

## Reducing Lane Departure Crashes

Working closely with safety systems manufacturers and the trucking industry, FMCSA has tested and evaluated forward-looking, vision-based systems that will assist drivers to consistently keep their vehicle within a roadway lane. The following on-board system can help prevent lane departure crashes:

- Lane departure warning systems (LDWS) are in-vehicle systems that monitor the position of a vehicle within a roadway lane and warn drivers if the vehicle deviates or is about to deviate from the lane. An LDWS warns the driver of a lane departure when the turn signal is not used. They also notify drivers when lane markings are inadequate for detection or if a system malfunctions. An LDWS can help prevent single vehicle roadway departure, lane change/merge, and rollover crashes, but does not take automatic action to avoid a lane departure or control the vehicle. Monitoring the vehicle position in the travel lane with the LDWS and detection of lane drifting, weaving, and tracking the lane may also be valuable as a driver training aid.



## Partnerships Are the Key to Success

In cooperation with the Technology and Maintenance Council within the American Trucking Associations and the American Transportation Research Institute, FMCSA is working with the industry to promote voluntary adoption of these on-board safety systems within trucking fleets.

As part of this partnership, voluntary functional requirements and recommended practices are being developed to define these safety systems and their operational functionality.

## Return on Investment

FMCSA is also analyzing and computing the economic benefits, expected costs, and industry return on investment of these on-board safety technologies. Verifying the costs and benefits of safety systems is critical for industry acceptance and for facilitating deployment.

## Improving Transportation Safety

Working together with the trucking industry, FMCSA envisions a future of smart technologies that support the expanding role of the trucking industry to safely and securely transport the nation's goods and products.

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**Please visit [www.fmcsa.dot.gov](http://www.fmcsa.dot.gov)** for more information about on-board safety systems by using the search feature with the following key words: "lane departure", "stability", and "forward collision".

## Federal Motor Carrier Safety Administration Office of Research and Analysis

# Deployment of On-Board Safety Systems



U.S. Department of Transportation

## Key On-Board Safety Technologies

Large truck rollovers, lane departures, and rear-end collisions account for some of the highest numbers of commercial motor vehicle fatalities and injuries. These crashes are often severe and frequently result in substantial traffic congestion and cleanup costs.

Safety is at the heart of the Federal Motor Carrier Safety Administration's (FMCSA) mission. Its goal is to reduce commercial motor vehicle crash fatalities on U.S. highways to 1.65 fatalities per 100 million miles of truck travel by 2008.

One way FMCSA seeks to improve highway safety is by promoting use of on-board safety devices that will warn drivers of dangerous situations including rollovers and lane departures, take action to control or reduce truck speed, and recommend actions to avoid collisions. However, these technologies alone cannot avoid crashes, and drivers remain responsible for the safe operation of their vehicles.

In collaboration with the trucking industry, FMCSA has tested and evaluated a number of on-board safety systems through the U.S. Department of Transportation's Intelligent Transportation System (ITS) Program and identified those that show promise for having the greatest impact on reducing fatalities and injuries involving commercial motor vehicles.



### Reducing Truck Rollovers

Several on-board technologies help reduce single-vehicle crashes, including rollovers. FMCSA has worked with system manufacturers and the trucking industry to test and evaluate the following stability systems that address these types of crashes:

- Roll stability advisors (RSA) are educational tools that advise the driver about recent conditions that presented a significant risk of rollover. An RSA system receives lateral force information and then issues an audible alert and a visual message to the driver after the risk has passed.
- Roll stability control (RSC) systems are safety systems that automatically intervene if a high rollover risk is detected while driving. If a rollover threat is occurring, an RSC system intervenes and tries to minimize the rollover risk by automatically reducing the throttle and, if necessary, applying the engine and foundation brakes without action of the driver.
- Electronic stability control (ESC) systems are active safety systems that automatically intervene when there is high risk of rollover or yaw instability. If the vehicle leaves the travel path, or if critical threshold values are approached, an ESC system will intervene to assist the driver. When a potential rollover risk is detected, the rollover function operates as previously described. When a vehicle starts to slide or spin, the ESC system reduces the throttle and selectively applies the appropriate individual brakes to produce a counter-force to better align the vehicle with an appropriate travel path.

### Reducing Rear-End Collisions

FMCSA worked jointly with safety system manufacturers and the trucking industry to test and evaluate commercial off-the-shelf systems that will warn drivers of a potential collision risk and assist in maintaining a safe distance between them and the vehicle directly ahead. The following on-board technologies address these safety issues:

- Forward collision warning systems (CWS) are in-vehicle electronic systems that monitor the roadway in front of a commercial motor vehicle and warn the driver when a potential collision risk exists. The CWS warns truck drivers of imminent slower moving vehicles and other hazards in the lane ahead of them. If the vehicle or object ahead violates a pre-defined closing-time threshold, the CWS provides a warning to the driver.
- Adaptive cruise control (ACC) systems are in-vehicle electronic systems that automatically maintain a minimum following distance to a vehicle ahead in the same lane. The ACC system uses components of the CWS and a conventional cruise control system. The ACC system interacts with the CWS to maintain a safe following distance. In the absence of a vehicle ahead, the ACC system operates like a conventional cruise control system and maintains a speed set by the driver. CWS and ACC systems can help prevent rear-end crashes and forward impact with objects in the travel lane. While these systems cannot prevent all rear-end crashes, they can reduce impact speed and, therefore, the severity of the crash.

