

Programs of the Federal Motor Carrier Safety Administration (FMCSA) encompass a range of issues and disciplines, related to motor carrier safety and security. FMCSA's Office of Analysis, Research and Technology defines a "research program" as any systematic study directed toward fuller scientific discovery, knowledge, or understanding that will improve safety, and reduce the number and severity of commercial motor vehicle crashes. Similarly, a "technology program" is a program that adopts, develops, tests, and/or deploys innovative driver and/or vehicle best safety practices and technologies that will improve safety and reduce the number and severity of commercial motor vehicle crashes. An "analysis program" is defined as economic and environmental analyses done for agency rulemakings, as well as program effectiveness studies, state-reported data quality initiatives, and special crash and other motor carrier safety performance-related analyses. A "large truck" is any truck with a Gross Vehicle Weight rating or Gross Combination Weight rating of 10,001 pounds or greater.

Currently, FMCSA's Office of Analysis, Research and Technology is conducting programs in order to produce safer drivers, improve safety of commercial motor vehicles, produce safer carriers, advance safety through information-based initiatives, and improve security through safety initiatives. The study described in this Tech Brief was designed and developed to support the strategic objective to produce safer drivers. The primary goals of this initiative are to ensure that commercial drivers are physically qualified, trained to perform safely, and mentally alert.



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Defensive Driving Tips For CMV Drivers: An Internet-Based Approach

The objective of the project discussed in this Tech Brief was to develop driving tips for commercial motor vehicle (CMV) drivers and fleet safety managers that show common large-truck driving errors and how to avoid such errors. The content is available on the Federal Motor Carrier Safety Administration (FMCSA) website as an internet-based training tool that is open to the public and contains real-world video clips of CMV drivers making various driving errors. It is intended that the CMV Web-Based Driving Tips provide compelling information to support safe driving.

Given the impact of driver errors on traffic safety, there has been a keen interest in developing training programs that focus on driver behaviors, specifically programs that train drivers to avoid specific errors. CMV drivers receive classroom and on-road training in order to obtain their commercial driver's license (CDL). Various organizations offer a number of driver improvement training programs, which focus on educating drivers to drive defensively and to think, see, and react more quickly to driving challenges. Though such programs claim to improve driving skills, their material may not be readily accessible. In addition, it is not known if the training used by these programs is based on empirical data. This project was initiated to create a supplemental defensive driving tips training program that is accessible to the public and based on naturalistic driving data. These defensive driving tips are not intended to replace existing training programs, but to fill in the gaps in existing training programs by providing supplemental training information to CMV drivers and fleet managers.

Drawing on data already collected for two other FMCSA-sponsored studies—the Large Truck Crash Causation Study (LTCCS) and the Drowsy Driver Warning System Field Operational Test (DDWS FOT)—as well as input from industry stakeholders, eight major driver errors were addressed:

- Failure to buckle up.
- Too fast for conditions.
- Unfamiliar roadway.
- Inadequate surveillance.
- Driver Fatigue.
- Driver Distraction.
- Following too closely.
- Inadequate evasive action.

Behavioral "do's" and "don'ts" (driving tips) for CMV drivers are exemplified in video segments of actual safety-critical events captured in recently completed naturalistic driving studies. The "don'ts" represent video segments demonstrating safety-critical events and the "do's" represent preventive measures (driving tips) in the form of text alongside the videos. Providing real-world examples of safety-critical events, and the behaviors that lead up to them, is a useful learning tool as the examples may serve to motivate CMV drivers to avoid making the same mistakes.

The Internet was seen as an ideal medium for this project because it provides a means to share a lot of information with the intended audience, namely CMV drivers and fleet managers. In addition, the use of the Internet allows the audience greater flexibility to access it at their own pace and whenever convenient.

To develop the final website, a literature review compiled information on website usability guidelines, driver errors, driver training, and naturalistic studies. The literature review resulted in information about specific driver behavior errors along with their preventive measures (driving tips). Then a focus group of subject matter experts was consulted to further maximize the usability of the driving tips content.

Expert Input and Review

An integral part of the development of the driving tips was to include the feedback/input from subject matter experts, including CMV fleet safety managers. A webinar meeting of subject matter experts, including fleet managers, was conducted to obtain expert opinions about the developed driving tips, to obtain additional driving tips, and to ensure usability of the driver training information content and its user-friendliness.

