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Vehicle configuration's evolution and ADS safety along lifetime

Consideration about potential impact on safety requirements and evaluation process of ADS

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ADS safety requirements should be met in any [authorized] vehicle configuration

- The fact that “ADS should maintain a safe operational state”. (Ensure safety throughout the useful life of the ADS, such as safety-critical updates, responses to obsolescence, end of production, etc.) is one of the five main aspects of ADS performance listed by FRAV.

- According to VMAD, the validation for the system safety should take into account the “overall vehicle design into which the ADS is being integrated”.

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Vehicle configuration will evolve during lifetime

- due to the **use of the vehicle**,
  - Ex: load variation: vehicle unloaded, loaded, overloaded
- because some parts wear out and **their performance changes with wear**,
  - Ex: tyre breaking distance
- because they can be **replaced by parts different from those used to homologate the vehicle**,
  - Ex: retreaded tyres for trucks
- because their repair will induce a **different adjustment** from that carried out in the factory,
  - Ex: cameras, detection sensors,
- because **the traffic rules require it**.
  - Ex: winter tyre fitment.

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ADS safety can be impacted by the evolution of the vehicle configuration

- The Vehicle Manufacturer is **responsible** for the ADS's response strategy to these configuration changes to ensure safety.

- But how should these configuration changes be taken into account by the approval process ?
- Should they be part of the ODD ?
- Should they be managed by the vehicle owner/driver if not detected by the ADS itself ? And then how should the vehicle owner/driver be informed of that ?

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Example of interference between ADS safety requirements and vehicle configuration: R157 amendment for « highway chauffeur ».

- Braking demand threshold in case of « imminent collision » : 5 m/s²
- Detection table for speed above 60 km/h

Specified maximum speed / km/h	*Minimum forward detection range / m*
0…60	46
70	50
80	60
90	75
100	90
110	110
120	130
130	150

μ = 0,5
seems to be the minimum adhesion level required to ensure adequate reaction time even at 130 km/h.

Lower μ levels can be reached in operation depending on the road conditions (dry, wet, snow, ice…), the type of tires fitted on the vehicle, their level of wear…

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This observation raises two questions

- How will the system cope with different grip conditions depending on the road and the vehicle's tire fitment during the vehicle's lifetime?
  - What are the consequences for the vehicle user/owner if the solutions are not standard?
- How will the system comply with local traffic rules in winter (mandatory special equipment on specific roads & countries) without recognizing its tires?
  - Who is liable in case of accident? The vehicle manufacturer or the vehicle owner?
- GRVA work should take these questions into considerations when proposing regulatory framework
  - (however GRAV may not be responsible to address these questions)

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Thank you for your attention.

Pierre Bazzucchi
Pierre.bazzucchi@developpement-durable.gouv.fr

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