The development of a Moving Deformable Barrier test procedure

GRSP, Geneva
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Partners

- Research institutes
  - TNO
  - UTAC

- Car manufacturers
  - GME
  - PSA
  - Renault

- Barrier manufacturer
  - AFL

- Loadcellwall manufacturer
  - FTSS
Objectives

- Future step in compatibility
- Feasibility and merits MDB, based on PDB
- Partner and self protection
Background

- Current regulatory and consumer tests have resulted in stiffness mismatch between vehicle classes
- Test severity needs to be balanced between vehicle classes
Geneva, 13 December 2007

MPDB-to-vehicle tests

- Feasibility
- Repeatability
- Vehicle classes

- Performed tests
  - Opel Astra 2x  mass ratio \( \approx 1 \)  \( (1403/1500 = 0.94) \)
  - Citroen C2  mass ratio <1  \( (1250/1500 = 0.83) \)
  - Renault Clio  mass ratio <1  \( (1313/1500 = 0.88) \)
  - Renault Laguna  mass ratio >1  \( (1853/1500 = 1.24) \)
  - Renault Espace  mass ratio >1  \( (2163/1500 = 1.44) \)
Main test specifications:

- Trolley mass 1500 kg
- HR LCW
- Closing speed 90 km/h (45/45 km/h)
  - Equal initial kinetic energy compared to static PDB-test
- Offset 50%
- PDB ground clearance 150 mm
- PDB version 8
### Results

#### Repeatability

<table>
<thead>
<tr>
<th></th>
<th>Astra-MPDB 1</th>
<th>Astra-MPDB 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADOD (X)</td>
<td>242.2 mm</td>
<td>231.8 mm</td>
</tr>
<tr>
<td>AHOD (Z)</td>
<td>492 mm</td>
<td>493 mm</td>
</tr>
</tbody>
</table>

![Graphical representation of results](image-url)
Results

MPDB-to-vehicle tests
Results
MPDB-to-vehicle tests

• Vehicle acceleration levels increased for small vehicles and decreased for large vehicles compared to a fixed PDB test

• MPDB accelerations are an indication for homogeneity
Results

MPDB-to-vehicle tests

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>MPDB</th>
<th>PDB</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clio</td>
<td></td>
<td></td>
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<tr>
<td>Astra</td>
<td></td>
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<tr>
<td>Laguna</td>
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<tr>
<td>Espace</td>
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</tbody>
</table>

Kinetic Energy [kJ]

- C2 MPDB
- C2 PDB
- Clio MPDB
- Clio PDB
- Astra MPDB
- Astra PDB
- Laguna MPDB
- Laguna PDB
- Espace MPDB
- Espace PDB

Legend:
- Energy Vehicle
- Energy Trolley
Conclusions

• The developed MPDB test method showed to be feasible and repeatable

• The procedure is a more realistic representation of a frontal car-to-car crash than current procedures

• For vehicles with mass ratio < 1 the severity is increased and decreased for mass ratio > 1 compared to a fixed PDB test
Future work

- Determine test specifications to maintain current self-protection levels
- FP7 proposal VVCP
  - Finalization of test protocol
  - Development of assessment criteria
    - Dummy
    - Barrier
    - HR LCW
Thank you for your attention