

Driver Monitoring Systems

According to the National Highway Traffic Safety Administration, in 2013 there were more than 5.6 million vehicle crashes in the U.S. Over 90 percent of these crashes could be attributed to human error. It is not a new trend, but is one that is not likely to decrease considering the potential distractions inside and outside operating vehicles. Research has indicated that the monitoring of driver behavior can have a positive effect on driver and fleet safety¹. This provides an overview of driver monitoring systems available to help fleet managers monitor, coach and mentor their drivers.

Fleet managers can take steps to help limit distractions and improve driving behaviors of their drivers (i.e. policies on use of cell phones, texting, etc.). Driver monitoring systems are another tool to consider. These systems can be used to help identify potential "risky" behaviors for the purpose of mentoring and coaching drivers. The trucking industry and agencies that regulate it are the "drivers" behind these systems. Much of the technology discussed and being contemplated is an outgrowth of this industry.

What has been done to monitor/control driver behaviors?

Attempting to monitor and control driving behavior is nothing new. Fleet managers have done (and still may do) ride alongs to determine what their drivers do well and areas where improvements can be made. However, a drawback to ride alongs is that the driver knows he/she is being evaluated and may not attempt "risky" behaviors. To help overcome that, many fleets make use of unannounced follow alongs or road observations.

Driving on the highway, individuals may see vehicle signs asking "How's my driving? Call 1-800...." or something to that effect. This is a method prompts independent road observations. It involves persons calling in to make a report to a monitoring company, who compiles. Having independent feedback is a positive, but the drawback is that it is random and may provide a negative bias (persons only calling in when they see a driver do something they consider bad). It doesn't necessarily help monitor all drivers on a regular basis.

The dangers of excessive vehicle speed (traveling too fast for conditions) are well documented. To help control vehicle speeds, organizations may make use of speed limiting technologies, commonly referred to as governors. These may be beneficial in limiting top speeds for vehicles that operate on open roads but often have little or no impact on vehicles traveling on roads where posted speed limits are below those of interstates. Governors are not monitoring systems but are an attempt to change driver behavior.

Onboard Safety Systems

Technology has led to a number of tools that can be used to help monitor, coach and train drivers including:

- **GPS Monitoring**

GPS monitoring of vehicles may be utilized to make more efficient use of resources available. It can help identify the location of vehicles and, from a customer service standpoint, can help get someone to the customer in a timely fashion. GPS has been used to enhance traditional voice communication systems. It can also help management from a driver safety standpoint. If a vehicle is not in the intended area or has stopped for an excessively long period of time, it could indicate that the driver is in trouble and pinpoint the location for assistance.

Driver Monitoring Systems

• Forward Collision Warning Systems (CWS)

These are in-vehicle electronic systems that monitor the roadway in front of the vehicle and warn the driver when a potential collision risk exists. These systems are designed to improve driver behavior by helping them maintain safe following distances. When objects ahead are too close a warning is provided to the driver. CWS systems may have the capability to store operational data internally for retrieval by the fleet. This data may be useful in reconstructing an accident or as training feedback in analyzing a driver's performance. Fleet managers may obtain operational data (e.g. number of hard-braking events) from CWS and analyze the data to determine any systemic problems with their fleet operations (e.g. disproportionate number of close-following events with certain drivers, high number of hard-braking events on certain routes)².

• Lane Departure Warning Systems (LDWS)

LDWS are in-vehicle electronic systems that monitor the position of a vehicle within a roadway lane and warn a driver if the vehicle deviates or is about to deviate outside the lane. LDWS warn the driver of a lane departure when the vehicle is traveling above a certain speed threshold and the vehicle's turn signal is not in use. Fleet managers may obtain operational data (e.g. number of lane departures) from LDWS and analyze the data to determine any systemic problems with their fleet operations (e.g. disproportionate number of lane departures with certain drivers, high number of lane departures on certain routes) and to use for driver training³.

• Roll Stability Control Systems (RSC)

RSC is an active vehicle safety system that automatically intervenes if a high rollover risk is detected while driving. If a rollover threat is occurring, the system intervenes and assists the driver in minimizing the rollover risk by automatically reducing vehicle speed. Frequently, activation takes place before the driver is aware of the need.

• Combination Systems (monitoring driving metrics)

There are a number of systems on the market today that monitor different driving metrics including speed and G-forces. These can include audible warnings provided to the driver when pre-set parameters are exceeded in addition to tracking the information. A video component is included in some of these systems, providing video for a set period of time from the onset of an "event."

• Onboard Video Monitoring

These systems provide continuous video monitoring of the vehicle interior and windshield view along with monitoring driving metrics similar to the above. They can be set up to provide audible warnings to the driver when pre-set parameters are exceeded in addition to tracking (and tagging to the video) the information. These systems typically use of a windshield mounted camera. It allows a fleet manager to review the driving behavior of any of their drivers (including compliance with corporate policies) and can help determine what was being done just prior to an "event" as these will be tagged on the video. The video can be an excellent tool in coaching both the new and the experienced driver.

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Do they help?

Although it is difficult to answer that at this time, there are indications that they do. The maintenance manager of a large EMS agency specified they had a 30 percent savings in maintenance costs after installing an on-board monitoring system. They attributed that to a reduction in emergency-type maneuvers while responding to emergencies along with “smoother” everyday driving.

Most drivers aware that they are “being watched” are likely to avoid risky behaviors. Audible warnings may provide real time feedback to drivers to help them improve their driving behaviors.

How about the future?

What about cars and trucks that drive themselves? Farfetched? Maybe, but with the rapid changes in technology, it is hard to imagine there isn't a real possibility. Some cars park themselves now and crash avoidance systems are entering the luxury car market. Testing is being done on vehicle-to-vehicle and vehicle-to-road communication systems that may allow vehicles to communicate with one another and to the road they are travelling. Can cars and trucks that drive themselves be that far off?

Summary

Distracted driving and risky behaviors behind the wheel contribute to countless preventable accidents each year. Fleet managers have taken steps to help reduce the number of accidents. Today there are a number of technology driven tools that may prove to be useful in avoiding a significant number of these accidents and may be worth investigating for a vehicle fleet.

References:

1. *Knipling, R.R.; Boyle, L.N.; Hickman, J.S.; York, J.S.; Daecher, C.; Olson, E.C.B.; and Prailey, T.D. Synthesis Report No. 4: Individual Differences and the High-Risk Commercial Driver. Project Final Report, Transportation Research Board Commercial Truck and Bus Synthesis Program. ISSN 1544-6808, ISSN 0-309-08810-0, 2004*
2. *U.S. Department of Transportation; Federal Motor Carrier Safety Administration, Concept of Operations and Voluntary Operational Requirements for Forward Collision Warning Systems (CWS) and Adaptive Cruise Control (ACC) Systems On-board Commercial Motor Vehicles, July 2005*
3. *U.S. Department of Transportation; Federal Motor Carrier Safety Administration, Concept of Operations and Voluntary Operational Requirements for Lane Departure Warning Systems (LDWS) On-board Commercial Motor Vehicles, July 2005*