Side Impact Child Seat Testing-Dorel/Kettering Method

In conjunction with

Dorel Juvenile Group

Kettering University

6/10/2009
Agenda

- Purpose
- Hyge test fixture
- Deceleration sled test fixture
- Repeatability of deceleration sled fixture
Purpose

Dorel, in conjunction with Kettering University, is working toward a side impact test protocol, “Dorel/Kettering Method”, using a deceleration sled.
Hyge sled test fixture

Hyge sled method

- 250 mm run up

- At ‘0 point’, the door fixture contacts the child seat and the honeycomb contacts the main seat fixture.

- Uses 93 in\(^2\) of contact area.

- Crushable distance of 11.8”.

Courtesy of NHTSA
Hyge sled test fixture

Layout Dimension - Frontal View

Beginning of the honeycomb crush
(At 100mm intrusion)

Courtesy of Takata

Courtesy of Takata
Deceleration sled test fixture

- Deceleration sled method
  - Uses a deceleration sled to carry the impacting door
  - Uses 3 - 5”x5”x11-1/2” honeycomb blocks for 75 in² contact area
  - Honeycomb specs: volume 287.5 in³ using 115 psi, 3003 aluminum, 3/8” cell size

- Child seat positioned on centerline of slide seat-15-7/8” (403.2 mm) from 0 point.

- Distance from to the honeycomb contact surface to the door contact surface is 7-7/8” (200 mm)

- Dummy positioned consistently and accurately using a target and laser.
Deceleration sled Maxi Cosi Priori

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Baseline plots

• A baseline test consists of all studied variables remaining constant. Variables included door foam density, incoming door speed, sliding seat brake pressure and honeycomb area were all the same.
Door face characteristics

- Three honeycomb contact points shown
- Door stack up allows precise contact point
- 1-1/2” thick 600 ethafoam
  - (6 lb/ft³ density closed cell polyethylene foam)
Conclusion

- **Slide sled kinematics**
  - The Dorel-Kettering slide sled accelerates and decelerates smoothly. Post impact oscillations were seen with the Hyge slide sled.
  - The Dorel-Kettering slide sled pulse can be tuned by varying the impacting sled speed, mass, or honeycomb volume.
  - The Dorel-Kettering method impacting speed comparable to the Hyge.
Conclusion

- Childseat contact and occupant response
  - Independent of method
  - Door variables include area, foam thickness, and foam density
  - Bench seat variables including foam and overhang dimension
  - Intrusion variables include distance and childseat/honeycomb contact timing