

# Side Impact Child Seat Testing-Dorel/Kettering Method



In  
conjunction  
with



# 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

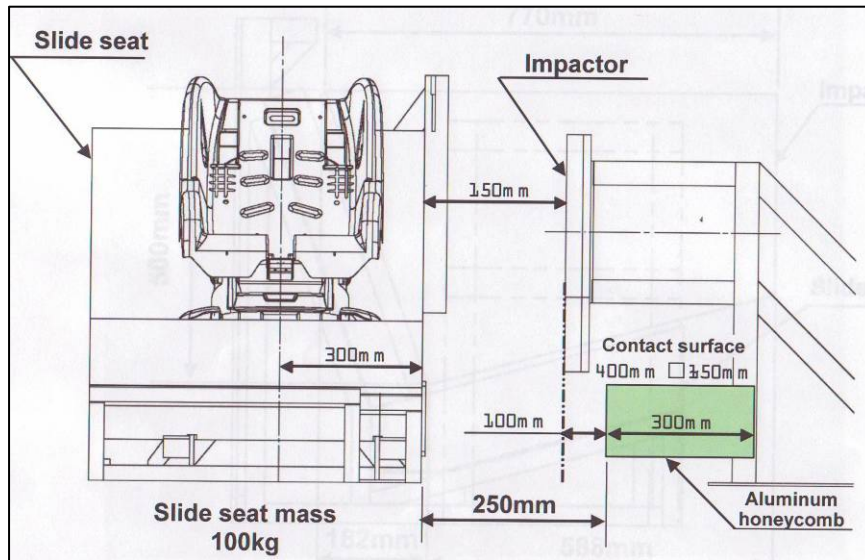
- Hyge sled method
  - 250 mm run up
  - At '0 point', the door fixture contacts the child seat and the honeycomb contacts the main seat fixture.
  - Uses 93 in<sup>2</sup> of contact area.
  - Crushable distance of 11.8”.



Courtesy of NHTSA

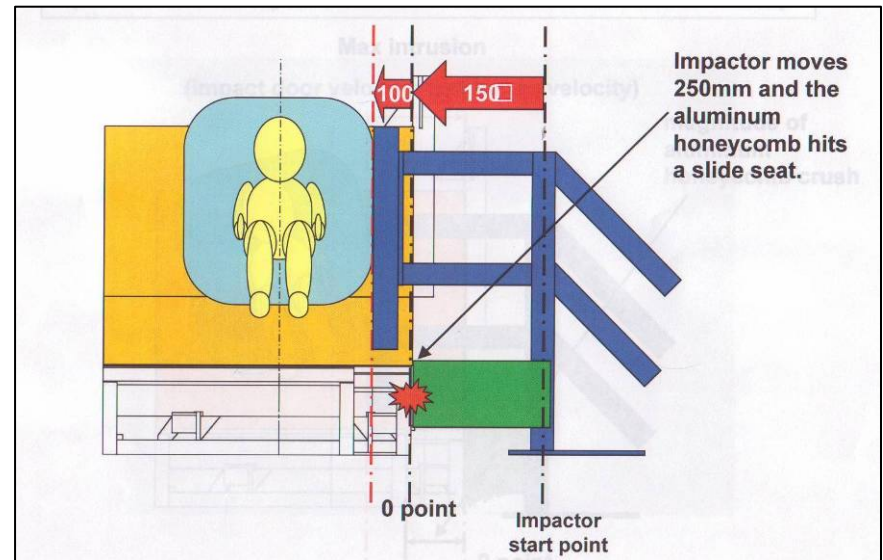
# Hyge sled test fixture

Layout Dimension - Frontal View



Courtesy of Takata

Beginning of the honeycomb crush  
(At 100mm intrusion)



