
2016 Transportation Research Board 95th Annual Meeting
Federal Motor Carrier Safety Administration
Analysis, Research, and Technology Forum
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NHTSA Automation Levels

- **Level 0: No Automation**
  - Driver in complete and sole control at all times
  - No automation
  - Now

- **Level 1: Function-specific Automation**
  - Driver can regain control or stop faster than if driving without the special function
  - Involves 1 or more specific control functions (e.g., stability control, pre-charged brakes)
  - No automation
  - Now

- **Level 2: Combined Function Automation**
  - Driver is temporarily relieved of these driving functions
  - Involves automation of at least 2 primary control functions working in unison (e.g., adaptive cruise control in combination with lane centring)
  - Now
  - 2013+

- **Level 3: Limited Self-Driving Automation**
  - Driver must be available to take over controls
  - Enables all safety-critical functions to be automated (incl steering, throttle, brake). The vehicle monitors any changes in conditions that require a transition back to driver control
  - 2020+?

- **Level 4: Full Self-Driving Automation**
  - Driver not expected to take control at any time
  - Vehicle is designed to perform all safety-critical driving functions and monitor road conditions for an entire trip (Includes both occupied and unoccupied vehicles)
  - 2025+?

Source: NHTSA (Modified)
Commercial Vehicle Automation Today: Level 2

- Automatic emergency braking (AEB) now required on heavy trucks in Europe.

- “Optioned In” today, along with:
  - Forward collision warning (FCW).
  - Lane departure warning (LDW).
  - Smart Cruise.
Advanced Automation: Near-Term Implementation—Level 3

- "Low-hanging fruit"
- Constrained environments:
  - Port queues.
  - Distribution warehouses.
  - Mine hauling.
Platooning

- Driver-operated first vehicle.
- Following under lateral and longitudinal control.
- Under ideal conditions, platooning trucks can travel as close as 36 feet from each other.
Connected Vehicles

- Vehicle-to-vehicle (V2V)
- Vehicle-to-infrastructure (V2I)
Connected/Automated Vehicle

- Combining V2V, V2I with AV systems.

Connected Automated Vehicle
Leverages autonomous and connected vehicle capabilities
Technical and Policy Challenges

- Public expectations.
- Human factors.
- Cybersecurity.
- Testing and certification complexity.
- Harmonizing State and local regulations.
- National Highway Traffic Safety Administration (NHTSA) mandates?
- Federal Motor Carrier Safety Regulations (FMCSRs).
- Inspections.
Proposed FMCSA Projects

- Commercial Motor Vehicle (CMV) Automated Vehicle Research:
  - Develop a research roadmap to identify the impact to the FMCSRs.

- Low-Speed Automated Truck Queue at Ports and Warehouses:
  - Research of studies.
  - Feasibility study.
Active Federal Highway Administration Projects

- Partial Automation for Truck Platooning:
  - Prime Contractor: California Department of Transportation.
  - Partners: Partners for Advanced Transit and Highways (PATH) (main technical partner, lead); Volvo Technology America; Cambridge Systematics; LA Metro; Gateway Cities; Peloton.

- Heavy Truck Cooperative Adaptive Cruise Control (CACC)—Evaluation, Testing, and Stakeholder Engagement for Near-Term Deployment:
  - Prime Contractor: Auburn University.
  - Partners: Peterbilt; Meritor Wabco; Peloton; American Transportation Research Institute (ATRI).
FMCSA Joint Projects

- Proposed analysis* in the following areas:
  - Commercial driver’s license (CDL) licensing.
  - Safety Measurement System (SMS) algorithm.
  - Hours of service.
  - Investigation/inspection criteria.
  - Advanced inspection tools and techniques.
  - Skill sets for roadside inspectors.

How Do We Inspect Advanced Technology?

VISUAL INSPECTION?
How Do We Inspect Advanced Technology?

WIRELESS INSPECTION?
Example of Proposed Project: Antilock Braking System (ABS) Test Tool

- Mandate of electronic stability control (ESC).
- FMCSRs revision.
- Inspection criteria.
- Roadside analysis of the system(s).
- A tool for use by the inspector to quickly and accurately check the “health” of the ABS.
- What about even more advanced technologies if they become ubiquitous?
  - Smart Cruise, Lane Keeping Assist, Automatic backing, etc.
Roadside Inspection?
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Credits

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