ALFA INTERNATIONAL
2015 TRANSPORTATION SEMINAR
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CRASH AVOIDANCE TECHNOLOGY CAN YOU AFFORD (NOT TO HAVE) IT?

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I.  What is Crash Avoidance Technology?
   a.  There are two main manufacturers of the crash avoidance technology, Meritor (On Guard) and Bendix (Wingman Advanced).
   b.  Crash Avoidance Technology is designed to be a driver-assistance system to help the driver quickly recognize and respond to potentially dangerous driving situations such as rear-end collisions or following too closely. It is not intended to replace driver control of the vehicle at any time. The driver maintains control of the vehicle and must ultimately determine the actions necessary for safe operation.
   c.  Forward Collision Avoidance & Mitigation (FCAM) systems:
      i.  Includes Forward Collision Warning (FCW); Adaptive Cruise Control (ACC); and collision imminent braking (CIB)
         1.  The Collision Warning System (CWS) will generate an audible and visible alert when the vehicle’s following distance may result in a collision. CWS provides only a warning and will not control vehicle speed unless ACC is engaged or a CMS event is detected. CWS cannot be turned off and is always active at vehicle speeds above 15 mph.
         2.  Adaptive Cruise Control works in conjunction with conventional cruise control to maintain the set cruise speed when no vehicle is being tracked and maintains a minimum following interval when a target vehicle is being tracked. The minimum following interval is achieved by controlling engine throttle, engine retarder and the foundation brakes without driver intervention. When the target vehicle is no longer being tracked, the set cruise speed resumes automatically. Maximum deceleration is .025G’s (equivalent to 1/3 full brake power).
            a.  When the ACC is active, the driver can override the system braking, engine throttle and engine retarder controls by manually depressing the accelerator pedal. ACC can also be deactivated by pressing the brake pedal, similar to standard cruise control.
         3.  Collision Mitigation System (CMS) will provide driver alerts with both visual and audible alarms through an in-cab dash display when the vehicle’s following distance could result in a rear-end collision. If a potential rear-end collision is developing and the driver does not take action
to decelerate the vehicle, the system automatically de-throttles the engine and applies the engine retarder and foundation brakes to provide up to .35G’s of braking power (approximately ½ the full power of the braking system).

a. The following-distance alert will emit an audible alert and the in-cab dash display screen will turn yellow if the driver is following too closely behind another vehicle at a steady driving speed. This alert will end when the vehicle speed drops below the speed of the lead vehicle and the following distance is increased.

b. If the lead vehicle is decelerating or the commercial vehicle is driving much faster than the lead vehicle, the system will display a collision warning symbol on the in-cab display, sound an audible alarm, turn the display screen red and activate the braking, engine and retarder control to reduce the vehicle speed.

d. Lane Departure Warning (LDW) Systems

e. Enhanced Visibility systems (Blind Spot Monitoring)

f. Vehicle to Vehicle (V2V) based safety systems.

II. A Look at the Numbers

a. The FMCSA Commercial Motor Vehicle Facts—March 2013 determined that in 2011 there were:

i. 3,568 fatal crashes involving large trucks or buses resulting in $39 Billion in estimated crash costs.

ii. 73,000 personal injury crashes involving large trucks or buses resulting in $32 Billion in estimated crash costs.

iii. 252,000 property damage only crashes involving large trucks or buses resulting in $16 Billion in estimated crash costs.

iv. Total of $87 Billion dollars in estimated crash costs in 2011 alone.

b. The National Highway Transportation Safety Administration in conjunction with University of Michigan Traffic Research Institute (UMTI) performed a controlled study in 2013 and released its NHTSA Heavy Vehicle Crash Avoidance Research Overview in January of 2014:

\[1\] T. Miller, E. Zaloshnja, and R. Spicer, Revised Cost of Large Truck and Bus Involved Crashes (2002), adjusted to 2012 dollars and 2013 value of a statistical life (VSL), and updated to reflect new guidance on valuing injuries from the Office of the Secretary of Transportation.
i. Three fleets were examined after having operated a portion of their fleet equipped with FCAM systems for a year or more.
   1. Results from two fleets were statistically valid.
   2. Insufficient data was available from the third fleet.