The safety managers were receptive to many of the driving tips presented. While discussing the driving tips for each driver behavioral error, participants unanimously suggested that the driving tips include a reason why it is important. Safety managers believed this would help CMV drivers remember the driving tips. The safety managers thought that some driving tips were too elementary and should be replaced with more compelling tips. Throughout the webinar session, the participants suggested many new creative and thoughtful modifications to the driving tips, as well as suggestions for additional driving tips. Overall, the webinar session was successful in terms of receiving valuable input from fleet managers.

Upon revision, the new driving tips included key information content such as the importance of each tip and “did you know” facts. During revision, some driving tips were eliminated on the basis of being too elementary, as indicated by subject matter experts’ input.

Naturalistic Data and Driving Videos

The information in this new training program is based on naturalistic data collected during the DDWS FOT study. Naturalistic data is collected during the normal operations of an instrumented vehicle. In this method, each vehicle contains several video cameras (e.g., face, front view, and right/left side view), and vehicle sensors to collect data on vehicle speed, global positioning system (GPS) position, braking intensity, steering patterns, forward range to a lead vehicle, and many more variables. This data is collected continuously; that is, the data collection system starts as soon as the vehicle ignition is turned on and continues to record until the vehicle is turned off. Naturalistic driving videos show real-world examples of driving to demonstrate driver behaviors to be avoided.

Between May 2004 and September 2005, the DDWS FOT collected naturalistic driving data from 103 volunteer CMV driver participants. That data includes 46,000 hours of driving data spanning 2.3 million miles (equivalent to almost 96 trips around the world or 770 coast-to-coast trips across the United States). Video data were continuously collected, providing a repository of video examples of driver errors for driver improvement training.

To include driver videos for training purposes on a public website, special driver permissions were sought. Despite the challenges faced in contacting drivers (given their transient nature), the authors obtained permission from 11 drivers for 16 video data clips. Each of the eight driver errors is illustrated online by at least one video data clip. For each video, a brief description was generated which preceded a series of training questions as a web-based training tool. See Figure 1.

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Because "driver error" is a primary contributing factor in large-truck crashes, the Commercial Motor Vehicle (CMV) web-based driving tips project was developed to provide defensive driving safety information to CMV drivers. Several studies, including many conducted by FMCSA-VTTI, identified specific driver behavior and performance errors, or "error categories." For example, the 2002 Large Truck Crash Causation Study (LTCCS) results assigned the critical reason to large trucks in 55 percent of the crashes studied and to driver errors in 87 percent of the cases. The 2005 Drowsy Driver Warning System Field Operational Test (DDWS FOT) results assigned the critical reason to large trucks in 71 percent of safety-critical events and to driver errors in 57.9 percent of safety-critical events. The LTCCS critical event framework was used as a basis for the error categories in this project.

Driving tips relating to each error category were developed from a literature review of previous research. Specific video examples from the DDWS FOT are used to support each category, and special permission was obtained from the drivers whose videos are used in this project. The image below shows the four camera views in each video.



VTTI hosted a webinar where five subject matter experts, who were mostly fleet safety managers, reviewed this Web site. They provided comments and suggestions on the relevance of the content to the intended audience (CMV drivers and fleet safety managers) and the readability and flow of the Web site. The webinar feedback was used to develop a prototype of the Web site. The Web site was reviewed a second time by the same subject matter experts, FMCSA staff, and VTTI staff. Additional input from the second review was incorporated into the final Web site.

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Figure 1. Screen Capture of the CMV Web-Based Driving Tips Project

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Website Format

The driving tips are incorporated into FMCSA's website and accessible by the public. They include an introductory homepage and different web pages for each of the eight driver error categories. The homepage welcomes the audience to the website and provides a brief overview of the purpose of the website, its organization, and instructions on how to use the website. Each of the eight driver error categories includes key information content: an operational definition of the driver error, the driving tip content (such as the importance of each driving tip), 'did you know' fact(s), naturalistic driving video example(s), and training exercises.

It is expected that the training exercises will serve to ensure driver attention during the training program as the questions quiz the driver about each video example. This may further assist CMV drivers to retain the necessary information about those specific driver-related behaviors or errors that must be avoided.

Further, referenced studies are listed on a separate page; each of the tips pages includes links to these citations. And a link goes to a page of support documents about the website's development.

The driver tips may be found online
at:<http://www.fmcsa.dot.gov/about/outreach/education/driverTips/index.htm>