

# *United States Rulemaking on Electronic Stability Control (ESC) for Light Vehicles*

**138 WP.29**

**March, 2006**

# *Reason for ESC Rulemaking*

- International consensus that ESC is effective in reducing loss-of-control crashes
- Evidence that it is cost effective
- It is practicable in terms of technical feasibility
- Prevention of single-vehicle crashes is the best rollover countermeasure
- Unlikely to become universal in small cars and pickups without a regulation
- Could save 1000s of lives a year
- Congressional pressure if we fail to be proactive



# *Cost Effectiveness Evaluation*

## ■ **General approach**

- Evaluated fatal single vehicles crashes from 1997 thru 2003
- Compared specific make/models with ESC with earlier versions without ESC

## ■ **Results**

- NHTSA found that fatal single vehicle crashes were reduced by:
  - 30 percent for passenger cars
  - 63 percent for SUVs
- Results were statistically significant

## ■ **A second updated study was recently completed with similar results**



# *Timeline*

- NPRM to OST- January 2006
- NPRM to OMB – 2nd quarter 2006
- NPRM publish date – Expected late summer 2006



# ***New Standard Would Consist of:***

1. **A test procedure that new vehicle would have to pass**
  - Test designed to prevent transient oversteer
2. **An equipment standard requiring vehicles to have ESC**
  - Will encourage:
    - Excessive understeer mitigation
    - Intervention to slow vehicle in emergency situations
3. **Requirements for ESC driver interface**
  - ESC malfunction indication lamp
  - ESC activation warning
  - Other interface issues



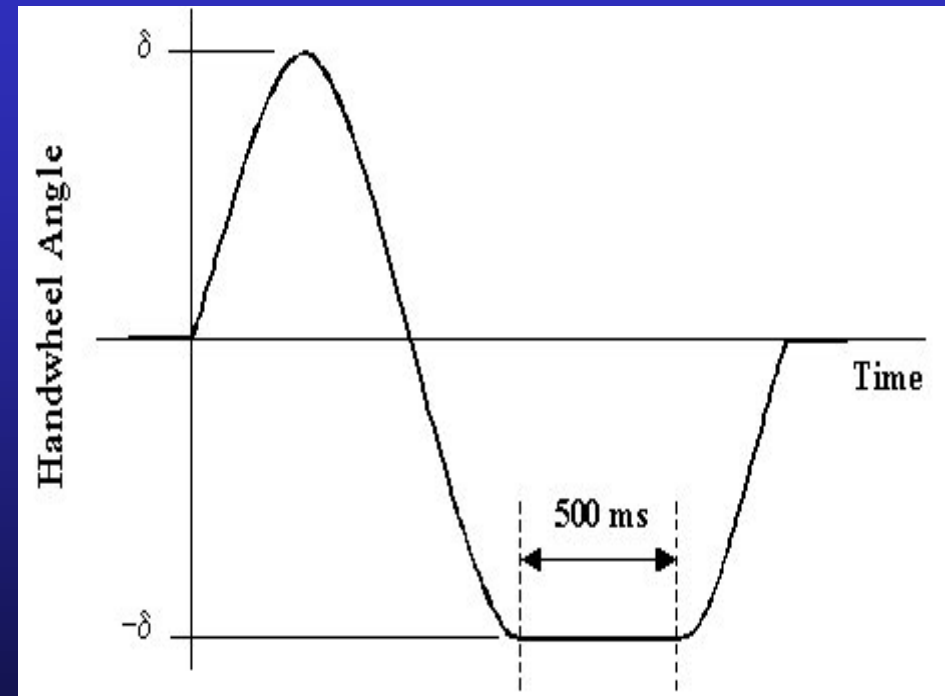


# *Performance Test*

# Performance Test:

## ■ Sine with dwell maneuver

- Lightly loaded vehicle with, for LTV, outriggers
- Steering frequency fixed at 0.7 Hz, with a 500 ms pause
- Steering robot
- 80 kph entrance speed
- Dropped throttle
- Dry asphalt pavement



# *Performance Test:*

## ■ **Sine with dwell - Justification:**

- Most severe maneuver found for inducing spinout
- Very good repeatability
- Straightforward to perform
  - Many companies have performed without difficulty
- Good face validity
  - Approximates obstacle avoidance maneuver





# *Pass/Fail Criteria:*

## **Two sets of pass/fail criteria:**

1. Must not spinout (no loss of control or lateral stability) during test
2. Must have adequate lateral responsiveness





# *ESC Equipment Requirement*

# *ESC Equipment Requirement:*

- **Would require vehicles to have ESC**
- **Multiple definitions for ESC have been proposed:**
  - General Motors
  - Germany's VDA
  - SAE J2564
  - NHTSA analyzed these and others to come up with a definition





# *Requirements for ESC Driver Interface*

# *Advanced Safety Systems Malfunction Indicator:*

- **Vehicles have more and more advanced safety systems:**
  - Common now:
    - Antilock Brake Systems
    - Tire Pressure Monitoring Systems
    - Traction Control Systems
    - Electronic Stability Control
    - Brake Assist
  - May be coming soon:
    - Adaptive Cruise Control with Braking Authority
    - Active Steering
    - Electronic Damping Control
    - Others



# *Advanced Safety Systems Malfunction Indicator:*

- **If there is a malfunction telltale for each system, it can quickly become confusing**
- **Many of these systems use common components**
  - Electronic control unit
  - Wheel speed sensors
- **If one system malfunctions, others are likely to also be out-of-service**



# *Advanced Safety Systems Malfunction Indicator:*

- **Considered having one telltale that would indicate malfunctions for multiple systems**
  - Systems using common light must be important but not critical (i.e., they must have a yellow malfunction light)
    - Could not use this light for brake system failure
  - Could limit use to systems that involve traction (ABS, Brake Assist, Traction Control, ESC) or could be more general and allow use for TPMS, Adaptive Cruise Control with Braking Authority, Electronic Damping Control, etc.



# ***ESC Activation Warning:***

- **A single standardized icon is recommended**
- **Results of large Industry study of ESC icon comprehension was used to reach decision**





# ***ESC Activation Warning:***

## **ESC activation warnings - should they be optional or mandatory?**

- Does not appear to help during the critical situation for which warning activates
- Activation warnings that persist for a few seconds after critical event may be more visible to drivers
- May have beneficial effects on longer-term driver performance



# *Other Interface Issues:*

- **Should driver disabling of ESC be permitted?**
  - Needed to prevent vehicle from getting stuck in deep snow, driving with snow chains, and off-roading
- **Should optional ESC modes be allowed?**
  - Desirable for racing/sports car enthusiasts
- **Should the ESC reset to standard mode every time ignition is cycled**
  - Manufacturer may want to reset ESC under other, suitable conditions





*Thank You*

For more info go to: <http://dms.dot.gov/>  
NHTSA Docket Number 19951