

LEVERAGING LARGE-TRUCK TECHNOLOGY AND ENGINEERING TO REALIZE SAFETY GAINS

INTRODUCTION

Large trucks with gross vehicle weight rating of more than 10,000 pounds drove approximately 280 billion miles on U.S. roads in 2015 and were involved in a total of over 400,000 crashes, which resulted in 116,000 injuries and 4,067 deaths. Advances in vehicle safety technology provide the opportunity to prevent substantial numbers of these crashes, injuries, and deaths. Examples of such technologies include braking systems designed to shorten a truck's stopping distance, systems that warn the driver if the truck begins to drift out of its lane, and systems that can detect when a crash is imminent and automatically apply the brakes if the driver fails to do so. The purpose of this study was to estimate the cost-effectiveness of these technologies by comparing the economic value of the benefits associated with installing these advanced safety technologies on large trucks with the costs of doing so.

KEY FINDINGS

Benefit-cost analyses were performed for four advanced safety technologies. Key findings include:

Lane departure warning systems: Installing these systems on all large trucks (existing as well as new trucks) could potentially prevent as many as:

■ 6,372 crashes ■ 1,342 injuries ■ 115 deaths annually

Video-based onboard safety monitoring systems: Installing these systems on all large trucks (existing as well as new trucks) could potentially prevent as many as:

■ 63,000 crashes ■ 17,733 injuries ■ 293 deaths annually

Automatic emergency braking systems: Installing these systems on all large trucks (existing as well as new trucks) could potentially prevent as many as:

■ 5,294 crashes ■ 2,753 injuries ■ 55 deaths annually

Air disc brakes: Installing air disc brakes on all combination unit trucks (existing as well as new trucks) could potentially prevent as many as:

■ 2,411 crashes ■ 1,447 injuries ■ 37 deaths annually

Research results show that the benefits of equipping all new and existing large trucks with lane departure warning systems and video-based onboard safety monitoring systems would far outweigh the cost of doing so. The benefits of equipping all new large trucks with automatic emergency braking systems and air disc brakes would likely outweigh the costs as well.

ABOUT

Established in 1947 by AAA, the AAA Foundation for Traffic Safety is a not-for-profit, publicly funded, 501(c)(3) charitable research and educational organization. The AAA Foundation's mission is to prevent traffic deaths and injuries by conducting research into their causes and by educating the public about strategies to prevent crashes and reduce injuries when they do occur. This research is used to develop educational materials for drivers, pedestrians, bicyclists and other road users. Visit www.AAAFoundation.org for more information.

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METHODOLOGY

Researchers examined the benefit-cost ratio of equipping large trucks with selected advanced safety technologies including:

- Lane departure warning systems, which detect when the vehicle drifts out of its lane and warn the driver.
- Video-based onboard safety monitoring systems, which use in-vehicle video cameras and other sensors to monitor the driver's behavior and performance, and help the driver's employer to provide feedback to the driver and improve their driving.
- Automatic emergency braking systems, which detect when the truck is in danger of striking the vehicle in front of it and brake automatically if needed.
- Air disc brakes, which provide maintenance and performance advantages relative to traditional drum brakes.

The number of crashes that these technologies could prevent was estimated using the best available studies, recommendations of an expert advisory panel comprising experts from the federal government and trucking industry, and data on rates of large truck crashes in years 2010 – 2015.

The present economic value of the estimated crash reduction took into account costs associated with medical care, emergency medical services, property damage, lost productivity, and monetized value of pain, suffering, and quality of life loss. While it is impossible to quantify the emotional cost of a crash on those affected, the study aimed to utilize a common societal cost calculation method that is widely accepted in the research community.

Costs considered were hardware installation, purchase, financing, maintenance, replacement of systems, training of drivers, and training of managers where applicable. Costs were based on published reports, information from technology vendors, and recommendations from the expert advisory panel.

Analyses were performed both for installing the relevant systems on all large trucks nationwide (both existing trucks and new trucks) and for installing the systems only on new trucks.

Analyses used the U.S. Office of Management and Budget method for calculating societal-level benefits and costs. Sensitivity analyses examined a range of possible system efficacy, costs, and monetary discount rates for benefits and costs experienced in the future.

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Lane Departure Warning Systems

VIEW REPORT

Video-based Onboard
Safety Monitoring Systems

VIEW REPORT

Automatic Emergency Braking Systems

VIEW REPORT

Air Disc Brakes

VIEW REPORT

