Insurance Institute for Highway Safety
Highway Loss Data Institute

IIHS
1005 N. Glebe Road, Suite 800
Arlington, VA 22201
+1 703 247 1500

iihs.org

July 26, 2019

The Honorable Raymond Martinez
Deputy Administrator
Federal Motor Carrier Safety Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Request for Comments on "Federal Motor Carrier Safety Regulations: Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles" Docket No. FMCSA-2018-0037

Dear Administrator Martinez:

The Insurance Institute for Highway Safety (IIHS) welcomes the opportunity to comment on the Federal Motor Carrier Safety Administration's (FMCSA's) advanced notice of proposed rulemaking on the safe integration of commercial motor vehicles (CMVs) equipped with an SAE Level 4–5 automated driving system (ADS). IIHS realizes the potential of automated driving systems to improve both safety and productivity, and expects that FMCSA's actions in regulating the use of automated driving systems in interstate commerce will prioritize safety above all else.

General themes that apply to FMCSA's questions

Before addressing some of the specific questions posed by FMCSA, IIHS offers some general themes that apply to many of the questions FMCSA posed.

- Automated driving systems operating without constant human supervision must do all the things an ideal human driver must do (e.g., stop for rail crossings and emergency vehicles, recognize all traffic/roadway situations, pull over after a crash, etc.).
- FMCSA should regulate transparency of the use and testing of automated driving systems in interstate commerce by requiring ADS information, exposure measures, and all crash involvements/circumstances to be reported and compiled into a publicly accessible database.
- If a CMV can be manually controlled, then both the vehicle and its driver must meet all current qualifications, regardless of the level of driving automation available in the CMV.

Specific questions and IIHS responses

1.1. How should FMCSA ensure than an ADS-equipped CMV only operates consistent with the ODD for the ADS equipped on the vehicle?

FMCSA should consider a rule requiring that automated driving systems be used only within their intended operational design domains (ODDs), which would encourage manufacturers to be as clear as possible about defining the ODD. Further, FMCSA should consider requiring automated driving systems used in interstate commerce to self-limit to the ODD to every extent possible.

1.3. Should FMCSA consider amending or augmenting the definition of "driver" and/or "operator" in 49 CFR 390.5 or define a term such as "ADS driver" to reduce the potential for misinterpretation of the requirements?

Yes, but only in future systems in which there is no human at the controls, as discussed in this request for comments. For example, it would be inappropriate to refer to a SAE Level 3 system as an "ADS Driver", or anything similar, when discussing driver responsibility in regulations.

2.1. Should a CDL endorsement be required of individuals operating an ADS-equipped CMV?

If the truck can be operated manually, then a CDL should be required – along with all other eligibility requirements to operate a CMV. Furthermore, given the potentially complex human-machine relationship posed by ADS operation, FMCSA should consider an ADS endorsement on top of the CDL and what the qualifications for this additional endorsement would be.

2.4. Should a driver be required to have specialized training for ADS-equipped CMVs?

Yes. If a driver operates an ADS-equipped CMV, it makes sense for the driver to have been trained in the use of that specific ADS. This is especially important for lower levels of automation (SAE Level 2 and Level 3), albeit not the focus of this request for comments, which can require immediate or persistent driver interventions. A recent Institute study (Mueller, Cicchino, Singer, & Genness, 2019) showed that a brief training session can improve passenger vehicle drivers' understanding of Level 1–2 system state as communicated by the instrument cluster, but that training alone does not eliminate driver confusion.

2.5. In an operational model that has an individual remotely monitoring multiple CMVs, should the Agency impose limitations on the number of vehicles a remote driver monitors?

Yes, clearly there should be a limit, and the first step in finding that limit is to determine if one person can adequately monitor more than one vehicle. Answering this question depends heavily on the specifics of the ADS-equipped CMVs being monitored and the monitoring technology.

2.6. Is there any reason why a dedicated or stand-by remote operator should not be subject to existing driver qualifications?

