

## **Written evidence submitted by the Road Safety Markings Association (SDV0041)**

### **EXECUTIVE SUMMARY**

This submission shall highlight:

- The need to define 'successful operation' of Self Driving Vehicles (SDV).
- The lack of 'real world' research and trials.
- The risk to successful introduction of increased levels of automation due to poor infrastructure.
- The role/responsibility of Government and Local Authorities (LAs) to achieve success.

### **THE RSMA**

Established in 1976, the RSMA is the trade association for the road marking sector and is one of the largest specialist trade bodies in the highways industry. With a membership comprising road marking contractors, material manufacturers and suppliers covering all areas of the United Kingdom, the RSMA is uniquely placed to provide evidence on the road markings on the UK road network and how this critical infrastructure impacts directly on how SDVs will be able to operate in the future.

### **THE NEED TO DEFINE 'SUCCESSFUL OPERATION' OF SDVs**

If you can't measure it, you can't manage it.

The UK must agree a definition for 'successful operation' of SDVs. This in itself is hindered by the now ubiquitous use of the term CAV and a failure to recognise that Connected and Autonomous are separate capabilities, (which may at times may overlap or be interdependent) that use the Vehicle as a platform for their operation.

I intend only to address the definition of 'successful operation' of the 'autonomous', or 'automated' function.

If for example a LKA equipped vehicle is unable to maintain its position, it shall require the driver to retake control – this is 'successful operation' – the vehicle has operated as it should. Likewise, if the driver responds appropriately, this

too could be defined as successful operation. That said, if LKA continues to drop out for x% of time/distance travelled, I would argue that although certain elements of the system have continued to achieve 'successful operation' the system as a whole has not.

The 3 elements comprising the systems approach to 'successful operation' are vehicle, driver and infrastructure. Each element contributes to the achievement or otherwise of 'successful operation' of the system as a whole. It is essential therefore that the holistic view should be taken and a systems approach be taken in defining 'successful operation'.

The public perception of 'successful operation' must also be considered. Each individual driver will establish their own personal definition of 'successful operation'. The confidence level of individual drivers/ purchasers of, for example, LKA capable vehicles may be eroded if the holistic 'system' fails to achieve what in their minds, is 'successful operation'. This in turn may lead individuals to be less trusting of subsequent development and further automated functionality and more reticent to invest in enhanced vehicle capabilities that may not achieve, in their opinion, 'successful operation'. This in turn may reduce/stunt the willingness of individuals to support the transition to greater levels of automation, the result of which shall be the failure to deliver the anticipated safety benefits of increasing levels of automation (a key pillar in the desire for increased levels of automation) and, ultimately, may lead to the UK failing to secure its desired position as *'a global science superpower'*.

## **THE LACK OF 'REAL WORLD' RESEARCH AND TRIALS**

Much is made of the many research and trials initiatives taking place throughout the UK. I would contend that these are either a) looking too far into the future and failing to assess the short-medium term or b) much of the work actively avoids 'real world' scenarios by creating near-perfect conditions in what are in effect outdoor laboratories – or both.

Little if any research addresses the 'real world' operation of Level 2/3 automation; the challenges of the present. There appears to be little clear understanding in respect of the current condition of 'real world' road markings and whether such work would generate a less optimistic picture of 'successful operation'.

One example of current guidance intentionally avoiding 'real world' scenarios:

- PAS 1881:2020 – *'Restrictions might include not testing where there identified environmental conditions (eg: .....poor lane markings,.....)'*.
  - This statement also fails to define 'poor' - the result being a subjective assessment.

## **THE RISK TO INCREASED LEVELS OF AUTOMATION DUE TO POOR INFRASTRUCTURE**

In the short-medium term, road markings shall remain pivotal to road user safety, allowing for the drivers of non-automated vehicles to safely navigate a road, as well as allowing for a semi-automated vehicles to operate. However, all too often, road markings are not being maintained, they are often neglected and left to fade. Without high quality road marking infrastructure, SDVs will not be able to operate successfully.

The UK Government has stated previously its intention to permit Automated Lane Keeping System (ALKS) equipped vehicles to operate on UK roads, with the aim of *'securing the UK's place as a global science superpower'*. Lane Keep Assist (LKA), already available in many new vehicles, is a 'stepping stone' to ALKS, but there are times when LKA simply does not work as the vehicle cannot 'read' the road markings. This is acknowledged in much research documentation. One example of which is:

- TRL PPR979: *'Unplanned event – a situation which is unknown in advance that creates uncertainty or affects the system's ability to perform the dynamic driving task (e.g.....missing lane marking)'*.

The dependence on high quality markings to the successful operation of automated vehicles is exemplified in one particular response to the CCAV Consultation 2020 *'Safe Use of ALKS'*. National Highways (then Highways England) commented that *'evidence suggests a high standard of road marking is necessary for successful lane recognition by ALKS'*.

It is generally accepted that the Strategic Road Network (SRN) shall be the entry point for operation of increasingly automated vehicles. It is also generally accepted that, due to budgetary pressures, road markings on the SRN are

installed and maintained to a higher standard than those on the LA maintained Major Roads Network (MRN). The MRN is the logical next step network on which the use of increasingly automated vehicles will be approved. The irony being that the SRN is the safest network in the UK and without upgrading the standard of the LA network (including MRN), the central pillar of reduced road casualties shall not be delivered for many years.