Courtesy of Takata

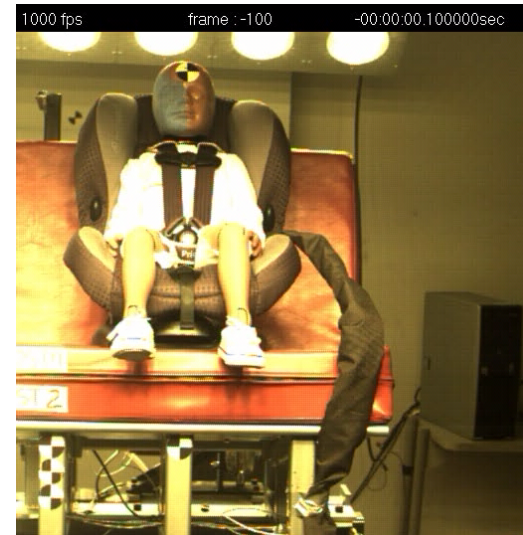
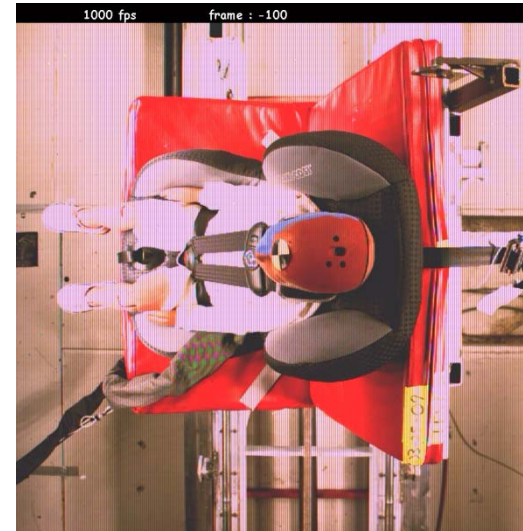
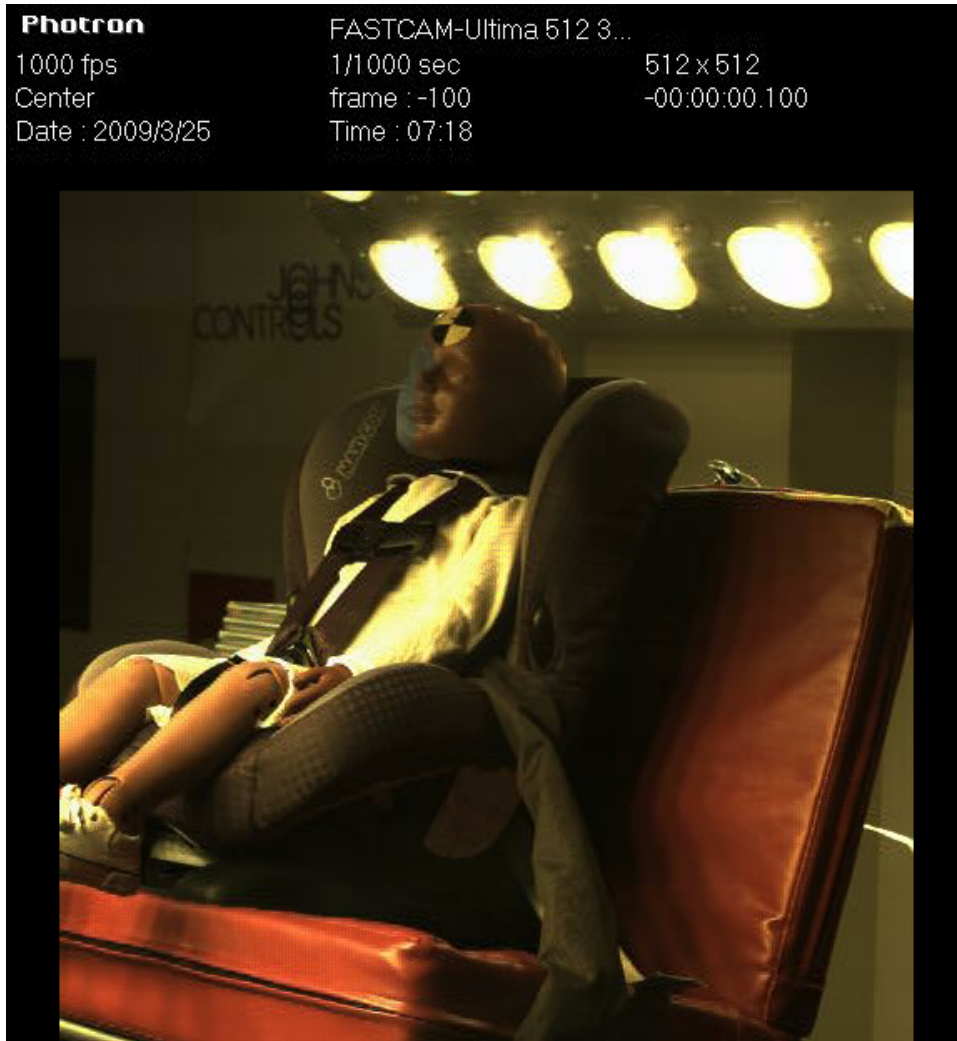
# Deceleration sled test fixture

- Deceleration sled method
  - Uses a deceleration sled to carry the impacting door
  - Uses 3 - 5"x5"x11-1/2" honeycomb blocks for 75 in<sup>2</sup> contact area
  - Honeycomb specs: volume 287.5 in<sup>3</sup> 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.

