Recommendation
Lateral Impact Test Procedure

GRSP IG CRS October 13th 2010 Berlin
Mandate

• Review severity level and corridor in order to
  – address timing issues of ISO Corridor
  – address severity resulting from UTAC/LAB tests
  – address PU tube capabilities

• Review head containment plane
  – location
  – feasibility with booster seats
Intrusion Velocity from ISO PAS

Intrusion velocity [m/s] vs. time [s]

- older cars (before 1995)
- newer cars (after 1995)
Intrusion Velocity from Car-to-Car Tests
Intrusion Velocity from Car-to-Car Tests

![Graph showing intrusion velocity from car-to-car tests with various car pair comparisons](image-url)
Relevant Timing for Lateral Impact Test Procedure

• Relevant points in time
  – Time of first contact between car and CRS
  – Time of start of dummy loading
  – Time of maximum dummy loading

• Analysis of timing in different cars (model years and sizes) and different CRS
  – Small, medium and large cars from manufacturing date between mid 90ies and mid 2000.
  – 6 different cars with 2 to 6 different CRS per car
Analysis First Contact CRS-Door

![Graph showing time distribution with mean, minimum, and maximum values. The mean is represented by a smaller bar, the minimum by a smaller bar, and the maximum by a larger bar. Beam points indicate standard deviation.]
Analysis Start of Head Loading from Intrusion
Analysis Timing Maximum Head Acceleration

![Bar graph showing mean, minimum, and maximum times with standard deviation annotations.](chart.png)
Discussion of Corridor

• An optimal test method would represent
  – Car acceleration
  – Intrusion velocity profile

• The proposed test procedure is a simplified test method

• For the simplified test method it is important to represent car data at crucial point in time
Discussion of Corridor

• It is felt that the period between start of dummy loading from intrusion and maximum dummy loading is most important

• Original corridor is representative with respect of intrusion velocity at time of first contact between CRS and car

• New corridor proposal is representative with respect to intrusion velocity at time of maximum head acceleration
Proposed Criteria According to latest Draft Version of Standard

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<th>Q0</th>
<th>Q1</th>
<th>Q1.5</th>
<th>Q3</th>
<th>Q6</th>
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Comparison Sled old Corridor with UTAC/LAB Tests

- BabyShell Q1.5 old corridor
- Group 1 FF TT Q3 old corridor
- Babyshell Q1.5 UTAC car test
- Group I FF TT Q3 UTAC car test

Actual measurement / limit [%]:
- HIC
- head a3ms
-"
Consideration of Timing in Intrusion Velocity Corridor according to ISO PAS 13396

- approx. 3 m/s at time of maximum head acceleration
New Corridor Proposal with TUB Data

Stopping distance 250 mm

Time of maximum head acceleration in test procedure

EVAluation PC Version 2.5.4.1
Comparison Sled new Corridor with UTAC/LAB Tests

actual measurement / limit [%]

- Babyshell Q0 new corridor
- BabyShell Q1.5 old corridore
- Babyshell Q1.5 new corridor
- Group 1 FF TT Q1 new corridor
- Group 1 FF TT Q3 old corridor
- Group 1 FF TT Q3 new corridor
- Babyshell Q1.5 UTAC car test
- Group I FF TT Q3 UTAC car test

HIC  head a3ms
Head Containment Plane

- Current position(s) of head containment plane:
  - 55 mm distance to contact surface of door panel
  - thickness 10 mm
- For a large no. of harness CRS no issue
- What about booster CRS?
Head Containment Plane

• Tests at conducted with Q6 and booster seats

• Approach for Q10?
  – Q10 could probably be available early 2011?
  – Q10 sitting height approx 150 mm more than Q6 -> Q6 adjustment reasonable?
Q6 Booster 1

Q6

Q3

Q6 NPACS
Q6 Booster 2

Q6

Q6 with additional bolster (100 mm)
(dummy sitting height lifted artificially by 100 mm)
Proposal for Head Containment Plane

- Location of the head containment plane has a distance of [55 mm] to the padding material (i.e., first contact surface of the CRS)
- Dummy‘s head must not cross this head containment plane
Next Steps

- Complete Validation Tests with new corridor
  - Babyshell SL Q1.5
  - Group 1 TT with Q3
  - Group 1 SL with Q1
  - Group I RF with Q3