



Research and Testing to Accelerate Voluntary Adoption of Automatic Emergency Braking (AEB) on Commercial Vehicles

OVERVIEW

Automatic emergency braking (AEB) is a collision avoidance technology that applies braking force in response to input from radar or other sensors. AEB has been available on heavy-duty vehicles for over a decade, and fleets using the technology have reported its efficacy in reducing the number and severity of crashes. A previous study showed that if AEBs were installed on all heavy-duty trucks, 55 fatalities, 2,753 injuries, and 5,294 crashes could be avoided annually.ⁱ

Wide-spread adoption of AEB has yet to occur; as of 2017 about 12.8 percent of vehicles in the U.S. heavy truck fleet were equipped with AEB. Due to the long useful life of commercial vehicles, new vehicles sold without AEB remain in service for years. Retrofitting a vehicle with AEB is possible but not cost-effective. Accelerating voluntary AEB adoption on new vehicle purchases presents the best opportunity to increase the share of operating vehicles equipped with AEB.

PURPOSE

To understand what barriers could prevent widespread voluntary AEB adoption, FMCSA commissioned a study to analyze AEB technical and marketing issues and gather information from industry experts and stakeholders. This report

presents findings along with 10 recommendations to increase voluntary AEB adoption toward a goal of 90 percent of new truck sales.

METHOD

This study explored AEB adoption in three steps:

1. A literature review to collect information about adoption rates, product updates, fleet opinions, and safety benefits.
2. Consultation with AEB suppliers and heavy vehicle manufacturers to identify technical barriers.
3. Consultation with AEB suppliers, heavy vehicle manufacturers, and insurers to identify market barriers.

Table 1. New class 8 trucks, estimated take rates, and estimates of AEB systems sold by year.

Year	New Class 8 Truck Sales ⁱⁱ	Est. Take Rate ⁱⁱⁱ	Est. AEB Systems Sold ^{iv}	Est. Cumulative AEB Sales
2009	94,790	1%	948	948
2010	107,140	3%	3,214	4,162
2011	171,350	5%	8,568	12,730
2012	194,710	10%	19,471	32,201
2013	193,010	15%	28,952	61,152
2014	220,340	20%	44,068	105,220
2015	248,730	30%	74,619	179,839
2016	192,520	40%	77,008	256,847
2017	192,252	50%	96,126	352,973

ⁱ American Automobile Association Traffic Safety Foundation, "Leveraging Large-Truck Technology and Engineering to Realize Safety Gains: Automatic Emergency Braking Systems," September 2017.

ⁱⁱ Oak Ridge National Laboratories. "2013 Vehicle Technologies Market Report." 2014; Oak Ridge National Laboratories. "2016 Vehicle Technologies Market Report." May 25, 2017; Gilroy, Roger. "Class 8 Sales Jump 43% in December to Cap Strong 2017." *Transport Topics*, January 12, 2018.

ⁱⁱⁱ Estimated AEB systems sold, divided by total new class 8 truck sales.

^{iv} Huetter, John. "Meritor WABCO Celebrates 10 Years of OnGuard, Says Tech Can Cut Rear-Ending Up to 87%." *Repairer Driven News*, March 8, 2017; Bendix Commercial Vehicle Systems. "Growing Adoption of Bendix Wingman Fusion Points to Future of Driver Assistance Systems." *OEM Off-Highway*, March 22, 2017; Menzies, James. "New Cascadia Driving Higher Penetration of Proprietary Components." *Truck News*, July 27, 2017.

FINDINGS

A 2012 estimate suggested that full adoption of AEB on large trucks could prevent up to 16–28 percent of front-to-rear crashes.^v Fleets now using AEB reported even better results.

Fleets

The up-front installation costs of AEB can approach \$5,000 per truck. The difficulty of calculating the exact return on investment (ROI) for AEB may represent a market barrier for fleets. Factors impacting ROI calculations include:

- Fleet exposure to crash and liability risk.
- How AEB affects exposure.
- Training expenses.
- Differences between generations of AEB.

Additionally, insurers may not be willing to offer discounted premiums for AEB without stronger data about its effects on liability. Positive ROIs could take years to realize and may depend on driver training and use of data gathered by AEB systems.

Drivers

Drivers' acceptance is critical to effective voluntary adoption of AEB. Early systems had issues with false activations, which may skew drivers' perceptions of current systems. The study found that the variety of AEB brands and number of generations, many with different interfaces and capabilities, are sources of confusion and a possible barrier to driver acceptance. AEB is also integrated with audio/visual alerts, and the frequency of alerts during non-critical situations is likely annoying to drivers.

Medium-Duty Markets

The medium-duty market has unique barriers to voluntary adoption, as AEB systems are unavailable on vehicles without electronic stability control (ESC), not standard on many medium-duty trucks. These trucks have a wide range of applications, some in environments that could damage AEB sensors and render the system inoperable. Some

applications may also minimize the benefits of AEB; the value of the system on a construction site compared to a highway is still unknown.

Multiple original equipment manufacturers (OEMs) are involved in building medium-duty trucks for specialized applications, with different OEMs building the chassis and body. The chassis OEM might not know a truck's eventual purpose and be unable to recommend ESC or AEB.

The long service life of both medium- and heavy-duty vehicles means that new trucks without AEB remain in service for years, and retrofits are not currently fiscally viable. Some OEMs now offer AEB as a standard feature on heavy-duty trucks, but they also offer discounts to customers who choose to remove the system.

RECOMMENDATIONS

The study identified 10 actions to promote voluntary AEB adoption. While many combinations of actions are possible, the study describes one low-risk core strategy that focuses on 4 of the 10 actions:

1. Work with industry to inform fleets about potential liability risks associated with deleting an OEM's standard safety technology from new truck purchases.
2. Develop and disseminate tools to assist fleets in calculating the ROI of AEB.
3. Encourage industry to develop standards for fleet training and fleet data use related to AEB.
4. Encourage industry groups to provide recommended practices or guidance on AEB functions and interfaces to improve consistency.

To read the complete report, please visit:

<https://rosap.nhtl.bts.gov/view/dot/49335>

^v Woodrooffe, J., Blower, D., Bao, S., Bogard, S., Flannagan, C., Green, P. E., LeBlanc, D. "Final Report: Performance Characterization and Safety Effectiveness Estimates of Forward Collision Avoidance and Mitigation Systems for Medium/Heavy Commercial Vehicles." Docket No. NHTSA-2013-0067. Washington, D.C.: National Highway Traffic Safety Administration, 2012.