Pedestrian Safety GTR
Head and Leg Impact Testing

141\textsuperscript{th} Session of WP.29
March 2007
Overview of US Testing

- Need to understand impact of draft GTR in terms of benefits in the US and costs for current US fleet
- Need to gather data to determine feasibility of extending draft GTR to cover all US light vehicle fleet (4500 kg), or whether draft GTR should only apply to vehicles of 3500 kg or 2500 kg
- Need to gather data for both the head and leg requirements in draft GTR
Test Overview - Head

★ Tested 11 vehicles for compliance with draft GTR head requirements
★ Purpose:
  – Provide data on current level of head protection for GTR benefits estimate
  – Focus on larger vehicles in US fleet
★ Methods:
  – Head impacts per GTR procedures (35 km/h)
  – 8 Hard/Soft/Typical points
  – Estimated 1/3 relaxation zone to identify probable “passing” points/vehicles.
    • <= 1700 HIC in relaxation zone (1/3 test zone)
    • <= 1000 HIC everywhere else
<table>
<thead>
<tr>
<th>Test vehicles</th>
<th>GVM (kg)</th>
<th>Bonnet Leading Edge WAD (mm)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002 Jeep Wrangler</td>
<td>2019</td>
<td>916</td>
</tr>
<tr>
<td>2005 Honda CR-V</td>
<td>2020</td>
<td>880</td>
</tr>
<tr>
<td>2006 Volkswagen Passat</td>
<td>2020</td>
<td>840</td>
</tr>
<tr>
<td>2006 Toyota Tacoma</td>
<td>2063</td>
<td>992</td>
</tr>
<tr>
<td>2003 Toyota 4Runner</td>
<td>2063</td>
<td>1030</td>
</tr>
<tr>
<td>1999 Dodge Dakota</td>
<td>2200</td>
<td>895</td>
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<tr>
<td>2003 Ford Crown Victoria</td>
<td>2632</td>
<td>804</td>
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<tr>
<td>2006 Dodge Durango</td>
<td>2903</td>
<td>1088</td>
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<tr>
<td>2003 Hummer H2</td>
<td>3901</td>
<td>1172</td>
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<tr>
<td>2003 Ford E350</td>
<td>4127</td>
<td>1162</td>
</tr>
<tr>
<td>2005 Chevrolet Silverado</td>
<td>4173</td>
<td>1210</td>
</tr>
</tbody>
</table>
Vehicles with No Failures

CR-V
Max. BLE >1000 mm

Passat
835 mm > BLE < 1000 mm

Silverado
BLE > 1000 mm
Vehicles with a Failing Impact in Estimated Relaxation Zone

Tacoma
Max. BLE > 1000 mm

Durango
BLE > 1000 mm

Crown Victoria
835 mm < Max. BLE ≤ 1000 mm
Multiple Failing Impacts in Estimated Relaxation Zone

Wrangler
Max. BLE>1000 mm

Dakota
835mm<BLE<1000 mm

4Runner
BLE>1000 mm
Vehicles with Multiple Failing Impacts in Relaxation Zone and outside of Relaxation Zone

H2
BLE>1000 mm

E350 Van
BLE>1000 mm
Solutions in Challenging Areas: Hinge

Jeep Wrangler – HIC 4302

Ford E350 – HIC 3993

VW Passat – HIC 1302

Crush space over hinge

Low-profile deformable hinge
Solutions in Problem Areas:

Cowl

Ford E350 – HIC 2448

Dodge Durango – HIC 981
Observations – Head Testing

★ No apparent reason to limit scope of GTR below 4500 kg.
  – The heaviest vehicle in our test program currently meets all head impact requirements in the draft GTR, while the lightest vehicle in our test program requires some redesign.
  – Technical consensus is that the vehicle shape, NOT the mass, that is most important

★ The test procedure is feasible and the requirements are cost beneficial for all vehicles up to 4500 kg.

★ Few vehicles will require major re-design, but most vehicles will require some redesign. Adequate leadtime must be provided to make these changes.

★ Effective countermeasures exist for challenges identified:
  • For all problem areas at least one vehicle performed well.
Leg Testing

- Testing is just starting
- Focus is on larger vehicles in the U.S. fleet
- Ford Motor Company is working with NHTSA to conduct this testing
- Goal is to have this testing completed in May, so we can share it at GRSP