*'Lining the Way: A National Examination of Road Markings (Edition 2) 2021'* undertaken by Gaist on behalf of DfT found that over 15% of the lines on A Roads were classed as 'poor'.

The RSMA has previously undertaken its own research on the condition of road markings across England. *'Lifelines 2016'* surveyed almost 4,000km of roads in England, of which almost half was LA controlled. *'Lifelines 2016'* found that almost 1/3 of road markings on LA controlled roads needed replacing immediately.

Mindful of the need to obtain a better understanding of the condition of road marking on the MRN the RSMA commissioned an independent survey that took place during Aug 22. The survey, undertaken by Reflective Measurement Services Ltd surveyed approximately 2,200km, comprising mainly LA controlled MRN roads in England. This survey shall establish the current condition of road markings, but also the preparedness of the MRN to meet the challenges of the transition to vehicles with increasing levels of automation. The results of the survey are not yet available to the RSMA and are therefore not included in this submission.

There is no uniformity of standards for road markings between the SRN and LA road networks (including MRN) or between LA road networks.

The SRN operates in accordance with *CS 126 - Inspection and assessment of road markings and road studs*, found within the Design Manual for Roads and Bridges. CS 126 defines when Overseeing Organisations (e.g. National Highways) are to inspect road markings on their network and at what point intervention action should be taken if the road markings become too worn. This allows for Overseeing Organisations to maintain road marking infrastructure on their networks to a high standard, re-installing road markings when necessary. In applying CS 126 to only the SRN an imbalance of standards and uniformity is created between the SRN and other networks.

The RSMA has attempted to correct this imbalance through the publication of STANSPEC 2022. STANSPEC 2022 deals with the supply and installation of road markings on LA road networks and contains the intervention and assessment aspects of CS 126, allowing for road markings to be inspected more frequently and maintained to a higher standard than they would have otherwise been. However, while this standard fills a void, it is voluntary; the RSMA has no power to force LAs to adopt it. Unless and until Government mandates the application of CS 126 to the MRN, the UK's operation of increasingly automated vehicles shall remain confined to the SRN, or worse still, the absurd scenario where a semi-automated vehicle could operate in one particular county but be unable to operate once it reaches the county boundary due to a lack of consistency in road marking standards.

In Jan 2018, the United States Federal Highway Administration (FHWA) stated, "Greater Uniformity and quality in road markings and traffic control devices would enable automation.

Having greater consistency in road markings and traffic control devices and an improved state of good repair benefits all road users, including ADS."

In 2013, Michael J. Robinson of General Motors testified before the [US] House Committee on Transportation and Infrastructure Subcommittee on Highway and Transit saying that, "One of the key highway needs is to provide – at a minimum – clearly marked lanes and shoulders."

In October 2018, the [US] DOT stated "The U.S. DOT recognizes that the quality and uniformity of road markings ... support safe and efficient driving by both human drivers and automated vehicles."

## **THE ROLE/RESPONSIBILITY OF GOVERNMENT AND LOCAL AUTHORITIES TO ACHIEVE SUCCESS.**

Don't forget the human.

Highway infrastructure is constantly evolving. A decade or so ago the focus was accommodating older drivers. In the transition towards greater automation and, as the focus shifts from the human driver to the machine driver, the needs of the human driver must be met. For many more years a mix of human drivers and machine drivers will share road networks. In adopting automated

vehicle technologies the UK Government and LAs must accommodate the needs of human drivers.

Much of the automated capability currently available relies on machine vision for most driving functions. For machine vision to be safe and effective for these vehicles, infrastructure such as highly detectable pavement markings and signage is required. Meanwhile, human drivers will continue to benefit from infrastructure that is easy to interpret and can be seen in a range of driving conditions.

Road markings are of critical importance to conventional drivers and SDVs. Level 5, fully-automated SDVs shall not happen quickly, a very long road must be travelled before SDVs are the norm – a road comprising a mixed-fleet of vehicles: conventional drivers and SDVs.

Funding.

The UK Government must secure or provide sufficient ring-fenced investment to improve the infrastructure of the UK road network, in particular the road markings of the SRN and MRN, if progress towards increased levels of vehicle automation is not to be negatively impacted. This should not be at the expense of funding made available to LAs for 'other' roads.

## **CONCLUSIONS**

- Define successful operation based on a holistic 'systems based' approach not individual elements.
- Accept that the quality of roads markings is pivotal to successful operation of SDVs.
- Undertake research and trials in the real world to obtain 'warts and all' results.
- Undertake a comprehensive study of the SRN and MRN of the current condition of road markings and both a) the ability to be read by machine and b) non-machine drivers.

- Mandate CS 126 applies to the MRN.
- Learn lessons from the experience of other countries.
- Reap the benefits of improved road safety as soon as possible. Expand operations onto the MRN and improve road markings in order to achieve this.
- Be prepared to address the short-medium term and not focus on over the horizon capabilities.
- Ensure sufficient protected funding is available to National Highways and LAs to ensure the UK achieves its aim of becoming a '*global science superpower*'.

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