

FAST DASH: A PROGRAM TO EVALUATE PROMISING SAFETY TECHNOLOGIES FOR TRUCK AND BUS OPERATIONS



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Abstract

A U.S. Department of Transportation program called FAST DASH was developed in 2010 to identify and evaluate promising safety technologies in the commercial truck and bus domain through small-scale field operational tests. The Virginia Tech Transportation Institute (VTTI) supported the Federal Motor Carrier Safety Administration (FMCSA) in the selection and testing of three technologies: a blind spot object detection and warning system, an onboard monitoring system, and a novel mirror technology. A fourth evaluation of a fatigue monitoring system is underway. These studies involve static and dynamic shakedown testing followed by before and after revenue producing operations with a participating commercial fleet. Collection and analysis are conducted on both objective (e.g., driving performance, safety) and subjective (e.g., driver opinion) measures. Guidance is delivered to the sponsor, fleets, and technology vendors. Final results are published in a technical report.

Keywords: Commercial Vehicle Technology, Technical Research, Driver Support, Safety

1. Introduction

As an agency within the U.S. Department of Transportation (DOT), the Federal Motor Carrier Safety Administration (FMCSA) provides a lead role in testing and evaluating promising safety technologies for use in Commercial Motor Vehicle (CMV) operations. In 2010, a program was developed by FMCSA to identify and evaluate promising safety technologies. Called FAST DASH (FMCSA's Advanced System Testing utilizing a Data Acquisition System on the Highways), the purpose of this ongoing program is to identify promising safety technologies in the commercial truck and bus domain, select a single technology for an evaluation cycle, and conduct a small-scale Field Operational Test (FOT). The findings are documented in a technical report that includes engineering guidance to the technology vendor for how the system might be improved.

In February 2017, FMCSA's Analysis Division provided data, from 1975 through 2015, on crashes involving large trucks and buses in the US (FMCSA, 2017). In 2015, there were 4,337 fatalities from crashes involving a large truck and bus. This was an increase in the number of fatalities from the previous year (4,337 vs 4,168) and in the fatality rate from the previous year (0.140 vs 0.138). Furthermore, looking back to 2009, fatalities from crashes involving large trucks and busses has increased year-over-year (with the exception of one year, 2014, where it dipped slightly as compared to 2013). From a countermeasure perspective, these increasing fatality rates presents an opportunity to identify and more effectively utilize technological solutions to improve safety for both truck and bus drivers and the motoring public that shares the road with these vehicles. FAST DASH was developed as a program to better understand safety systems in this domain and to identify and test promising technologies.

Originally developed as a cooperative agreement with the Virginia Tech Transportation Institute (VTTI), FAST DASH has so far completed testing of three technologies, with each evaluation lasting approximately 18 months. These technologies tested have included: (i) blind spot object detection and warning system, (ii) onboard monitoring system, and (iii) novel mirror technology. Testing includes both static and dynamic evaluations in controlled settings, and a FOT involving a fleet and revenue-producing deliveries. This paper describes the program, highlights the technologies that have been evaluated so far, and outlines how interested vendors can become involved in future evaluations.

2. Research Approach

It is important to note that many field operational tests (FOTs) have been conducted in commercial truck and bus operations previously, not only in the U.S., but in many countries including those in the EU. For example, the *euroFOT* study, that ended in 2012, was a large scale evaluation of the impact of driver assistance systems (www.eurofot-ip.eu). So, the concept of testing promising safety technologies is not new. However, FAST DASH may be somewhat unique in that it was developed to facilitate small scale evaluations with a shorter timeline (18 months).

As shown in Figure 1, a common protocol is applied for each evaluation. After a technology has been selected by FMCSA, the technology goes through a shakedown period that includes bench testing and testing in both static and dynamic environments. Once a clear understanding of the technology has been determined, an on-road field study is planned and conducted. A trucking fleet with an interest in the particular technology is identified and 15-20 drivers from that fleet are recruited. Fleet trucks (15–20) are instrumented with data collection equipment,

including sensors and video-cameras. The technology vendor works directly with the fleet to implement the systems, while VTTI serves in an independent evaluator capacity.

A common study design includes a baseline period of 2 months, with the test technology installed but, for example, not providing alerts, followed by a 4-month intervention period. Analyses are conducted that include assessment of both objective (e.g., driving performance, safety) and subjective (e.g., driver opinion) measures. The study is then documented in a final report that includes recommendations to the tech vendor of potential system improvements.

