Intelligent Technologies: NHTSA’s Approach to Future Crash Safety

June 5, 2007

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Persons Killed and Rate 100M VMT

Source: 2005 FARS
Trends in Crash Rates – All Crashes

Year

Crashes/100 Million VMT


200 210 220 230 240 250 260 270
Approach for Intelligent Technologies

- Performance Specifications
- Objective Test Procedures
- Field Operational Tests
- Independent Evaluation
Field Operational Tests
New ITS Safety Initiatives (5 – 6 Year Program Plan)

- Integrated Vehicle-Based Safety Systems (IVBSS)
- Intersection Crash Prevention Systems (CICAS)
- Vehicle-Infrastructure Integration (VII)
Crash Avoidance Technologies

6.2 million police reported crashes
Source: 2004 NASS GES Data

- Lane Departure Warning
- Electronic Stability Control
- Lane Keeping
- Curve Speed Warning

- Rear-End (29%)
- Road Departure (23%)
- Intersection (26%)
- Pedestrian/Cyclist & Animal (6%)
- Other (7%)

- Side Radar
- Blind Spot Detection
- Forward Radar
- Active Braking
- Night Vision

- Adaptive Cruise Control
- Forward Radar
- Brake Assist
Vehicle to Vehicle Communications Support

- Emergency Electronic Brake Lights
- Forward Collision Warning
- Blind Spot Warning
- Lane Change Warning
- Do Not Pass/On-Coming Crash Warning
- Intersection Movement Assist
Connecting Vehicles and Infrastructure

Creating an “enabling communication infrastructure”
Trends in Fatality Rates in head on crashes

![Graph showing trends in fatality rates from 1996 to 2006. The graph illustrates a downward trend in fatality rates per 1000 crashes over the years.]
Frontal Crashes - Millions

- Rear-End: 44%, 1.570
- Head-on: 0.063, 2%
- Fixed Object: 0.471, 13%
- Parked Vehicle: 0.074, 2%
- Straight: 0.432, 12%
- Turn Into Path: 0.419, 12%
- Turn Across Path: 0.515, 15%
Critical Events – Crashes in Millions

- Decelerating: 0.487
- Slow Steady Speed: 0.130
- Crossing Lanes: 0.063
- Other Vehicle Stopped: 0.953
Driver Actions – Crashes in Millions

- Unknown: 1.076
- No Maneuver: 0.201
- Braking: 0.276
- Steering: 0.055
- Braking Steer: 0.025
Importance of Crash Timelines

Volvo forward collision warning
Importance of Crash Timelines
Hypothetical Example of Cumulative Delta V for Head-on Collisions ABA: 0.8g @ TTC = 0.5 sec
Importance of Crash Timelines
Importance of Crash Timelines
The Challenge

How do we know if these systems, and others, improve or degrade safety?
Driver Assistance System Assessment Process

- **Describe**
  - System Performance

- **Analyze**
  - Supporting Data

- **Perform**
  - Objective Tests

- **Estimate**
  - Benefits
Automotive Technologies Timeline

**Occupant Protection Systems**
- Adaptive Restraint System
- Whip-Lash Protection
- Reversible Belt Tensioners & Load Limiters
- Occupant Readiness Monitoring
- Belt Minders
- Child Seat Mounting Systems
- Comprehensive Restraint Systems (belts & airbags)

**Energy Absorbing Structures**

2006   2010

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Automotive Technologies Timeline

Driver Warning & Driving Assistance Systems

- Alcohol / Impairment Detection
- Intersection Collision Avoidance Systems
- Automatic Collision Notification
- Road Departure Warning Systems
- Automatic Braking
- Rear-End Collision Avoidance System
- Brake Assist
- Blind Spot Warning
- Lane Departure Warning
- Roll Stability Control
- Adaptive Cruise Control
- Night Vision
- Electronic Stability Control

Developed by: Joseph N. Kanianthra
Conclusions

• Integrated Safety has enormous safety potential
• Advanced technologies offer new opportunities
• Need to optimize the benefits at each step
• Make sure there are no unintended consequences
• Consumers will give limited chance to do it right
ESV Conference is coming soon!

20th International Technical Conference on the Enhanced Safety of Vehicles

Lyon, France
June 18-21, 2007
http://www-esv.nhtsa.dot.gov