a standard feature has increased from three percent to seventy five percent⁵. Features that were very recently considered highly advanced, have quickly become standard on most models. While fully automated cars might be some time away, the progress from assisted driving to partially/highly automated driving is underway.

The five stages of autonomy

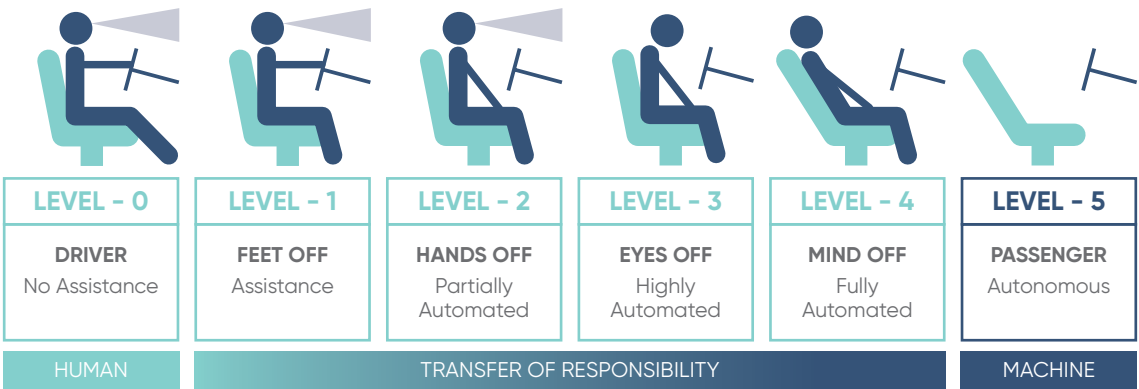


FIGURE 2 - Levels defined by SAE for autonomous vehicles.

The autonomy continuum

Today, vehicles coming off the production line sit between level one and two in the autonomy continuum. Features such as adaptive cruise control or park assist support the driver with the task of driving. These features are known as Advanced Driver Assistance Systems (ADAS). Through the use of sensors, ADAS views the environment around the car. If danger is detected, ADAS can warn the driver or even take control of the car to avoid a collision.

The benefits of Advanced Driver Assistance Systems

ADAS is having a positive impact on the safety of drivers, passengers and pedestrians. A 2016 study estimated that autonomous emergency braking (AEB) reduced rear-end car crashes by 40%⁶, while the use of Intelligent Speed Assistance (ISA) to slow cars in high risk areas, may reduce pedestrian fatalities⁸.

ADAS reduces human error through a number of different ways.

- Pedestrian detection/avoidance
- Lane departure warning/ correction
- Traffic sign recognition
- Automatic emergency braking
- Blind spot detection

These systems work through vision based algorithms, combining information from a number of sensors, cameras, radars and ultrasound devices placed at key points around the vehicle. Machine Learning algorithms use this information to understand the environment, predict events and intervene as required.

The changing role of the driver

As vehicles become more digitally capable, more simple tasks are completed by technology. This can include staying in a lane, using adaptive cruise control or reversing into a car park. However, drivers are still responsible for their vehicle. They need to be ready to take back control if the automation doesn't respond when it should, or it responds incorrectly. This creates the challenge of staying alert whilst not continuously and actively participating in the driving⁸. The skills of the driver must adjust to this new model of driving. As drivers rely more on driving systems, it becomes vital that the systems consistently perform as expected.

Greater trust is required as automation increases

Drivers rely on warning systems (such as dashboard lights) to ensure their vehicle is safe to drive. Equally, they would expect to know if their driver assist features have stopped operating correctly.