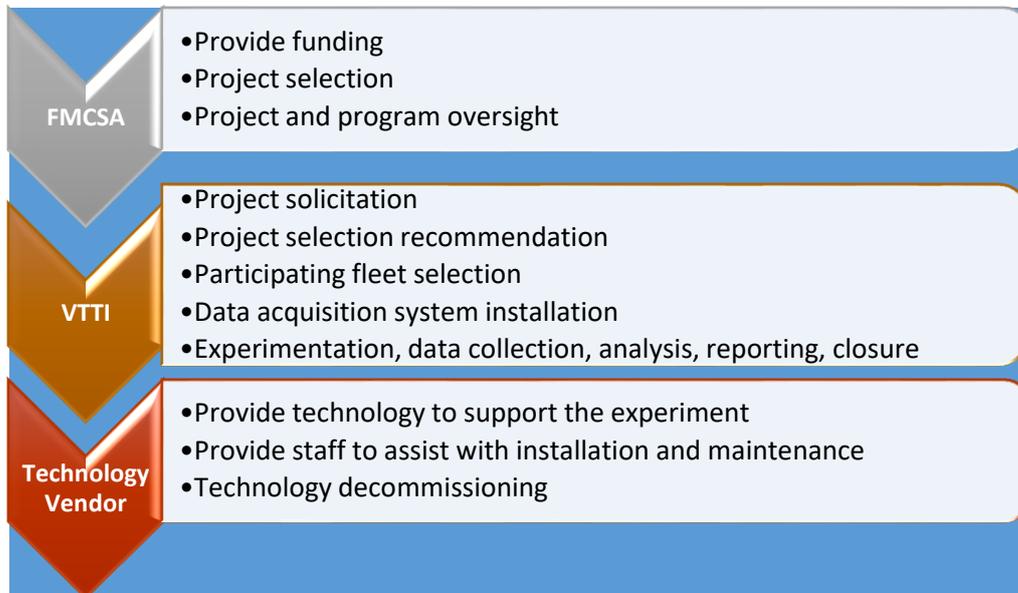


Figure 1 – Overview of FAST DASH

3. Technology Applications

The types of technologies that have thus far applied to the program are highlighted in Table 1. For each solicitation, 10-20 vendors might apply. In terms of general categories of those vendors that have previously applied, they include technologies directed at: (i) Fatigue/Drowsiness, (ii) Fleet Management, (iii) Visibility Safety, (iv) Cell Phone Policy Enforcement, and (v) Other. Each cell beneath the heading represents a separate technology. The table is meant to show the breadth of technology vendors that applied and is not inclusive of all applications.

Table 1 – Overview of types of technologies in FAST DASH

Fatigue/Drowsiness	Fleet Management
Fatigue Management	Safety Telematics fleet management
Evidence based solutions for fit-for-duty risk associated with drugs, alcohol and fatigue - small start-up company	Using a cloud based platform to improve compliance, safety and accountability for commercial vehicles by facilitating on-line inspection reports for annual DOT inspections
Wearable solution, shields drivers from fatigue and distraction	Driving state/enforcement technology application
Drowsiness Detection Technology	Visibility Safety Systems
Fatigue & risk management products - fatigue assessment tool	Vehicle camera systems
Fatigue Risk Management System - how to/support/assessment	Mirror-eye - removing side mirrors replaced with cameras
Real-time alertness and emergency monitoring	
Cell Phone Policy Enforcement	
Hands free wireless LCD connection (interface for phone)	Mobile policy enforcement technology
Other Systems	
Application of neuroscience, psychology and computer science for optimal performance and safety in the work place.	Pneumatic Trailer Legs
Tire inflator	Preview Radar
Deceleration warning & brake light illumination while moving below 10 mph	Seat technology
Driver Training System	

4. Tested Technologies and Future Opportunities

Since the program was initiated, three evaluations have been completed, with one ongoing, and the results presented elsewhere. The completed evaluations, shown in Figure 2 were: (i) a blind spot object detection and warning system (Schaudt et al., 2014), (ii) an onboard monitoring system (Krum et al., 2016), and (iii) novel mirror technology (Miller et al., 2016). The fourth evaluation, which is currently ongoing, is a driver fatigue monitoring system. Once completed, the technical reports for the evaluations can be found on FMCSA’s website (www.fmcsa.dot.gov).

Interested vendors can apply to participate in the program and there is a rolling application process. FMCSA reviews the applications and selects the technology to test. Interested vendors can find information about the program, and a statement-of-work detailing the requirements at: <https://www.vtti.vt.edu/research/ctbs/fast-dash.html>.



Figure 2 – Clockwise from top, BSW technology used (“SideEyes” by Novita Technologies (ISO 17387, Type I); OBMS technology used (waySmart™ by inthinc®); Novel mirror technology used (“Hick’s Mirror”)

5. References

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