



Programming Safety into Every Mile

By Nicholas Will

Advancing technologies have played a large role in improving safety standards and preventive practices for businesses across industries. As alerts and automation adapt and evolve to meet market demands, new levels of access provide visibility to unsafe driving behaviors, situations, and vehicle conditions. With these insights, fleets have been able to pursue preventive and corrective measures with greater speed and accuracy. While many great in-cab tools and add-ons are available, one of the best safety mitigating tools is right under the hood: The Body Control Module (BCM). Programming safety features through the BCM builds safety right into the rig and allows specialization for specific applications as well. With all the tools available today, any fleet can program safety into every mile.

The Body Control Module is an essential component, responsible for coordinating all electronic modules in a vehicle. It receives operating data through a combination of sensors, vehicle performance indicators, and variable reactors. This data is then processed and used to test systems, detect malfunctions, and integrated circuits. In this way, the BCM coordinates all the work done by electronic systems in the vehicle. Because a BCM can perform multiple operations simultaneously, detecting malfunctions is a major objective of this system, making it a key player in ensuring safety.

A BCM has the ability to integrate with and control a wide range of electronic systems. Alarms and power windows are perhaps the most common and well-known spec of these systems, but this is just scratching the surface of its capabilities. BCMs can integrate with energy management, advanced driver assistance, and even driver authorization systems and immobilizers. Driver authorization systems and immobilizers work hand in hand to combat theft by requiring an operator to enter a passcode before ignition. Not only does this protect the asset, but it also protects anyone on the road from reckless driving if an untrained operator were behind the wheel.

Depending on the vehicle's application, integrations like these can be programmed to aid specific systems across industries. For example, dump truck operators find utility in low hydraulic oil level indicators, as these indicators measure and send alerts when oil volume is low, providing the operator an opportunity to prevent

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equipment damage. Onboard diagnostics allow operators to pinpoint and address vehicle issues like these in seconds. This would be of less importance to someone operating a mixer. A mixer operator would find greater utility in a feature like a hopper control, which automatically stows the hopper when the vehicle is moving faster than ten miles an hour, preventing injury or incident in the event they forgot to manually stow the hopper before beginning an extended trip. Safety features are not necessarily the focus of a BCM, but rather a helpful byproduct.

Certain safety features are tailored toward specific applications. For instance, vehicles hauling compressed gas may use an equipment stow safeguard, which interlocks the hose and nozzles with the engine, preventing the vehicle from driving off-site until

equipment is properly stowed. Interlocks can also be made with transmissions and even engines. These immobilizing mechanisms can prevent unnecessary injury and unsafe situations in the event of human error. Drivers wearing seatbelts is a common issue for many fleets as it is a difficult safety standard to enforce once a truck has left the yard. In 2019, 58,749 seat belt violations were issued for the year (FMCSA Pocket Guide, pg 23). With ignition inhibition programming, drivers are not able to start the vehicle until their seatbelts were fastened. When preventive measures fail, these systems serve as an additional safeguard against unexpected incidents.

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Many violations could have been mitigated through advanced fault code reporting and maintenance. According to the FMCSA, over a million lighting violations were issued in 2019 (FMCSA, Motor Carrier Management Information System (MCMIS), data snapshot as of January 31, 2020). Only 6% of carriers were considered Satisfactory in 2019 (FMCSA, Motor Carrier Management Information System (MCMIS), data snapshot as of December 27, 2019).

As is seen with most trends in the transportation sector, heavy-duty tends to follow shortly after that of the automotive industry. Recent additions to the safety spec of automotive manufacturers like General Motors (GM) can reveal much about what is in store for future safety features and priorities in heavy-duty. General Motors partnered with the University of Michigan Transportation Research Institute in a study designed to evaluate the effectiveness of safety features on GM vehicles from 2013-2017 in preventing or mitigating crashes. There were four primary types of crashes: backing, rear-ending, lane departing, and pedestrian/bicyclist/animal crashes (Leslie, 2019). Of these, automatic emergency braking was the most effective, with forward automatic braking and collision alerts reducing rear-end accidents by nearly half and reverse automatic braking at about 80%. Lane departure and side blind alerts and reduced crashes by 20%. While these are available in the heavy-duty market, not everyone includes them in their specifications. Depending on the application, different features may take higher priority. Many features are safety-oriented, but there are also a great deal of convenience features specific to industry demands.