No. Anyone operating, or potentially operating, a CMV should be subject to all existing qualifications.

3.1. Should HOS rule changes be considered if ADS technology performs all the driving tasks while a human is on-duty, not driving; off-duty or in the sleeper berth; or physically remote from the CMV?

IIHS does not see the need for HOS (hours of service) rule changes beyond clarifications. In particular, this situation largely parallels non-ADS CMV operation with two drivers working as a team, in terms of how the human tracks his or her hours.

3.2. Should the HOS requirements apply to both onboard and remote operators?

Yes, there is no reason to think fatigue is not an issue for remote operators.

3.3. If so, how should HOS be recorded when an individual is not physically in control of the vehicle?

FMCSA should require the use of some kind of technology to ensure the remote operator is indeed operating or supervising the ADS/CMV adequately. If technology exists to remotely operate a CMV and monitor the person at the controls, then surely recording these hours will not be very challenging.

4.1. Should some of the physical qualification rules be eliminated or made less stringent for humans remotely monitoring or potentially controlling ADS-equipped CMVs?

Any physical qualifications related to the driving task should remain in place for drivers who can operate a CMV onboard. Examples of the need for manual operation would include ADS being temporarily disabled (e.g., for maintenance reasons) and operation outside of the ODD. For remote operation of CMVs, it is possible that some requirements could be waved depending on how these systems are designed. For example, loss of a leg would not be an issue if the remote operation system is designed without foot pedals; hearing ability may not be an issue if systems issue only visual/haptic feedback instead of audio and do not transmit sounds from the CMV.

4.3. Should the Agency consider less restrictive rules for humans who have the benefit of ADS technology to assist them in controlling the vehicle (e.g., technologies that would enable individuals with limb impairments to operate at a level comparable to individuals without such impairments)?

If the CMV can be operated without ADS, then all current driver qualifications clearly must apply.

5.1. How should the prohibition against distracted driving (i.e., texting, hand-held cell phone) apply to onboard operators responsible for taking control of the CMV under certain situations, and to remote operators with similar responsibilities?

Because these drivers are responsible, or potentially responsible, for part of the driving task, the prohibitions should apply as they do currently. Distracted drivers cannot be expected to supervise ADS adequately.

6.1. Should FMCSA consider revising its rules to ensure that (1) any human exercising control of an ADS-equipped vehicle must continue to comply with all the rules under Part 392, and (2) a CMV under the control of a Level 4 or Level 5 ADS must satisfy the operational rules?

Yes. However, it is not clear that any revision is necessary, perhaps beyond a simple clarification. There is no reason drivers or CMVs should be exempted from safety regulations.

6.2. For example, should FMCSA require that the ADS be capable of identifying highway-rail grade crossings and stopping the CMV prior to crossing railroad tracks to avoid collisions with trains, or going into a highway-rail grade crossing without having sufficient space to travel completely through the crossing without stopping?

Yes. If ADS takes over the driving task without human input, it should be required to do the same things human drivers are required to do. Collisions with trains should be avoided for ADS-equipped CMVs as well as for conventional CMVs.

6.3. For scenarios in which the control of the ADS-equipped CMV alternates, or may alternate, between a human and the technology, should FMCSA require that both the human operator and ADS comply with the applicable operational rules?

Yes.

7.1. What qualifications should be required of the individual performing the pre-trip inspection?
7.2. What kind of routine or scheduled inspections should be performed and what types of ADS-related maintenance records should be required?
7.3. Should the inspection period be more or less frequent than annual for an ADS-equipped CMV?
7.4. Should inspections be mileage-based or time-based (e.g., 1,000 miles, 3 months, or 1,000 hours of operation)?