ii. Results from both fleets were consistent—the FCAM system had protective effect against rear-end crashes:
   1. In Fleet A, trucks without the FCAM system were 2.2 times more likely to be the striking vehicle in a rear-end crash than trucks with the system.
   2. In Fleet B the odds ratio was very similar at 1.96.

iii. Based on the results of the survey, the NHTSA has initiated an FOT focused on Crash Avoidance systems for heavy vehicles.
   1. The full results will not be available until mid-March of 2015 but they expect “notable and statistically verifiable reduction” in all types of collisions.

   c. Engineers and vendors expect even greater returns on second and third generation technologies
      i. Newer/better sensor technology and sensor fusion
      ii. More refined detection algorithms (e.g.; reduced nuisance and false alarms)

III. What does it Cost to Outfit a Fleet with Crash Avoidance Technology?
    a. Trucks are now coming factory equipped with Crash Avoidance Technology
    b. Cost depends upon the size of the fleet
       i. Roughly $3,000 per tractor

IV. What are some potential problems?
    a. Does it encourage drivers to be less attentive?
    b. Will rapid deceleration cause the CMV to be rear-ended by traffic?
    c. Do you run the risk of keeping potentially damaging data as a fleet, or per driver?
    d. Can the data be worked into a driver training/retention program?
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CURRENT TOPICS IN A FAST MOVING INDUSTRY
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Crash Avoidance Technology—Can you afford (not to have) it?
Bendix Wingman Advanced
Bendix Wingman Advanced
Bendix Wingman Advanced

Stationary Object Alerts

- Metallic Objects, such as
  - Road Debris
  - Stopped Vehicles
- Data for truck tractors only, and, truck was striking vehicle (or otherwise “at fault”)
- Based on data from Volpe Report *Heavy Vehicle Pre-Crash Scenario Typology for Crash Avoidance Research*
Early Adopter Analysis

- Crash records from three fleets were examined after having operated a portion of their fleet equipped with FCAM systems for a year or more.
  - Results from 2 of the fleets were statistically valid.
  - Insufficient data was available from the third fleet.

- Results from both fleets were consistent. The FCAM system had a protective effect against rear-end crashes:
  - In the case of Fleet A, trucks without the FCAM system were 2.2 times more likely to be the striking vehicle in a rear-end crash than trucks with the system.
  - The result for Fleet B was very similar, with an odds ratio 1.96.
<table>
<thead>
<tr>
<th>Year</th>
<th>Fatal Crashes</th>
<th>Injury Crashes</th>
<th>Property Damage Only Crashes</th>
<th>Total: All CMV Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>$39 Billion</td>
<td>$32 Billion</td>
<td>$16 Billion</td>
<td>$87 Billion</td>
</tr>
<tr>
<td>2010</td>
<td>$38 Billion</td>
<td>$30 Billion</td>
<td>$16 Billion</td>
<td>$84 Billion</td>
</tr>
<tr>
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<td>$34 Billion</td>
<td>$27 Billion</td>
<td>$18 Billion</td>
<td>$79 Billion</td>
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</tbody>
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**Notes:** The total costs may not add due to rounding. Changes to past years are the result of updating for inflation and changes in guidance from the Office of the Secretary of Transportation on how to value fatalities and injuries.

**Source:** T. Miller, E. Zaloshnja, and R. Spicer, *Revised Cost of Large Truck and Bus Involved Crashes (2002)*, adjusted to 2012 dollars and 2013 value of a statistical life (VSL), and updated to reflect new guidance on valuing injuries from the Office of the Secretary of Transportation.
## Estimated Costs of Commercial Motor Vehicle (CMV) Crashes (2012 Dollars)

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### Total: All CMV Crashes

- $87 Billion
- $84 Billion
- $79 Billion

**Notes:** The total costs may not add due to rounding. Changes to past years are the result of updating fatalities and injuries.

**Source:** T. Miller, E. Zaloshnjak, and R. Spicer, Revised Cost of Large Truck and Bus Involved Crashes, guidance on valuing injuries from the Office of the Secretary of Transportation.
• 21% of all accidents are rear-end accidents
• 21% of $87 Billion is more than $18.2 Billion