Evaluation of Small Overlap / Oblique Test Procedures

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Fatalities in Frontal Crashes Despite Seat Belts and Air Bags

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

![Pie chart showing the distribution of fatal crashes]

- Severe, 40%
- Underride, 14%
- Oblique, 11%
- Vulnerable Occupant, 12%
- Tall Narrow Object, 3%
- Corner, 10%
- Corner Oblique, 3%
- Other, 7%
Develop Test Procedures

- Real world analysis
- Vehicle-to-Vehicle
- Compare MDB and Vehicle-to-Vehicle
- Vehicle-to-Pole

Presented Gov/Industry Located on NHTSA’s website
Thor-NT placed in driver seat of target vehicle

18 percent overlap

50 percent overlap

Aligned with Structure

Test conditions determined from real-world analysis and modeling
50% Overlap

MDB-to-Taurus

Taurus-to-Taurus
Dummy Kinematics: V-to-V vs. MDB-to-V

**MDB-to-Taurus**
- Air bag deploys at 13 ms
- SW catches dummy shoulder, inhibiting forward movement
- Head contacts steering wheel

**Taurus-to-Taurus**
- Air bag deploys at 29 ms
- Dummy roles off the bag
- Head contacts door
Crush Comparison

MDB-to-Taurus

Taurus-to-Taurus

Difference in A-pillar deformation
Small Overlap Comparison Taurus-to-Taurus to MDB-to-Taurus

Can not compare V-t-V test to real-world and MDB-t-V due to unexpected engagement of vehicles
Pole Setup

Floating Floor
Countermeasure Evaluation

'05 Civic (Non-ACE)  '09 Civic (ACE)
Countermeasure Evaluation

'05 Civic (Non-ACE)    '09 Civic (ACE)
## Summary of Testing

<table>
<thead>
<tr>
<th>Target Vehicle*</th>
<th>Bullet Vehicle*</th>
<th>Target Vehicle DV/ Bullet Vehicle Speed (mp)</th>
<th>Angle</th>
<th>Overlap</th>
<th>NHTSA Test Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005 Taurus (TH)</td>
<td>2005 Taurus (HIII)</td>
<td>35/70</td>
<td>15 degrees</td>
<td>80%</td>
<td>6829</td>
</tr>
<tr>
<td>2005 Taurus (TH)</td>
<td>2005 Taurus (HIII)</td>
<td>35/70</td>
<td>15 degrees</td>
<td>50%</td>
<td>6830</td>
</tr>
<tr>
<td>2005 Taurus (TH)</td>
<td>2005 Taurus (HIII)</td>
<td>30/60</td>
<td>15 degrees</td>
<td>18%</td>
<td>6832</td>
</tr>
<tr>
<td>2007 Ford 500 (TH)</td>
<td>2007 Ford 500 (HIII)</td>
<td>35/70</td>
<td>15 degrees</td>
<td>50%</td>
<td>6831</td>
</tr>
<tr>
<td>2005 Taurus (TH)</td>
<td>214 MDB</td>
<td>35/79</td>
<td>15 degrees</td>
<td>50%</td>
<td>6852</td>
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<tr>
<td>2005 Taurus (TH)</td>
<td>214 MDB</td>
<td>30/≈70</td>
<td>15 degrees</td>
<td>18%</td>
<td>6855</td>
</tr>
<tr>
<td>2007 Ford 500 (TH)</td>
<td>214 MDB</td>
<td>35/≈80</td>
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<td>6865</td>
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<tr>
<td>2007 Ford 500 (HIII)</td>
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<td>35/70</td>
<td>15 degrees</td>
<td>50%</td>
<td>6865</td>
</tr>
<tr>
<td>2005 Civic (TH)</td>
<td>Pole</td>
<td>30/30</td>
<td>15 degrees</td>
<td>20%</td>
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<td>2009 Civic (TH)</td>
<td>Pole</td>
<td>30/30</td>
<td>15 degrees</td>
<td>20%</td>
<td>6873</td>
</tr>
</tbody>
</table>

* TH – Thor NT 50 percentile male in driver seat
  HIII – HIII 50 percentile male in driver seat
Future Work

- **Use Research MDB (RMDB)**
  - Modified FMVSS No. 214 cart
  - Higher and lower barrier face
  - Suspension system
  - Ballesting system

**Suspension system of the RMDB**

**Ballasting system of the RMDB**
Future Work (continued)

- Repeat the Taurus-to-Taurus small overlap test
- Perform another Vehicle-to-Vehicle small overlap test
- General Trend
Future Work (continued)

- Perform two RMDB tests 50% overlap
  - Taurus and Ford 500
  - Determine next set of testing
- Perform Taurus into Pole (small overlap)
  - Comparison of test procedures
- Perform Current Vehicle into Pole (small overlap)
THANK YOU!