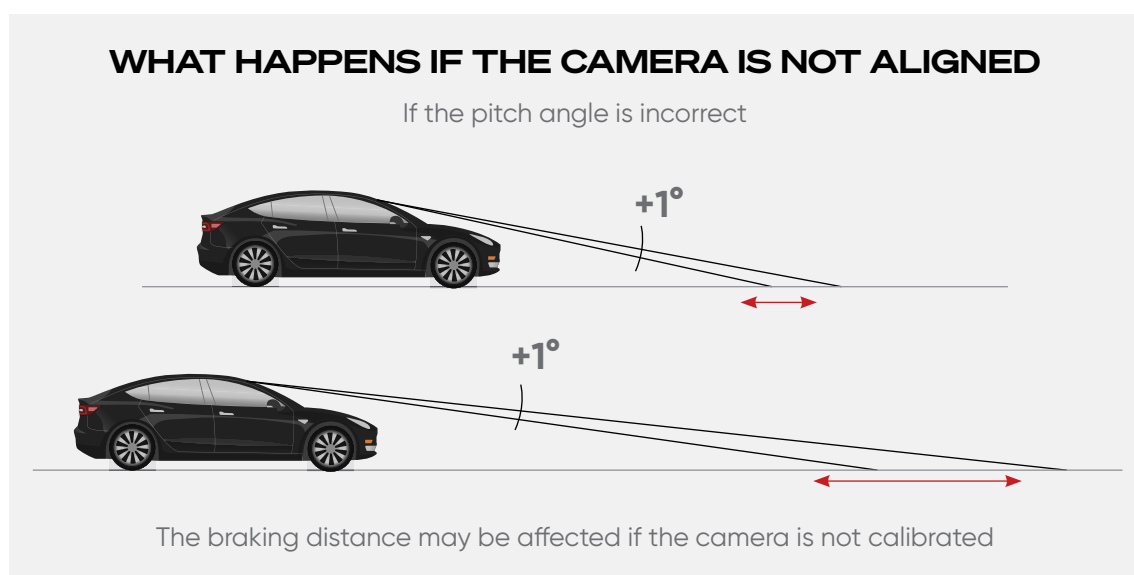
However, while the speed of ADAS development has raced ahead, the systems qualifying its performance have not kept pace. There is no dashboard light to let a driver know when sensors have been disrupted. A warrant of fitness (WOF) or service does not check the accuracy either. This lack of visibility for the system's performance creates a significant safety risk, which is not currently being addressed.

How easily can ADAS sensors lose their accuracy?

When a vehicle is involved in a collision, has a windscreen repair, or even gets repainted, the sensors can be affected. If a sensor is moved by as little as a millimetre, it can result in a metre (or more!) of error in the reading it gathers. On the road, this can translate to a matter of life or death if the car misreads the position of a pedestrian, the closeness of the car in front, or the position of a lane.

Even in the absence of a specific incident, ADAS sensor accuracy can deteriorate over a period of time, resulting in inaccurate measurements and corresponding actions.

Therefore, to ensure the system performs as it is intended – and as the driver is expecting, ADAS recalibration is required both in response to an incident, and periodically as routine maintenance.



Where does ADAS calibration take place?

Over 70% of original equipment manufacturers (OEMs) require their systems to be calibrated under workshop conditions. OEMs provide repair procedures for each make and model of car. These processes often require specialist equipment and expertise. The testing will often be a combination of static testing in the workshop, as well as dynamic on the road testing.

At present, awareness of the need for recalibration amongst consumers, insurers and mechanics is low, thereby driving very little demand. In New Zealand, this safety issue is yet to be addressed from an industry best practice perspective or as part of a legislative framework.

Connected vehicles will only increase the urgency to address this issue

Cars are set to become increasingly technological as we move towards driverless vehicles. One of the stepping stones towards driverless cars is the introduction of connected vehicles, where vehicles connect over wireless networks to other nearby devices. The potential for vehicle connectivity to avoid collisions and pedestrian harm by removing human error is significant. Cities are already piloting and preparing for the future with connected vehicle programmes and car manufacturers are innovating quickly towards this goal. The future of cars will only rely more heavily on technology, and the ability to be able to trust it is imperative.

Addressing ADAS calibration in New Zealand

Consumer and industry awareness of the need for ADAS calibration is increasing, and this will provide greater impetus for change. The question is who will lead the change? There is a strong case for an inter-industry approach. By taking control, insurance companies, collision repair providers and other industry stakeholders can determine industry codes of compliance ahead of government legislation. This will allow positive changes to happen in the short term. Such proactive and collaborative action can help Aotearoa achieve its goal of Vision Zero, with safer cars on our roads, and fewer traffic related injuries and fatalities.

ABOUT ADAS EXPERTS

We deliver the most advanced repairs and servicing of Advanced Driver Assistance Systems via a network of automotive specialist centres throughout New Zealand. The ADAS EXPERTS network also supports partners within the Windscreen Recalibration Industry.

Contact us at www.adasexperts.co.nz.

References

International Transport Forum, "Road Transport Annual Report 2020" www.itf-oecd.org

Ministry of Transport, "Safety - Road deaths" www.transport.govt.nz

Auckland Transport, "Vision Zero for the greater good" www.at.govt.nz

International Transport Forum "Zero Road Deaths Safe Systems" www.transport.govt.nz

Deloitte "Semi Conductors - the next wave" www.deloitte.com 2020

ANCAP "Availability of Autonomous Braking in Australia" www.ancap.com.au

International Transport Forum "Zero Road Deaths Safe Systems" www.transport.govt.nz

GRVA "Who is in Control?" www.unece.org 2020

Thatcham Research "UK Insurance Industry Requirements (IRR) for the safe repair of ADAS equipped vehicles" www.thatcham.org