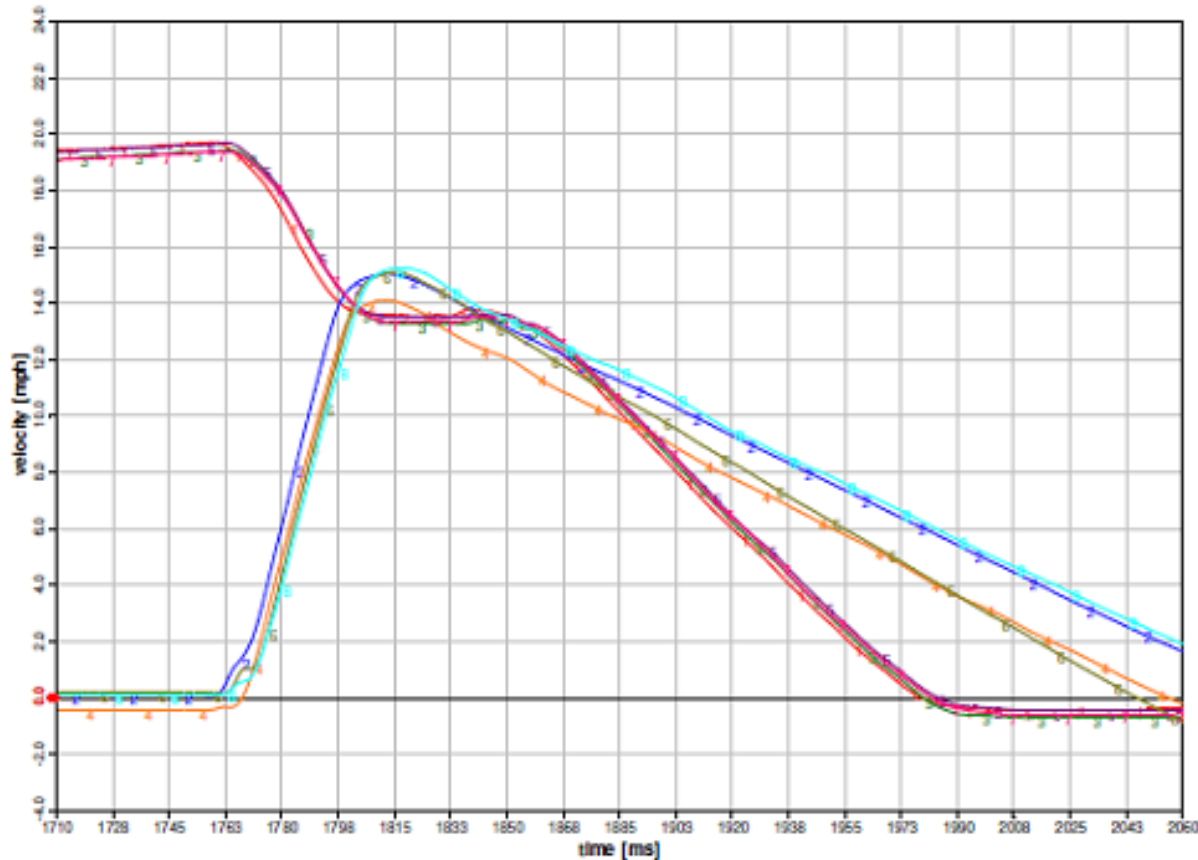




# Deceleration sled Maxi Cosi Priori



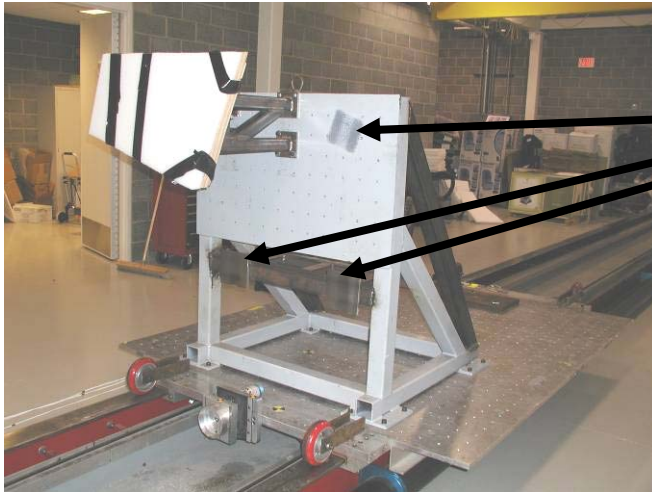
# Baseline plots



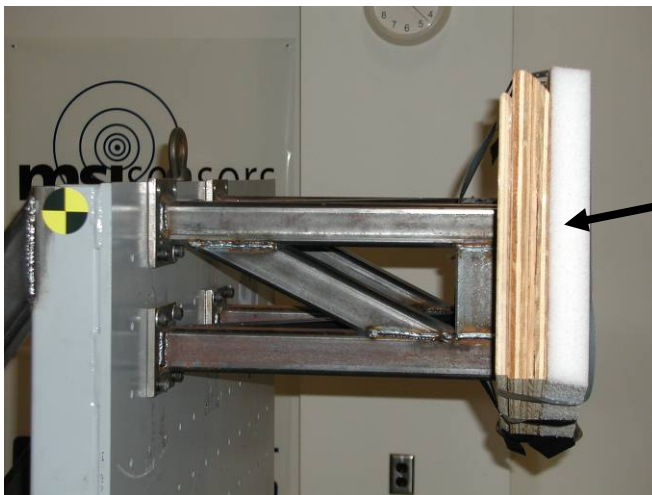
- A baseline test consists of all studied variables remaining constant. Variables included door foam density, incoming door speed, sliding seat brake pressure and honeycomb area were all the same.



# Door face characteristics



- Three honeycomb contact points shown
- Door stack up allows precise contact point



- 1-1/2" thick 600 ethafoam
  - (6 lb/ft<sup>3</sup> 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