FMCSA's Advanced System Testing Utilizing a Data Acquisition System on the Highways (FAST DASH) Safety Technology Evaluation Project #2: Driver Monitoring

The Federal Motor Carrier Safety Administration (FMCSA) established the FAST DASH program to perform efficient independent evaluations of promising safety technologies aimed at commercial vehicle operations. In this second FAST DASH safety technology evaluation project, researchers evaluated an onboard monitoring system (OBMS). The tested OBMS—the waySmart® 820—is a fleet risk management system that requires fleet management interaction.

Figure 1. Photograph. The tested OBMS driver interface and controller unit hardware.

The tested monitoring technology varies significantly from other OBMSs, in that it applies kinematic measures (such as accelerometers) to track aggressive driving, but it does not capture video for manager review, which may make the driver less conscious of the monitoring system. The tested OBMS includes seatbelt usage monitoring and proprietary "Speed-by-Street™" monitoring, which compares real-time vehicle speed to pre-existing speed maps. A feature of the tested OBMS is its driver-vehicle interface display, which sounds an audible verbal alert when speeding, seatbelt, or aggressive driving criteria have been exceeded. Evaluation of the effectiveness and accuracy of this OBMS can serve to provide operating fleets with a better understanding of how to apply this technology, and technology vendors with a better understanding of how to improve their systems to meet the needs of fleets and their drivers.

Using vehicle kinematic and network data, accelerometers, and a global positioning system (but no video), the tested OBMS identifies unacceptable behavior and provides feedback to the driver, which is aimed at correcting the offending behavior within a given period of time. Examples of such behaviors include speeding (based on the posted speed limit or other pre-set criteria), driving aggressively (based on kinematic sensors), and lack of seatbelt use (also based on sensors). If the speed or seatbelt violation is corrected (e.g., speed reduced or seatbelt fastened) within the allowable period, no violation (i.e., infraction identified by the system) is recorded. The system also monitors idling and approximates fuel usage by accessing data on the controller area network.

The performance and reliability of the OBMS was evaluated based on controlled testing on the Virginia Smart Road and on field testing in a revenue-producing fleet. The controlled testing evaluated activation and the data acquisition system (DAS) collection of OBMS-generated data. The field testing evaluated accuracy of the OBMS based on the sampling of collected OBMS, vehicle, and DAS sensor data.

RESULTS

The field study indicated that the OBMS performed reliably and had positive effects on driver performance. Results are summarized below.

- **OBMS reliably detects speeding and seatbelt violations.** Field testing demonstrated that the OBMS speed monitoring sensor correctly identified when CMV drivers were speeding (according to fleet-selected criteria) 86 percent of the time. The OBMS seatbelt monitoring sensor correctly identified when the driver's seatbelt was unfastened 100 percent of the time. The majority of seatbelt violations occurred in parking lots (85 percent) and at low speeds (less than 15 mi/h; 93 percent).

- **Significant decrease in speeding.** The rate of speeding violations per 1,000 miles averaged across all drivers was significantly reduced (37 percent) from baseline to the first 2-week intervention period, when the OBMS started providing in-cab feedback.

- **Significant improvement in seatbelt use.** The rate of seatbelt violations was significantly reduced (56 percent) from baseline to the first 2-week intervention period and remained so throughout the entire intervention phase.

- **No significant change in safety-critical events (SCEs).** The field testing demonstrated neutral results regarding the effect of the OBMS on safe driving performance, as measured by SCEs (i.e., crashes, tire strikes, near-crashes, crash-relevant conflicts, and unintentional lane deviations). The mean rate of driver-at-fault SCEs (excluding curb strikes) per 10,000 miles during the intervention phase was not significantly lower than the mean rate during the baseline phase. However, the rate of driver-at-fault SCEs (excluding curb strikes) decreased for two-thirds of drivers (see Table 1).

- **No observed fuel usage improvement.** Collected drive file average fuel rates were compared between a group of drivers active in the intervention period and a group of drivers active in the baseline period (during a simultaneous 1-month period). The fuel efficiency results were inconclusive.

- **Positive driver and manager reviews.** A subset of drivers and fleet managers reported being able to understand and respond to the OBMS technology and found it beneficial and effective at improving safe driving performance.

- **Inconsistent/irregular fleet coaching.** Though the fleet management understood the involvement required for this evaluation, the research team observed that the fleet did not consistently follow the coaching protocol developed by the OBMS provider. For example, there was limited application of weekly email reports and limited use of the Web portal by fleet managers. It is likely that this lack of rigor may have had a negative impact on the realization of benefits of the tested OBMS. As an example, though a significant improvement in speeding violations was recorded in the early part of the study when driver violations were actively coached, the speeding rate returned to near baseline performance by the end of the intervention period, when it was observed that coaching had dropped off.

To read the complete report, please visit: http://ntl.bts.gov/lib/60000/60400/60403/16-002-FAST_DASH_Final_Report-Evaluation_2-FINAL-508C.pdf.