Evaluation of Small Overlap / Oblique Test Procedures

James Saunders, NHTSA
Fatalities in Frontal Crashes Despite Seat Belts and Air Bags

- 2000-2007 NASS fatalities for model year vehicles 2000+ where occupant was restrained

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Develop Test Procedures

- Real world analysis
- Vehicle-to-Vehicle
- MDB-to-Vehicle
- Vehicle-to-Pole
NASS/CIREN Case Selection

- NASS/CDS 1997-2007, CIREN
- Frontal definition from Kuppa’s ESV
- No rollover
- No fatalities
- Belted drivers
- AIS 3+ injury for the head, chest, and/or knee-thigh-hip (KTH)
- Vehicle model years 1998 and above

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NASS/CIREN Case Reviews
Percent AIS 3+ Injuries by Body Region

211 cases with 444 AIS 3+ injuries

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NASS/CIREN Head Injury Source

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Test Setup

50 percent overlap

Aligned with Structure

Thor-NT placed in driver seat of target vehicle

18 percent overlap

Test conditions determined from real-world analysis and modeling
50 Percent 07 Taurus-to-Taurus
18 Percent 07 Taurus-to-Taurus
Thor Kinematics Taurus-to-Taurus

50 Percent

18 Percent

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Taurus-to-Taurus Crush

50 Percent

18 Percent

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Real-World Examples

**NASS ID 2002-11-068**
2002 Concord into 1988 Jetta
84 yo, Male
Delta V: UN ; PDOF: 350
AIS 5 Head Injury
AIS 3 Femur

**CIREN ID 781129518**
2005 Taurus into 2007 Mercedes CLK
25 yo, 6’, 180 lb, Male
Delta V: 71 kph ; PDOF: 0
AIS 4 Head Injury
AIS 3 Chest Injury
AIS 3 Femur
Conclusion Vehicle-to-Vehicle Tests

- Thor head contact similar to case reviews
  - A-pillar, door, or IP in all tests
- 50% overlap
  - Crush pattern similar to case reviews
- 18% crush pattern not as severe as fatal or injured NASS/CIREN cases due to interaction of the vehicles
  - Occupant Kinematics and intrusion in proper direction
Future Work

- Evaluation of the Thor data
- Possibility of evaluating of different barrier faces on a MDB
- Evaluating crabbed vehicle into pole or fixed structure
Test data will be on NHTSA public website in spring