Full Width Deformable Barrier Repeatability

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Background

• The Japanese expert provided FWDB repeatability tests with the Toyota Surf at the last 16th GRSP FI group meeting
• The Japanese tests from 2005 (as extracted from the presentation) are compared to available data from:
  – A recent FWDB Toyota Surf test provided to FIMCAR by JAMA
  – A European SUV with a similar structure tested in VC-Compat project
FWDB after Tests

Test 1
Test 2
Test 3 (JAMA)

Tests from 2005

JAMA Test 2011
• Structure alignment is identical in all three tests
• Bumper cross beam and longitudinals are contained in Row 4 with a small overlap in Row 3
Observations

• The 2005 tests have different results reflected in load cell force distributions and barrier deformations.

• The most recent Surf Test (2011) appears to have a crash box which do not seem present in the earlier (2005 tests).
Comparison of Recent Tests

• The following slide compares a European SUV with a single load path to the most recent Toyota Surf test

• Both vehicles load the same part of the barrier (Row 4 – see lower figures)

• The segmented rear layers in both tests appear to be stable and deformation is visually consistent with vehicle loading
European SUV

Toyota Surf
Conclusions (1)

• All vehicles tested with the FWDB to date have not been explicitly designed for this test and this may be most problematic for vehicles explicitly designed for a FWRB:
  – The softer initial contact in the FWDB may not activate crush triggers that were designed for a FWRB pulse (undeformed crush cans observed in FWDB and car-car tests in FIMCAR were perfectly deformed in FWRB)
  – Deformation behaviour that depends on a high contact force / high friction force locking the longitudinal ends on the barrier will not be duplicated in a FWRB
    • FWDB load cell measurements will provide better indication of stable deformation during impact than the FWRB
Conclusions (2)

• The 2005 tests presented by Japan exhibited poor repeatability but the vehicles may not represent modern vehicle designs (ie lack of crash cans)
• Recent tests with the FWDB have more consistent behaviour but limited data is available
• Recent barrier specifications must be re-evaluated and retested to confirm repeatable performance at the proposed test speed of 50 km/h