Electronic Stability System

Position Statement

Whereas, worldwide, single vehicle crashes represent nearly a third of all crashes with a fatal occupant injury,

Whereas, Electronic Stability Control (ESC) effectiveness studies completed in different countries and different parts of the world have found that ESC reduces the risk of occupant fatality in single vehicle crashes between 25 and 35 percent,

BE IT RESOLVED, that the Association for the Advancement of Automotive Medicine supports the installation of Electronic Stability Control Systems into every new passenger vehicle and further research into the effectiveness of ESC in other vehicles.

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ELECTRONIC STABILITY CONTROL SYSTEM

Background Information

There have been significant improvements in passive safety design for automobiles, as well as successes in increasing safe behaviors among drivers and passengers in the United States. Still, highway fatalities in the United States remain near the 43,000 per year. More than 14,000 of these fatalities occur in single vehicle crashes [1]. The combination of passive safety measures with increased restraint use has saved approximately 330,000 lives since the mid-1960's, according to the National Highway Traffic Safety Administration (NHTSA).

Unfortunately, in 2005, we have arrived at a point of diminishing returns. Further improvements in passive safety will not bring the same benefits we have come to expect. This has lead to a movement in auto safety engineering to design active safety technologies. Instead of reacting to imminent collisions, newer systems work to provide optimal injury protection by avoiding collisions altogether.

The Electronic Stability System (ESC) technology addresses the avoidance of crashes in the first place and, thus, prevents injuries and fatalities. The ESC combines the Antilock Braking System (ABS) with the Traction Control System (TCS), and multiplies the advantages of both systems. ABS prevents wheel-lock when the brakes are applied and TCS controls traction to prevent wheel-spin when accelerating. [2,3,10].

With ESC, the two technologies work in synergy— using the speed sensors on each wheel along with the ability to brake individual wheels, which are the basis of antilock braking and traction control systems. ESC adds a steering angle sensor, as well as a vehicle rotation sensor that measures rotation around the vehicle's vertical axis. ESC also provides a control unit that monitors when the steering and rotation sensors detect that a vehicle is about to travel in a direction different from the one indicated by the steering wheel position. Then, ESC automatically brakes the appropriate wheel to help the driver maintain control. Engine throttle may also be reduced.

The US is several years behind other parts of the world in making ESC widely available to consumers. Only 7.3 percent of the light vehicle fleet of model year 2003 is equipped with ESC, while other countries have been installing ESC into vehicles for the past 5 to 10 years. The US can now benefit from the results of multiple ESC effectiveness studies, which have been conducted in Europe and Japan.

The European Accident Causation Survey (EACS), containing data from 1,674 crashes in five European countries (1995 to 1999), found improved outcomes for vehicles equipped with ESC:

- Injury accidents reduced by18%
- Fatal accidents reduced by 34%
- Injury accidents in loss of control situations reduced by 42%
- Fatal accidents in loss of control situations reduced by 67%. [4,10].

The Swedish National Road Administration and Swedish universities looked at 2000 to 2004 traffic data and detected a 22 percent reduction in collision and injury for vehicles equipped with ESC. [5].

Newly registered Mercedes vehicles equipped with ESC, listed in the German "Statistische Bundesamt," realized a reduced number of side-impacts, rollovers, and average injury severity as compared to vehicles without ESC.

- Collisions reduced by 15%
- Single vehicle crashes reduced by 30%. [7,10].

Volkswagen and Audi reported that ESC prevented 80 percent of all skidding accidents and 35 percent of all fatal accidents. They also noted that many of the off-road side-impacts were converted into frontal collisions or were eliminated in vehicles equipped with ESC. [6].

The Institute for Traffic Accident Research and Data Analysis (ITARDA) collected traffic accident data from 3 popular Toyota models equipped with ESC in Japan and found:

- Reduction in casualties (for single vehicle and head-on collisions) of 35%
- Reduction in head-on collisions of 30%
- Highest effectiveness of ESC was in the 40 kph to 100 kph range. [7].

In the United States, Jennifer Dang of the NHTSA looked at 1997 to 2003 Fatal Automotive Reporting System (FARS) data as well as data from five states from 1997 to 2002 and reported a reduction for ESC-equipped vehicles in severity of single vehicle crashes:

- Passenger cars realized 35% reduction
- SUV's realized a 67% reduction

As well as a reduction of fatal single vehicle crashes:

- Passenger cars realized a 30% reduction
- SUV's realized 63% reduction. [8].

The Insurance Institute for Highway Safety (IIHS) considering the available US data, noted a reduction in fatal crash risk for ESC-equipped vehicles:

- Single vehicle crashes were reduced by 56%
- Multi-vehicle crashes were reduced by 17%
- All fatal crashes were reduced by 35%

IIHS concluded that a 100 percent ESC installation rate on all light vehicles in the US could result in a reduction of 800,000 single vehicle crashes and save 7,000 lives per year in the US. [9,10]

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