



BOSCH

Bosch response to:

NTC Safety Assurance

Submission

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Introduction

The Bosch Group is a leading global supplier of technology and services. Operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology.

Our mobility solutions technology development is centred on the themes of connected, electrified and automated. The Bosch Group is developing automated driving technologies to increase safety and comfort and enable the self-driving car.

This submission paper is prepared by Robert Bosch (Australia) Pty Ltd (Bosch) and will cover:

- Background
- Key considerations
- Bosch approach to Safety Assurance
- Bosch recommendations

Bosch supports the need to establish a nationally consistent regulatory process to assure the safety of new and in-service road vehicles operating in Australia.



Background

The Chassis Systems Control division (a division of the Bosch Mobility Solutions business unit) of Bosch has led the way in automotive safety for 110 years with life-saving innovations such as ABS and ESP. As the world's largest automotive parts and systems supplier, Bosch continues to push the frontiers of automated driving and connected mobility, having built several of the most advanced self-driving vehicle prototypes in the world.

Bosch employs a deliberate and intentional approach to world-class safety: automotive testing, validation and road release are core competencies that are central to the Bosch Mobility division.

Through a well-managed global network of almost 400,000 employees in 150 countries, Bosch uses its reach, skills, experience and market position to influence the safe, efficient rollout of Automated Driving (AD) testing and development in key regions.

Key Considerations

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- Bosch supports a nationally consistent approach to an AD regulatory framework and road access, enabling commercial fluidity and mobility
- The terms ‘Automated Driving System Entity’ (ADSE) and ‘Operational Design Domain’ (ODD) need to be clarified and defined before a government and industry collaboration can adequately identify and mitigate safety risks.
- Bosch would support a transitional approach to a safety assurance system. The system infrastructure should be designed to support both comprehensive testing and encompass flexibility to grow with the industry
- While the proposed assessment criteria (*safety, innovation, flexibility & responsiveness, accountability & probity, regulatory efficiency, international and domestic consistency, safe ODD and timeliness*) are key considerations, Bosch also considers topics put forward by the National Highway Traffic Safety Authority (NHTSA) in North America to be pertinent:

Data Recording and Sharing	Consumer Education and Training	Post-Crash Behaviour
Privacy	Registration and Certification	Ethical Considerations
System Safety	Federal, State and Local Laws	Operational Design Domain
Vehicle Cybersecurity	Object and Event Detection and Response	Fall Back (Minimal Risk Condition)
Human Machine Interface	Crashworthiness	Validation Methods



Bosch Approach to Safety Assurance

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An efficient Safety Assurance System for Automated Vehicles must ensure that:

- The design (ODD) for which the automated function was created must be adequately described. It is also important to specify exclusions – what the function was **not** intended for
- Identification of potentially critical traffic situations and the human's capacity to avoid accidents
- The environments that the systems will be used in are categorized into different 'safety levels' (e.g. using Automotive Safety Integrity Level (ASIL) classification scheme)
- Quality criteria for a HAD function must span the lifetime of the vehicle, notwithstanding system updates, including over-the-air (OTA) updates

Goals (important for regulatory bodies to consider)

- Catalogue of critical traffic situations with probabilities, human capacity and accident avoidance potential as well as quality measures for HAD functions
- Catalogue of test and certification specifications
- Defined and proven toolchains including necessary processes
- Quality assurance of ADS entities' processes and procedures – not only focusing on product output but maintaining integrity throughout the development process

Bosch focus topics

- Definition of test methods and specifications (simulation, test track, field test)
- Use simulation environments and models and test tracks
- Derivation of limitations of the test methods in SAS



Bosch Recommendations

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- Bosch supports a risk management approach to safety, particularly at this early stage in the life-cycle of automated driving
- As the AD market matures, it is possible that elements of Self Certification and Accreditation could be useful
- A Pre-market approval structure would ensure comprehensive testing and restrict unsafe features from reaching the market
- Pre-market approval can be modified to be a transitional system but provides infrastructure that can be built upon as an enduring framework


Pre-market approval

- Automated driving systems are certified by a government agency (or a third party on its behalf) as meeting minimum prescribed technical standards, prior to market entry.
- Government develops testing processes and expertise for different applications and technologies.
- Manufacturer reports safety-critical events to government and must seek reapproval for any major changes to functionality.
- Onus on government to assess safety (or a third party on its behalf).
- ADRs continue to apply.
- Able to recognise equivalent processes in a manufacturer's country of origin.

Self-certification

-  Manufacturers make a Statement of Compliance against high-level safety criteria developed by government.
- ADRs and existing safeguards continue to apply.
- No additional regulatory oversight or reporting to government.
- If voluntary, manufacturers are incentivised to manage safety because of reforms to the Road Rules and other laws that will put legal obligations on the automated driving system entity.
- Could allow for recognition of overseas approvals.
- Could be supported by industry codes.

Accreditation

-  Government accredits an automated driving system entity, not the vehicle.
- The accredited party demonstrates it has identified and managed safety risks to a legal standard of care, such as 'so far as is reasonably practicable'.
- Three elements of safe design: vehicle integrity, environment (including operational design domain) and driver (including human-machine interface).
- No prescribed technical standards.
- Safety-critical changes to functionality and errors are reported to government.
- ADRs continue to apply.
- Able to recognise equivalent processes in a manufacturer's country of origin.