Below are some BCM features a fleet might consider including in their specifications based on application:

DRY VAN

- Pre-Trip Exterior Light Inspection to help lower and stow
- Lift Gate Control prevents battery discharge when battery voltage drops
- Integrated Body and Cab Door Locks and Alerts prevent theft, spoiled cargo, and informs the driver if doors are open while the ignition is on

UTILITY TRUCKS

- Wheel Chock Sensors remind operators to stow wheel chocks
- Low Voltage Alarm Warnings prevent battery discharge when battery voltage decreases
- Cabinet and Body Lights help conserve battery power by using custom timers

REFUSE TRUCKS

- Automated Packing customizes and automates waste packing
- Master Body Switch Power with Interlocks ties use of body equipment, PTI, packer, or engine into specific safety conditions that must be met before operators can initiate tasks
- Rear Lighting for Back-Up Cameras increases visibility with additional lights and instrument panel switches

FIRE TRUCKS

- Split-Shaft Water Pump Control automates steps to safely and efficiently engage the water pump system.
- Load Management prevents battery discharge when battery voltage drops
- Siren Control enables operators to safely and conveniently control sirens from a steering wheel module.

MIXER TRUCKS

- Remote Throttle Control enables operators to remotely activate throttle from the rear while concrete is pouring.
- Barrel Control allows operators to control barrel speed and direction from the instrument panel.
- Hopper Control automatically stows the hopper when trucks travel faster than 10 miles per hour.

PLOW TRUCKS

- Power Take-Off (PTO) Shutdown Override Switch allows operators to override PTO shut down in order to raise the vehicle blade.
- Auto Chain Control initiates chains from an instrument panel switch, disengaging chains at high speeds and helping to avoid equipment damage.
- Tarp Control allows operators to wind and unwind their tarp using an instrument panel switch to prevent cargo loss.

RECOVERY ROLLBACK TRUCKS

- Theft Deterrent Systems require the operator to enter a predetermined code before ignition.
- Park Brake Alarms alert operators to set the parking brake when any door is open.
- Body Equipment Interlocked to Engine interlocks body equipment and transmission, preventing the truck from moving until equipment is properly stowed.

TANKER TRUCKS

- Pump Sequencing allows operators to design a custom dispensing system sequence with safety-enhancing interlocks.
- Electrical Valve Activation automatically opens valves before PTO operation, reducing equipment fatigue and potential for error.
- Headlights on with Wipers turn on headlights automatically when windshield wipers are initiated.

BUSES

- Red lights on and stop signs out when bus doors open with amber lights flashing.
- Sounding alarm that can only be silenced by pressing a switch at the rear of the bus, ensuring no children have been left behind.

Whatever the industry, safety in transportation is well mitigated through advancing automation and technologies. As safety standards continue to evolve, industry demands for increased precaution and group discussion drive the cultivation and introduction of new tools to meet goals. Recent research in the automotive industry reinforces the importance of incorporating technology in safety efforts and sheds light on the effectiveness of safety features. Utilization of the body control module is not only an effective way to enhance safety practices. Injury or incident can often be prevented through automated features like immobilizing mechanisms.

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He has worked for Peterson for 12 years across multiple divisions starting in the Caterpillar Power generation, Earthmoving, and now guides and supports on-highway fleets with software, telematics, and compliance solutions. Mr. Will received a B.S. in Marketing Management from Cal State East Bay and has used this to better understand customers with in-person training and support with digital products.

REFERENCES:

Leslie, Andrew J. Analysis of the Field Effectiveness of General Motors Production Active Safety and Advanced Headlighting Systems. (2019) University of Michigan Transportation Research Institute (UMTRI).

<https://deepblue.lib.umich.edu/handle/2027.42/150660>

<https://www.gm.com/safetystudy.html>

2020 Pocket Guide to Large Truck and Bus Statistics, FMCSA (January 2021), pg. 7.

FMCSA Pocket Guide, pg 23.

FMCSA, Motor Carrier Management Information System (MCMIS), data snapshot as of January 31, 2020

FMCSA, Motor Carrier Management Information System (MCMIS), data snapshot as of December 27, 2019