IIHS does not have specifics to offer, but encourages FMCSA to use this authority to ensure the safe function of automated driving systems as well as CMVs in general in terms of inspection rules. Inspection violations are known to be a risk factor for interstate large truck crashes (Teoh, Carter, Smith, & McCartt, 2017), and there is little reason to believe that would be different for ADS-equipped CMVs. Furthermore, advanced automated driving systems may offer opportunities to conduct self-inspection as a backup/redundancy to standard inspection procedures. Developing the specifics for answering these questions likely will have to wait until such vehicles exist on the market to understand their capabilities and opportunities.

7.5. Should FMCSA impose general requirements for motor carrier personnel responsible for ADS-related inspection, repair, and maintenance tasks similar to the Agency's brake inspector qualification requirements?

This is a good idea, but because such vehicles do not exist on the market yet, it would be premature to specify any such requirements.

7.6. How could FMCSA ensure that motor carriers apply safety-critical software updates?

FMCSA should work with NHTSA to design a FMVSS requirement that will ensure certain such information is made available to officers during roadside inspections. For example, systems can be designed to display the software version and installation date as well as ADS manufacturer on an interface screen or smartphone app.

8.1. Should motor carriers be required to notify FMCSA that they are operating Level 4 or 5 ADS-equipped CMVs?
8.2. If so, how should the carrier notify FMCSA?

In order to improve understanding of the safety effects of such systems, motor carriers should be required to periodically report (at minimum) ADS manufacturer, model, and version; vehicle miles traveled; crash involvements; and the circumstances of those crash involvements for all ADS-equipped CMVs they operate—including on-road testing of pre-market ADS prototype systems. Compiling these data, which need not include any proprietary or confidential information, into a publicly available database would allow FMCSA, safety organizations, and the public to evaluate the safety and progress of ADS-equipped interstate CMVs. If there are safety problems, they can be identified faster this way. If automated driving systems are safe beyond expectations, they can be implemented more broadly sooner.

8.4. Should the Agency require motor carriers to utilize ADS-equipped CMVs that have a malfunction indicator?

It seems like a good idea to require a malfunction indicator. Lack of feedback and interaction between automation and operator has been observed as a problem in commercial aviation automation (Norman, 1989). However, FMCSA should consider whether such an item should follow from a larger strategy to ensure the safe performance of ADS systems on CMVs. For instance, ADS should be designed to detect high-risk malfunctions and respond accordingly (e.g., pull over and park the CMV).

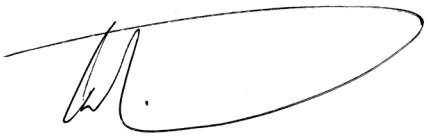
8.5. Should the Agency require that motor carriers deploying ADS-equipped CMVs ensure the vehicle can pull over in response to Federal and State officials or move out of the way of first-responders?

ADS-equipped CMVs, operating without human supervision, must do the things human-driven CMVs must do. It is not clear whether ensuring this is the responsibility of the carriers deploying ADS-equipped CMVs, the manufacturers of the ADS technologies, or other entities.

Summary

To summarize, FMCSA is wise to plan ahead, but must recognize that regulating certain aspects of ADS operation likely depends on specifics of such systems once they are developed. If the human is not directly in the loop, ADS must do all the things a human driver must do. If a CMV can be operated manually, it is important that it and its driver meet all qualifications for non-ADS-equipped CMVs. Also, FMCSA should ensure that efforts to plan ahead for automated driving systems do not detract from moving forward with currently existing countermeasures that work.

Sincerely,



Eric Teoh
Senior Statistician

References

Mueller, A.S., Cicchino, J.B., Singer, J., Jenness, J.W. (2019). *Effects of training and display content on Level 2 driving automation interface usability*. Arlington, VA: Insurance Institute for Highway Safety.

Norman, D.A. (1989*). The "problem" of automation: inappropriate feedback and interaction, not "overautomation"* (Report No. 8904). La Jolla, CA: Institute for Cognitive Science, University of California, San Diego.

Teoh, E.R.; Carter, D.L.; Smith, S.; McCartt, A.T.. (2017). Crash risk factors for interstate large trucks in North Carolina. *Journal of Safety Research, 62*, 13-21.